Appendix B

Plant BIOLOGICAL EVALUATION
Aquatics BIOLOGICAL EVALUATION and
Wildlife BIOLOGICAL EVALUATION

Note: the following biological evaluations were written separately and given separate table numbers. For the purposes of this appendix, data tables were numbered contiguously through this appendix with the label, BE Table and the original table numbers then retained in parens for text reference.

BIOLOGICAL EVALUATION
for
PROPOSED, THREATENED, ENDANGERED, AND SENSITIVE
PLANTS
February 2002
Blue Mountain Ranger District
Malheur National Forest
Southeast Galena Restoration

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I. SUMMARY
This biological evaluation (BE) describes and displays any effects to sensitive species of the flora associated with the SE Galena Watershed Restoration Project on the Blue Mountain Ranger District. No proposed, threatened, or endangered plant species occur on the Malheur National Forest. The following are effects/impacts on the sensitive plant species considered in the SE Galena Restoration Analysis, and decisions are contingent upon implementation of mitigation measures, identified on the following page.

BE Table 1—Sensitive Plant Species of the Blue Mountain Ranger District

Species	Common Name	Populations Present	Habitat Present
Achnatherum hendersonii	Henderson's ricegrass	S	HD
Achnatherum wallowensis	Wallowa ricegrass	S	HD
Astragalus diaphanus var. *diurnis*	S Fork John Day milkvetch	N	HN
Astragalus tegetarioides	Deschutes milkvetch	N	HN
Botrychium ascendens	ascending moonwort	S	HD
Botrychium crenulatum	crenulate moonwort	D	HD
Botrychium lanceolatum	lance-leaf grapefern	D	HD
Botrychium minganense	Mingan grapefern	D	HD
Botrychium montanum	mountain moonwort	D	HD
Botrychium pinnatum	pinnate grapefern	D	HD
Calochortus longebarbatus var. *peckii*	long-bearded sego lily	N	HN
Camissonia pygmaea	dwarf evening primrose	N	HN
Carex backii	Back's sedge	S	HD
Carex interior	inland sedge	D	HD

Carex parryana	Parry's sedge	S	HD
Cypripedium fasciculatum	clustered lady slipper	S	HD
Lomatium erythrocarpum	redfruit desert parsley	N	HN
Lomatium ravenii	Raven's lomatium	N	HN
Luina serpentina	colonial Luina	N	HN
Mimulus evanescens	vanishing monkeyflower	N	HN
Pellaea bridgesii	Bridge's cliff-brake	S	HD
Phacelia minutissima	least phacelia	S	HD
Pleuropogon oreganus	Oregon semaphore grass	N	HD
Thelypodium eucosmum	arrow-leaved thelypody	N	HD

Occurrence

HD	Habitat Documented or suspected within the project area or near enough to be impacted by project activities
HN	Habitat Not within the project area or affected by its activities
D	Species Documented in general vicinity of project activities
S	Species Suspected in general vicinity of project activities
N	Species Not documented and not suspected in general vicinity of project activities

II. INTRODUCTION

This Biological Evaluation (BE) analyzes the potential effects of the proposed action for the SE Galena Restoration Project, Malheur National Forest. This BE satisfies the requirements of Forest Service Manual 2672.4 that requires the Forest Service to review all planned, funded, executed or permitted programs and activities for possible effects on proposed, endangered, threatened or sensitive species.

The following sources of information have been reviewed to determine which TES species, or their habitats, occur in the project area:

- Regional Forester's Sensitive Species List
- Forest or district sensitive species database(s) and the GIS mapping layer(s)
- Oregon Natural Heritage Program, Rare, Threatened and Endangered Plants and Animals of Oregon
- Project area maps and aerial photos.

The SE Galena Restoration project is composed of a variety of activities including timber harvest, forest thinning, prescribed burning, road decommissioning, aspen grove protection, riparian hardwood planting, and in-stream work.

III. PROJECT DESCRIPTION

The project will take place in the NE portion of Grant County in the Middle Fork John Day watershed, and includes at least portions of 5 subwatersheds.

For details of the project proposal, see the SE Galena Restoration EIS.

IV. EFFECTS ANALYSIS

To determine which sensitive plant species may be affected by the proposed action, two steps are taken. First, the Forest GIS and sensitive plant database is searched to locate known sensitive plant populations that occur in or near the area of the proposed action. Second, to identify habitats that may harbor sensitive plants, the physical and biological features in the project area are correlated with those in which sensitive plants are known or suspected to occur (Nelson 1985). Specific habitat features for Forest sensitive plants are described in Sensitive Plants of the Malheur, Ochoco, Umatilla, and Wallowa-Whitman National Forests, (Brooks, et al. 1991), and in site reports of documented species.

Areas of suspected habitat for sensitive plants are identified in pre-field analysis based on aspect, elevation, and ecoclass. A large proportion of potential habitats was surveyed by the intuitive controlled method at the appropriate season during 1998 and 2000. Several populations of sensitive species were found, as well as additional potential habitat. More habitat exists than was surveyed, especially for *Achnatherum, Botrychium,* and *Carex* species. However, these species favor habitats receiving minimal impacts from proposed activities, so are not at risk. The species in the following table of effects have either potential habitat or known populations within the analysis area.

BE Table 2—Conclusion of Effects

Species	**Alternative**				
	No Action	Alt.2	Alt. 3	Alt. 4	Alt. 5
Achnatherum hendersonii (Henderson's ricegrass)	NI	NI	NI	NI	NI
Achnatherum wallowensis (Wallowa ricegrass)	NI	NI	NI	NI	NI
Botrychium ascendens (ascending moonwort)	NI	NI	NI	NI	NI
Botrychium crenulatum (crenulate moonwort)	NI	NI	NI	NI	NI
Botrychium lanceolatum (lance-leaf grapefern)	NI	NI	NI	NI	NI
Botrychium minganense (Mingan grapefern)	NI	NI	NI	NI	NI
Botrychium montanum (mountain moonwort)	NI	NI	NI	NI	NI
Botrychium pinnatum (pinnate grapefern)	NI	NI	NI	NI	NI
Carex backii (Back's sedge)	NI	BI	BI	BI	BI
Carex interior (inland sedge)	NI	NI	NI	NI	NI
Carex parryana (Parry's sedge)	NI	NI	NI	NI	NI
Cypripedium fasciculatum (clustered lady slipper)	NI	MIIH	MIIH	MIIH	MIIH
Pellaea bridgesii (Bridge's cliff-brake)	NI	NI	NI	NI	NI
Phacelia minutissima (least phacelia)	NI	BI	BI	BI	BI
Pleuropogon oregonus (Oregon semaphore grass)	NI	BI	NI	NI	BI
Thelypodium eucosmum (arrow-leaved thelypody)	NI	NI	NI	NI	NI

Effects Determinations

Sensitive Species

NI	No Impact
MIIH	May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
WIFV	Will Impact Individuals or Habitat with a Consequence that the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species
BI	Beneficial Impact

Achnatherum hendersonii and ***wallowensis*** (Henderson's ricegrass)

Status Federal: none
State: Candidate
Region 6: Sensitive

Achnatherum hendersonii has recently been split taxonomically into 2 separate species (Maze and Robson, 1996). *A. hendersonii* populations are known from the Ochoco NF to the west of the Malheur, and *A. wallowensis* has been found primarily on the Wallowa-Whitman NF to the east. Because their habitats are similar, both are treated here under the common name of Henderson's ricegrass.

Environmental Baseline

Henderson's ricegrass is a strongly tufted perennial that has been found on the Ochoco NF at elevations from 4100 to 5400 ft. Its range is east of the Cascades from central Washington to the Wallowa Mountains of northeast Oregon.

This grass is found in dry, rocky, shallow soil, in association with sagebrush or ponderosa pine, although some sites have been found in scablands with no overstory. It has been found in *Artemisia rigida/ Poa secunda* plant communities, as well as *Eriogonum strictum/Poa secunda* plant communities. Other associated plants include species of *Lomatium, Sitanion, Trifolium,* and *Zigadenus.*

Henderson's ricegrass reproduces from seed, and known populations contain few plants.

No populations of *Achnatherum hendersonii* or *A. wallowensis* have been found during field surveys.

Direct Effects

Grazing, which is likely to remove the seed crop as well as impact individual clumps, is the greatest threat to Henderson's ricegrass.

Broad-spectrum herbicides applied directly to this species would kill it.

Indirect Effects

Ground-disturbing activities, such as road building and log skidding, can degrade habitat for Achnatherums, as well as damage any individual plants that are present.

Some noxious weeds such as St. Johnswort can thrive and spread in the dry habitats preferred by this ricegrass. Heavy infestations of such weeds can displace the native plants.

Cumulative Effects

Heavy historic grazing has likely been a prime factor in reducing the occurrence of this palatable grass. Historic use of scablands for yarding and log landings has destroyed vegetation, compacted soils, and altered runoff and moisture retention patterns on some potential habitat.

Fire is unlikely to affect Henderson's ricegrass or its habitat, which is so sparsely vegetated that a burn is not likely to carry through it.

Mitigation

Skidding will be avoided on unsuitable (non-forested) land, where feasible, to minimize displacement, erosion, and irreversible damage to the soils that may provide potential habitat for Henderson's ricegrass. Skid trail locations will be designated and approved prior to logging, to minimize soil impacts.

<u>Determination</u>

<u>Alternative 1</u>

Noxious weeds, without any control, are the most likely to spread into and degrade potential habitat for Henderson's ricegrass under this alternative. However, noxious weed populations are currently few and small, so do not pose a large or immediate threat. This alternative **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

<u>Alternatives 2 - 5</u>

With the above mitigation, these alternatives would not impact potential habitat, nor are they likely to contribute to a trend towards federal listing or cause a loss of viability to the species.

Botrychium ascendens (ascending moonwort)

Status Federal: Species of concern
State: Candidate
Region 6: Sensitive

Botrychium crenulatum (crenulate moonwort)

Status Federal: Species of concern
State: Candidate
Region 6: Sensitive

Botrychium lanceolatum **(lance-leaf grapefern)**

Status Federal: none
State: none
Region 6: Sensitive

Botrychium minganense (Mingan moonwort)

Status Federal: none
State: none
Region 6: Sensitive

Botrychium montanum (mountain moonwort)

Status Federal: none
State: none
Region 6: Sensitive

Botrychium pinnatum (pinnate grapefern)

Status Federal: none
State: none
Region 6: Sensitive

All Botrychium species with occurrence potential on the district are here treated under a single analysis because they have common habitat requirements and are, in fact, frequently found growing together.

<u>Environmental Baseline:</u>

Botrychiums, also known as moonworts or as grapeferns (due to the clusters of fruiting structures at the top of their stalks), are small, primitive plants closely related to ferns.

They reproduce by spores, and are known to be mycorrhizal, though many details of their life history and growth requirements are still unknown. Although green and apparently photosynthetic, the species considered here are all capable of surviving for years with only sporadic above-ground growth, apparently drawing reserves from the host plants with which they have mycorrhizal connections. As a result, populations of these moonworts appear to fluctuate from year to year, depending on how many plants produce visible leaves and/or fruiting bodies. The factors determining yearly appearance of plants above ground are not yet understood.

These 6 Botrychium species are found sporadically throughout the mountains of the Pacific Northwest and the Rockies, and *B. minganense* is known across Canada to the eastern part of the continent. In the Blue Mountains they have primarily been found between 4500 and 7500 feet in elevation.

Preferred habitat of these species is perennially moist ground at the edges of small streams, wet meadows, springs, and seepy openings in forest. The plants often favor partial shade from an overstory of conifers and/or riparian shrubs such as alder and red-osier dogwood, but also occur in openings or meadows with only grasses and forbs providing shade. Wet meadow edges with encroaching lodgepole pine are prime grapefern sites, as are the mossy openings around springs in mixed conifer forest that includes subalpine fir and Engelmann spruce. On the Umatilla NF several botrychium species are found under young spruce in moist tree plantations that are 20 to 40 years old. Plants frequently associated with botrychiums in the Blue Mountains include strawberries and violets, *Pinus contorta, Picea engelmannii, Alnus incana, Vaccinium scoparium, Carex aurea, Geum macrophyllum, Platanthera dilatata,* and other *Botrychium* species.

In many instances, moonworts appear to be "seral" species favored by one-time ground disturbance, tending to appear 10 years or more after such disturbance occurs. It is possible that they die out eventually, as forest succession shades out understory plants. A mosaic of forest habitats that shift over time, providing new openings as old ones fill in, may best ensure the long-term survival of botrychiums. However, until this is definitively known and the needs of these moonworts are better understood, it is important to preserve existing populations. Since most of the plants are quite small and are difficult to find, they may be easily overlooked except in intensive surveys. Their habitat, on the other hand, is readily identified and protected or avoided during management activities.

Reproduction of these fern allies is accomplished by the dispersal of spores by wind and water, and pollinators are not required.

Good potential habitat for grapeferns exists at numerous sites within the SE Galena Project Area. Fourteen populations of *Botrychium spp.* have been documented, as shown in the following table.

BE Table 3—Documented Botrychium Populations in SE Galena

Species	**Subwatershed**	**Number of populations**
Botrychium crenulatum	30201	3
"	30203	1
"	30207	2
Botrychium lanceolatum	30201	1
Botrychium minganense	30203	2
"	30207	2
Botrychium montanum	30207	1
Botrychium pinnatum	30203	1
"	30207	1

Direct Effects

Loss of individual above-ground stems, as by herbivory, unseasonable frost, or mechanical damage, may not harm plants in the long run, considering that they do not appear every year, and probably rely on some underground reserves to persist through "dormant" years. However, ground disturbance such as soil disruption by road construction, logging and yarding activities, and trampling by ungulates may disrupt mycorrhizal connections, damage shallow root systems, and cause direct mechanical damage to above-ground plants during the growing season.

Herbicides applied directly to these species would probaby kill them.

Indirect Effects

Along with ground disturbance that alters the quality of habitat, changes in moisture availability, such as loss of ground water sources or hydrological alterations, are probably the most potentially damaging to moonwort populations. While existing plants may have the capacity to survive droughty periods via their mycorrhizal connections, germination and establishment of new plants require ample moisture. Loss of wet sites capable of supporting botrychiums, whether due to water "developments" for livestock or mining, or to upstream, upslope hydrologic disturbance such as by road building or soil compaction by heavy equipment, can most effectively eliminate potential habitat. Continuous crown closure and a lack of canopy gaps may also reduce the edge habitat that some moonworts favor.

The effects of fire on local botrychiums are not known. Several moonworts in the midwestern prairies are adversely affected by fire in drought years (Johnson-Groh and Farrar, 1999). Because moonworts are limited to very wet microhabitats in the Blue Mountains, they are unlikely to be directly affected by fire, unless it is severe. However, the death of overstory trees may remove a necessary mycorrhizal host and impact an entire population, as in those that grow at the edges of meadows around small lodgepole pine. Loss of even partial shade that many populations favor could also affect long-term survival of these plants. It is not known what consequences fire might have, or whether an existing population could persist after a severe burn.

Cumulative Effects

In meadow habitats, grazing can reduce competition from tall grasses and forbs, and may enhance moonwort vigor, but disturbance of substrates and of mycorrhizal connections is detrimental. Overuse of wetlands, springs, and riparian areas by ungulates may have damaged some populations.

Water developments such as cattle troughs and ditches for mining and irrigation have decreased wet meadow habitat. Lowering of water tables associated with stream channel degradation and loss of historic beaver wetlands has reduced wetland habitat that probably supported some botrychium species.

Very hot burns through riparian areas during the Summit Fire may have killed some populations. Though surveys for these species were not conducted before the fire occurred, the nearly complete loss of canopy cover and shade may have affected any populations that did exist. Extensive potential habitat is present within the burn, but the few surveys done since the fire have documented no plants.

Mitigation

Current Pacfish buffers that avoid mechanical activities or timber harvest within at least 100 feet of riparian areas will adequately protect both exisiting populations and potential habitat. It should be emphasized that even the smallest springs and seeps provide good potential habitat, especially above 4500 feet elevation.

Determination

Alternative 1

The **no action** alternative could indirectly affect existing populations of botrychiums by changing canopy cover **if** severe wildfires were to occur. The loss of mycorrhizal host trees from severe fire could adversely affect existing populations, as well as decrease potential for new population establishment. However, the occurrence of wildfire is a risk, rather than a known outcome of this alternative. Alternative 1 **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 3 & 4

Since these alternatives propose no harvest within RHCAs, they **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 2 & 5

If the above mitigation is included, these alternatives **would not impact known individuals or habitat,** and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Carex backii (Back's sedge)

Status Federal: none
State: none
Region 6: Sensitive

Environmental Baseline:

Carex backii is a tufted sedge that grows in lowlands to mid-montane elevation. Its range extends across southern Canada to British Columbia and south to Utah and Colorado, though it is infrequent in the Pacific Northwest. Two documented sites in the Blue Mountains are on the northern Umatilla National Forest, and on the north end of the Burns Ranger District of the Malheur in a wetland classification plot.

Carex backii usually grows in riparian areas in warm, moist, often shady places, commonly in thickets or woods. On the Burns site, this sedge is found growing in an *Alnus incana/Symphoricarpos albus* plant association. Other shrubs present include *Prunus virginiana, Cornus stolonifera, Ribes aureum* and *R. hudsonianum*. Associated understory plants include *Carex praticola, Juncus balticus, Poa pratensis, Glyceria striata*, and numerous riparian forbs. At the Mill Creek site on the Umatilla, most plants occur on gravel bars and streamside substrates that show evidence of fairly frequent disturbance, and all are in dappled to deep shade. When mixed in with other riparian vegetation, this small sedge is difficult to find and recognize, so it is possible it is more abundant than current records indicate.

Carex backii does not have creeping rhizomes, therefore, only reproduces only by seed.

No *Carex backii* has been found in the analysis area, though ample potential habitat is present.

Direct Effects

Grazing, off-road recreation, and stream channel restoration are the management activities most likely to directly affect *Carex backii.*

Cattle grazing in riparian areas is the greatest threat to individual plants, due to the palatability of this sedge.

Inappropriate use of ORVs in riparian areas and stream crossings, as along the Davis Creek Trail, could damage plants as well as potential habitat.

Direct damage to individual plants and their habitat could result from in-stream restoration activities, especially if they involve the use of heavy equipment.

Because *Carex backii* grows in wet riparian zones, only severe fire is likely to adversely affect plants.

Direct application of broad-spectrum herbicide could kill this species.

Indirect Effects

Logging activities are only likely to have an adverse effect on this sedge if they encroach on riparian areas enough to reduce stream shading, or if road construction or other ground disturbing activities directly impact plants at stream crossings.

Excessive ungulate use resulting in bank degradation, and “post-holing” can adversely impact this sedge’s habitat. Grazing during the period of seed set can eliminate this sedge’s opportunities for reproduction and spread or increase.

Severe fire could impact populations or habitat of *Carex backii* indirectly by reducing shade to riparian areas, both from conifers and from streamside shrubs.

Construction of instream structures that result in aggradation, raising of water tables, and possible formation of gravel bars, could have a beneficial impact on this sedge by increasing potential habitat. So could shrub plantings that increase shade along stream channels.

Cumulative Effects

The associated plants from the Burns wetland classification plot that includes *Carex backii* indicate that the Burns site has been heavily grazed. The depletion of shrubs by long-term cattle use can cause a reduction in riparian shade, thereby degrading potential habitat. Late season grazing and wild ungulate use have likely decreased the abundance of this sedge across the landscape, in part by seed crop consumption that limits reproduction, and in part by degradation and loss of habitat.

Historic activities such as mining have caused stream channel straightening and degradation leading to downcutting. Because *Carex backii* is often associated with gravel bars and shallow stream banks, these changes may have reduced potential habitat over the last century.

Determination

Alternative 1

Alternative 1 **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 2-5

These alternatives **would not impact individuals, might beneficially impact habitat** due to instream work (Alternatives 2 & 5 only) and to an increase in shade from hardwood plantings (all the action alternatives), and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Carex interior (Inland Sedge)

Status Federal: none
State: none
Region 6: Sensitive

Environmental Baseline:

Carex interior is a densely tufted sedge that grows in lowland to mid-montane elevations. It is a widespread North American species found throughout the range of the Pacific Northwest, as defined by Hitchcock and Cronquist; however, it is apparently uncommon in Oregon.

Carex interior inhabits saturated riparian areas with year-round surface water, such as swamps and wet meadows associated with seeps, springs, or streams. It thrives in full sun, and can survive with small amounts of shade. Associated species include *Alnus incana*, *Carex cusickii, Carex utriculata, Cicuta douglasii, Deschampsia cespitosa, Juncus spp*., and *Menyanthes trifoliata.*

Carex interior is not rhizomatous and reproduces by seed only.

One population of *Carex interior* has been documented within the analysis area. Numerous areas of potential habitat exist, not all of which have been surveyed.

Direct Effects

Harvesting of logs from riparian areas might cause mechanical damage to plants.

Grazing is the most likely management activity to directly impact this species. Like other sedges, *Carex interior* remains palatable fairly late in the summer and may become preferred forage when other plants are drying up.

Inland sedge grows in such wet habitats that plants are unlikely to be adversely affected by controlled burning.

Direct application of broad-spectrum herbicide could kill this species.

Indirect Effects

The use of heavy equipment associated with logging, mining, road construction, and instream structure work can be very harmful to the fragile, wet soils that this sedge inhabits, as can excessive use by ungulates. However, a reduction in overstory shading by timber harvest could increase potential habitat.

Besides potentially damaging substrates, late season grazing can remove the seed crop, negatively impacting this species' reproduction.

Intense fires in RHCAs, due to high fuel loading, could kill *Carex interior* plants. However, reduction in canopy cover and increase in light availability could increase potential habitat.

Cumulative Effects

Canopy closure and dense shade from conifers resulting from years of fire suppression may well have reduced potential habitat from the ERV, and may have caused existing populations to shrink.

Heavy grazing and wild ungulate use may have decreased the abundance of this sedge across the landscape.

Water developments such as cattle troughs and ditches for mining and irrigation have decreased wet meadow habitat. Lowering of water tables associated with stream channel degradation and loss of beaver wetlands has also reduced wetland habitat that has the potential to support *Carex interior.*

Mitigation

If an alternative is implemented that includes entering RHCAs to harvest logs within the Banner Blowdown area, the single known population will be protected from any direct mechanical impacts by the standard 100 foot buffer against heavy equipment use.

Determination

Alternatives 1- 5

If the above mitigation is included, **none** of the alternatives **would impact individual plants or habitat**, nor would they contribute to a trend towards federal listing or cause a loss of viability to the species.

Carex parryana (Parry's sedge)

Status Federal: none
State: none
Region 6: Sensitive

Environmental Baseline:

Carex parryana is a loosely tufted sedge that grows from lowlands to moderate elevation. Its range is chiefly east of the continental divide but it extends onto the Pacific slope in central and east Idaho and northern Utah; it is also known from northeast Oregon and central Nevada.

Carex parryana grows in the driest communities of moist meadows, swales, and moist, low ground around streams and lakes, and on prairies and high plains as well. Associated plants found on a wetland classification plot on the Burns RD were *Poa pratensis, Agrostis stolonifera, Juncus balticus,* and *Carex praegracilis*.

Carex parryana can reproduce via creeping rhizomes, and by seed production.

No populations of *Carex parryana* have been found within the analysis area, although there is some potential habitat.

<u>Direct Effects</u>

There is no information about the effects of fire on *Carex parryana*. However, because it grows in the driest communities of meadows, it could be affected by fire. If the fire is low to moderate, as in a controlled burn, the creeping rhizomes would likely survive and resprout after the fire.

The abundance of *Poa pratensis* and *Juncus balticus* on the Burns site indicate that the area has been grazed, though the effects on the *C. parryana* population are unknown. This sedge remains palatable fairly late in the summer and may become preferred forage when other plants are drying up.

Noxious weeds, knapweeds in particular, can spread rapidly in this species' preferred habitat.

Direct application of broad-spectrum herbicide could kill this species.

<u>Indirect Effects</u>

Late season grazing can remove the seed crop, negatively impacting this species' reproduction.

The meadow habitat is probably not negatively affected by controlled burning, or even by wildfire, since fuel loading tends to be light.

<u>Cumulative Effects</u>

Historic heavy grazing, including late season use that removes the seed crop, may have reduced occurrences of this sedge in NE Oregon.

Lowered water tables associated with stream channel degradation and with the loss of beaver wetlands may have reduced potential habitat.

<u>Determination</u>

<u>Alternatives 1 - 5</u>

The spread of noxious weeds that could potentially threaten the habitat of this species will not be controlled under Alternative 1, and only partially controlled under Alternatives 3 and 4. However, noxious weed populations are currently few and small, so do not pose a large or immediate threat. Therefore **none** of the alternatives **would impact individuals or habitat,** nor would they contribute to a trend towards federal listing or cause a loss of viability to the species.

Cypripedium fasciculatum (clustered lady's-slipper)

Status Federal: Species of concern
State: Candidate
Region 6: Sensitive

<u>Environmental Baseline:</u>

Cypripedium fasciculatum is an uncommon orchid that occurs sporadically in a variety of forested environments. It has been found over a range of elevations from 1600 to 8000 feet throughout the Pacific Northwest, from British Columbia south on both sides of the Cascade Range to California and Utah.

Habitats in which the clustered lady's-slipper grows range from wet forests dominated by grand fir overstory to, more commonly, drier forest types such as ponderosa pine and/or Douglas fir overstory with pinegrass (*Calamagrostis rubescens*) understory. It prefers at least dappled shade from overstory trees or shrubs, and can apparently tolerate fairly dense shade. It has been found near springs and creeks in moist plant associations, as well as in drier environments in duff and moss under Douglas fir and oceanspray (*Holodiscus discolor*), and Douglas fir and ninebark (*Physocarpus malvaceus*). It sometimes grows with its larger and more conspicuous relative, *Cypripedium montanum*.

Cypripedium fasciculatum is a long-lived perennial that grows from a rhizome shallowly buried in duff or soil. Each year it puts up at least one pair of leaves and, probably only after reaching 12 years or more of age, an associated flowering stalk. Harrod (unpublished report) has found that each separate population probably consists of a single genet derived from one rhizome, which explains the lack of genetic variation between apparently separate "plants" within a population. Genetic variability is generally low throughout the species, suggesting the importance of protecting any populations found in order to preserve as much of that genetic potential as possible.

Harrod (unpublished report) has found that this lady's-slipper is particularly susceptible to mechanical soil disturbance. Because the above-ground portion of the plant is actively growing in the springtime, burns at this season are probably more detrimental to the plant than fall fires. On the other hand, a hot wildfire during the dry season is bound to cause more severe damage to the habitat than a controlled spring burn, and might kill individual rhizomes as well.

Response of *Cypripedium fasciculatum* to fire depends on burn intensity. This species' relatively long lifespan, especially before it reaches reproductive maturity, coupled with its preference for shaded environments, suggests that it may thrive in a longer fire return interval than was historically common in drier forests. On the other hand, its shade requirements could indicate that its preferred habitat is one hosting frequent cool fires that leave the overstory intact. In the latter case, the underground rhizomes would need to be resistant to surface fires. Frequent fires that minimized duff accumulations would cause the rhizomes to grow below the surface of mineral soil, thereby increasing their chances of survival when a ground fire did move through.

Seed set in the clustered lady's-slipper is typically low, and requires the activity of a pollinator, possibly a bumblebee. Seed germination, as in other orchids, requires a particular symbiotic fungus. Seeds, though tiny, do not move far at typical understory windspeeds, but may also be dispersed by wild ungulates that browse on the fruits (Harrod, unpublished report). Seedling establishment is probably extremely limited, based on the above factors, making the genetic contributions of each new individual especially important to the species as a whole.

No plants of *Cypripedium fasciculatum* were found in the analysis area, though potential habitat is abundant.

Direct Effects

Mechanical operations in forested environments pose a direct threat to this species and its habitat.

The Conservation Assessment for Region 1 reports the effects of several recent fires on known populations, and concludes that the lady's-slipper "can survive some low to moderate intensity fires, but not higher intensity fires" (Greenlee, 1997).

Direct application of herbicide could kill this species.

Indirect Effects

A decrease in canopy cover due to harvest, thinning, or fire reduces potential habitat for clustered lady's-slipper.

Possible effects of fire on pollinators of *Cypripedium fasciculatum* are unknown.

Cumulative Effects

Past harvest activities have reduced canopy cover in many areas, degrading potential habitat, especially in moist forest types. At the same time, fire suppression has raised the threat of severe wildfires that could cause further reductions in the quality and extent of potential habitat. Because both harvest and fire suppression have occurred over much of the Blue Mountains, potential habitat has been widely affected.

Determination

Alternative 1

This alternative **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 2 - 5

Since no plants have been found within the analysis area, these alternatives **would not impact individuals, would impact potential habitat**, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the species.

Pellaea bridgesii (Bridge's cliff-brake)

Status Federal: none
State: none
Region 6: Sensitive

Environmental Baseline

Pellaea bridgesii is a small, evergreen fern that favors the rocky substrate of outcrops and talus slopes of metamorphic and igneous origin, especially granitics. It tends to grow on south or east aspects on the upper third of slopes and over an elevation range from about 4000 to 9500 feet. It is known from the Sierras, the Wallowa and Elkhorn Mountains of northeast Oregon, and the ranges of central Idaho.

Known sites are mostly in full sun, but are occasionally under trees, and may or may not include moss and forb ground covers. Granitic rock crevices provide favored locations for this uncommon little fern.

The evergreen nature of the leaves of Bridge's cliff-brake make it identifiable any time of year that it is not covered with snow, though it may easily be confused with the closely related and more common *Pellaea breweri*.

Fire is not likely to threaten *Pellaea bridgesii* due to this species' preference for inflammable substrates, though where it grows with enough other ground forbs to carry a fire, it could be at risk. Logging is also unlikely to adversely impact this species, due to the plant's inclination for non-forested habitat and its resilience in unshaded environments.

Reproduction of this small fern is accomplished by the dispersal of spores on the wind and pollinators are not required.

There are small areas of potential habitat, but no plants of Bridge's cliff-brake have been found within the analysis area. Not all of the potential habitat has been surveyed, but most of it occurs within the Vinegar Hill Scenic Area where no major activities are proposed.

Direct Effects

Bridge's cliff-brake is rare primarily due to the limited extent of its favored rocky habitat, and management activities in general have little impact on it. Direct mechanical alteration of its rocky environs, as in road building, could adversely impact a population.

Direct application of herbicide could kill this species.

Indirect Effects

None.

Cumulative Effects

None.

Determination

Alternatives 1 through 5

These alternatives **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Phacelia minutissima (least phacelia)

Status Federal: Species of concern
State: Candidate
Region 6: Sensitive

Environmental Baseline

Phacelia minutissima is a regional endemic of the Pacific Northwest, found in Oregon, Washington, Idaho, and Nevada. It grows at moderate elevations (5000 to 7000 feet) in the mountains, in micro-habitats that are at least vernally moist. It is known from the Wallowas, from the Aldrich Mountains, and from one site on upper Camp Creek, a tributary to the Middle Fork John Day River.

According to Atwood (1996) least phacelia grows along streambanks in sagebrush communities and in aspen stands. In the Blue Mountains it occurs in association with false hellebore (*Veratrum californicum*) and white mules ears (*Wyethia helianthoides*) in vernally moist meadows and small scablands that are common throughout the forest. In currently known sites, it exists in relatively disturbed habitat where its greatest threat may be invasion by exotic plant species such as birdsfoot trefoil (*Lotus corniculatus*).

Both because of its annual nature and its preferred moist habitat, this species incurs little threat from fires. It can survive fall burns in its seed stage, and is unlikely to be exposed to much heat in the case of spring burning, when vernal moisture will mostly exclude fires from the areas in which it grows. Prescribed fire is not likely to adversely impact this plant's favored habitat. While individual aspen stands might be temporarily altered by fire, the continued presence of spring moisture would ensure continuity of habitat.

Populations of least phacelia are most abundant and easily located in wet years, though its diminutive size, along with its annual life cycle, makes this plant difficult to locate. For this reason it is possible that it is more widespread than current records indicate. The first population to be found in the Middle Fork John Day watershed was documented in summer, 2001.

No populations of *Phacelia minutissima* have been found within the analysis area, although abundant habitat is present, and one population occurs in the neighboring Camp Creek watershed.

Direct Effects

Cattle grazing is the primary threat to *Phacelia minutissima* (Atwood, 1996).

Ground disturbing activities such as logging operations or fireline construction would have a direct negative impact on existing plants. However, by re-seeding onto disturbed ground, this species can survive some disruption of its habitat.

Direct application of herbicide could kill this species.

Indirect Effects

Aspen stand protection and enhancement could have a beneficial effect by increasing potential habitat for *Phacelia minutissima*.

Spread of noxious weeds and other introduced plants such as forage grasses could degrade habitat and outcompete this diminutive annual.

Cumulative Effects

Historic heavy grazing and overuse of riparian zones and meadows may have reduced the extent and abundance of least phacelia throughout its range, and may have degraded potential habitat as well. While it can exist in areas of moderate disurbance, its survival on severely impacted soils is in question.

Determination

Alternative 1

This alternative **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 2-5

These alternatives **would not impact individuals, might beneficially impact habitat** through aspen grove enhancement, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Pleuropogon oregonus (Oregon semaphore grass)

Status	Federal: Species of Concern
	State: Threatened
	Region 6: Sensitive

Environmental Baseline

Oregon semaphore grass is a rare rhizomatous perennial that is known from 8 sites in Lake and Union counties in Oregon. It was considered extinct for much of this century until it was relocated in 1979 in Lake County, and 7 more sites were found in the 1980s.

This grass is found in moist meadows and marshlands, and in seasonally wet meadows, in association with several species of sedges, *Deschampsia cespitosa*, rushes, camas, and other grasses, some of them non-native.

Oregon semaphore grass can produce extensive rhizomes, but may not set much viable seed (But *et al*., 1985). Very little is known about this species, its pre-European distribution, or its reproductive potential.

No populations of *Pleuropogon oregonus* have been found during field surveys, and most of its potential habitat, which occurs along the Middle Fork John Day River, has been altered by agricultural use.

Direct Effects

Ground disturbance such as ditching of wet meadows, or plowing of drier ground would directly impact any individuals of this species that might be present.

Grazing, which is likely to remove the seed crop as well as impact individual clumps, is a common threat to this semaphore grass, though some populations have apparently survived fairly heavy fall grazing (Oregon Natural Heritage Program EO Report, 1983).

Broad-spectrum herbicides applied directly to this species would kill it.

Indirect Effects

Draining of wetlands could eliminate the moist habitat that this species favors.

Invasion of wetter habitats by noxious weeds could threaten this grass through excessive competition.

Cumulative Effects

Most of the extant populations of *Pleuropogon oregonus* occur in wetter areas of agricultural ground. Loss of habitat by conversion of native wet meadows to hayfields and pastures dominated by introduced grasses has probably been the primary factor in reducing occurrence of this species. Grazing may be an associated factor, but the extent of grazing effects is not currently clear.

Fire is unlikely to affect Oregon semaphore grass or its very moist habitat.

Determination

Alternative 1

Noxious weeds, without any control, are the most likely to spread into and degrade potential habitat for Oregon semaphore grass under this alternative. However, noxious weed populations are currently few and small, so do not pose a large or immediate threat. This alternative **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 3 & 4

Because these alternatives do not propose alterations to floodplain habitat along the Middle Fork**, these alternatives would not impact individuals or potential habitat**, nor are they likely to contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 2 & 5

It is possible that, over time, the planned re-creation of wetlands near the mouths of Vincent and Caribou Creeks will create usable habitat for *Pleuropogon oregonus*. In this case **it is possible that proposed activities would have a beneficial impact on habitat**, and they are not likely to contribute to a trend towards federal listing or cause a loss of viability to the species.

Thelypodium eucosmum (arrow-leaved thelypody)

Status Federal: Species of Concern
State: Listed threatened
Region 6: Sensitive

Environmental Baseline

Thelypodium eucosmum is a locally endemic, short-lived perennial mustard found only in Baker, Grant, and Wheeler counties, Oregon. Known populations range in elevation from 1800 to 5000 feet.

Arrow-leaved thelypody inhabits slopes with vernal moisture sources on otherwise dry sites, and is often found in the shade of junipers or ponderosa pine. It also occurs in mountain mahogany, sagebrush, and grass steppe communities, frequently in association with many introduced weedy species such as *Bromus tectorum* and *Lepidium perfoliatum*. It can grow on a variety of substrates including light clays, and occasionally moist, possibly alkaline soils near rivers. It is probably not tolerant of very dry sites.

Thelypodiums propagate by seed or creeping rootstocks. Each plant requires a minimum of one year of adequate moisture to flower and set fruit. Plants may be able to hold for several years in the rosette stage until conditions are optimum for seed production; however, Thelypodiums are known to be highly palatable to cattle, so increasing time to seed set increases vulnerability to predation as well. Since this species often grows in heavily grazed habitat that has lost much of its palatable forage, presence of cattle is probably its primary threat.

Several populations documented by historic collections have proved impossible to re-locate, and the species was considered extinct until a new site was documented in 1981. About 20 extant populations have since been found. Because this species is so limited in distribution and in number of known populations, any documented sites should be protected.

No information is available on pollinators of this species.

No populations of this species have been found within the analysis area.

Direct Effects

Cattle grazing is the primary threat to *Thelypodium eucosmum*.

Ground disturbing activities such as logging operations or fireline construction would have a direct negative impact on existing plants. However, by re-seeding onto disturbed ground, this species can survive some disruption of its habitat.

The direct effect of fire on this species is not known. Presence of enough ground fuels to carry a fire would probably allow injury or killing of individual plants.

Direct application of herbicide could kill this species.

Indirect Effects

Increasing competition from exotic plant species may be reducing potential habitat and limiting the abundance of *Thelypodium eucosmum*.

Habitat could be lost if fire reduces overstory junipers or pines that provide shade. Potential habitat appears to be fairly widespread, so concerns about fire impacts are minimal.

Cumulative Effects

Historic overgrazing has probably reduced this species to its current limited occurrences because the plant is so highly palatable. Continued grazing may prevent it from rebounding.

As above, increasing loss of habitat to invading weeds is occurring across the range of this species.

Determination

Alternative 1

Noxious weeds, without any control, are the most likely to spread into and degrade potential habitat for *Thelypodium eucosmum* under this alternative. However, noxious weed populations are currently few and small, so do not pose a large or immediate threat. This alternative **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 3 and 4

These alternatives **would not impact individuals or habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

Alternatives 2 and 5

Because chemical control of weeds is more effective than manual treatment, these alternatives **would maintain potential habitat longer** than the other alternatives. Alternatives 2 and 5 **would not impact individuals or degrade habitat**, and would not contribute to a trend towards federal listing or cause a loss of viability to the species.

V. REFERENCE

Atwood, D. 1996. Final report for challenge cost share project inventory for least phacelia (*Phacelia minutissima*); a Forest Service Region 6 sensitive species. Wallowa-Whitman National Forest, Baker, Oregon.

Brooks, P., K. Urban, and G. Yates, Sensitive Plants of the Malheur, Ochoco, Umatilla, and Wallowa-Whitman National Forest, R6-WAW-TP-040-92, USDA Forest Service, Pacific Northwest Region, 1991.

But, P.P.H., J. Kagan, V.L. Crosby, & J.S. Shelly. 1985. Rediscovery and reproductive biology of *Pleuropogon oregonus* (POACEAE). *Madrono* 32:189-190.

Greenlee, J. 1997. Cypripedium fasciculatum Conservation Assessment. USDA Forest Service, Region 1, Lolo National Forest, Missoula, MT.

Harrod, R. (no date) Unpublished report of current findings by Richie Harrod, District Botanist, Leavenworth Ranger District, Wenatchee National Forest, Wenatchee, Washington.

Hickman, James C., ed. 1993. The Jepson Manual: Higher Plants of California. University of California, Berkeley.

Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson. Vascular Plants of the Pacific Northwest, Parts 1-5. University of Washington Press, Seattle, WA. 1969

Johnson-Groh, C. and D. Farrar. 1997. The effects of fire on prairie moonworts (*Botrychium* subgenus *Botrychium*). In Am. J. Bot. 1997 supplement – abstracts.

Maze, J. and K.A. Robson, 1996. A new species of *Achnatherum* (*Oryzopsis*) from Oregon. Madrono 43:393-403.

Oregon Natural Heritage Program. 1983. Element occurrence report #PMPOA4Y040*003. Portland, Oregon.

----, 1995. Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Program, Portland, Oregon. 84 pp.

BIOLOGICAL EVALUATION

for

PROPOSED, THREATENED, ENDANGERED, AND SENSITIVE

AQUATICS

February 2002

Blue Mountain Ranger District

Malheur National Forest

Southeast Galena Restoration

Prepared by:
Perry Edwards – District Fisheries Biologist

Threatened, Endangered, Proposed, and Sensitive Species

BE Table 4—Summary Conclusion of Effects (Short and Long-term)

Threatened(T)/Endangered(E)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Mid-Columbia River (ESU) Summer-run Steelhead (T)	NE/LAA	LAA/BE	LAA/BE	LAA/BE	LAA/BE
Columbia River Basin Bull Trout (T)	NE/LAA	LAA/BE	LAA/BE	LAA/BE	LAA/BE
Designated Critical Habitat					
Mid-Columbia River (ESU) Summer-run Steelhead	NE/NLAM	NLAM/BE	NLAM/BE	NLAM/BE	NLAM/BE
Spring Chinook Salmon Essential Fish Habitat (EFH)	NE/UAA	UAA/BE	UAA/BE	UAA/BE	UAA/BE
Sensitive Species					
Mid-Columbia River (ESU) Spring Chinook Salmon	NI/MIIH	MIIH/BE	MIIH/BE	MIIH/BE	MIIH/BE
Interior Redband Trout	NI/MIIIH	MIIH	MIIH	MIIH	MIIH
Westslope Cutthroat Trout	NI	NI	NI	NI	NI

Listed Species:
NE = No Effect
LAA = May Effect – Likely to Adversely Affect
NLAA = May Effect – Not Likely to Adversely Affect
BE = Beneficial Effect

Listed Habitat:

NE = No Effect
NLAM = Not Likely to Adversely Modify
LAM = Likely to Adversely Modify
UAA = Unlikely to Adversely Affect

Sensitive Species:
NI = No Impact
MIIH = May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species.
* WIFV = Will Impact individuals or habitat with a consequence that the action may contribute to a trend toward Federal listing or cause a loss of Viability to the population or species.
BE = Beneficial Impact

* = Trigger for a Significant Action as defined by NEPA

ESU = Evolutionary Significant Unit – a geographically definable landscape area utilized by a distinct taxa or species population unit, considered reproductively isolated from other conspecific population units, and represents an important evolutionary link in the species genetic legacy.

INTRODUCTION

This Biological Evaluation (BE) documents the review and findings of Forest Service planned programs and activities for possible effects on species (1) listed or proposed for listing by the USDI Fish and Wildlife Service (USFWS) and by the National Marine Fishery Service (NMFS) as Endangered or Threatened; or (2) designated by the Pacific Northwest Regional Forester as Sensitive. It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4, FSM 10.89 R-6 Supplement 47 2670.44, and the Endangered Species Act (ESA) of 1973 (Subpart B; 402.12, Section 7 Consultation).

Proposed, Endangered, Threatened, or Sensitive species considered in this evaluation are those listed in FSM 2670.44, R-6 Interim Directive No. 90-1, March, 1989 as suspected or documented to occur on the Malheur National Forest's Blue Mountain Ranger District.

The following analysis addresses the potential effects of the SE Galena Restoration Project on threatened, endangered, and sensitive aquatic species. This determination, required by the Interagency Cooperation Regulations (Federal Register: January 4, 1978), ensures compliance with the Endangered Species Act of 1973, P.L. 93-205 (87 Stat. 884) as amended.

Species Considered in this Assessment

The following sources of information have been reviewed to determine if PETS (proposed, endangered, threatened, or sensitive) species and their associated habitats may or may not occur within the project area:

- Regional Forester's Sensitive Species List
- Forest sensitive species database and the current GIS mapping layers
- Sensitive Plants of the Malheur, Ochoco, Umatilla, and Wallowa-Whitman National Forests
- Oregon Natural Heritage Program Data Base records
- Project area maps, unique habitat data bases, and any historical records
- Current Regulatory Agency status reports and listed species new releases

Habitats for proposed, endangered, threatened, or sensitive species (PETS) are identified by correlating the physical and biological features found in the project planning area with habitat features in which PETS species are known or suspected to occur. All aquatic Management Indicator Species (MIS) on the Blue Mountain Ranger District of the Malheur National Forest are currently listed as threatened or sensitive. Therefore, MIS species will not be discussed as a separate topic.

Fish species documented to occur in the Middle Fork John Day River Basin are listed below.

Mid-Columbia River Summer-run Steelhead (*Oncorhynchus mykiss gairdneri*)

Status: Federal – Threatened (24 March 1999)
Critical Habitat – Designated (16 February 2000)
Heritage Status – Global Conservation Status Rank: G5T2Q (22 Oct 1999)

Rounded Global Conservation Rank: T2

Global Conservation Status Rank Reasons:

Small breeding range in the middle Columbia River basin, Washington, and Oregon; continued declines in abundance; increasing percentage of hatchery fishes in natural escapements; genetic introgression and detrimental ecological interactions with hatchery stocks are potential problems. The John Day, Deschutes, and Yakima Rivers support the largest native, natural spawning stocks (NMFS 1999) in the Middle Columbia River Evolutionary Significant Unit (ESU).

The total run size for the Columbia River during the pre-1960 era might have been in excess of 300,000. This number was reduced to somewhat below 200,000 by early 1980. The most recent 5 year average run size was 142,000, with a naturally produced component of 39,000. The Middle Columbia River ESU comprises the majority of this run estimate (NMFS 1996). Serious declines have however, occurred in the John Day basin (NMFS 1999).

Environmental Baseline

The Middle Columbia River summer-run steelhead are named for the timing of their adult spawning run. The name "summer" refers to the time of year the fish enter the Columbia River for migration to the middle portion of the Columbia River, between Mosier Creek in Oregon and the Yakima River in Washington. First time spawning fish are generally 4-5 years old. Individuals are capable of spawning more than once before they die, though spawning more than twice is rare. Adult steelhead in this ESU spend up to one year in fresh water prior to spawning. These fish can utilize headwater areas for spawning purposes and require clean gravels with nearby resting pool habitat during the three to six week spring spawning period. Steelhead eggs incubate 1.5 to 4 months before hatching which varies with water temperature. Juveniles spend 1-4 (generally 2) years in fresh water before migrating to the ocean as smolts. While in the fresh water rearing stage, young steelhead prefer a water temperature range between 10-13° C, adequate pool habitat, and cover in the rearing streams.

BE Table 5—Steelhead Bearing Streams in Analysis Area (Table2)

Subwatershed	Steelhead Fish Bearing Miles	Perennial Non-fish Bearing Miles	Intermittent/ Seasonal Miles	Habitat Type
Davis/Placer Gulch	9.5	10.6	11.7	Rearing, Spawning
Vinegar Creek	7.3	10.4	25.3	Rearing, Spawning
Vincent Creek	4.5	3.1	9.1	Rearing, Spawning
Little Boulder/Deerhorn Creek	10.6	16.5	28.8	Rearing. Spawning
Tincup Creek/Little Butte Creek	6.8	12.4	14.9	Rearing. Spawning
Butte Creek	2.7	7.1	10.2	Rearing, Spawning
Granite Boulder Creek	4.1	12.2	8.5	Rearing, Spawning

Mid-Columbia River (ESU) summer run steelhead (threatened) and its (designated) critical habitat. Most steelhead spawning and rearing occurs in the second to fourth order streams in the forested environment. Even when small streams are not accessible to migrating fish because of barriers or steep gradients, they are vitally important to the quality of downstream habitats. Within this proposed project area, steelhead spawning and rearing habitat is found in Davis, Vinegar, Vincent, Tincup, Butte and Granite Boulder Creeks, as well as the in the Middle Fork John Day River (See Table 2). Due to the very limited flow in Tincup and Vincent Creeks, the potential for steelhead rearing is very limited in these streams.

Interior Redband Trout (*O. mykiss gairdneri*)

Status: USFS Region 6 Sensitive
Heritage Status – Global Conservation Status Rank: G5 (25 Sept 1996)
Rounded Global Conservation Rank: T4
American Fisheries Society Status: Special Concern

Global Conservation Status Rank Reasons:

Still widespread in interior western North America but with local declines and extirpations. The global range includes the Columbia River basin east of the Cascades to barrier falls on the Kootenay, Pend Oreille, Spokane, and Snake Rivers; the upper Frazier River basin above Hell's Gate; and Athabasca headwaters of the Mackenzie River basin, where headwater transfers evidently occurred from the upper Frazier River system (Benke 1992). In the Columbia River basin, nearly all upriver and many lower river stocks appear to be improving after having declined (Nehlsen et al. 1991). Many stocks in the Columbia River basin are, however, threatened by mainstem passage problems, habitat damage (due to logging, road construction, mining, and grazing, which decrease water quality and increase siltation), and interactions with hatchery fishes (Nehlsen et al. 1991).

Environmental Baseline

There are four different populations of redband trout in the Blue Mountains. These are: 1) sympatric populations with steelhead, 2) isolated allopatric populations in anadromous watersheds, 3) allopatric populations in the Great Basin portion of the Blue Mountains, and 4) allopatric populations in watersheds that formally supported anadromous populations (N.F. Malheur and Upper Malheur Rivers). There is little data on current population trends of the redband, however, the four population types do not face the same level of threats from management activities. Subpopulations of the Great Basin redband are probably at the greatest threat of listed as threatened under the ESA. These fish are located in Trout Creek, a tributary to the Silvies River. Redband populations in this project area are primarily of sympatric origin. Overall, the Interior redband trout have the most extensive area of all game fishes in the Blue Mountains. They are in the smallest headwater areas as well as in the largest rivers of the Blue Mountains.

BE Table 6—Redband Bearing Streams in Analysis Area (Table 3)

Subwatershed	Redband Fish Bearing Miles	Perennial Non-fish Bearing Miles	Intermittent/Seasonal Miles	Habitat Type
Davis/Placer Gulch	12.6	10.6	11.7	Rearing, Spawning
Vinegar Creek	11.1	10.4	25.3	Rearing, Spawning
Vincent Creek	5.2	3.1	9.1	Rearing, Spawning
Little Boulder/Deerhorn Creek	14.2	16.5	28.8	Rearing. Spawning
Tincup Creek/Little Butte Creek	12.4	12.4	14.9	Rearing. Spawning
Butte Creek	9.1	7.1	10.2	Rearing, Spawning
Granite Boulder Creek	8.1	12.2	8.5	Rearing, Spawning

Interior redband trout (sensitive) are assumed to be the resident form of the anadromous steelhead. Most redband spawning and rearing occurs in the second to fourth order streams in the forested environment. Even when small streams are not accessible to migrating fish because of barriers or steep gradients, they are vitally important to the quality of downstream habitats. Their distribution within the proposed project area (see Table 3), and habitat needs, are similar to the steelhead. However, redband spawning may occur in areas with insufficient flow for steelhead spawning.

Columbia River Basin Bull Trout (*Salvelinus confluentus*)

Status: Federal – Threatened (10 June 1998)

Heritage Status – Global Conservation Status Rank: G3T2Q (27 Oct 1999)

Rounded Global Conservation Rank: T2

Global Conservation Status Rank Reasons:

Many populations exist throughout the Columbia River basin, but these have been isolated by dams and expanses of degraded habitat. Many local extirpations have occurred throughout its range with a resulting ongoing reduction in total abundance. Many of the migratory forms of bull trout have been lost, exacerbating isolation.

This distinct population segment of bull trout includes populations residing in the Columbia River and its tributaries, excluding the Jarbridge River, Nevada, and east of the Continental Divide, Montana (USFWS 1998). Bull trout currently occur in 45 percent of the estimated historical range (USFWS 1998). Hydroelectric dams and large expanses of unsuitable habitat have isolated many populations. Factors contributing to isolation include habitat degradation (e.g. from forest management practices, agricultural practices, livestock grazing, road construction and maintenance), water diversion, mining, and residential development (see USFWS 1998 for details). Illegal harvest and introduced brook trout also appear to be having a negative impact on bull trout.

This Distinct Population Segment is significant because of the overall range of the species would be substantially reduced if this discrete population were lost (USFWS 1998).

Environmental Baseline

Bull trout require more specific habitat requirements than other salmonids. Water temperatures below 15° C are required for rearing and reproducing in forested streams (Buchanan and Gregory 1997). In addition, these fish need a "pristine" environment including high levels of shade, high levels of undercut banks, a large woody debris volume, high levels of gravels in riffles, low levels of sediment in riffles, and low levels of bank erosion (Dambacher and Jones 1997). These factors require careful management by landowners to ensure the conditions listed above continue to be in bull trout habitable waters.

Bull trout spawn during the fall months of September and October. Once deposited within the gravels, the eggs develop for 4 to 5 months. The alevins then further develop still within the gravels for three more months, finally emerging into the stream late summer.

BE Table 7—Bull Trout Bearing Streams in Analysis Area

Subwatershed	Bull Trout Fish Bearing Miles	Perennial Non-fish Bearing Miles	Intermittent/Seasonal Miles	Habitat Type
Granite Boulder Creek	4.1	12.2	8.5	Rearing, Spawning
Vinegar Creek	Currently, extent of population and habitat use is unknown			
Butte Creek	Currently, extent of population and habitat use is unknown			
Middle Fork John Day River	8.8	0.0	0.0	Migratory (mainstem)

Columbia River Basin bull trout (threatened) are found in varying numbers in the Middle Fork John Day River tributary drainages of Big Creek, including Deadwood Creek, Granite Boulder Creek, and upper Clear Creek. The lower Middle Fork John Day River is a migratory corridor for bull trout. The upper Middle Fork mainstem (upstream of the Analysis Area) prior to 1990 had bull trout in it however, because of water withdrawal, habitat degradation, and high water temperatures is now considered historic habitat. Within the project area, bull trout use appears to be limited to migratory/seasonal use in the main Middle Fork, and spawning/rearing habitat in Granite Boulder Creek (see Table 4). Individual bull trout have been found in Vinegar Creek and Butte Creek within the last 5 years. It is unknown if these were stray fluvial fish or small populations.

Mid-Columbia River Spring Chinook Salmon (*O. tshawytscha*)

Status: USFS Region 6 Sensitive

Heritage Status – Global Conservation Status Rank: G5Q

Environmental Baseline

Adult Mid-Columbia River spring Chinook enters natal streams in the spring, several months before spawning. The adult salmon remain in headwater streams, such as the Middle Fork John Day, throughout the summer then spawn in the fall (Torgerson 1996).

Torgerson (1996) also reported 2.4 adult Chinook per kilometer holding in the Middle Fork and 3.0 Chinook per kilometer spawning in the Middle Fork. The distribution of the salmon was clustered in reaches where stream temperature was lower than expected. The status of this species has been under review by the National Marine Fisheries Service (NMFS) that determined in February 1999 that listing was not warranted at that time. Returning adults in the John Day River basin range from 400 to 3,000 with the vast majority spawning in three main areas: the upper North Fork John Day, the upper Middle Fork John Day, and the upper mainstem John Day. The activities occurring in this Analysis Area may have an indirect effect to the salmon since the tributaries have a direct flow to the mainstem.

BE Table 8—Chinook Bearing Streams in Analysis Area (Table 5)

Subwatershed	Chinook Fish Bearing Miles	Perennial Non-fish Bearing Miles	Intermittent/Seasonal Miles	Habitat Type
Davis/Placer Gulch	1.9	10.6	11.7	Rearing
Vinegar Creek	7.1	10.4	25.3	Rearing
Little Boulder/Deerhorn Creek	3.5	16.5	28.8	Rearing
Tincup Creek/Little Butte Creek	4.4	12.4	14.9	Rearing
Butte Creek	0.64	7.1	10.2	Rearing
Granite Boulder Creek	2.0	12.2	8.5	Rearing

Mid-Columbia River spring Chinook salmon (sensitive) are found within the project area. Spawning within the project area is mostly in the Middle Fork John Day River. There is some very limited potential for spawning in the lower reaches of Granite Boulder Creek and Vinegar Creek. Adult holding and juvenile rearing also occur in these same general areas (see Table 5).

Chinook salmon Essential Fish Habitat (EFH) analysis is also included. Public Law 104-267, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for "Essential Fish Habitat" (EFH) descriptions in Federal fishery management plans and to require federal agencies to consult with NMFS on activities that may adversely affect EFH. "Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (Magnuson-Stevens Act).

Westslope Cutthroat Trout

Westslope cutthroat trout do not occupy any habitat in the Middle Fork John Day Sub-basin or tributaries thereof and so are not found in the Southeast Galena Project Area.

Project Area Location

The Southeast Galena EIS analysis area is located about 25 air miles northeast of John Day, Oregon. Access to the analysis area is east from John Day on Highway 26 to the junction of Highway 7, north on Highway 7 to the junction of County Road 20, then west on County Road 20 along the Middle Fork John Day River. Major Forest developed roads that access the analysis area include the 2010, 2045, 2050, 2055, 2610, 2612, 2614, 4550, 4557, and 4559 roads.

The Southeast Galena Analysis Area is located within the Galena Watershed, one of five watersheds located in the Middle Fork John Day River Sub-basin (see vicinity map). The analysis area encompasses the following subwatersheds:

BE Table 9—Subwatersheds and Land Ownership within the Southeast Galena Restoration Analysis area (Table 1).

Subwatershed (SWS) Name (HUC 6)	SWS Number	SWS Acres (in analysis area)	Malheur NF Acres	Umatilla & Wallowa-Whitman NF Acres	Private Acres
Davis/Placer Gulch	30201	7,462	6,966		496
Vinegar Creek	30203	7,585	7,118	411	56
Vincent Creek	30205	3,769	3,758		11
Little Boulder/Deerhorn Creek	30207	10,983	10,614		369
Tincup Creek/Little Butte Creek	30209	7,430	7,173		257
Butte Creek	30211	4,861	4,854		7
Granite Boulder Creek	30213	7,383	6,631	713	39
Total Acres		**49,473**	**47,114**	**713**	**1235**

Intensive timber harvest occurred within the area as early as the 1910s when extensive railroad logging removed much of the mature tree component in valley bottoms of analysis area streams. On July 2, 1998, a severe windstorm blew down several thousand trees over about 1,400 acres in the headwaters of Vincent and Vinegar subwatersheds. Resource specialists quickly toured the area to determine the scale of the blowdown and related consequences of having so much timber blown down over such a large area. Immediate concerns were the high fuel loads (about five times higher than normal) on the ground and the increased risk of wildfire; the high amount of spruce and Douglas-fir that was blown down creating suitable host for spruce and Douglas-fir bark beetles; loss of shade and soil holding capacity to the streams; and loss of cover habitat for big-game. District personnel began an environmental assessment (EA) that summer of the blow down to develop alternatives to address these concerns.

Following consultation with Forest managers, Regional Office Staff, resource specialists from two tribal governments, and resource managers from two federal regulatory agencies, the Forest determined that an EA would not adequately address the significance of the situation. The Forest decided to perform a watershed analysis (WA) for the Galena Watershed prior to preparing a National Environmental Policy Act (NEPA) document. The goal was to assess the condition of the watershed, identify recommendations for restoring its health, and then prepare an environmental impact statement (EIS) to implement recommendations from the watershed analysis.

Southeast Galena Analysis Area Total Road Density

In January 1999, District resource specialists began the *Galena Watershed Analysis*. In June 1999, the analysis was completed, and the *Southeast Galena Restoration EIS* was the first NEPA analysis initiated for implementing recommendations from this WA. In the mean time, the Forest initiated a large-scale project called *VV Beetle* to reduce the beetle population that was expected to emerge from the blowdown spring/summer of 1999. This project used attractant pheromones to draw insects to funnel traps and fell green spruce “trap” trees outside of riparian habitat conservation areas (RHCAs) to draw insects to the trap tree and away from the remaining standing spruce, as well as disruptive pheromones to repel insects from heavy concentrations of remaining live spruce and Douglas-fir. The funnel traps were emptied periodically of their insects. The insects were collected for analysis on the effectiveness of the pheromones. The trap trees were removed to a rock pit near Flagtail Lookout, over 60 miles southwest of the blowdown area, under a separate NEPA document. The bark was stripped off of them to expose the insects to weather and ultra violet sunlight, killing them. The *VV Beetle* project was implemented again during spring/summer 2000 (with the exception of creating additional trap trees) to ensure as many of the two-year life cycle insects were captured as possible. The project may be implemented again in 2001 if analysis of the 2000 trapping effort indicates large insect populations still remain on site. The VV Beetle project “bought time” for Forest managers. It did not address the elevated fuel levels created by the blowdown—that is one of the objectives of this EIS.

On June 30, 1999, Oregon Governor John Kitzhaber, USDA Under Secretary Jim Lyons, and USDA Forest Service Chief Mike Dombeck announced the Blue Mountains Province would serve as the first of several Demonstration Areas nationwide. The purpose of the Blue Mountains Demonstration Area is to accelerate forest and watershed ecological restoration activities, and continue developing and enhancing relationships with partners and communities in the Blue Mountains.

Shortly after this announcement, the Malheur National Forest (Forest) selected the Middle Fork John Day River Sub-basin as the area to implement projects developed within the Demonstration Area (DEMO). The *Southeast Galena Restoration Environmental Impact Statement* (EIS) is one of the first EIS projects the Forest has developed under DEMO.

Current Road Situation – All of the subwatersheds in the Southeast Galena Analysis Area are either “At Risk” or “Not Properly Functioning” according to the National Marine Fisheries Service Matrix of Pathways and Indicators. This road density information was obtained from Blue Mountain Ranger District GIS data (2002), which includes both open and closed roads (decommissioned roads are not included). Table 7 shows the road density and RHCA road miles by subwatershed for the entire analysis area.

BE Table 10 —Road density and RHCA road miles by subwatershed (Table 7)

Subwatershed	Total Road Density (Miles/ Mile^2)	Total RHCA Roads (miles)
Davis/Placer Gulch	3.9	9.9
Vinegar Creek	3.6	8.8
Vincent Creek	5.2	7.1
Little Boulder/Deerhorn	2.4	10.1
Tincup/Little Butte	3.2	8.0
Butte Creek	3.7	5.8
Granite Boulder Creek	3.5	9.8
Total		59.5

Any density over 2.0 mi/mi^2 is considered either At Risk (2-3 mi/mi^2) or Not Properly Functioning (greater than 3 mi/mi^2). The matrix of pathways and indicators for bull trout (USF&W 1998) lists road densities of <1 mi/mi^2 with no valley bottom roads as Properly Functioning, 1-2.4 mi/mi^2 with some valley bottom roads as Functioning at Risk, and densities over 2.4 mi/mi as Functioning at Unacceptable Risk. Granite Boulder, Vinegar Creek and Butte Creek should be held to USF&W standards as bull trout are present or have been observed in the last 5 years in these streams. Any new road construction without an equal or greater decommission or obliteration would be detrimental to the remaining subwatersheds.

II. Proposed Action and Alternatives Considered

See Southeast Galena Environmental Impact Statement for details by each alternative

III. Potential Effects of the Proposed Action and Alternatives on Listed Species and Designated Critical Habitat

To reduce the amount of redundancy in the document, the following discussion will not be done species by species (unless warranted), and alternative by alternative.

Redband trout and steelhead are resident and anadromous life forms of the same species. The potential effects of proposed actions are essentially the same for both species. These are the fish with the widest distribution within the project area. Potential effects to fish and fish habitat will focus on those species most likely affected by activities in the project area.

Chinook salmon distribution is generally limited to the main Middle Fork John Day River with limited potential for use in the lower segments of tributary streams. Therefore, the potential effects on Chinook salmon, or salmon habitat, is generally more of an off-site effect. For example, sediment input to a tributary stream could potentially affect redband/steelhead, or their habitat. To affect Chinook salmon, or salmon habitat, that sediment would have to be transported downstream in a quantity sufficient to have an effect downstream or flows/water temperatures modified to the extent to affect Chinook salmon in the Middle Fork John Day River. With limited actions proposed within RHCAs, the threshold for effects to fish and fish habitat will generally be lower for redband/steelhead, than for Chinook salmon. The threshold for effects to bull trout is lower than redband or steelhead where bull trout utilize project area subwatersheds, or 6th field HUCs (Habitat Unit Codes).

For the proposed action and the action alternatives, regarding potential effects on fish and fish habitat, there is also a lot of overlap. After discussing the No Action alternative, Alternative 2, the proposed action, will be described in detail. Then Alternatives 3, 4 and

5 will be described in terms of how they differ from Alternative 2. The NMFS matrix of pathways and indicators will be used as a checklist for this evaluation. The baseline conditions are listed in table 3.

Westslope cutthroat trout do not occur in, or downstream from the proposed project area. There will be "No Impact" to this species under any alternative.

WATERSHED(S): Middle Fork John Day River Sub-basin

BE Table 11—CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE ON RELEVANT INDICATORS

DIAGNOSTICS/ PATHWAYS	POPULATION AND ENVIRONMENTAL BASELINE		
INDICATORS	Functioning Appropriately	Functioning At Risk	Functioning at Unacceptable Risk
Subpopulation Characteristics: Subpopulation Size		St	BuT
Growth and Survival		St	BuT
Life History Diversity and Isolation		St, BuT	
Persistence and Genetic Integrity		St ,BuT	
Water Quality: Temperature			X
Sediment		X	
ChemicalContaminants./Nutrients		X	
Habitat Access: Physical Barriers			X
Habitat Elements: Substrate Embeddedness			X
Large Woody Debris		X	
Pool Frequency and Quality			X
Large Pools			X
Off-channel Habitat		X	
Refugia		X	
Channel Cond. & Dynamics: Wetted Width/Max. Depth Ratio		X	
Stream bank Condition		X	
Floodplain Connectivity		X	
Flow/Hydrology: Change in Peak/Base Flows		X	
Drainage Network Increase		X	
Watershed Conditions: Road Density & Location			X
Disturbance History		X	
Riparian Conservation Areas		X	
Disturbance Regime		X	
Integration of Species and Habitat Conditions		X	

A. Alternative 1-No Action:

In order to compare this alternative to the other alternatives, it is necessary to identify some of the actions that will not occur under this alternative. No vegetative treatments would occur in riparian areas. There would be no prescribed fire treatments, which could affect riparian vegetation. There would be no road management activities other than routine road maintenance, which is an ongoing program. There would be no weed treatment activities other than those specified in the *Malheur National Forest Weed EA* and those activities completed by State and County Road Departments.

1. Water Quality

a. Temperature: With no vegetative treatments or prescribed burning in riparian areas, there will be no short-term effect on water temperature. Riparian areas within the project area are not large enough to act as fire breaks for higher intensity wildfires. Since there would be no treatment to reduce the risk of stand replacement wildfires, all streams in the area with existing conifer, hardwood or shrub shading, will be at risk for losing shade and increasing summer water temperatures in the future. This alternative is a no effect in the short-term, and a potential adverse effect in the long-term.

b. Sediment: The activities with the highest potential for affecting sediment input to streams are road management activities. Under this alternative, there would be no road management activities other than ongoing routine road maintenance. This can be considered a no effect, or no change from the existing condition, in the short-term. At existing funding levels, road maintenance will not keep up with all needs. This alternative would do nothing to reduce impacts of the existing road system. Analysis of project area roads estimated that 25% of the 467 road/stream crossings are not designed to handle a 100-year event. It would be expected that sedimentation from existing roads would increase over time, unless other projects are implemented to address these impacts. This is a no effect in the short-term, and an adverse effect in the long-term.

c. Chemical contaminations/nutrients: With no proposed actions using chemicals near streams, this is a no effect. Current weed spraying was covered under the *Malheur National Forest Weed EA*.

2. Habitat Access

Physical barriers: The activities with the highest potential for affecting physical barriers to fish movement are road management activities. Under this alternative, there would be no road management activities other than ongoing routine road maintenance. Roads crossings (culverts) that inhibit fish movement at some flow would continue to do so with the no action alternative. Analysis in the project area 23 of 31 road/stream crossings on Category 1 streams pose a barrier to fish migration at some level of flow. This can be considered a no effect, or no change from the existing condition.

3. Habitat Elements

a. Substrate embeddedness: See the previous discussion on sediment. Substrate embeddedness is affected by changing the amount of sediment input to the stream (or by changing the hydraulic energy of the stream, which is not a consideration here). Therefore, this is a no effect in the short-term, and an adverse effect in the long-term.

b. Large woody material (LWM): See the previous discussion on water temperature. Large woody material is provided by large trees, as they die and fall. The no action alternative would have no effect on LWM in the short-term, but would put the source of future LWM at greater risk of stand replacement fire that could reduce LWM amounts in project area streams.

c. Pool frequency and quality: See the previous discussion on LWM and sediment. A major factor affecting pool frequency and quality is the supply, condition, and future sources of LWM. Another is brush or small hardwood trees providing stability in meander pools. A third that can diminish pool frequency and quality is sediment from historic activities and road/stream crossings. The no action alternative would have no effect on pool frequency (currently reduced) and quality (currently degraded) in the short-term, but would likely have an adverse effect in the long-term with the risk of wildfire and sediment.

d. Large pools: See the previous discussion on pool frequency and quality. In these streams, the potential to affect pool structure is similar for large pools.

e. Off-channel habitat: The potential for off-channel habitat is very limited along the small streams in this project area. This alternative would have no effect on off-channel habitat.

f. Refugia: This alternative would likely have no effect on refugia within the project area. It would not lead to any improvement or degradation of current conditions.

4. Channel condition and dynamics:

a. Wetted width/maximum depth ratio: The no action alternative would have no effect on this parameter in the short-term. In the long-term, the only potential scenario that could adversely affect this parameter would be a stand replacement fire of sufficient size and intensity to result in increased peak flow and sediment as well as reduced riparian vegetation causing increased channel instability.

b. Streambank condition: See above.

c. Floodplain connectivity: The activities with the highest potential for affecting floodplain connectivity are road management activities. Under this alternative, there would be no road management activities other than ongoing routine road maintenance. This can be considered a no effect, or no change from the existing condition.

5. Hydrology/flow:

a. Change in peak/base flows: The no action alternative would have no effect on this parameter in the short-term. Current base flows are below what are expected in project area subwatersheds. In the long-term, the only potential scenario which could adversely affect this parameter would be a stand replacement fire of sufficient size and intensity to result in increased peak flow and decreased base flows.

b. Drainage network increase: The activities with the highest potential for affecting drainage network are road management activities. Under this alternative, there would be no road management activities other than ongoing routine road maintenance. There is the potential for drainage structures to not function as designed and cause ephemeral draws to become intermittent channels if there is a lapse in road maintenance. Effects of past management activities (grazing, fireline construction, timber harvest, trails, etc.) are also contributing to erosion of ephemeral draws resulting in formation of intermittent

(PACFISH definition) channels. This would increase the drainage network. Overall, this alternative can likely be considered a no effect, or no change from the existing condition.

6. Watershed Condition:

a. Road density and location: Under this alternative, there would be no road management activities other than ongoing routine road maintenance. No roads would be constructed nor decommissioned. This can be considered a no effect, or no change from the existing condition.

b. Disturbance history: As a result of historic activities in the area, several watershed conditions have been modified. Historic logging practices and fire control have resulted in existing tree (conifer) stands having fewer large trees, but much higher smaller tree densities. The no action alternative would have no effect on features of the disturbance history within the sub basin.

c. Riparian Conservation Areas: This is not applicable to the no action alternative.

Summary of effects:

In summary, the No Action alternative would have no effect on fisheries, or fish habitat, in the short-term. There is an increasing risk, over time, that this alternative would result in adverse effects, as a result of increasing impacts from the existing road system and from the risk of high intensity, stand replacement fire. These future impacts could potentially reach a magnitude of "Likely to Adversely Affect" steelhead and bull trout. It is not likely that the effects would reach a magnitude that they would have a long-term adverse effect on steelhead designated critical habitat (NLAM). These impacts would not cover a large enough area to result in a "WIFV" determination for redband trout. It is also unlikely, but possible, that these effects would be of a magnitude to affect Chinook salmon, downstream from most of the potential impacts.

Determinations:

Mid-Columbia Summer Steelhead (T): No Effect in the short-term. Risk of May Affect, **Likely to Adversely Affect** in the long-term.

Steelhead Designated Critical Habitat: No Effect in the short-term. Risk of May Affect, **Not Likely to Adversely Modify** in the long-term.

Columbia River Basin Bull Trout (T): No Effect in the short-term. Risk of May Affect**, Likely to Adversely Affect** in the long-term.

Chinook Salmon (S): No Impact in the short-term. Risk of **May Impact Individuals or Habitat**, but will not likely contribute toward federal listing or loss of viability to the population or species, in the long-term.

Chinook Salmon Essential Fish Habitat: No Effect in the short-term. Risk of May Affect**, Unlikely to Adversely Affect** in the long-term.

Interior Redband Trout (S): No Impact in the short-term. Risk of **May Impact Individuals or Habitat**, but will not likely contribute toward federal listing or loss of viability to the population or species, in the long-term.

B. Alternative 2:

1. Water Quality

a. <u>TEMPERATURE</u>: No commercial timber harvest and non-commercial thinning of live trees is proposed within RHCAs. There will be limited commercial thinning of live trees on 30 acres in RHCAs associated with aspen stand improvement in 5 subwatersheds. There is very little risk of a loss of stream shade due to these activities. Trees already down will be removed on 72 acres in the outer half of RHCAs in the headwaters of Vinegar Creek, but they are not currently providing or have potential to provide shade.

The riparian planting of hardwoods/conifers and vegetation protection projects would occur in RHCAs in Category 1, 2 and 4 streams. Hand placement of coarse woody debris, fiber matting is also planned in Category 2 and 4 streams. These activities are not expected to cause any short-term impacts or benefits to temperature. In the long-term they would create shade to better maintain stream temperatures in project area streams and downstream in the Middle Fork John Day River.

Channel/floodplain rehabilitation projects (hydrology) on 2 miles in Vincent Creek and 1 mile in Deerhorn Creek would entail the use of heavy equipment to reestablish channels and floodplains by connecting relic channels or constructing new channels. Fisheries habitat improvement projects include creation of 3 instream structures in Vinegar Creek to allow for fish passage through a culvert, 69 structures in Granite Boulder Creek and 14 structures in Butte Creek are designed to create deep, self-maintaining pools, decrease width to depth ratios, reconnect floodplains, improve base flows and maintain stream temperatures. Improvement of existing structures (29) in Butte Creek and (7) in Granite Boulder Creek would have the same benefits as listed for new structures with less short-term impacts. These projects would not likely have short-term impacts on stream temperature and are designed to have long-term benefits for stream temperature.

Wildfire in riparian areas can result in substantial loss of stream shade. However, design criteria for the proposed prescribed burning treatments in this project ensure that the risk of losing substantial stream shade will be negligible. Prescribed fire may occur in the spring or in the fall, depending on weather and fuel moisture conditions. Suitable burning conditions will be identified in each "burn plan." Seasonal weather conditions may not produce a suitable open "burn window" in any given spring or fall. Suitable fall burning conditions usually occur during "Indian Summer," after there has been some rain.

Ignition is not planned within RHCAs. Fire from upslope burning units, which is within prescription, will be allowed to back into RHCAs. Design criteria include retention of at least 95% of stream shade. The prescribed burning will be done with moisture and climate conditions that would minimize the potential for a hot fire. With these planned low intensity burns, very little stream vegetative cover is expected to burn under the more moist conditions encountered in riparian areas. The risk of a loss of shade which would result in affecting stream temperature, is minimal.

Longer term beneficial effects could result from increased riparian vegetative vigor, as a result of these low intensity burns in riparian areas. However, with the design criteria to reduce the risk of short-term loss of shade, the potential beneficial effect is limited. To substantially increase the vigor of the post-fire vegetation, it would be necessary to "thin" the existing vegetation, which would have the corresponding risk of a short-term loss of shade.

Proposed transportation management actions will have a negligible short-term effect on stream shade/water temperature. Approximately 0.12 miles of road construction is proposed within RHCAs. Road decommissioning and closure actions will not have any direct effect on shade in the short-term. Removal of a few hazard trees in RHCAs which may be providing shade to a stream would potentially have a minor effect on water temperature but would not likely be measurable. Over the long-term, vegetation which is reestablished in the decommissioned roadways will provide additional shade in those areas where the existing road is precluding shading vegetation.

The combined effects of the proposed actions on water temperature are expected to be a negligible short-term effect, and a beneficial long-term effect.

b. SEDIMENT: No commercial timber harvest is proposed within RHCAs. Commercial thinning would be implemented on 30 acres of RHCAs associated with aspen enhancement in 5 subwatersheds. Trees already down will be removed on 72 acres using helicopters in the outer half of RHCAs in the headwaters of Vinegar Creek, but they are not currently providing soil stability or reducing sediment. Trees in contact with the ground will not be removed; only “stacked” trees will be flown out.

There will be soil disturbance associated with commercial timber harvest, primarily as a result of tractor skidding, and subsoiling of skid trails and landings. The risk of enough sediment from these activities reaching a stream with fish present, to adversely affect fish habitat, is negligible, due to the distance of these activities (use of PacFish RHCAs) from stream channels. Sediment generated from these activities which has the potential to move off-site, would be captured in the RHCA "buffer."

There is minimal potential for generating sediment from non-commercial thinning operations. And none of this activity is proposed within RHCAs. The potential for sediment from this activity affecting fish habitat is negligible.

There is no planned use of heavy equipment for the hardwood/shrub planting and protection projects planned to occur in Category 1, 2 and 4 streams. Hand placement of coarse woody debris, fiber matting is also planned in Category 2 and 4 streams. These activities are not expected to cause any short-term impacts or benefits to sediment. The risk of creating enough sedimentation to impact streams and affect fish habitat is negligible. In the long-term they would improve bank stability and reduce rilling/gullying in the vicinity of project area streams and downstream in the Middle Fork John Day River.

Channel/floodplain rehabilitation projects (hydrology) on 2 miles in Vincent Creek and 1 mile in Deerhorn Creek would entail the use of heavy equipment in RHCAs to reestablish channels and floodplains by connecting relic channels or constructing new channels. Fisheries habitat improvement projects include creation of 3 instream structures in Vinegar Creek to allow for fish passage through a culvert, 69 structures in Granite Boulder Creek and 14 structures in Butte Creek to create greater habitat complexity, reconnect floodplains, improve base flows and reduce sedimentation. Improvement of existing structures (29) in Butte Creek and (7) in Granite boulder would have the same benefits as listed for new structures with less short-term impacts. These projects would have short-term impacts on sedimentation but would have long-term benefits for fish and fish habitat.

High intensity fire has the potential to result in exposed soil, which in turn poses a potential for sediment transport off-site. The design criteria for the proposed prescribed burning in this project would minimize sedimentation risk. Burn plan prescriptions will include parameters for weather and fuel moisture conditions, percent duff removal, percent mineral soils exposed, and others. These will set the sideboards to keep fire intensity to a level that will not result in soil loss. Along with the limits on the use of fire within RHCAs described above, this will result in a negligible risk of sediment from prescribed burning activities adversely affecting fish habitat.

From the standpoint of habitat management for listed fish species, an important component of the proposed action is to reduce impacts of the existing road system on water quality and fish habitat. This is a continuation of actions initiated with the Summit Environmental Assessment [EA](Pogo Timber Sale, 1994), Crawford EA (2001), and several road management actions. Roads and road management contribute more sediment to streams than any of the other proposed management activities. Most sediment from timber harvest is related to roads and road building. The existing road system within this project analysis area includes 264 miles of open and closed roads. About 61 miles of these roads, including some of the main access routes into the area, are within RHCAs.

There are several interrelated road management actions that are part of this alternative (see transportation maps in the Southeast Galena EIS). The general approach is to build new roads needed for future management of the area in upslope locations, and to decommission existing roads that are within RHCAs, and which are not needed for management actions in the foreseeable future.

New Road Construction: The proposed action includes construction of about 17.52 miles of system road, with only 0.12 miles within RHCAs. Approximately 2.8 miles were specifically identified for fish watershed improvement reasons. Some of these new system roads will be closed following implementation. Roads closed after use will be left in a self-maintaining condition. Very little sediment generated from the construction, or use of these roads, is expected to reach fish bearing streams because of the location and design criteria for these roads. The risk of causing enough sedimentation to reach streams and affect fish habitat is negligible.

Temporary Road Construction: Less than 0.5 miles of temporary road construction are planned with this alternative (in Vincent Creek subwatershed). None would occur within RHCAs. As described in chapter 3 of the *SE Galena EIS*, temporary roads are not part of the Forest Developed Road system, and they will be decommissioned after use. Similar to the new road construction described above, these are low standard, low profile roads. The main difference between decommissioning these roads and closing the roads as described above, is that as needed to assure revegetation of the road surface, the roads will be scarified, or subsoiled. Because of the location and design criteria for these roads, it is not expected that any sediment generated from the construction, or use of these roads, will reach fish bearing streams. The risk of causing enough sedimentation to streams to affect fish habitat is negligible.

Road Reconstruction and Maintenance: Road reconstruction and maintenance include several activities that potentially result in sedimentation from the road prism to the ditch line, or the adjacent slope. These include adding, or replacing drainage structures, installing drainage dips, road blading, snow plowing, adding road surfacing, and cleaning culverts. Based on existing surveys, the only in-channel work planned is culvert cleaning. This will be done during the instream work window of July 15 – August 15.

There are about 165 miles of roads in need of reconstruction. Twenty-three miles of which are within RHCAs, some segments within 100 feet of stream channels. These actions do pose a short-term risk of generating sediment which could reach streams, and could affect the fish and fish habitat in those streams. Best management practices (BMPs) for these activities are incorporated into standard road maintenance and reconstruction practices, and standard contract clauses. The proposed design criteria and application of BMPs will reduce the probability and magnitude of this short-term risk to impact steelhead, steelhead habitat, or bull trout. There is potential of sediment impacting individual fish where culvert replacement is planned on Category 1 streams. The potential to transfer this effect downstream to Chinook salmon EFH is low.

The long term effects of road reconstruction and maintenance actions would reduce the chronic sediment production of existing roads by improving drainage, removing ruts and rills from the driving surface, replacing or adding drainage structures, and adding less erosive surfacing material. This is particularly important on roads within RHCAs.

Road Decommissioning: About 65 miles of existing roads are planned for decommissioning as part of this project. Twenty-four miles of this total are portions of roads within RHCAs. There is a short-term risk of generating sediment that could reach streams and could affect the fish and fish habitat in those streams. This risk is primarily associated with removing culverts and with the scarification (subsoiling) which may be needed on some road segments to assure revegetation and proper water infiltration on the road surface. Design criteria include the culvert removal guidelines listed in chapter 3 of the Southeast Galena EIS, as well as standard contract clauses, which incorporate BMPs. The proposed design criteria and application of BMPs would reduce the probability and magnitude of this short-term risk to fish and fish habitat.

The long-term effects of road decommissioning are beneficial effects for water quality and fish habitat. The improved infiltration and ground cover conditions of the decommissioned roads will help restore natural watershed function, including reduced sediment yield from the road prism.

Road Closure: Some of roads planned to be constructed for this project will be closed after use for management activities. These roads will be needed for future management of the area, but they will be closed to use following this project. Drainage will be self-maintaining after closure. Closure of these roads poses a negligible risk of sedimentation to fish bearing streams. Four miles of roads closed will be inactivated. The standards for inactivation are the same as decommission except they are kept on the transportation system for future management activities.

The long-term effects of road closure are beneficial effects for water quality and fish habitat. The improved infiltration and ground cover conditions of the closed roads will help increase natural watershed function, including reduced sediment yield from the road prism, although these beneficial effects will likely accrue more slowly than after decommissioning.

Design Criteria for Commercial Road Use and Operations: These design criteria, described in chapter 3 of the Southeast Galena EIS, also help to limit sedimentation from road use during the heavier use period associated with commercial operations. The combined effects of the proposed road management actions on sediment are expected to be a minimal short-term sediment input, and a beneficial long-term effect.

The combined effects of the proposed road management actions on sediment are expected to be a small short-term increase in sediment input, and a beneficial long term effect. The potential number of fish that might be affected by these actions is small.

c. CHEMICAL CONTAMINATIONS/NUTRIENTS: Several chemicals will be used with the proposed actions. These include saw gas and oil, fuels used to ignite fires, and herbicides/pesticides used to reduce weeds, vegetative competition and damage by gophers. All have the potential to adversely affect fish or fish habitat if they were to enter nearby stream systems. Only weed control activities would use chemicals within PacFish RHCAs. Spot application of herbicide (glyphosate) is planned on 1.5 acres within RHCAs with Alternative 2. Project Design Criteria (listed in Chapter 2 of the EIS), BMPs, handling procedures and spill plans will minimize the risk of potential effects of any chemical use. Fire suppression chemicals will not be used within RHCAs in the event of the need for fire suppression actions. There is minimal risk of an accidental spill from vehicles used to transport crews, equipment and ignition materials.

Lignin sulfonate, or magnesium chloride may be used for dust abatement, as needed, during periods of heavier vehicle use associated with commercial timber harvest activities. "Based on the literature review and typical application rates for dust abatement, the effects of these compounds on plants and animals would be negligible" (Heffner, K. 1992).

2. Habitat Access

PHYSICAL BARRIERS: Analysis in the project area estimated that 23 of 31 existing road/stream crossings on Category 1 streams pose a barrier to fish migration at some level of flow. These crossings would be modified as funding sources are found to improve connectivity. No new physical barriers limiting bull trout or steelhead movement and dispersal will be created as a result of this project. Activities will be conducted mostly outside established RHCAs, and activities within the RHCAs will not contribute to any new physical barrier. All culverts to be removed during decommissioning, or replaced during reconstruction would be improved to pass fish at all flows. The baseline condition will likely be maintained but moved toward restore with this alternative.

3. Habitat Elements

a. SUBSTRATE EMBEDDEDNESS: See the previous discussion on sediment. The combined effects of the proposed road management actions on sediment are expected to be a minimal short-term effect, and a beneficial long-term effect. The expected minimal short-term effect on sediment would have a negligible effect, if any, on substrate embeddedness.

b. LARGE WOODY MATERIAL (LWM): See the previous discussion on water temperature. The proposed actions which have the potential to have a short-term effect on large woody material, are the same as those which have the potential to affect shade/water temperature. These include removal of down trees in RHCAs, the hardwood restoration projects, prescribed burning and hazard tree removal. The combined effects of these proposed actions on large woody material are expected to be negligible, for the same reasons as described for water temperature. Similar to potential effects on water temperature, the long-term effects of the road decommissioning would likely be a beneficial effect, although it will take several decades to grow trees to a size that would provide natural large woody material.

c. POOL FREQUENCY AND QUALITY: See the above discussion on LWM. The potential to affect pool frequency and quality is mostly related to the potential to affect the supply, condition, and future sources of LWM. As described above, the potential for a short-term loss of LWM is negligible. The likely long-term effect would be a beneficial effect, mostly as a result of road decommissioning.

The other potential way to affect pool quality would be by producing a substantial increase in sediment input to the streams, which could result in filling in of existing pools. As described above in the discussion of sediment, only a minor input of sediment is expected as a result of the proposed actions. This would likely have no discernable effect on pool frequency, or quality.

Instream improvement projects (creation of structures or channel modification would increase pool frequency and quality in the activity area as well as in the proximity of these projects on Vincent Creek, Butte Creek and Granite Boulder Creek. The potential to reduce pool frequency and quality is minimal; these projects would create a beneficial effect

d. LARGE POOLS: See the above discussions on LWM and Pool Frequency and Quality. The potential to affect large pools is mostly related to the potential to affect the supply, condition, and future sources of LWM. As described above, the potential for a short-term loss of LWM is negligible.

e. OFF-CHANNEL HABITAT: Existing off-channel habitat within the Southeast Galena Analysis Area is very limited. The potential for off-channel habitat along the small streams in this area is also quite limited. Instream improvement projects (creation of structures or channel modification would improve floodplain connectivity and reconnect abandoned side channels. This would increase off channel habitat in the long term; no impacts to this criterion are expected in the short term.

f. REFUGIA: None of the proposed actions have the potential to substantially affect this baseline condition for the Middle Fork John Day River subbasin. Instream improvement projects (see pool frequency and quality discussion) could improve this matrix criterion in subwatershed where activities would occur.

4. Channel Condition and Dynamics

a. WETTED WIDTH/MAXIMUM DEPTH RATIO: A limited amount of activity is proposed within RHCAs. Heavy equipment use immediately adjacent to streams is associated with the creation of instream structures (see chapter 3 of *Southeast Galena EIS* and discussion on sediment in this BE). These structures are designed to reduce width/depth ratios in project streams and the vicinity. Removal of culverts from project area stream channels as part of road decommissioning are not expected to impact this parameter in the short-term and are designed to improve these ratios in the long-term.

b. STREAMBANK CONDITION: See above, wetted width/maximum depth ratio.

c. FLOODPLAIN CONNECTIVITY: No road construction, or other activity is proposed, which could result in disconnecting any floodplain function from the adjacent stream. The proposed action, which has the potential to affect floodplain connectivity, plans decommissioning about 25 miles of roads. Only a small portion of these roads, approximately 9.6 miles are within RHCAs, is actually within a floodplain. After road decommissioning activities, the reduction of compaction of the road prism, resulting from physical processes such as freeze/thaw cycles, will occur for several years, or maybe a few decades. Removal of culverts that maintain downcut channels in the current location as well as wood added to channels and instream structures would improve floodplain connectivity. There will likely be no adverse short term effect and a limited long-term beneficial effect on floodplain connectivity.

5. Hydrology/Flow

a. CHANGE IN PEAK/BASE FLOWS: About 9,870 acres (16%) of the analysis area (63,277 acres total) are proposed for some type of mechanical treatment which will decrease tree (conifer) density over the next 5 – 10 years. This includes commercial and non-commercial thinning. Reducing the number of trees growing on a site can result in increased summer base streamflow, by reducing evapotranspiration. Many conifers effectively stop respiration during the late summer months. Conversely, snow tends to remain on the ground longer where tree density is higher which slows the movement of water to streams during spring melt. With the level of canopy reduction in this proposed action, the expected magnitude of the change in base flow would be small.

Up to 21,970 acres are proposed for prescribed burning. A large portion of this is in areas where a primary objective is to reduce ground fuels (duff and needle layer). In this type of prescribed burning, about 60% of the area typically burns, and fire intensity is low. There will be some mortality of very small trees, but very limited loss of larger trees. With the percentage area treated in any given year, and the low intensity of the prescribed burning, the risk of increased peak flows of a magnitude to affect channel stability and sedimentation will be insignificant in most areas. The headwaters of Deerhorn, Little Butte and Little Boulder Creeks may be exceptions. Large scale, high intensity wildfires can result in increased peak flows.

Road systems can also affect peak flow by extending the drainage network and increasing delivery efficiency to the stream channel. As described below, the proposed action will not extend the drainage network and will not change peak flows from the existing condition.

The combined effects of the proposed actions on peak/base flows is expected to be minimal in the short-term and designed to improve conditions (beneficial effect) in the long-term.

b. DRAINAGE NETWORK INCREASE: Road management is the part of the proposed action that has the greatest potential to affect the drainage network. Design criteria and location for the new road construction will result in no increase in the drainage network. Road reconstruction will result in a reduction of the drainage network by adding relief drainage structures and reducing the channeling of water in ephemeral draws.

Decommissioning of roads in RHCAs will decrease the drainage network over time. A lesser beneficial effect will result from road closures. Watershed improvement projects would rehabilitate areas of disturbance and reduce channeling by slowing and capturing overland water flow. Implementation of this project is expected to maintain the baseline condition in the short-term, and improve the baseline in the long-term.

6. Watershed Condition

a. ROAD DENSITY AND LOCATION: 17.6 miles of new construction are proposed; 0.12 miles of the total construction will occur within RHCAs. Most of the construction will take place in uplands. Some New roads will be put in a condition of self-maintaining drainage and closed after use. Others will remain open, replacing roads to be decommissioned in RHCAs with the action.

About 65 miles of road decommissioning are proposed; 24 miles of the total are located within RHCAs. Many segments of these roads are hydrologically connected to the stream drainage network.

The net change in road miles is a reduction of approximately 46 miles. The net decrease of 31.8 miles of roads in RHCAs is even more important to fisheries. This would reduce road densities in all project area subwatersheds. This is a beneficial effect from the baseline condition.

b. DISTURBANCE HISTORY: The proposed action would have a limited effect on features of the disturbance history within this watershed. As a result of historic activities in the area, several watershed conditions have been modified. The proposed action addresses a few of those modifications to a limited degree.

As a result of historic logging practices and fire control, existing tree (conifer) stands have fewer large trees, but much higher tree densities. The proposed action would move about 9870 acres (16% of the area) to a condition which is more similar to historic open canopy stand conditions.

The proposal also includes:

- The use of prescribed burning to move toward reestablishing low intensity, recurring fires to the area. The proposed action would treat about one third of the area over the next 5-10 years.
- Road management actions which will have the net result of reducing the effects of the existing road system, especially existing roads in riparian areas.
- Limited restoration of riparian hardwood (aspen and cottonwood) stands.
- Limited meadow restoration projects.

The net sum of all projects planned in the analysis area is nearly equivalent considering additional disturbance (adding to history) and restoration (subtracting from history) effects. The magnitude of these beneficial effects is relatively small, in such a large area.

c. RIPARIAN CONSERVATION AREAS: The Upper Middle Fork John Day Watershed is covered by the PACFISH riparian conservation strategy. The proposed action follows the standards and guidelines in PACFISH. The action would not retard attainment of RMOs, and in several cases would contribute to meeting RMOs.

Summary of effects:

Collectively, analysis of all criteria discussed for Alternative 2 shows a low risk of short-term adverse effects on fisheries and fish habitat, with long-term beneficial effects. It is unlikely that the short-term effects discussed above would be of a magnitude to result in fish mortality, or adverse modification of habitat. There is the potential that sediment from road management actions, timber management or stream channel improvement projects could affect a few rearing redband trout, steelhead fry or bull trout. The potential to transport short term effects downstream to Chinook salmon or EFH in the Middle Fork John Day River is negligible.

Determinations:

Mid-Columbia Summer Steelhead (T): May Affect, **Likely to Adversely Affect** in the short-term. **Beneficial Effect** in the long-term.

Steelhead Designated Critical Habitat: May Affect, **Not Likely to Adversely Modify** in the short-term. **Beneficial Effect** in the long-term**.**

Chinook Salmon (S): May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species, in the short-term. **Beneficial Effect** in the long-term.

Chinook Salmon Essential Fish Habitat: No Effect in the short-term. **Beneficial Effect** in the long-term.

Columbia River Basin Bull Trout (T): May Affect, **Likely to Adversely Affect** in the short-term. **Beneficial Effect** in the long-term.

Interior Redband Trout (S): May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species, in the long-term.

D. Alternative 3:

Summary of Effects:

From the standpoint of potential effects on fish and fish habitat, Alternative 3 is essentially the same as Alternative 2. This alternative would do about 1930 acres less of commercial harvest and thinning treatments. Road construction is one mile less, reconstruction is nearly identical and decommission is the same for this alternative as for Alternative 2. There would be about 2750 fewer acres of prescribed burning and 1 miles less road construction than in Alternative 2. The main difference between this alternative and Alternative 2 is no instream work would be completed using heavy equipment in RHCAs with Alternative 3.

All of the same design criteria apply as in Alternative 2 except for the increase in stream buffers for intermittent channels in the project area. The same Access and Travel Management plan would be implemented. As a result, the potential risk of short term adverse effects is somewhat less, and the potential long term beneficial effects are somewhat less than for Alternative 2. The overall differences are minimal, and do not change the determinations for listed and sensitive species.

Determinations:

Mid-Columbia Summer Steelhead (T): May Affect, **Likely to Adversely Affect** in the short-term. **Beneficial Effect** in the long-term.

Steelhead Designated Critical Habitat: May Affect, **Not Likely to Adversely Modify** in the short-term. **Beneficial Effect** in the long-term**.**

Chinook Salmon (S): May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species, in the short-term. **Beneficial Effect** in the long-term.

Chinook Salmon Essential Fish Habitat: No Effect in the short-term. **Beneficial Effect** in the long-term.

Columbia River Basin Bull Trout (T): May Affect, **Likely to Adversely Affect** in the short-term. **Beneficial Effect** in the long-term.

Interior Redband Trout (S): May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species, in the long-term.

E. Alternative 4:

Summary of Effects:

From the standpoint of potential affects on fish and fish habitat, Alternative 4 has some similarities to Alternative 2 but several important differences. This alternative would do no commercial harvest but would have 2730 acres of precommercial thinning treatments. There would be only 2 miles of road construction and 20 miles less road reconstruction than alternative 2. Road decommission projects are the same for this alternative as for Alternative 2. There would be about 10610 fewer acres of prescribed burning than in Alternative 2. Another difference between this alternative and Alternative 2 is no instream structure, channel or floodplain work would be completed using heavy equipment in RHCAs with Alternative 4.

All of the same design criteria apply as in Alternative 2. The same Access and Travel Management plan would be implemented. The potential risk of short-term adverse effects is somewhat less, but the potential long term beneficial effects are also somewhat less than for Alternative 2. The overall differences do not change the determinations for listed and sensitive species.

Determinations:

Mid-Columbia Summer Steelhead (T): May Affect, **Likely to Adversely Affect** in the short-term. **Beneficial Effect** in the long-term.

Steelhead Designated Critical Habitat: May Affect, **Not Likely to Adversely Modify** in the short-term. **Beneficial Effect** in the long-term**.**

Chinook Salmon (S): May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species, in the short-term. **Beneficial Effect** in the long-term.

Chinook Salmon Essential Fish Habitat: No Effect in the short-term. **Beneficial Effect** in the long-term.

Columbia River Basin Bull Trout (T): May Affect, **Likely to Adversely Affect** in the short-term. **Beneficial Effect** in the long-term.

Interior Redband Trout (S): May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species, in the long-term.

C. Alternative 5:

Summary of Effects:

From the standpoint of potential effects on fish and fish habitat, Alternative 5 is essentially the same as Alternative 2. This alternative would do about 1600 acres more harvest and thinning treatments. Nearly 4 more miles of road construction are planned, associated with harvest units. About 5 miles less of decommission is planned with this alternative. There would be about 740 more acres of prescribed burning.

All of the same design criteria apply as in Alternative 2. None of the additional harvest, or fuels treatment is within RHCAs. Only 0.4 miles of the additional roadwork are located in RHCAs. As a result, the potential risk of short term adverse effects is minimally greater, and the potential long term beneficial effects are somewhat less than for Alternative 2. The overall differences are minimal, and do not change the determinations for listed and sensitive species.

Determinations:

Mid-Columbia Summer Steelhead (T): May Affect, **Likely to Adversely Affect** in the short-term. **Beneficial Effect** in the long-term.

Steelhead Designated Critical Habitat: May Affect, **Not Likely to Adversely Modify** in the short-term. **Beneficial Effect** in the long-term**.**

Chinook Salmon (S): May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species, in the short-term. **Beneficial Effect** in the long-term.

Chinook Salmon Essential Fish Habitat: No Effect in the short-term. **Beneficial Effect** in the long-term.

Columbia River Basin Bull Trout (T): May Affect, **Likely to Adversely Affect** in the short-term. **Beneficial Effect** in the long-term.

Interior Redband Trout (S): May Impact Individuals or Habitat, but will not likely contribute toward federal listing or loss of viability to the population or species, in the long-term.

REFERENCES

Benke, R.J. 1992. Native trout of western North America. American Fisheries Society Monograph 6. xx + 275 pp.

Buchanan, D.V. and S.V. Gregory. 1997. Development of water temperature standards to protect and restore habitat for bull trout and other cold water species in Oregon. 1 Proceedings of the Friends of the Bull Trout Conference. Calgary, Alberta.

Dambacher, J.M. and K.K. Jones. 1997. Stream habitat of juvenile bull trout populations in Oregon, and benchmarks for habitat quality. Proceedings of the Friends of the Bull Trout Conference. Calgary, Alberta.

Hefner, Kathy, 1992, USDA Forest Service, Fisheries Biologist, Idaho Panhandle National Forest. "Water Quality Effects of Three Dust Abatement Compounds."

National Marine Fisheries Service (NMFS). 1996. Proposed endangered status fro five ESUs of steelhead and proposed threatened status for five ESUs of steelhead in Washington, Oregon, Idaho, and California. Federal Register 61(155): 41541-61.

National Marine Fisheries Service (NMFS). 16 February 2000. Critical habitat for 19 evolutionarily significant units of salmon and steelhead in Washington, Oregon, Idaho, and California. Federal Register 65(32): 7764-7787.

Nehlsen, W., J.E. Williamson, and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16(2): 4-21.

Torgerson, Christian E. 1996. Multiscale assessment of thermal patterns and distribution of Chinook salmon in the John Day River basin, Oregon. A Master of Science Thesis submitted to Oregon State University.

U.S. Fish and Wildlife Service (USFWS). 10 June 1998. Determination of threatened status for the Klamath River and Columbia River distinct population segments of bull trout. Federal Register 63(111): 31647-31674.

BIOLOGICAL EVALUATION
for
PROPOSED, THREATENED, ENDANGERED, AND SENSITIVE
WILDLIFE SPECIES
February 2002
Blue Mountain Ranger District
Malheur National Forest
Southeast Galena Restoration

Prepared by:

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This Wildlife Biological Evaluation is organized in the following manner:

GALENA VEGETATION MANAGEMENT PROJECT

I. SPECIES CONSIDERED IN THIS ASSESSMENT

II. POTENTIAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES ON LISTED SPECIES AND CRITICAL HABITAT

Gray Wolf (*Canis Lupis*)

Northern Bald Eagle (*Haliaeetus leucocephalus*)

Canada lynx (*Lynx canadensis*)

III. POTENTIAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES ON SENSITVE SPECIES

American Peregrine Falcon (*Falco peregrinus*)

California Wolverine (*Gulo gulo*)

Pacifc Fisher (*Martes pennanti*)

Bobolink (*Dolichonyx oryzivorus*)

Sandhill Crane (*Grus canadensis*)

Long-billed Curlew (*Numenius americanus*)

Tricolored Blackbird (*Agelaius tricolor*)

Columbia Spotted Frog (*Rana luteiventris*)

Western Sage Grouse (*Centrocrcus urophasianus phaios*)

Gray Flycatcher (*Empidonax rightii*)

References

Summary of Effects

Species	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Threatened					
Gray Wolf *(Canis hupis)*	NE	NE	NE	NE	NE
Northern Bald Eagle *(Haliaeetus leucopephalus)*	NE	NE	NE	NE	NE
Canda Lynx *(Lynx canadensis)*	NE	NLAA	NLAA	NLAA	NLAA
Sensitive					
American Peregrne Falcon *(Falco peregrinus)*	NI	NI	NI	NI	NI
California Walverine *(Gulo gulo)*	NI	MIIH	MIIH	MIIH	MIIH
Pacific Fisher *(Mares pennanti)*	NI	MIIH	MIIH	MIIH	MIIH
Bobolink *(Dolichonyx oryzivorus)*	NI	MIIH	NI	NI	MIIH
Sandhill Crane *(Grus Canadensis)*	NI	MIIH	NI	NI	MIIH
Long-billed Curlew *(Numenius americanus)*	NI	MIIH	NI	NI	MIIH
Tri-colored Blackvird *(Agelaius tricolor)*	NI	NI	NI	NI	NI
Columbia Spotted Frog *(Rana luteiventris)*	NI	MIIH/BI	MIIH/BI	MIIH/BI	MIIH/BI
Western Sage Grouse *(Centrocercus urophasianus phaios)*	NI	NI	NI	NI	NI
Gray Flycatcher *(Empidonax wrightii)*	NI	NI	NI	NI	NI

Lister Species	**Sensitive Species**
NE = No Effect NLAA = May Affect-Not Likely to Adversely Affect	NI = No Impact MIIH = May Impact Individuals or Habitat but will not likely contribure toward federal listing or loss of viability to the population or species BI = Beneficial Impact

BIOLOGICAL EVALUATION

This Biological Evaluation analyzes the potential effects of the proposed action and other alternatives on species listed under the Endangered Species Act and species identified as sensitive by the U.S.D.A. Forest Service, Pacific Northwest Region. The most recent R-6 sensitive species list, dated November 11, 2000, was used.

I. SPECIES CONSIDERED IN THIS ASSESSMENT

The federally listed species documented or suspected to occur in the project area are: gray wolf (endangered), northern bald eagle (threatened), and habitat for the Canada lynx (threatened). Sensitive species documented or suspected to occur in the project area are: California wolverine, Pacific fisher, bobolink, sandhill crane, long-billed curlew, tricolored blackbird, Columbia spotted frog, western sage grouse, and gray flycatcher.

II. POTENTIAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES ON LISTED SPECIES AND CRITICAL HABITAT

Gray Wolf (Canis lupis)

Status: Federal — Endangered

State — Endangered

Region 6 — Endangered

Biology and Ecology

Wolves are considered to be absent from Oregon although one female radio-collared wolf from the experimental population in Idaho traveled to the Malheur National Forest and was trapped and returned to Idaho in 1999. This wolf was in the vicinity of the Upper Middle Fork Watershed. During the fall of 2000, a male wolf was killed on Interstate 84 near Baker City, Oregon. This indicates that wolves can and will travel to Oregon and the Malheur National Forest. It is very probable that dispersing wolves will eventually establish breeding territories in Oregon and possibly on the Malheur National Forest.

Gray wolves (*Canis lupus*) are the largest wild members of the Canidae, or dog family, with adults ranging from 18 to 80 kilograms (kg) (40 to 175 pounds [lb]) depending upon sex and subspecies (Mech 1974 as cited in Federal Register: July 13, 2000). Wolves resemble coyotes (*Canis latrans*) or domestic German shepherd or husky dogs (*C. domesticus*), but can be distinguished from them by their longer legs, larger feet, wider head and snout, and straight tail (Federal Register: July 13, 2000).

Wolves are social animals, normally living in packs of two to ten members. They need a large, remote area relatively free from human disturbance (Snyder, S. A. 1991 [16]). Packs occupy, and defend from other packs and individual wolves, a territory of 50 to 550 km^2 (20 to 214 mi^2)). In the northern U.S. Rocky Mountains territories tend to be larger, typically from 520 to 1040 km^2 (200 to 400 mi^2) (Federal Register: July 13, 2000).

The gray wolf historically occurred across most of North America, Europe, and Asia. In North America, gray wolves formerly occurred from the northern reaches of Alaska, Canada, and Greenland to the central mountains and the high interior plateau of southern Mexico. The only areas of the contiguous United States that apparently lacked gray wolves since the last glacial events are much of California and the Gulf and Atlantic coastal plain south of Virginia. Wolves were generally absent from the extremely arid deserts and the mountaintops of the western United States (Goldman 1944, Hall 1959, Mech 1974 [all as cited in Federal Register: July 13, 2000]). The influx of European settlers into North America brought superstitions and fears of wolves.

Their attitudes, coupled with perceived and real conflicts between wolves and human, led to widespread persecution of wolves. Poisons, trapping, and shooting, spurred by Federal, State, and local government bounties, resulted in its extirpation from more than 95 percent of its range in the 48 conterminous States. When the Endangered Species Act was passed, probably only several hundred wolves occurred in northeastern Minnesota and on Isle Royale, Michigan, and possibly a few scattered wolves in the Upper Peninsula of Michigan, Montana, and the Southwest.

Normally, only the top-ranking male and female in each pack breed and produce pups. Litters, usually four to six pups, are born from early April into May (Michigan Department of Natural Resources (MI DNR) 1997, U.S. Fish and Wildlife Service 1992a, both as cited in Federal Register: July 13, 2000). Wolves excavate natal dens in well-drained soils in meadows near water, but occasionally they will den in hollow logs, under tree roots, rock outcrops, or even in beaver lodges (Snyder, S. A. 1991 [11, 16]). After 1 to 2 months natal dens are abandoned for an open area called a rendezvous site. Here a few adult pack members guard the pups, while the rest of the pack hunts (Snyder, S. A. 1991 [1]).

Yearling wolves frequently disperse from their natal packs, although some remain with their pack (Michigan Department of Natural Resources (MI DNR) 1997, U.S. Fish and Wildlife Service 1992a, both as cited in Federal Register: July 13, 2000). Dispersers may become nomadic and cover large areas as lone animals, or they may locate suitable unoccupied habitat and a member of the opposite sex and begin their own territorial pack.

Wolves' habitat preferences appear to be more prey dependent than cover dependent. Forests, open meadows, rocky ridges, and lakes or rivers all comprise a pack's territory (Snyder, S. A. 1991 [16]). In the West wolves have been known to follow the seasonal elevational movements of ungulate herds. Wolves prey mainly on large ungulates, such as moose (*Alces alces*), deer (*Odocoileus* spp.), elk (*Cervus elaphus*), and caribou (*Rangifer tarandus*). Beaver (*Castor canadensis*) are a major supplement to wolves' diets (Snyder, S. A. 1991 [23]). Voigt and others (Snyder, S. A. 1991 [33]) reported that wolves' diets vary, depending on relative prey abundance. Other prey species include mountain goats (*Oreamnos americanus*), bison (*Bison [Bos] bison*), pronghorn (*Antilocapra americana*), various rodents, upland game birds and waterfowl, snowshoe hare (*Lepus americanus*), and black bear (*Ursus americana*) (Snyder, S. A. 1991 [6,10,21,23,25,33]). Occasionally wolves prey on domestic livestock.

Humans are the only significant predator of the wolf and have eradicated it from almost all of its former range worldwide (Snyder, S. A. 1991 [27,34]). Pimlott and others (Snyder, S. A. 1991 [26]) noted black bear preying on wolf cubs and adults.
Wolf extermination efforts in the western United States began in the 1860's. Yellowstone and Glacier National Parks established an official predator-control policy between 1914 and 1926 (Snyder, S. A. 1991 [27]). Today both parks are included in the Northern Rocky Mountain Wolf Recovery Plan as two areas capable of sustaining viable wolf populations. Fear of livestock depredation seems to be the biggest reason for opposition to wolf recovery. Also hunters worry that big game populations will decrease if wolves recolonized their former ranges.

Environmental Baseline

Wolves are habitat generalists and potentially could occupy the entire Malheur National Forest. Because of human persecution, seclusion is a very important factor in providing wolf habitat; therefore open road density can be used to evaluate wolf habitat. Within the Galena Watershed, there are approximately 613 miles of roads of which over 420 miles are open to all traffic. The total road density is 5.16 miles/square mile, and the open road density is 3.54 miles/square mile.

Timber sales that are on going within the watershed are Pog/Pogo on the Blue Mountain Ranger District and Clear Salvage, Foggy, and Angel Timber Sales on Prairie City Ranger District. Other projects are planned but not implemented on the Prairie City Ranger District were analyzed in the Dry Fork EA resulting in Dry Fork, Stormy, Clear, and possibly other timber sales. Currently, Pog/Pogo the timber sale in the SE Galena area is nearly complete, but post-sale activities, such as slash treatments, planting, animal damage control (mostly gopher control through baiting or trapping), and small-diameter tree thinnings (also called precommercial thinning) are still to be completed. Other sales on the Prairie City Ranger District have similar post-sale activities.

Effects Common to All Action Alternatives

The SE Galena project would manage vegetation and roads. All other activities that occur in the watershed will remain as described above in the baseline. Only effects actions proposed in SE Galena will be addressed in this BE.

Wolves feed on big-game animals and occasionally on other species. Therefore, actions that affect big-game populations could affect wolf survival or productivity. Overall, Alternatives 2, 3 and 4 improve big game habitat by 1) improving cover/forage ratios, 2) enhancing forage by opening up canopies and planting and protecting hardwoods, and 3) reducing open road densities. The SE Galena Restoration EIS Wildlife Report provides detailed information. .

Alternative 5 reduces deer and elk habitat effectiveness due to increased open road densities and reduced thermal and hiding cover in several subwatersheds. Given that no wolves currently occupy the Forests, the effects of reduced prey would still result in a No Effects call.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting - There would be no risk of primary poisoning; gray wolves do not consume grains or seeds as part of their diets. There would be little to no risk of secondary poisoning. The potential for exposure to bait or poisoned animals is low. The bait would be applied below ground. Applicators would adhere to strict handling and storage procedures. Poisoned gophers typically die below ground. Although wolves may feed on pocket gophers, gophers are unlikely to be a significant component of a wolf's diet. If one applies the lowest lethal dose for mammals of .33 mg/kg, a 40 kg wolf would have to consume 5 to 50 poisoned gophers in a short period of time to be killed. Given the absence of populations on the Forest, coupled with the low risk of toxic exposure, no effects to gray wolves would be expected.

Aluminum phosphide fumigation - Because the effects of fumigation are limited to those animals which actually inhabit the underground burrows, no direct effects to gray wolves would occur. The potential for secondary toxicity would be highly unlikely. Phosphine does not accumulate in animal tissue. Due to the mode of action - phosphine reacting within the respiratory system - and the extremely short half-life in target animals following death, residue levels present in animals directly killed by phosphine gas are not high enough to produce the same effect in a predator or scavenger.

Herbicide Applications –The US Forest Service contracted Syracuse Environmental Research Associates Inc. and the Syracuse Research Corporation to compile relevant studies on registered pesticides and to evaluate ecological risks (SERA, 1995, 1996 and 1997). Studies generally indicate that glypohosate, and hexazinine are characterized by relatively low toxicity to mammalian and avian species. These herbicides do not bioaccumulate in tissues of exposed animals, but rather are rapidly excreted in urine or feces (USDA 1992 and 1997).

See the Southeast Galena Restoration Project Wildlife Report for additional discussion on chemical effects.

Determination of Effects

The determination for is No Effect (NE) for the following reasons:

1. No populations currently occupy this Forest.
2. No denning or rendezvous sites have been identified.
3. There is an abundance of prey; that is not a limiting factor.
4. Most Forest Service management activities for non-breeding populations are compatible with wolf protection and recovery.
5. If wolves become established while project implementation is occurring, measures will be taken to protect them.

Northern Bald Eagle (Haliaeetus leucocephalus)

Status: Federal – Threatened
State – Threatened
Region 6 — Threatened

Biology and Ecology

Bald eagles prey largely on fish and, to a lesser extent, waterfowl and are usually associated with rivers or lakes. Habitat includes clean water with abundant fish and/or waterfowl populations, and many large, "wolfy" (having many dense branches) perch trees and roost sites nearby. In the Pacific Northwest, bald eagle nests are usually in multistoried, predominantly coniferous stands with old growth components near water bodies that support adequate food supply (U. S. Dept. Interior 1986). They usually nest in the same territories each year and often use the same nest repeatedly which can result in very large nest structures, 2-3 feet deep and up to 5 feet in diameter. They will use alternate nests. Nest trees have stout upper branches to support the nest structure and usually provide an unobstructed view of an associated water body. Most nests in Oregon have been within 1/2 mile of water.

Existing Condition

On the Malheur National Forest, bald eagles congregate at winter roost sites during the late fall, winter, and early spring. They scavenge in agricultural valleys and wetlands, feeding primarily on carrion normally found in areas of cattle concentration and birthing, or where ranchers dispose of dead animals. They roost at night in mature forest stands that provide a microclimate that helps protect them from cold weather and wind.

Bald eagles have been sighted along the Middle Fork of the John Day River and probably forage there during the winter as long as carrion is present and available. In 2001, wildlife biologists identified the first suspected bald eagle nest to be located on the Blue Mountain Ranger District. The nest was identified along the Middle Fork of the John Day River, approximately 9 miles west, i.e., down river, of the Southeast Galena project area. It is believed the nest failed to fledge young. In the winter, bald eagles roost and feed in Bear Valley, along the South Fork John Day River, Middle Fork John Day River, and the main John Day River. Temporary winter roosts are possible within the project area but none have been documented. Bald eagles have been sighted on or near the Blue Mountain Ranger District in each month, but not every month for every year since 1990; and peak use is November to March.

There are no bald eagles or critical habitat necessary for their recovery within the project area. According to the Pacific Bald Eagle Recovery Plan (USFWS 1986), key areas nearest the project area occur as winter roost sites along the John Day River.

Effects Common to All Alternatives

Bald eagle presence in the area is transitory in nature and eagles would not likely be affected during implementation of the proposed activities. There would be no direct, indirect, or cumulative effects to bald eagles.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Seasonal Restrictions - Seasonal restrictions would prohibit chemical applications from November 15th to March 15th, the winter roosting season for bald eagles on the Malheur National Forest, reducing the potential for exposure.

Strychnine baiting - There would be no risk of primary poisoning; bald eagles do not consume grains or seeds as part of their diets. There would be no risk of secondary poisoning. Although bald eagles may feed on pocket gophers, gophers are unlikely to be a significant component of a bald eagle's diet. Although no strychnine tolerance studies have been conducted on bald eagles, it may be reasonable to apply the results of the clinical studies on great-horned owls and red-tailed hawks as discussed previously (Anthony et al. 1984). Raptors have a relatively high tolerance for strychnine (Anthony et al. 1984). If one applies the lowest lethal dosage of 7.7 mg/kg, a 4.5 kg bald eagle would have to consume 12 to 385 strychnine killed mammals over a short period of time to be killed. No effects to bald eagles would be expected.

Aluminum phosphide fumigation – Because the effects of fumigation are limited to those animals which actually inhabit the underground burrows, no direct effects to bald eagles would occur. The potential for secondary toxicity would be highly unlikely. Phosphine does not accumulate in animal tissue. Due to the mode of action - phosphine reacting within the respiratory system - and the extremely short half-life in target animals following death, residue levels present in animals directly killed by phosphine gas are not high enough to produce the same effect in a predator or scavenger.

Herbicide Applications –The US Forest Service contracted Syracuse Environmental Research Associates Inc. and the Syracuse Research Corporation to compile relevant studies on registered pesticides and to evaluate ecological risks (SERA 1996 and 1997). Studies generally indicate that glypohosate, and hexazinine are characterized by relatively low toxicity to mammalian and avian species. These herbicides do not bioaccumulate in tissues of exposed animals, but rather are rapidly excreted in urine or feces (USDA 1992 and 1997).

See the Southeast Galena Restoration Project Wildlife Report for additional discussion on chemical effects.

Determination of Effects

There would be no effect to bald eagles, or critical habitat by implementing any of the alternatives.

Canada Lynx (Lynx canadensis)

Status: Federal – Threatened
State – None
Region 6 - Threatened

Biology and Ecology:

Major Threats

The Canada lynx has a large range in northern North America, particularly in Alaska and Canada. Declines have occurred in some populations, but are apparently still widespread and relatively abundant in most of the historic range, though population data are lacking for many areas. Lynx distribution at southern latitudes, including mountainous regions in Northeast Oregon, represent the occupation of marginally suitable habitat that decreases in quality and availability as one continues to move southward.

Habitat loss, fragmentation and susceptibility to overharvest (trapping) are major concerns across the lynx's range (TNC 1999). Factors contributing to these concerns include; forest management activities, fire suppression, landscape level catastrophic wildfire, roads, developments that destroy habitat, grazing, predator control and trapping, competition with other predators, and human disturbances (winter recreation off-highway travel and highways) that displace lynx from their habitat (Wisdom et al. 2000, TNC 1999, and Witmer et al. 1998).

Habitat General Description

Lynx are typically associated with large tracts of high elevation boreal forests where their physical adaptations of long legs and broad paws allow them to negotiate deep snow and effectively hunt their principal prey, the snowshoe hare (*Lepus americanus*). Lynx require a mix of late and early seral habitats to meet their cover and food needs. Mature forests provide the lynx with denning space and hiding cover, while early seral habitats provide a prey base (Koehler 1990). Intermediate successional stages may serve as travel cover, but function primarily to provide connectivity within a forested landscape. Home range size varies considerably and is usually dependent upon prey availability. Typical home range territories are 45-155 mi^2 (Ruggiero 1994).

Lynx denning habitat is characterized as having large woody debris that provides security and thermal cover and mature overstory canopies. These elements combine to provide both vertical and horizontal structural diversity (Ruggiero 1994). Habitat quality, as measured by the availability of alternate den sites, appears to be an important factor in kitten survival when disturbance occurs. Primary denning sites are often in large hollow logs, beneath windfall or upturned roots, or in brush piles in dense thickets (Brittell et al. 1989). Lynx den sites are in forests with a high density of downfall logs in patches scattered over 5-10 acres (>40 logs per 40 yards [46 m] lying 1 to 4 feet [0.3-1.3 m] above the ground) (Koehler 1990). Pockets of dense forest must be interspersed with prey habitat (Grange 1965). Pockets of late and old forest, at least 5-10 acres (2-4 ha), should be left for denning sites. Management units should be designed to provide travel corridors, especially along ridges and saddles, as lynx are more likely to use these areas.

Lynx primarily prey on snowshoe hare (*Lepus americanus*). Their diet also includes squirrels (*Tamiasciurus spp.),* ducks (Anas spp), and upland game birds; especially grouse (*Dendrogapus* spp). Preferred foraging habitat is found in early to mid-successional, densely stocked, mixed conifer forests that support plentiful populations of snowshoe hare for hunting (Ruggiero 1994). Good hare habitat is provided by stands with a high stem and lower bough density (approximately 2,400 to 13,000 stems and boughs per acre) on trees that are small (less than 4-inch dbh with 1-inch diameter stems and boughs preferred) but above snow level. Lynx populations usually fluctuate in a cycle with snowshoe hare populations, peaking about every 9 to 10 years (Burt and Grossenheider 1976, Fox 1978, Mech 1980, U.S.D.I. Fish and Wildlife Service 1994). Because of these volatile swings, their populations became very low about every 10 years. Therefore, they can be rare in any one given area at these times.

Deep snow and cold temperatures are often associated with lynx habitat. Other predators, such as the wolverine, may need to migrate to lower elevations under these conditions in order to follow their food source. Lynx, however, remain and thrive under these conditions due to their physical adaptations to low temperatures, deep snow and ability to successfully hunt the snowshoe hare.

Because lynx populations fluctuate with snowshoe hare populations, events that create snowshoe hare cover and forage generally benefit lynx (Koehler and Brittell 1990). These events might have negative short-term effects by eliminating denning habitat. However, as forest succession progresses after a disturbance, such as fire, insect outbreak, or logging, stands transition from non habitat to forage and then to denning habitat. A certain level of dynamic cycling it seems is essential for maintaining optimal habitat.

Travel corridors provide security during movement from denning areas to foraging areas and during dispersal. Cover that is generally greater than 8 feet tall with stem densities in excess of 180 trees per acre allows for movement of lynx within their home ranges (Koehler 1990). Riparian corridors, forested ridges, and saddles appear to be favored travel ways. Lynx avoid large openings (> 300 feet from cover) that have the potential to disrupt movement between isolated populations (Ruggiero 1994).

Lynx can be managed by managing for their prey. Snowshoe hare populations increase dramatically following disturbance, particularly fire. However, snowshoe hare recolonization may not occur until 6 to 7 years following logging, and that snowshoe hare densities may not reach their maximum for another 20 to 25 years (Koehler and Brittell 1990). This depends on site conditions and type of treatment. As stands become older (about 20 to 30 years old), their benefits to snowshoe hare decrease.

Lynx breed when they are one year old. The breeding season is January or February, sometimes into April (Brainerd 1985, Nellis et al. 1972). The gestation period is 60 days and birthing occurs in March or April, sometimes May or June.

Distribution

The geographic range of lynx includes all of Alaska and Canada (except the northeastern parts of Northwest Territories) and the United States south to a line from southern Oregon to southern Colorado, southern Iowa, southern Indiana and southern Maryland (Verts and Carraway 1998). Lynx are considered to have historically resided in 16 of the contiguous United States (Maine, New Hampshire, Vermont, New York, Massachusetts, Pennsylvania, Michigan, Wisconsin, Minnesota, Washington, Oregon, Idaho, Montana, Wyoming, Utah, and Colorado) based on historical observations, trapping records, and other documented evidence. The occurrence of lynx in most of the contiguous United States is likely the result of transient dispersal during declines in population density of their primary prey, snowshoe hares (Quinn and Parks 1987).

Oregon Distribution

Oregon is considered to be at the southern fringe of the lynx's range, and animal density and habitat use are expected to differ from further north where habitat is considered more suitable. The lynx has always been rare in Oregon (Koehler and Aubry 1994).

In Oregon, there are twelve verified records of lynx documented between 1897-1993, six of which were taken from the Blue Mountains (Ruggiero et al 1999, Verts and Carraway 1998). Of these 12 known specimens, one each was collected in 1897, 1964, 1974, and 1993, 2 in 1920, and 3 each in 1916 and 1927. Three of the six specimens taken in the Blue Mountains were collected near the town of Granite, approximately 10 miles northeast of the project area. The remaing six specimens were taken from the Wallowa Mountains, the Cascade Mountains, the Willamette Valley, the Stinkingwater Mountains and the Steens Mountains.

Peaks in density of lynx populations in Alaska reportedly occurred in 1916-1918, 1926-1928, 1963-1966, and 1974-1975 (Quinn and Parks 1987). Peak periods somewhat correlate to collections made in Oregon. Verts and Carraway (1998) suggest that lynx occurrence in Oregon may be dispersed from occupied areas farther north that immigrate into the area and persist for a short time.

Surveys using a hair sampling protocol that targets lynx were conducted on the Malheur National Forest in 1999, 2000 and 2001. One of the 1999 surveys included habitat in the Southeast Galena Project Area. The 1999 and 2000 surveys did not determine lynx presence; the 2001 data is still being analyzed. Surveys to detect other forest carnivores have been conducted in the past, and while no lynx were detected, snowshoe hare tracks were reported along several routes. In the early 1990's, winter track and camera station surveys were conducted on the Malheur National Forest to inventory forest carnivores, but no lynx were detected.

Recent unconfirmed lynx sightings have been reported along the Middle Fork of the John Day River, Blue Mountain Ranger District, and in the Reynolds Creek Subwatershed, Prairie City Ranger District.

Based on the limited available information, the Fish and Wildlife Service cannot substantiate the historic or current presence of a resident lynx population in Oregon (USF&WS 2000). Verts and Carraway (1998) conclude that there is no evidence of self-maintaining populations in Oregon and USDI (1997) considered lynx "extirpated" from Oregon. Additional surveys and research are warranted before lynx are considered as having self-maintaining populations in Oregon.

Until survey results supply better information, analysis for this Environmental Impact Statement assumes that the project area currently supports reproductive lynx and assesses the effects due to management actions accordingly. Effects have been analyzed using project-level standards and guidelines provided in the Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000).

Lynx Habitat Analysis in the Galena Project Area

Lynx habitat was modeled for the Malheur National Forest using forest stand plant association information as well as verification through field surveys. A stand's plant association indicates the type of vegetation likely to occur on the site throughout succession.

Habitat is defined as stands above 5,000 feet that are classified as subalpine fir, Engelmann spruce, lodgepole pine, or moist grand fir plant associations. Biophysical environments are considered cold/dry, cool/moist, or cool/wet. Subalpine fir, Engelmann spruce and lodgepole pine plant associations are considered primary habitat. Grand fir types in the cool/moist and cool/wet biophysical environments provide habitat only in conjunction with primary types and are considered secondary habitat.

The grand fir/grouse huckleberry plant association, a cold/dry type, provides lynx habitat at the higher elevations, but frequently does not at the lower elevations, particularly on south and west slopes. Under these latter conditions, grand fir/grouse huckleberry sites are often warm/dry types shaped by low intensity/high frequency fire regimes. Historically, ponderosa pine, western larch and Douglas-fir dominated these sites and consequently, did not provide lynx habitat. In general, the grand fir/grouse huckleberry plant association provides habitat on north and east slopes above 5,000 feet and on south and west slopes above 5,650 feet.

Lynx Analysis Units

Lynx Analysis Units (LAUs) are areas delineated for management of habitat characteristics and implementation of Project Design Criteria (PDC's) necessary for the lynx to complete its life cycle. An LAU contains lands capable of producing the necessary lynx components: denning and foraging habitat. LAUs encompass both suitable lynx habitat and unsuitable areas. Habitat may or may not be currently in suitable conditions for denning or foraging habitat.

The Malheur National Forest developed LAU's using protocol in the Canada Lynx Conservation Assessment and Strategy (LCAS) (2000). Lynx habitat was classified based on lynx plant associations, elevation, structural stage and canopy closure. Concentrations of lynx habitat were then aggregated into LAU's based on LAU sizes recommended in the LCAS.

LAUs are not designed to represent the actual home range of a lynx. Rather, LAUs are intended to provide the fundamental or smallest scale which to begin evaluation and monitoring of the effects of management actions on lynx habitat. Conservation measures listed in the LCAS will generally apply only to lynx habitat on federal lands within LAU's.

Nine LAU's have been designated on the Malheur National Forest. The Galena Restoration Project Area is in the Southeast Galena Lynx Analysis Unit (see map). Twenty-nine percent (16,636 of the 58,352 acres) of this LAU is classified as lynx habitat. Habitat is concentrated in two areas. In the north, habitat is located in and around the Vinegar Hill-Indian Rock Scenic Area. In the south, habitat is located in and around the Dixie Butte Wildlife Emphasis Area. In the Southeast Galena Project Area, twenty-eight percent (13,688 of the 49,473 acres) of the project area is classified as lynx habitat.

Denning and Foraging Habitat

Stand structural stages, combined with tree canopy coverage, were used to help classify stands as denning, foraging or unsuitable habitat. Table 2 displays lynx habitat classification within the SE Galena LAU and the SE Galena Project Area. The Canada Lynx Conservation Assessment and Strategy (LCAS) (2000) recommends assessing effects at the LAU scale.

BE Table 12—(Table 2). Lynx habitat classification in SE Galena LAU and SE Galena Project Area —denning, foraging, unsuitable, and created unsuitable habitat by acres and percent of total lynx habitat.

Habitat Element	Exiting Condition			
	SE Galena LAU -		SE Galena Project Area	
	Acres	% Habitat	Acres	% Habitat
Denning	8,165	49%	6,608	48%
Forage	6,166	37%	5,739	42%
Unsuitable[1]	2,305	14%	1,341	10%
Created Unsuitable[2]	1,281[2]	8%[2]	639[2]	5%[2]
Total[3]	16,636[3]	100%[3]	13,688[3]	100%[3]

[1]*Unsuitable* = habitat made unsuitable by management activities, such as timber harvest, within the last *15* years *or* habitat made unsuitable by natural disturbances such as wildfire or wind throw regardless of when the disturbance occurred.

[2]*Created Unsuitable* = a subset of "unsuitable" and refers to lynx habitat made unsuitable by management activities within the last *10* years. The 1,281 acres of "created unsuitable" habitat displayed above are included in the 2,305 acres of "unsuitable" habitat as well.

[3]*Total acres* = denning + forage + unsuitable = 16,638 acres/13,688 acres. *Created unsuitable* acres are already included in *unsuitable* category and consequently, not double-counted.

In the LAU, denning habitat comprises 8,165 acres or 49% of total habitat. Denning habitat typically occurs in stands where mature trees and multiple canopy layers are present. The number of down logs tends to be higher in these stands than in younger stands. Insects, such as mountain pine, and diseases, such as root rot, often kill mature trees. Windstorms will occasionally blow down patches of trees. Many stands with past spruce budworm outbreaks contain areas with accumulations of down logs; however, most logs are smaller diameter and the accumulations do not occur at depths that would be likely to facilitate lynx denning. Down logs of the density to provide good denning habitat occur infrequently, but are believed to occupy at least 10% of the total denning habitat. During past field reconnaissance, areas of sufficient downed logs have been identified, but not recorded or mapped. Although some stands may lack the down wood necessary to provide a den, most other important structural characteristics are intact.

In the LAU, foraging habitat comprises 6,166 acres or 37% of total lynx habitat. Habitat exists for snowshoe hare as well as known and fairly dense populations of Douglas squirrel. Snowshoe hares are the primary prey of lynx. Douglas tree squirrels are considered a secondary prey species. Research suggests that when a lynx depends on tree squirrels as a primary food source, lynx reproduction rates may not be sustainable (Koehler 1990).

Because lodgepole pine regenerates in thick dense stands, it provides excellent snowshoe hare habitat when trees are young and needles continue to be within reach at normal snow depths. In this LAU, normal snow depths are 2-4 feet at elevations above 5,000 feet. Stands that are likely to support a significant component of lodgepole pine at some point during succession were considered to be the best potential snowshoe hare habitat. The quality of forage habitat is unknown throughout most of the LAU.

Stands that are likely to best develop and sustain mature, multistoried characteristics were considered to be potential Douglas squirrel habitat. The quantity of forage for snowshoe hare is usually lower than in a stand classified solely as foraging habitat, and the quantity of forage for Douglas tree squirrels is higher than in a stand classified as foraging habitat. Many plant associations/structural satges can support both hares and squirrels.

Denning and foraging habitats are typically interspersed. Habitat has been fragmented by natural disturbances, such as wildfire and wind throw, as well as human-related disturbances, such as timber harvest.

<u>Denning and Foraging Habitat by Structural Stage</u>

Denning habitat typically occurs in stands classified as OFMS (Old Forest Multiple Strata), YFMS (Young Forest Multiple Strata), or UR (Understory Reinitiation).

Foraging habitat occurs in many, but not all, stands classified as OFMS (Old Forest Multiple Strata), YFMS (Young Forest Multiple Strata), UR (Understory Reinitiation), and SI (Stand Initiation) stands. OFMS and YFMS stands, which represent more mature stand conditions, are likely to be optimal squirrel habitat. OFMS, YFMS and UR stands having small openings dominated by thickets of dense young trees probably provide habitat for both squirrels and snowshoe hares. SI stands, i.e., early successsional stands, dominated by dense young trees, provide habitat for snowshoe hares if trees are about 8 feet or taller and provide winter forage. These younger stands often have high densities of lodgepole pine unless the stands have been precommercially thinned. Because snowshoe hares tend to occur more frequently in very dense lodgepole pine stands, thinning results in lower snowshoe hare density and a reduced prey base for lynx.

SECC (Stem Exclusion Closed Canopy), stands containing fairly dense pole-sized trees, provide some forage during the winter; however the forage is very limited. The quantity is much lower than in stands in the other structural stages because tree crowns frequently are too far above the ground for snowshoe hares to reach, and bole diameters are greater than those used by hares. Also, stand structure and cone production provide limited tree squirrel habitat.

OFSS (Old Forest Single Stratum) and SEOC (Stem Exclusion Open Canopy) stands are typically found on hot/dry and warm/dry sites. Low intensity/high frequency fires kept these stands relatively open and dominated by ponderosa pine, western larch and Douglas-fir. Consequently, these sites typically do not provide lynx habitat.

<u>Unsuitable Habitat</u>

Table 2 indicates that approximately 2,300 acres or 14% of total lynx habitat is currently classified as "unsuitable" as a result of vegetation management or natural disturbance. These stands currently do not have the necessary vegetation and/or down logs to support lynx for either denning or foraging. Specifically, "unsuitable" refers to habitat made unsuitable by management activities, such as timber harvest, within the last ***15*** years *or* habitat made unsuitable by natural disturbances such as a wildfire or windstorm regardless of when the disturbance occurred. Harvested stands greater than 15 years old generally have redeveloped into foraging habitat. "Created unsuitable" is a subset of "unsuitable" and refers to lynx habitat made unsuitable by management activities within the last ***10*** years. In the Southeast Galena LAU, approximately 1,300 acres or 8% of the habitat is classified as "created unsuitable."

LCAS standards permit the conversion of suitable lynx habitat to a nonsuitable condition, but limits the rate of conversion. If more than 30% of lynx habitat within an LAU is currently in unsuitable condition, vegetation management activities, which would further reduce suitable conditions, is prohibited. Currently, 14% of lynx habitat in the LAU is in an unsuitable condition. In addition, management activities shall not change more than 15% of lynx habitat within a LAU to an unsuitable condition within a 10-year period. About 8% of lynx habitat has been converted to an unsuitable condition in the last 10 years.

Two large-scale fires, the Summit (29,809 acres) and Reed (2,310 acres) Fires, have burned in the LAU since 1970. Most of the Summit Fire occurred in the adjacent Northwest Galena LAU. These fires were predominantly high severity, stand replacement fires, destroying denning and foraging habitat in some areas. Many acres have been planted with conifers. Natural regeneration of lodgepole is high in some areas. Recent burns may stimulate woody browse production for use by snowshoe hares. Although many fire-killed trees were harvested, snag levels remain high. Snags will eventually fall, and may provide down wood for future lynx denning.

In July 1998, approximately 1,400 acres blew down in the Vincent and Vinegar Subwatersheds. Rarely was blowdown 100% on any one acre. Quality denning conditions probably exist where blowdown was more moderate and overstory canopies remain intact. Extreme blowdown occurred on only 245 acres, and even on these acres smaller trees and advanced regeneration remain intact and are providing forage. On the 245 acres, the windstorm converted lynx denning habitat to forage habitat due to the reduction in canopy cover. These acres are unlikely to redevelop into denning habitat in the short-term. The number of large trees on the ground would provide great opportunities for denning except that many of the concentrations are out in the open. Quality denning conditions probably only exist where log piles are located immediately adjacent to undamaged denning habitat at the periphery of the blowdown area. Log piles provide natal sites while adjacent canopy cover provides additional security.

<u>Connectivity Habitat</u>

Connectivity for lynx is being addressed via the Land and Resource Management Plan, Amendment 2 old growth corridors (LRMP2 corrdiors)) and Key Linkage Areas (KLAs) (see connectivity map in Appendix). Definitions follow:

<u>LRMP Amendment 2 (LRMP2) Corridors</u> –LRMP2 corridors are also referred to as old growth corridors or late and old structure (LOS) corridors. Cover vegetation is provided in a quantity and arrangement to provide old growth associated wildlife species sufficient habitat for free movement between distinct old growth areas, interaction of adults, and dispersal of young. LRMP standards require that LOS stands be connected by corridors where trees of medium or larger diameter are common and canopy closures are within the top 1/3 of site potential. Standards require that corridors be at least 400 feet wide. Management direction for LRMP2 corridors is included in the Malheur National Forest Plan, as amended (USDA 1990 and USDA 1995). Although the main purpose of LRMP2 corridors is to connect blocks of old growth, the corridors also inadvertently provide connectivity for lynx. In some instances, LRMP direction failed to create connectivity between blocks of lynx habitat, specifically, stands that do not classify as old growth. In these areas, additional connectivity corridors were added. Geographic features that lynx are known to use for travel including ridges, riparian areas, and saddles, are to a certain extent represented in the corridors, but were not specific targets. Corridors were designed primarily on structural stage characteristics, not geographic features. Therefore, geographic features conducive to lynx travel may be lacking in some portions of connective habitat.

<u>Proposed Key Linkage Areas (KLA)</u> – KLAs are intended to provide cover vegetation in a quantity and arrangement to provide large, wide-ranging carnivores, such as Canada lynx, California wolverine, and gray wolf, sufficient habitat for dispersal and movement across the landscape. Connected forests allow animals to easily move long distances in search of food, cover and mates. On the Malheur National Forest, proposed KLAs are approximately 3 miles wide. Within any perpendicular transect to the KLA, at least 1/3 (i.e., 1 mile) should provide movement and dispersal habitat any point in time. In the project area, a KLA is proposed along

the northern boundary. This KLA is intended to connect LAUs on the Malheur National Forest to LAUs on the Umatilla, Wallowa-Whitman and Ochoco National Forests. Although management direction for KLAs is included in the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger, et al. 2000), the LCAS does not provide specific direction on how to implement KLAs. The USFS Regional Office is currently developing a region-wide strategy for KLAs. On the Malheur National Forest, KLAs are only proposed at this time pending further direction.

Alternative 1 - No Action Alternative

Direct and Indirect Effects

Short-term (less than 10 years)

Under the No Action Alternative, there would be no management activities; therefore, there should be no direct or indirect effects to transient lynx or the lynx habitat.

Denning habitat, i.e., mature stands with significant amounts of down logs, would remain unchanged. In the Vincent/Vinegar blowdown area, large concentrations of down logs would remain where they fell. On the periphery of the blowdown area, where down log levels are moderate and overhead canopies remain intact, conditions are likely some of the best for lynx denning.

Forage habitat, i.e. early successional stands, exist on 6,166 acres within the LAU. Approximately 925 of the 6,166 acres are in plant associations where lodgepole pine is seral. These stands should provide the highest quality habitat for snowshoe hare, and consequently the highest quality foraging habitat for lynx as well. The remaining acres are in subalpine fir, Engelmann spruce and grand fir stands where lodgepole pine is not as major a stand component. These stand provide foraging habitat, but are considered of somewhat lesser quality. Small trees forage stands would continue to mature and lower branches on stems would begin to self-prune. Alternate forage habitat, i.e., habitat for Douglas tree squirrels, is more often associated with older, mature stands. Little change would occur in these stands because they change more slowly than young stands. Where the 1998 Vincent/Vinegar windstorm converted denning habitat to forage habitat (250 acres), the number of logs on the ground is probably limiting development of new regeneration. Development of foraging habitat into denning habitat would likely be delayed. This area in particular remains at high risk to wildlife due to the elevated fuels caused by the windstorm.

Approximately 2,300 acres of unsuitable habitat exists within the Southeast Galena LAU, 1,300 acres in the Southeast Galena Project Area. Most of these acres have either been planted and/or are naturally regenerating. By 2010, acres regenerated in the early- to mid-1990s would begin to redevelop into foraging habitat. Regenerating trees would just begin to reach sufficient height and density to begin providing forage at average snow depths. Few of these stands are expected to develop into suitable in the next 10 years.

Sufficient connectivity habitat is available for dispersal and movement of animals across the landscape.

Long-term (greater than 25 years)

Denning habitat is not expected to increase significantly. Endemic levels of insect and disease should continue to kill both large and small diameter trees. Eventually snags would fall, gradually contributing down logs for natal sites. Field observations indicate that many natural stands that have never been entered for timber harvest, do not support downed logs of sufficient diameter and density to provide quality natal sites. Endemic levels of insect and disease have rarely generated large piles of large diameter trees. Suitable concentrations of downed logs are probably best created by small blowdown events or elevated bark beetle infestations in lodgepole pine stands.

Stand classified as forage habitat in 2000 are expected to undergo reductions in suitability as dense stands age and begin to self-prune and lose green needles in the lower branches, taking forage out of reach of snowshoe hares. Habitat for Douglas tree squirrels should remain plentiful.

Approximately 2,300 acres of unsuitable habitat would likely develop into foraging habitat in the next 10 to 25 years. Essentially all acres considered potential for lynx habitat would be classified as lynx habitat.

In the absence of a major disturbance, stands will eventually transition from unsuitable to foraging habitat to denning habitat. The YFMS would most likely become denning habitat first, followed by UR and SECC, then SI. This can provide an even flow of habitat overtime, depending on future management. If all acres develop into denning habitat, the amount of foraging habitat would become the limiting factor in population viability. Denning habitat is currently comprises 49% of the lynx habitat in the LAU; this is in excess of the 10% standard in the LCAS. If anything, denning currently is in excess and foraging is low in the LAU.

Habitat would remain at high risk to stand replacement fire. Although stand replacement fires are considered within the Historic Range of Variation (HRV) for many of these sites, the uncharacteristically "*large size*" of recent wildfires, e.g. the Summit Fire at 30,000 acres, is considered outside HRV. Risk remains high that a large, uncharacteristically severe wildlife could destroy lynx habitat. The Vincent/Vinegar blowdown area remains at particularly high risk; and this area likely supports some of the best denning habitat in the project area. In the Dry Forest types, much of the travel or connectivity habitat remains susceptible to stand replacement fire as well. Loss of travel habitat could isolate animals or populations at the landscape level.

Road density would remain as currently exists (Table 3). See Alternative 1 – No Action.

BE Table 13—(Table 3). Open, closed, decommissioned and total miles of roads, and open and total road density by alternative.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Open Road Miles	169.46	128.46	128.46	126.46	201.46
Closed Road Miles	175.54	168.54	167.54	153.54	104.54
Total Road Miles	345.00	297.00	296.00	280.00	306.10
Open Road Density	1.80	1.37	1.36	1.34	2.14
Total Road Density	3.66	3.15	3.14	2.97	3.25
Constructed Roads	0.00	18.00	17.00	2.0	22.00
Decommissioned Roads1	0.00	67.00	67.00	67.00	62.00
Decommissioned roads are not included in total road mileage and road density values. These roads are removed from the District's transportation system. Road entrances are obscured, culverts are removed, and the roadbeds are either re-contoured or re-shaped to the lie of the land or allowed to revegetate on their own.					

<u>Cumulative Effects</u>

None are identified

Determination of Effects

This alternative will *not effect (NE)* lynx or their habitat.

Alternative 2 – Proposed Action

<u>Direct and Indirect Effects</u>

<u>Timber harvest</u>

Alternative 2 does not treat lynx denning or foraging habitat with the exception of the Vincent/Vinegar blowdown area.

In the blowdown area, salvage harvest (HSV) would occur on 245 acres classified as lynx foraging habitat. The objective is to reduce elevated fuel loads. Proposed salvage units would be #'s 350, 352. 354. 356, 358 and 360. All of the units are in primary habitat except unit 354, which is in secondary habitat. The majority of the overstory trees were blown down in these areas. Sufficient understory trees and advance regeneration survived for these stands to still classify as foraging habitat. Following treatment, habitat percentages would remain as displayed in Table 2.

Salvage harvest would be limited to downed trees. Live, commercial sized trees still standing would not be removed, unless considered a safety hazard during logging operations. Trees would be removed by helicopter. Following harvest, slash would be hand piled and burned. Non-commercial size trees, i.e., trees less than 7" dbh, would be retained to maintain foraging habitat and security cover. Areas below recommended trees stocking levels would be planted.

Ten percent of the acres to be treated (25+ acres) would be retained in untreated patches of 2 to 5 acres to provide denning opportunities for Canada lynx. A District biologist would locate those patches which would best meet the needs of lynx, i.e., concentrations of blowdown located over a variety of topographical features including ridges, saddles and riparian areas and where patches of vegetation cover may still be available. This design feature meets direction in the Canada Lynx Conservation Assessment and Strategy (2000) and the Forest's Project Design Criteria (PDC) (2001).

Salvage operations would have negative effects on lynx in the short-term by removing downed logs that could be used for security and in some places for denning. Where blowdown is heavier, small openings could be created, but the units as a whole are expected to remain forage habitat. Openings would be planted.

Salvage operations would benefit lynx in the long-term. Removal of downed material would open up areas and expose mineral soil for planting and natural regeneration. Quality forage habitat would likely be restored more rapidly over more acres than if left untreated. Lodgepole regeneration is already high in some locations. Salvage of blowdown would reduce high fuel accumulations, and consequently reduce the risk of severe wildfires. Fire risk would be reduced within the units as well as in adjacent denning and foraging habitat.

In denning habitat, blowdown would be partially removed from 72 acres located within Riparian Habitat Conservation Areas (RHCAs). Blow down levels are lower here than in the salvage units discussed previously. Much of the mature overstory and complex stand structure remains intact. Blowdown would only be removed from the outer ½ of the RHCAs, and only 50% to 80% of the blowdown would be removed. Trees would be removed by helicopter and decked. As with the salvage units, concentrations of blow down would be left in patches 2 to 5 acres in size to maintain denning opportunities. Patches would be retained over at least 20% of the acres as compared to 10% in the salvage units. These stands would still be classified as denning habitat following treatment. Habitat percentages in Table 2 would remain the same. Risks of wildfire would be reduced.

Because only 317 acres of 16,636 acres of habitat would be treated; overall effects to habitat would be as described in Alternative 1 - No Action.

<u>Prescribed burning</u>

No prescribed burning would be conducted with lynx denning or foraging habitat. No effects to lynx would occur. Treatment of slash in salvage units would be as described in the timber harvest section above.

Connectivity habitat

Tables 4 and 5 display proposed harvest acres within LRMP2 corridors and KLAs by alternative.

BE Table 14—(Table 4) Treatment in LRMP2 corridors by Alternative.

Total LRMP2 acres = 7,333 ac.	Alt 1	Alt. 2	Alt. 3	Alt. 4	Alt.5
LRMP2 acres treated	0	171	0	38	220
% of LRMP2 corridors treated by harvest	0%	2%	0%	1%	3%
LRMP2 acres treated with modified prescription (HTH1/SPC1)	0	171	0	38	220
% of LRMP2 treated acres with modified prescription	---	100%	---	100%	100%1
1Prescription requires canopy closure remain within the top1/3 of site potential, but does not require stocking at 180 trees per acre.					

BE Table 15—(Table 5)—Treatment in KLAs by Alternative. Percentage of KLA which meets 1/3rd canopy rule and 180 tpa stocking.

Total KLA acres = 18,369 ac.	Alt 1	Alt. 2	Alt. 3	Alt. 4	Alt.5
KLA acres treated	0	2,833	2,619	847	3,619
% of LRMP2 corridors treated by harvest	0%	15%	14%	5%	20%
KLA acres treated with modified prescription	0	1,122	1,013	511	0
% of KLA treated acres with modified prescription	0%	40%	39%	60%	0%
% of KLA which meets 1/3rd canopy rule and 180 tpa	75.3%	66.2%	66.5%	73.5%	55.6%

Alternative 2 would harvest timber on 171 acres or 2% of the LRMP2 corridors. A modified commercial thinning (HTH1) would reduce stocking, increase growth rates on the residual trees, and accelerate development of old forest structure, while maintaining connectivity. Thinning prescriptions would maintain the minimum standards required for movement and dispersal. Canopy closure would be maintained in the top 1/3 of site potential; and a minimum of 180 trees per acre would be left on site. Whereas a standard thinning prescription might leave about 60 square feet of basal area, this prescription would retain approximately 80 square feet. LRMP standards require that canopy closure meet the top 1/3 of site potential, but does not specify minimum tree density. Koehler (1990) reports that lynx may not use stands that are thinned below 180 trees per acre for movement and dispersal. Tops of trees would be yarded. Where understory stocking is high, a modified precommercial thinning (SPC1) would also be used to reduce stocking. Clumps of small trees would be retained to provide connectivity and horizontal as well as vertical diversity. Treatment units are 47,48, 49, 64, 600, 602, 603, 606 and 608. In units 64 and 606, slash would be hand piled and burned. Several travel corridors are being maintained in riparian areas. Timber harvest is being excluded within 100 feet of intermittent streams, 150 feet of perennial fish bearing, and 300 feet of major fish bearing streams. These riparian corridors would be widened to at least 400 feet to meet LRMP standards.

Harvest and slash disposal would reduce tree density, and down wood that could have provided cover for lynx for a short time would be burned. Although this reduces the potential for lynx hiding cover, this is consistent with the LCAS because the stand would be managed within the HRV for these Forest types. Harvest on 171 acres would have negligible effects on the overall corridor system. These corridors would remain conducive to lynx travel (Koehler 1990).

In the proposed KLA, alternatives 2 would treat 2,833 acres. Tree stocking and canopy closure would be reduced in all treatment units, likely reducing the quality of some habitats for wildlife movement and dispersal. Densities would be reduced to levels that maximize tree growth and reduce bark beetle risk. Harvest prescriptions would be modified on 1,122 acres or 40% of the acres treated to retain canopy closures in the top 1/3 of site potential and tree stocking at 180 trees per acre or greater. Within the KLA, minimum cover standards would be met on 66% of the acres, well above the 33% level desired to ensure at least a 1-mile swath of the 3-mile wide corridor maintains sufficient cover for travel. Harvest would reduce stand densities, but still maintain connectivity.

Prescribed burning would be conducted within connectivity habitat, including LRMP2 corridors and KLAs. Underburning would be used to reduce fine fuels. Burning could kill smaller trees or prune back branches that are near the ground, which could reduce hiding cover within corridors. Burning prescriptions would be designed to maintain canopy closure within the top 1/3 of site potential and stocking at a minimum of 180 trees per acre. Where these standards cannot be met, burning would be forgone. Several LRMP2 corridors are within RHCAs; fires would not be ignited within RHCAs, but would be allowed to creep in from the outer edges. Most of the area proposed for burning is in Dry Forest types with a history of high frequency/low intensity fires. Burning would begin to restore the natural fire regime, but it would reduce the quality of habitat in the corridor for at least few years. In the future, additional maintenance prescribed burning may occur in the project area and surrounding areas. This activity should remove accumulations of natural fuels from the uplands, remove decadent vegetation, stimulate regeneration of fire dependent plants, and maintain the area so natural fire cycles can be reestablished that create and retain mosaic habitat conditions.

New roads would be constructed across connectivity corridors at four locations. Three of the four new roads would remain open following harvest; one road would be closed. Two of the roads would be constructed as close to right angles to the corridors as possible to minimize effects. The other two roads would be constructed to relocate roads outside of RHCAs; these two roads would be *aligned* with the corridors, increasing potential effects. These two roads would remain open. This will adversely affect the quality of the affected corridors. About 22 miles of road would be decommissioned or relocated outside RHCAs, improving corridors for travel.

Management activities would reduce the risk that uncharacteristically severe disturbance events could reduce or alter connectivity habitat and isolate populations.

<u>Hardwood Restoration</u>

Although considered suitable as lynx habitat, most hardwood stands in the LAU are not mapped as lynx habitat because they are very small, usually less than a couple acres. Twenty-five decadent aspen stands on 28 acres have been identified. Healthy, reproducing aspen stands can provide quality habitat for snowshoe hare. Most of the aspen stands in the project area are at elevations below 5000 feet. The 5000 foot elevation band is used as the minimum elevation to classify stands as denning or forage habitat. However, aspen stands are located in riparian areas, many of which serve as travel corridors between lynx habitat on the north side and south sides of the project area.

Hardwood rehabilitation will increase the amount of aspen by protecting sprouts from browsing. All action alternatives would remove encroaching conifers from around aspen. Aspen stands would then be fenced, often by buck and pole fences, to reduce browsing and facilitate regeneration, ensuring the long-term survival of these stands. Snowshoe hare and lynx will still have access to these aspen stands. Lodgepole pines may be removed or girdled. Cutting lodgepole pine would reduce the amount of forage for snowshoe hare temporarily until new aspen suckers begin to grow which will take about two growing season. However, it will be about 5 years before aspen suckers provide much forage. Cutting conifers is consistent with the LCAS because the LCAS standards state, "apply harvest prescriptions that favor regeneration of aspen." (Ruediger et al., 2000, p. 79). Because aspen grows so quickly, it has the potential to replace the forage removed by cutting conifers in just a few years. Snowshoe hare habitat would be incrementally improved by aspen restoration.

Hardwood trees and shrubs would be planted along 21 miles of streams; seedlings would be fenced to protect them from browsing. An additional 4 miles of existing shrubs would also be fenced. Hardwood restoration would likely benefit lynx.

<u>Road Densities</u>

Roads through lynx habitat increases human access and may increase human-lynx encounters. High road densities lead to increased potential for poaching, road kill, and incidental mortality of lynx (Witmer et al. 1998). Road density would be reduced in all subwatersheds. Total road miles would be reduced by decommissioning 67 miles (see Table 3). Road entrances would be obscured, culverts removed, and the roadbeds would either be re-contoured or re-shaped to the lie of the land or allowed to re-vegetate on their own. Open road density would be reduced from 1.8 miles per square mile to 1.4 miles per square mile. Closing roads would reduce the risk of incidental lynx mortality if transient lynx were to pass through the area in the future. Closed roads have the potential to be used periodically, or the road could be opened again if another project is implemented in the area (currently none are envisioned). Therefore, closed roads probably will remain as created openings indefinitely.

As an action connected to the timber sale, 18 miles of roads would be constructed of which .06 miles miles would be through lynx foraging habitat. New roads would be closed after the sale, but would remain on the transportation system.

Winter harvest could occur with this project. Roads could be plowed which would allow other carnivores to have access to elevation above 5,000 feet, areas where deep snows, greater than 2 feet during the winter, usually exclude them. This could increase competition for food, which could adversely affect lynx. Because the duration of the project is relatively short, usually 3-5 years, this is consistent with the LCAS. There will be no net increase in permanently plowed roads nor an increase in winter sports activities from this project.

<u>Trail Construction</u>

Approximately 38 miles of designated hiking/biking/all-terrain vehicle trail are within the LAU (Table 6). Portions of these trails are located within or adjacent to denning or foraging habitat. The Davis Creek Trail is the only trail designated for use by all-terrain vehicles. Alternative 2 proposes several changes to the area's trail system.

BE Table 16—(Table 6) - Bike/Hiking/ATV trails within the Southeast Galena LAU.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Blackeye Trail	3.46	3.26	3.26	3.26	3.26
Davis Creek	9.16	8.66	8.66	8.66	14.26
Princess/Vincent	20.85	20.85	20.85	20.85	20.85
Sunrise Butte	0.89	.89	.89	.89	.89
Tempest Mine	3.38	4.68	4.68	4.68	4.68
TOTAL	37.74	38.34	38.34	38.34	43.94

The Blackeye and Tempest Trails would be modified to reduce resource concerns and create a new loop trail opportunity. On the Blackeye Trail system, an existing trailhead and about 0.7 miles of trail would be decommissioned. This section of trail is located in lynx denning habitat. A new trailhead and about 0.5 miles of new trail would be constructed to provide a new tie in to the trail system. This new section of trail would parallel Forest Road 2010, the major access road into the Vinegar Hill-Indian Rock Scenic Area. New construction would be within lynx denning habitat.

Approximately 1.3 miles of new trail would be added to the Tempest Trail, with about 0.7 miles through lynx foraging habitat. This new section of trail would follow an existing jeep trail, so construction would be minimal. Recreation use would not be expected to change significantly as a result of these modifications. Effects to lynx would be minimal.

The Davis Creek Trail would be modified to reduce hydrology and fishery resource impacts. Approximately 1.0 mile of trail would be decommissioned; and replaced with 0.5 miles of new trail to reduce hydrology and fisheries concerns. These activities are outside lynx habitat. About 8.3 miles would be reconstructed. Reconstruction would not change the existing use of this trail, but it would be widened to reduce safety and resource concerns related to ATV use. Approximately 0.4 miles of this trail pass through lynx habitat. Because the trail already provides motorized access, no effects to lynx would be anticipated.

No changes would be made to the snow mobile trail system.

<u>Pesticide and Herbicide Use</u>

Tables 7 and 8 display animal damage control and competing vegetation control by alternatives. In additional, 1.4 acres of noxious weeds would be treated by herbicide. Non-chemical treatments would not be a concern to lynx. This section discloses the effects of chemical use.

BE Table 17—(Table 7) –displays acres of animal control treatments by alternative.

Treatment	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Strychnine Baiting	0	1,439	0	0	2,298
Trapping	0	0	1,197	0	0
Aluminum Phosphide Fumigation	0	250	0	0	300
Total Pocket Gopher Treatment	0	1689	1,179	0	2,598

BE Table 18—(Table 8) –displays acres of competing vegetation control by alternative.

Treatment	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
No Treatment	0	844	508	0	1,259
Subsoiling	0	193	193	0	266
Large Scalps or Mulch Mats	0	897	741	0	1,318
Herbicides	0	897	0	0	1,318

Strychnine baiting - There would be no risk of primary poisoning. Canada lynx do not consume grains or seeds as part of their diets. There would be little to no risk of secondary poisoning. The potential for exposure to bait or poisoned animals is low. The bait would be applied below ground. Applicators would adhere to strict handling and storage procedures. Poisoned gophers typically die below ground. Although lynx may feed on pocket gophers, gophers are unlikely to be a significant component of a lynx's diet. Strychnine would be prohibited within ½ mile of Canada lynx denning habitat, and at distances in excess of ½ mile, where lynx plant associations are continuous between denning habitat and a reforestation unit. If one applies the lowest lethal dose for mammals of .33 mg/kg, a 6.7 kg lynx would have to consume <2 to 20 poisoned gophers in a short period of time to be killed. No effects to lynx would be expected.

Aluminum phosphide fumigation - Because the effects of fumigation are limited to those animals which actually inhabit the underground burrows, no direct effects to gray wolves would occur. The potential for secondary toxicity would be highly unlikely. Phosphine does not accumulate in animal tissue. Due to the mode of action - phosphine reacting within the respiratory system - and the extremely short half-life in target animals following death, residue levels present in animals directly killed by phosphine gas are not high enough to produce the same effect in a predator or scavenger.

Herbicide Applications –The US Forest Service contracted Syracuse Environmental Research Associates Inc. and the Syracuse Research Corporation to compile relevant studies on registered pesticides and to evaluate ecological risks (SERA, 1995, 1996 and 1997). Studies generally indicate that glypohosate, and hexazinine are characterized by relatively low toxicity to mammalian and avian species. These herbicides do not bioaccumulate in tissues of exposed animals, but rather are rapidly excreted in urine or feces (USDA 1992 and 1997). No effects to lynx or their prey would be expected.

See the Southeast Galena Restoration Project Wildlife Report for additional discussion on chemical effects.

<u>Disturbance</u>

Timber harvest, post-harvest activities, and associated activities, such as road construction and reconstruction, precommercial thinning, and underburning, have the potential to disturb lynx that potentially could be in the project area when activities are in progress. This could cause a change in movement patterns while projects are ongoing. Activities could continue for up to 10 years after initiation, but not all activities would occur at the same time. Timber harvest and associated activities, such as road construction and reconstruction, are likely to occur first. These would be followed by post-harvest activities of damaged and diseased tree removal, precommercial thinning, fuels treatment, and prescribed underburning. Management activities would be prohibited within ¼ mile of lynx denning habitat from May 1 to August 30 to prevent disturbances to lynx raising their young.

Cumulative Effects

The Canada Lynx Conservation Assessment and Strategy (2000) recommends analyzing lynx habitat at the LAU scale. Projects similar to those proposed in this project are being conducted or planned elsewhere within the LAU, and include timber harvest, road construction, prescribed burning, precommercial thinning, and hardwood planting and protection. Most of the activities have already been completed. Projects are listed in the Cumulative Effects Table located in Appendix C of the Southeast Galena Restoration Project EIS. Potential cumulative effects have been considered, and pose no additional threats to lynx or its habitat. The Middle Fork and Northwest Galena LAUs lie to the east and west of the Southeast Galena LAU. Separate lynx assessments are being made for projects that are ongoing or proposed within these LAUs. Projects are listed in the Cumulative Effects Table located in Appendix C of the Southeast Galena Resotoration Project EIS. The cumulative total of treatments in all areas has the potential to alter suitable lynx forage and denning habitat. However, without a large-scale habitat assessment determining the status of lynx habitat components, the effects of cumulative actions are unknown.

Determination of Effects – Alternative 2

This project meets the standards and guidelines in the LCAS. Based on the information provided in this assessment, I conclude that actions proposed under the action alternative may affect individuals, but are not likely to adversely affect the continued existence of the Canada lynx. Thresholds for creation of unsuitable habitat are not exceeded. Although salvage of blowdown in denning and foraging habitat would reduce security cover, and denning and foraging opportunities, treatment intensity would not be sufficient to change habitat classification to unsuitable. Concentrations of blowdown would be retained on site on at least10% of the acres, as recommended by the LCAS. Salvage operations would benefit lynx in the long-term. Removal of downed material would open up areas and expose mineral soil for planting and natural regeneration. Quality forage habitat would likely be restored more rapidly over more acres than if left untreated. Salvage of blowdown would reduce high fuel accumulations, and consequently reduce the risk of severe wildfires. Fire risk would be reduced within the units as well as in adjacent denning and foraging habitat.

Harvest, thinning, and burning in LRMP2 corridor and KLAs would affect the lynx habitat by reducing the quality, less horizontal and vertical structure to hide a lynx, of connectivity habitat; however, standards for cover would be met. New road construction though corridors and habitat could degrade use locally, but would be offset by an overall reduction in open road density. The changes to the connectivity corridors would reduce their effectiveness, but would not preclude their use by lynx. Disturbance for proposed activities could affect a lynx's movement and foraging patterns, but other options would remain allowing foraging and movement through the area.

Alternative 3

Direct and Indirect Effects

Timber harvest

Timber harvest would be similar to Alternative 2. Blowdown would be removed by helicopter on 317 acres; on 245 acres in foraging habitat and 72 acres in denning habitat. Salvage operations would have negative effects on lynx in the short-term by removing downed logs that could be used for security and in some places for denning. Removal of blowdown would not modifiy habitat classification in these areas; acres would not be converted to unsuitable.

Salvage operations would benefit lynx in the long-term. Removal of downed material would open up areas and expose mineral soil for planting and natural regeneration. Quality forage habitat would likely be restored more rapidly over more acres than if left untreated. Salvage of blowdown would reduce high fuel accumulations, and consequently reduce the risk of severe wildfires. Fire risk would be reduced within the units as well as in adjacent denning and foraging habitat.

Prescribed burning

No prescribed burning would be conducted with lynx denning or foraging habitat. No effects to lynx would occur. Treatment of slash in salvage units would be as described in the timber harvest section above.

Connectivity habitat

Tables 4 and 5 display proposed harvest acres within LRMP2 corridors and KLAs by alternative. Alternative 3 does not propose harvest activities within LRMP2 corridors. Harvest is proposed within the KLA; effects are similar to Alternative 2 except that fewer acres are treated. Following harvest activities and prescribed burning, 66% of the KLA would meet cover and density standards, well above the 33% level desired to ensure at least a 1-mile swath of the 3-mile KLA maintains sufficient cover for travel. Management activities would reduce the risk that uncharacteristically severe disturbance events could reduce or alter connectivity habitat and isolate populations.

New roads would be constructed across connectivity corridors at four locations. Three of the four new roads would remain open following harvest; one road would be closed. Two of the roads would be constructed as close to right angles to the corridors as possible to minimize effects. The other two roads would be constructed to relocate roads outside of RHCAs; these two roads would be *aligned* with the corridors, increasing potential effects. These two roads would remain open. This will adversely affect the quality of the affected corridors. About 22 miles of road would be decommissioned or relocated outside RHCAs, improving corridors for travel.

Hardwood Restoration

Effects of hardwood restoration would be as described for Alternative 2.

Road Densities

Changes in the road system would be similar to Alternative 2. Total road miles would be reduced by decommissioning 67 miles (see Table 3). Open road density would be reduced from 1.8 miles per square mile to 1.4 miles per square mile. Closing roads would reduce the risk of incidental lynx mortality if transient lynx were to pass through the area in the future. As an action connected to the timber sale, 17 miles of roads would be constructed of which 0.6 miles would be through lynx foraging habitat. New roads would be closed after the sale, but remain on the transportation system. Winter harvest could occur with this project. Roads could be plowed. Because the duration of the project is relatively short, usually 3-5 years, this is consistent with the LCAS. There will be no net increase in permanently plowed roads nor an increase in winter sports activities from this project.

Trail Construction

Proposed activities and effects would be as described for Alternative 2.

Pesticide and Herbicide Use

No pesticides or herbicides would be use to control competing vegetation, noxious weeds or pocket gophers (see Tables 7 and 8). No adverse effects to lynx would be expected.

Disturbance

Management activities would be prohibited within ¼ mile of lynx denning habitat from May 1 to August 30 to prevent disturbances to lynx raising their young. Effects would be as described for Alternative 2.

Determination of Effects – Alternative 3

This project meets the standards and guidelines in the LCAS. Based on the information provided in this assessment, I conclude that actions proposed under the action alternative may affect individuals, but are not likely to adversely affect the continued existence of the Canada lynx. Effects would be similar to Alternative 2. Slightly less acres would be treated. No harvest activities would be conducted in LRMP2 corridors, so effects to connectivity would be reduced. No pesticides or herbicides would be used. See Determination of Effects for Alternative 2 for detailed rationale for determination.

Cumulative Effects

Cumulative effects would be similar to those described in Alternative 2.

Alternative 4

Direct and Indirect Effects

Timber harvest

No harvest would be conducted with lynx denning or foraging habitat. No blowdown would be removed in the Vincent and Vinegar Subwatersheds. Logs would remain on the ground providing security habitat for lynx and their prey. Quality denning conditions probably exist along the periphery of the blowdown area where concentrations of downed logs are found in proximity of vegetation with high canopy closure. High concentrations of blowdown

Prescribed burning

No prescribed burning would be conducted with lynx denning or foraging habitat. No effects to lynx would occur. Treatment of slash in salvage units would be as described in the timber harvest section above.

Connectivity habitat

Tables 4 and 5 display proposed harvest acres within LRMP2 corridors and KLAs by alternative. Alternative 4 would precommercial thin 38 acres or 1% of the LRMP2 corridors. A modified precommercial thin (SPC1) would reduce tree stocking, bark beetle risk, and fuel loads. Thinning prescriptions would maintain the minimum standards required for movement and dispersal. The treatment units are #'s 602 and 603. Harvest is proposed within the KLA; effects are similar to Alternative 2 except that fewer acres are treated. Following harvest activities and prescribed burning, 74% of the KLA would meet cover and density standards, well above the 33% level desired to ensure at least a 1-mile swath of the 3-mile KLA maintains sufficient cover for travel. Management activities would reduce the risk that uncharacteristically severe disturbance events could reduce or alter connectivity habitat and isolate populations.

New roads would be constructed across connectivity corridors at two locations. These roads would relocate roads outside of RHCAs. Both roads would remain open following harvest. The two roads would not be constructed at right angles to the corridor; rather, they would be *aligned* with the corridors, increasing potential effects. This will adversely affect the quality of the affected corridors. About 22 miles of road would be decommissioned or relocated outside RHCAs, improving riparian corridors for travel.

Hardwood Restoration

Effects of hardwood restoration would be as described for Alternative 2.

Road Densities

Changes in the road system would be similar to Alternative 2. Total road miles would be reduced by decommissioning 67 miles (see Table 3). Open road density would be reduced from 1.8 miles per square mile to 1.3 miles per square mile. Closing roads would reduce the risk of incidental lynx mortality if transient lynx were to pass through the area in the future. About 2 miles of roads would be constructed to relocate existing roads outside of RHCAs. New roads would be closed after the sale, but would remain on the transportation system. Winter harvest could occur with this project. Roads could be plowed. Because the duration of the project is relatively short, usually 3-5 years, this is consistent with the LCAS. There will be no net increase in permanently plowed roads nor an increase in winter sports activities from this project.

Trail Construction

Proposed activities and effects would be as described for Alternative 2, except that the status of the Davis Creek Trail would be changed from motorized to non-motorized. Reconstruction would not be required along 8.3 miles of trail. Approximately 0.4 miles of trail passes through lynx habitat; the potential for disturbance would be reduced.

Pesticide and Herbicide Use

No pesticides or herbicides would be use to control competing vegetation, noxious weeds or pocket gophers (see Tables 7 and 8). No adverse effects to lynx would be expected.

Disturbance

Management activities would be prohibited within ¼ mile of lynx denning habitat from May 1 to August 30 to prevent disturbances to lynx raising their young. Effects would be as described for Alternative 2.

Cumulative Effects

Cumulative effects would be similar to those described in Alternative 2.

Determination of Effects – Alternative 4

This project meets the standards and guidelines in the LCAS. Based on the information provided in this assessment, I conclude that actions proposed under the action alternative may affect individuals, but are not likely to adversely affect the continued existence of the Canada lynx. Harvest would not occur in denning or foraging habitat. Treatment would be reduced in travel habitat as compared to Alternatives 2. In the KLA, effects would be considerably reduced from Alternative 2. In the LRMP2 corridors, effects from harvest activities would be negligible. Reduced open road densities would reduce opportunities for human-lynx interactions. No pesticides or herbicides would be used.

Alternative 5

Direct and Indirect Effects

Timber harvest

Timber harvest would similar to Alternative 2. Blowdown would be removed by helicopter on 317 acres; on 245 acres in foraging habitat and 72 acres in denning habitat. Salvage operations would have negative effects on lynx in the short-term by removing downed logs that could be used for security and in some places for denning. Removal of blowdown would not modifiy habitat classification in these areas; acres would not be converted to unsuitable.

Salvage operations would benefit lynx in the long-term. Removal of downed material would open up areas and expose mineral soil for planting and natural regeneration. Quality forage habitat would likely be restored more rapidly over more acres than if left untreated. Salvage of blowdown would reduce high fuel accumulations, and consequently reduce the risk of severe wildfires. Fire risk would be reduced within the units as well as in adjacent denning and foraging habitat.

Prescribed burning

No prescribed burning would be conducted with lynx denning or foraging habitat. No effects to lynx would occur. Treatment of slash in salvage units would be as described in the timber harvest section above.

Connectivity habitat

Tables 4 and 5 display proposed harvest acres within LRMP2 corridors and KLAs by alternative. Alternative 5 would harvest timber on 220 acres or 3% of the LRMP2 corridors. A modified commercial thinning (HTH1) would reduce stocking, increase growth rates on the residual trees, and accelerate development of old forest structure, while maintaining connectivity. Thinning prescriptions would maintain the minimum standards in the LRMP required for movement and dispersal. Canopy closure would be maintained in the top 1/3 of site potential. Unlike Alternative 2, tree densities could be reduced below 180 trees per acres as long as the canopy closure standard is met. LRMP standards require that canopy closure meet the top 1/3 of site potential, but does not specify minimum tree density. Koehler (1990) reports that lynx may not use stands that are thinned below 180 trees per acre for movement and dispersal. Consequently, alternative 5 could create breaks in the corridors that lynx may not cross. Tops of trees would be yarded. Where understory stocking is high, precommercial thinning (SPC1) would also be used to reduce stocking. Clumps of small trees would be retained to provide connectivity and horizontal as well as vertical diversity. Treatment units are 43, 47,48, 49, 64, 600, 602, 603, 606 and 608. In units 64 and 606, slash would be hand piled and burned. Several travel corridors are being maintained in riparian areas.

Harvest and slash disposal would reduce tree density, and down wood that could have provided cover for lynx for a short time would be burned. Although this reduces the potential for lynx hiding cover, this is consistent with the LCAS because the stand would be managed within the HRV for these Forest types. Harvest on 220 acres would have negligible effects on the overall corridor system. These corridors would remain conducive to lynx travel (Koehler 1990).

In the proposed KLA, Alternatives 5 would treat 3,619 acres. Tree stocking and canopy closure would be reduced in all treatment units, likely reducing the quality of some habitats for wildlife movement and dispersal. Most stands are in Dry Forest types; priority would be given to restoring HRV. Densities would be reduced to levels that maximize tree growth and reduce bark beetle risk. Canopy closures in harvest units may fall below the top 1/3 of site potential. Tree stocking could fall below 180 trees oper acre with understory densities being reduced the most. Following treatment, approximately 56% of the KLA would have stands that are in the top 1/3 of potential canopy closure, a reduction of 20% from the existing condition. Management activities would reduce the risk that uncharacteristically severe disturbance events could reduce or alter connectivity habitat and isolate populations.

New roads would be constructed across connectivity corridors at four locations. Three of the six new roads would remain open following harvest; three roads would be closed. Four of the roads would be constructed as close to right angles to the corridors as possible to minimize effects. The other two roads would be constructed to relocate roads outside of RHCAs; these two roads would be *aligned* with the corridors, increasing potential effects. These two roads would remain open. This will adversely affect the quality of the affected corridors. About 22 miles of road would be decommissioned or relocated outside RHCAs, improving corridors for travel.

<u>Hardwood Restoration</u>

Effects of hardwood restoration would be as described for Alternative 2.

<u>Road Densities</u>

Changes in the road system would be similar to Alternative 2. Although 67 miles of road would be decommissioned (see Table 3), additional roads would be constructed and many left open. Open road density would increase from 1.8 miles per square mile to 2.14 miles per square mile. This alternative was designed to address public concern for reduced access. Increasing road densities could increase the risk of incidental lynx mortality if transient lynx were to pass through the area in the future. Open road densities are higher in the lower elevations than in the upper elevations where lynx habitat is located. As an action connected to the timber sale, 18 miles of roads would be constructed of which 0.14 miles would be through lynx foraging habitat. New roads would be closed after the sale, but remain on the transportation system. Winter harvest could occur with this project. Roads could be plowed. Because the duration of the project is relatively short, usually 3-5 years, this is consistent with the LCAS. There will be no net increase in permanently plowed roads nor an increase in winter sports activities from this project.

Trail Construction

Proposed activities and effects would be as described for Alternative 2. In addition, 7.9 miles of trail would be added to create a loop trail system. The new trail would use a combination of existing roads and new road proposed under this project. The new trail would not be designated within lynx habitat. Motorized use of the trail would be expected to remain at current use levels.

Pesticide and Herbicide Use

Affects would be as described for alternative 2, except that additional acres would receive chemical treatments (see Tables 7 and 8). No effects would be anticipated.

Disturbance

Management activities would be prohibited within ¼ mile of lynx denning habitat from May 1 to August 30 to prevent disturbances to lynx raising their young. Effects would be as described for Alternative 2.

Cumulative Effects

Cumulative Effects would be similar to those described in Alternative 2.

Determination of Effects – Alternative 5

This project meets the standards and guidelines in the LCAS. Based on the information provided in this assessment, I conclude that actions proposed under the action alternative may affect individuals, but are not likely to adversely affect the continued existence of the Canada lynx. Thresholds for creation of unsuitable habitat are not exceeded. Although salvage of blowdown in denning and foraging habitat would reduce security cover, and denning and foraging opportunities, treatment intensity would not be sufficient to change habitat classification to unsuitable. Concentrations of blowdown would be retained on site on at least10% of the acres, as recommended by the LCAS. Salvage operations would benefit lynx in the long-term. Removal of downed material would open up areas and expose mineral soil for planting and natural regeneration. Quality forage habitat would likely be restored more rapidly over more acres than if left untreated. Salvage of blowdown would reduce high fuel accumulations, and consequently reduce the risk of severe wildfires. Fire risk would be reduced within the units as well as in adjacent denning and foraging habitat.

Harvest, thinning, and burning in LRMP2 corridor and KLAs would affect the lynx habitat by reducing the quality, less horizontal and vertical structure to hide a lynx, of connectivity habitat; however, standards for cover would be met. New road construction though corridors and habitat could degrade use locally, but would be offset by an overall reduction in open road density. The changes to the connectivity corridors would reduce their effectiveness, but would not preclude their use by lynx. Increasing road densities could increase the risk of incidental lynx mortality if transient lynx were to pass through the area in the future. Open road densities are higher in the lower elevations than in the upper elevations where lynx habitat is located. Disturbance for proposed activities could affect a lynx's movement and foraging patterns, but other options would remain allowing foraging and movement through the area.

IV. POTENTIAL EFFECTS OF THE PROPOSED ACTION AND ALTERNATIVES ON SENSITIVE SPECIES

American Peregrine Falcon (*Falco peregrinus*)

Status: Federal – Species of Concern
State - Threatened
Region 6 - Sensitive

Biology and Ecology

Peregrine falcons prefer a variety of open habitats near nesting cliffs or mountains (Snyder 1991). They usually inhabit areas near water, such as lakes, rivers, or oceans. Nest sites are often used for several years. They tend to choose overhanging cliffs with loose soil, sand, dead vegetation, or gravel, in which they can scrape a depression for their eggs. Peregrine falcons primarily eat birds. Secondary prey species include tree and ground squirrels, rabbits, various other small mammals (Snyder 1991).

The peregrine falcon's most destructive predator is man. Peregrine falcon populations in the United Sates were dramatically reduced by exposure to chlorinated hydrocarbon pesticides. These pesticides reduce eggshell thickness, thereby causing the eggs to break during incubation. These pesticides are now banned in the United States and Canada. The peregrine falcon has made a dramatic comeback in the past decade.

Environmental Baseline

Peregrine falcons have been observed in the Galena Watershed with most sightings occurring at Coyote Bluffs and Ragged Rocks. Coyote Bluffs is located within the project area on cliffs adjacent to the Middle Fork of the John Day River; cliff characteristics and close proximity to County Road 20 probably make this site low potential for nesting. Ragged rocks is located approximately 3 miles east of the SE Galena project area; this site has been identified as having good potential for falcon nesting. Nesting peregrines have not been documented at either site. Nesting habitat also occurs about one mile north of the project area on the Umatilla National Forest; peregrines have been reported there, but nesting has not been documented.

<u>Effects Common to All Alternatives</u>

Peregrine falcon presence in the area is transitory in nature and falcons would not likely be affected during implementation of the proposed activities. There would be no direct, indirect, or cumulative effects to falcons.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting - There would be no risk of primary poisoning; peregrine falcons do not consume grains or seeds as part of their diets. There would be no risk of secondary poisoning. Although peregrine falcons will feed on small mammals, their diet consists predominantly of small birds. Raptors have a relatively high tolerance for strychnine (Anthony et al. 1984). If one applies the lowest lethal dosage for raptors of 7.7 mg/kg, a peregrine falcon would have to consume from 1 to 42 strychnine-killed mammals to be killed. Peregrine falcons are rare visitors to the project area. No impacts to peregrine falcons would be expected.

Aluminum phosphide fumigation – Because the effects of fumigation are limited to those animals which actually inhabit the underground burrows, no direct effects to peregrine falcons would occur. The potential for secondary toxicity would be highly unlikely. Phosphine does not accumulate in animal tissue. Due to the mode of action - phosphine reacting within the respiratory system - and the extremely short half-life in target animals following death, residue levels present in animals directly killed by phosphine gas are not high enough to produce the same effect in a predator or scavenger.

Herbicide Applications –The US Forest Service contracted Syracuse Environmental Research Associates Inc. and the Syracuse Research Corporation to compile relevant studies on registered pesticides and to evaluate ecological risks (SERA, 1995, 1996 and 1997). Studies generally indicate that glypohosate, and hexazinine are characterized by relatively low toxicity to mammalian and avian species. These herbicides do not bioaccumulate in tissues of exposed animals, but rather are rapidly excreted in urine or feces (USDA 1992 and 1997).

See the Southeast Galena Restoration Project Wildlife Report for additional discussion on chemical effects.

Determination of Effects

There would be no impact (NI) to peregrine falcon by implementing any of the alternatives.

California Wolverine (Gulo gulo)

Status: Federal – Species of Concern
State - Threatened
Region 6 - Sensitive

Biology and Ecology

Unless other wise noted, information was taken from Ruggiero et al. (1994), which compiles and summarizes all of the existing information on wolverine. Research indicates that wolverines tend to prefer higher alpine areas with a mixture of habitats including dense mixed conifer forest as well as shale/rock slide areas for both denning and foraging habitat (Ruggiero et al., 1994). In presettlement times, wolverines were widespread but likely always occurred at low densities in the western United States. In general, wolverine densities are low relative to carnivores of similar size. Reproductive rates are low and sexual maturity delayed, even in comparison with other mammalian carnivores.

Wolverines generally are opportunistic omnivores in summer and primarily scavengers in winter. All studies have shown the paramount importance of large mammal carrion, and the availability of large mammals underlies the distribution, survival, and reproductive success of wolverines. They will eat smaller prey, but they are too large to survive on only small prey. However, a prey base diverse in size and species is important because large carrion is not always available. An abundance of large mammal carrion or a diverse prey base does not guarantee the presence of wolverines, especially if other life needs, such as denning habitat, are not met.

In North America, information on natal dens is biased to tundra regions. Above treeline, dens appear to require snow 1 to 3 meters deep that persists into spring. Proximity of rocky areas, such as talus slopes or boulder fields, for dens or rendezvous sites appeared to be important in Norway, Russia, and Idaho. Limited information is available on dens in forested habitat. Dens in forests have been in holes dug under fallen trees, in cavities of large standing trees, under fallen logs or the roots of upturned trees, and in accumulations of woody debris. Physical structure may be important for denning in forest habitats. Wolverines appear to be extremely sensitive to human disturbance during natal denning (prior to weaning). If females are disturbed, they will move their kits, possibly to unsuitable den sites.

Wolverine habitat is probably best defined in terms of adequate year-round food supplies in large, sparsely inhabited wilderness areas, rather than in terms of particular types of topography or plant associations. Preferences for some forest cover types, aspects, slopes, or elevations have been primarily attributed to greater food abundance, but also to avoidance of high temperatures and humans. The perception that wolverines are a high-elevation species has arisen because where wolverines are surrounded by people, they are usually found in the most inaccessible habitats: the mountain ranges.

Apparently, wolverines do not tolerate land-use activities, such as agriculture or urban and industrial development that permanently alter habitats. The greatest impacts on wolverine possibly are habitat fragmentation and access from land-use activities. Because of the wolverine's large home range and extensive movements, it may appear that specific habitat attributes are not important and recolonization of vacant habitats is not a concern. However, natal and maternal dens may require much structural diversity and may be limiting in habitats that have been extensively modified by logging or other land-use practices. Insufficient denning habitat may decrease their already low reproductive potential.

Home ranges of adult wolverine in North America are approximately 100 km^2 to 400 km^2 for females, and approximately 200 km^2 to 1,600 km^2 for males. Home range size may vary due to differences in abundance and distribution of food. Habitat is reduced or degraded, primarily due to forest fragmentation and high road densities.

Environmental Baseline

There is little information in the Blue Mountains relative to population density and distribution of wolverines. Wolverine habitat occurs primarily in wilderness and large roadless areas. Areas of low human impacts, low human disturbance, and high deer and elk concentrations are preferred. Within the project area, the Vinegar Hill-Indian Rock Scenic Area and Dixie Butte Wildlife Emphasis Area exhibit these characteristics. Elsewhere on the District, the Strawberry Mountain Wilderness, Dry Cabin Wildlife Emphasis Area and the Shaketable, McClellan Mountain, and Aldrich Mountain Roadless Areas share these characteristics.

Periodically throughout the 1990s, wolverine surveys were conducted across the District, including areas in and near the project area. No wolverine tracks or individuals were found. A wolverine was confirmed from bones and fur found in the Strawberry Mountain Wilderness in 1992. Unconfirmed sightings of wolverine were reported in the project area near Dixie Mountain and to the northwest near Big Boulder Creek. Additional sightings of animals and tracks have occurred on the District, but none have been confirmed.

It is likely that a wolverine could use the project area, particularly the large, unroaded areas associated with the Vinegar Hill-Indian Rock Scenic Area and Dixie Butte Wildlife Emphasis Area.

The Cold, Moist and Lodgepole Forest types represent the highest quality habitat, particularly where they remain relatively undeveloped and undisturbed. Quality habitat includes both the OFMS and YFMS structural stages. Approximately 13,500 acres of these forest types exist. Of that, 9,895 acres, or 73%, are in OFMS or YFMS condition. Structural stage percentages are within the estimated HRV for OFMS and in excess of the estimated HRV for YFMS. Potential habitat by forest type is as follows:

- In the moist forest type, 11,500 acres of potential habitat exists. Of that, 8,395 aces, or 73%, are in the OFMS and YFMS structural stages.
- In the cold forest type, 2,000 acres of potential habitat exists. Of that, 1,500 aces, or 75%, classifies as OFMS or YFMS.
- Approximately 1,100 acres of lodgepole pine habitat exists with 615 acres, or 55% in OFMS or YFMS conditions.

Elsewhere, lesser quality habitat provides sufficient cover and security to meet landscape connectivity between potential home range areas.

Alternative 1- No Action Alternative

There would be no effects (NE) to wolverine or potential home range or movement corridors within the planning area. All of the connectivity and late and old structure (LOS) habitat would remain as currently exists.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Timber harvest would occur primarily in lower elevation Dry Forests that have already been intensively managed; wolverines likely only use these areas as travel habitat. Approximately 980 acres or 8.5% of the Moist Forest types would be managed, primarily at mid to low elevations. No Cold or Lodegpole Forests would be entered. No harvest would occur within the large undisturbed areas in the Vinegar Hill-Indian Rock Scenic Area and Dixie Butte Wildlife Emphasis Area. After timber harvest, lower stand densities in stands currently providing dense conditions and travel habitat may affect individual wolverine. Similar to lynx, wolverines typically use ridges, saddles, and riparian areas for travel. Loss of travel habitat is expected to have similar impacts to wolverine as described for lynx. LRMP2 corridors and the Key Linkage Area maintained as described for lynx are expected to prevent impediments to wolverine travel and dispersal through the project area (see Canada lynx, Alternative 2, Connectivity Habitat). Reduced open road densities would reduce the potential for human-wolverine interaction.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting - There would be no risk of primary poisoning. Wolverines do not consume grains or seeds as part of their diets. Although wolverines do feed on pocket gophers, there would be little to no risk of secondary poisoning. The bait would be applied below ground. Applicators would adhere to strict handling and storage procedures. Poisoned gophers typically die below ground. It is possible that a wolverine could pass through treated plantations, dig into gopher burrows and scavenge poisoned gophers or other non-target animals. If this would occur, it is estimated that for an average-sized wolverine to consume a lethal strychnine dose it would have to locate and consume approximately 5 to 50 poisoned carcasses within a short period of time without regurgitation (based on the lethal dose for medium sized carnivore, 35 to 45 pounds (Barnes et al. 1985). In the event that a wolverine did visit one or more treatment units during or immediately following baiting, it is likely that it would not occupy the area long enough to locate and consume sufficient carcasses to receive a lethal dose because of relatively high human disturbance in the area. It is more likely that an animal could opportunistically feed on a few isolated carcasses while passing through a treatment unit. The resulting dosage level could potentially cause some minor gastric problems until the toxin was metabolized or regurgitated, but it would not be life threatening. No substantial impacts to wolverines would occur.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Aluminum phosphide fumigation - Because the effects of fumigation are limited to those animals which actually inhabit the underground burrows, no direct effects to wolverines would occur. The potential for secondary toxicity would be highly unlikely. Phosphine does not accumulate in animal tissue. Due to the mode of action - phosphine reacting within the respiratory system - and the extremely short half-life in target animals following death, residue levels present in animals directly killed by phosphine gas are not high enough to produce the same effect in a predator or scavenger.

Herbicide Applications –The US Forest Service contracted Syracuse Environmental Research Associates Inc. and the Syracuse Research Corporation to compile relevant studies on registered pesticides and to evaluate ecological risks (SERA, 1995, 1996 and 1997). Studies generally indicate that glypohosate, and hexazinine are characterized by relatively low toxicity to mammalian and avian species. These herbicides do not bioaccumulate in tissues of exposed animals, but rather are rapidly excreted in urine or feces (USDA 1992 and 1997).

See the Southeast Galena Restoration Project Wildlife Report for additional discussion on chemical effects.

Cumulative Effects

Several timber sales are planned for the near future to the east and west of the project area. Without a large-scale habitat assessment conducted to determine current condition of wolverine habitat, the impacts of cumulative actions are unknown.

Determination of Impacts

Based on current information, implementation may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species (MIIH).

Alternative 3

Effects would be similar to those described for Alternative 2. Fewer treatments are scheduled for upper elevation mixed conifer stands, therefore, the effect would be reduced. Approximately 700 acres or 6% of the Moist Forest types would be managed versus 8.5% under Alternative 2. More seclusion habitat due to higher tree densities would remain than in the proposed action. Loss of travel habitat is expected to have similar impacts to wolverine as described for lynx. LRMP2 corridors and the Key Linkage Area maintained as described for lynx are expected to prevent impediments to wolverine travel and dispersal through the project area (see Canada lynx, Alternative 3, Connectivity Habitat). Reduced open road densities would reduce the potential for human-wolverine interaction. No pesticides or herbicides would be used.

Cumulative Effects

Several timber sales are planned for the near future to the east and west of the project area. Without a large-scale habitat assessment conducted to determine current condition of wolverine habitat, the impacts of cumulative actions are unknown.

Determination of Impacts

Based on current information, implementation may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species (MIIH).

Alternative 4

Direct and Indirect Effects

Impacts are low. No commercial timber harvest would occur. Precommercial thinning would be implemented primarily in Dry Forest types. Alternative 4 treats the least amount of upper elevation mixed conifer stands. Approximately 250 acres or 2.2% of the Moist Forest types would be precommercially thinned. Loss of travel habitat is expected to have similar impacts to wolverine as described for lynx. LRMP2 corridors and the Key Linkage Area maintained as described for lynx are expected to prevent impediments to wolverine travel and dispersal through the project area (see Canada lynx, Alternative 4, Connectivity Habitat). Reduced open road densities would reduce the potential for human-wolverine interaction. No pesticides or herbicides would be used.

Cumulative Effects

Several timber sales are planned for the near future to the east and west of the project area. Without a large-scale habitat assessment conducted to determine current condition of wolverine habitat, the impacts of cumulative actions are unknown.

Determination of Impacts

Based on current information, implementation may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species (MIIH).

Alternative 5

Direct and Indirect Effects

Proposed management intensity is somewhat higher than under Alternative 2, the proposed action. Dry Forests would be more intensively managed. Approximately 1,150 acres or 10% of the Moist Forest types would be managed, primarily at mid to low elevations versus 8.5% under Alternative 2. No Cold or Lodegpole Forests would be entered. No harvest would occur within the large undisturbed areas in the Vinegar Hill-Indian Rock Scenic Area and Dixie Butte Wildlife Emphasis Area. Loss of travel habitat is expected to have similar impacts to wolverine as described for lynx (see Canada lynx, Alternative 5, Connectivity Habitat). LRMP2 corridors and the Key Linkage Area maintained as described for lynx are expected to prevent impediments to wolverine travel and dispersal through the project area for lynx. Alternative 5 reduces big game habitat effectiveness in some subwatersheds; potentially affecting movement and distribution of deer and elk (see Southeast Galena Wildlife Report). Wolverines may shift use areas in search of prey. Increased open road densities could increase the potential for human-wolverine interaction. The effects of pesticide and herbicide application are discussed in Alternative 2.

Cumulative Effects

Several timber sales are planned for the near future to the east and south of the planning area. Without a large-scale habitat assessment conducted to determine current condition of wolverine habitat, the impacts of cumulative actions are unknown.

Determination of Impacts

Based on current information, implementation may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species (MIIH).

Pacific fisher (Martes pennanti)

Status: Federal – Species of concern
State - Sensitive
Region 6 - Sensitive

Biology and Ecology:

Authorship and citation for the following baseline data, unless indicated otherwise, is taken from http://www.livingbasin.com./endangered/Mammals/fisher.html

Fishers are medium sized carnivores that prey on a wide variety of foods including birds, rabbits, porcupines, and carrion. Distribution is likely governed by the availability of food but the presence of overhead cover may also be an important factor. Home range sizes of fishers vary up to 30 km^2 (about 7,400 acres) for adult males. The range of one male will overlap those of more than one female, but home ranges within adult sexes are exclusive.

Fishers are found only in North America. Their current range is reduced from that which occurred prior to European settlement of the continent, but most of this reduction has occurred in the United States (Ruggiero et al. 1994). Fisher's range is in forested areas of central and southern Canada, south in the east to Wisconsin, Minnesota, Michigan, New York, and New England. In the west, they range south into northern Idaho, western Montana, Oregon, Washington, and the Sierra Nevada in California (Marshall 1996).

In Oregon, their range is the coastal range, Klamath Mountains, Cascade Range, and east to the Blue Mountains, and Gearhart Mountain or farther. They occur, or are likely to occur, in Baker, Clackamas, Coos, Curry, Deschutes, Douglas, Jackson, Josephine, Klamath, Lake, Lane, Linn, Tillamook, Union, and Wallowa counties. They formerly occurred in all forested counties (Marshall 1996). Parts of the Malheur National Forest are delineated to be within the fisher's range in Grant County, Oregon, according to the map found in Csuti et al. (1997).

Fishers use primarily coniferous or mixed-wood habitats. Optimum Fisher habitat consists of a diversity of forest types and, therefore, greater prey abundance. Studies have shown a preference for forests dominated by multi-layered conifer stands, and in Idaho, they prefer mesic forest habitats (Witmer et al. 1998), but some hardwoods may be desirable for maximum prey numbers and diversity. A 70 to 80 percent canopy closure is believed optimum, but a California study showed a preference for 40 to 70 percent canopy cover areas. Fishers are known to inhabit second growth and even clearcuts after cover is established (Marshall 1996). It is not known whether the second growth and sparse overhead canopy habitats are used transiently or the basis of stable home ranges (Ruggiero et al. 1994). Large diameter trees with cavities, especially riparian cottonwoods in British Columbia, are important as natal den sites. Fishers move to larger cavities as the young grow. Dense forest stands in the latter successional stages provide the best quality habitat, particularly in western North America. Ruggiero et al. (1994) noted that fisher use riparian areas disproportionately more than their occurrence and exhibit a strong preference for habitats that have overhead tree cover.

In Ruggiero (1994) it has been hypothesized that the physical structure of the forest and prey associated with the structure are the critical features that explain fisher habitat use, not specific forest types. Forest structure needs to provide three important functions for fisher usage: 1) lead to a high diversity of dense prey populations, 2) lead to high vulnerability of prey to fisher, and 3) provide natal and maternal dens and resting sites.

Fishers are vulnerable to habitat loss through forestry, trapping, and hydroelectric development. Loss of habitat through the cutting of forests for timber or conversion to other land uses, over-trapping and the widespread use of poisons as a harvest and predator control method have also contributed to the reduction and extirpation of Fisher populations. Forest harvesting elsewhere also increases access for trappers, which is a particular concern because fishers are taken in marten sets. Marshall (1996) states that timber harvesting is not considered compatible with maintenance of maximum fisher numbers in most areas; and if severe, it will eliminate fishers. Degraded, destroyed, or fragmented habitat may result in isolated habitats that are too small to maintain viable fisher populations.

Environmental Baseline

Although habitat exists in the project area, fisher are not known or suspected to occur there. Fisher have been extirpated from much of their range due to trapping and loss of habitat due to logging (http://imnh.isu.edu/digital atlas/splash_navigate/pcmain.htm). They are considered extirpated from Oregon (Oregon Natural Heritage Program 2001).

The Moist Forest, Cold Forest and Lodgepole Pine Forest types represent the highest quality habitat for fisher based upon site capability. Quality habitat includes both the OFMS and YFMS structural stages. Approximately 14,600 acres of these forest types exist. Of that, 10,510 acres, or 72%, are in OFMS or YFMS condition. Structural stage percentages are within the estimated HRV for OFMS and in excess of the estimated HRV for YFMS. Potential habitat by forest type is as follows:

- In the moist forest type, 11,500 acres of potential habitat exists. Of that, 8,395 aces, or 73%, are in the OFMS and YFMS structural stages.
- In the cold forest type, 2,000 acres of potential habitat exists. Of that, 1,500 aces, or 75%, classifies as OFMS or YFMS.
- Approximately 1,100 acres of lodgepole pine habitat exists with 615 acres, or 55% in OFMS or YFMS conditions.

The *warmer* Dry Forest typess likely provide fisher habitat as well, i.e., those plant associations with a notable grand fir component. Many of these stands have higher tree densities than they did historically. These conditions have resulted in the accumulation of dead wood habitat, both in the form of snags and down wood. These dead wood habitats, however, are generally smaller, and may provide a poorer quality of habitat. While fisher may use these areas for foraging, and possibly denning, over all use is likely less when compared to Moist forest, Cold forest and Lodgepole Pine Forest types. In addition, these drier habitats tend to be more fragmented and degraded by timber harvest. Approximately 17,500 acres of dry grand fir plant associations exist. Of that, 9,915 acres, or 57%, are in OFMS or YFMS structure habitat. This percentage is excess of the estimated HRV of 10% to 30% for OFMS and YFMS in dry forests.

No Action Alternative

Direct and Indirect Effects

No changes to fisher habitat would occur from timber management. Canopy closure will continue to increase in stands that currently have canopy closure less than 40%. As canopy closure increases above 40%, the risk of tree mortality due to insects and diseases increases. Stands on the dry end of the spectrum of capable fisher habitat probably cannot sustain canopy closure much above 40% because of the likelihood of insect- or disease-induced mortality. Stands on the moister end probably will continue to increase in canopy closure, but achieving or sustaining canopy closure above 60% for very long is unlikely.

Cumulative Effects

Cumulative effects include past timber sales that reduced canopy closure in fisher habitat. Most harvest treatments would require 20-50 years before the treated stands achieve at least 40% canopy closure.

Determination of Impacts

This alternative will *not impact (NI)* fisher or their habitat.

Alternative 2 - Proposed Action

Direct and Indirect Effects

Forest structure and species composition would change immediately following proposed timber harvest and prescribed burning activities. Habitat conditions would be modified accordingly. The majority or proposed treatments occur in the Dry Forest types (see Table 9), followed by the Moist Forest types. No timber harvest or burning activities would be implemented in Cold Forest types or Lodgepole Forest types under any action alternative.

BE Table 19—(Table 9) Acres of harvest treatment by Forest type and alternative. The table also displays % of total treatment acres in each Forest type.

FOREST TYPE	TOTAL ACRES IN FOREST TYPE	# OF TREATMENT ACRES (% OF TOTAL TREATMENT ACRES)			
		Alternative 2	Alternative 3	Alternative 4	Alternative 5
Dry Forest	29,000	9,700 (91%)	7,470 (91%)	2,460 (90%)	11,120 (91%)
Moist Forest	11,500	940 (9%)	740 (9%)	270 (10%)	1,100 (9%)
Lodgepole Forest	1,100	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Cold Forest	2,000	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total Acres	43,600	10,640 (100%)	8,210 (100%)	2,730 (100%)	12,220 (100%)

Dry Forest Types

Tables 10 and 11 display changes to Dry Forest due to timber harvest. Table 10 displays treatment by harvest prescription. Table 11 displays percentage of each structural stage for each alternative. HRV is displayed to indicate desired distribution. Alternative 1 displays the existing structural stages. The easiest way to summarize alternative effects on Pacific fisher habitat is to review changes in structural stage distribution.

BE Table 20—(Table 10) Percentage of Dry Forest type treated by silvicultural prescription and alternative.

TREATMENT	ALT. 2	ALT. 3	ALT. 4	ALT. 5
Dry Forest (29,000 acres)				
Commercial. Thinning (HTH)	14.7%	10.9%		15.8%
Comm. Thin & Precommercial Thin (HTH/SPC)	4.6%	3.7%		6.5%
Comm. Thin in Connectivity Corridors (HTH1)	1.8%	1.0%		0.5%
Comm. Thin & Precommercial. Thin in Connectivity Corridors. (HTH1/SPC1)	2.6%	2.1%		.1
Understory Removal (HUR)	3.0%	0.8%		4.0%
Shelterwood (HSH)	4.8%	3.3%		9.3%
Salvage (HSV)	0.2%	0.2%		0.2%
Precommercial Thinning (SPC)	2.0%	2.1%	6.2%	2.4%
Precommercial Thin in Connectivity Corridors (SPC1)	0.3%	0.4%	2.1%	
Total Treatment	35.0%	24.5%	8.3%	40.0%
No Treatment (HNT)	65.0%	75.5%	91.7%	60.0%

BE Table 21—(Table 11) Dry Forest Structural Stage Distribution by Alternative.

ALTERNATIVE	PRECENTAGE OF FOREST TYPE						
	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
HRV Range	5-15%	5-25%	5-10%	5-10%	5-15%	30-55%	5-15%
1 – *Existing*	5%	42%	3%	7%	30%	1%	12%
2	5%	43%	2%	13%	24%	4%	9%
3	5%	42%	3%	11%	26%	2%	11%
4	5%	42%	3%	9%	28%	1%	12%
5	5%	43%	2%	17%	20%	5%	8%

Alternative 2 would treat approximately 9,700 acres of Dry Forest. All prescriptions would reduce canopy closure to below 40%. Habitat would be degraded or lost for species that prefer high canopy cover and complex structure stands, including the Pacific fisher. YFMS is noticeably reduced. Harvest treatment would convert most of these stands to UR and SEOC structural stages. There are three relatively large, contiguous blocks of YFMS that could provide sufficient habitat to support reproducing pairs of fisher. Two blocks in the Little Boulder/Deerhorn and Vinegar Creek Subwatersheds are each about 1,200 acres in size, although the block in Vinegar Creek is more fragmented. A third block of YFMS, 600 acres in size, is in the Butte Subwatershed. These YFMS blocks are not considered the highest quality habitat for Pacific fisher. They are in Dry Forest types, are not OFMS, likely have reduced canopy closure, have had past harvest, and are likely deficient in dead wood habitat. Elsewhere, smaller existing YFMS blocks are found along the periphery of larger contiguous blocks of OFMS, and probably provide foraging habitat for reproducing pairs in the adjacent OFMS blocks.

Alternative 2 essentially converts the entire Little Boulder and Butte blocks from YFMS to UR and SEOC structure, likely making these blocks unsuitable for denning. These alternatives also convert about ½ of the Vinegar block to UR and SEOC structure. Consequently, implementation would potentially reduce the project area carrying capacity for fishers. Although Alternatiev 2 enters additional smaller blocks of YFMS structure, many of these habitat blocks are isolated or heavily fragmented. Where these smaller habitat blocks are adjacent to larger contiguous blocks of OFMS, they may provide additional foraging habitat, but treatment is unlikely to exclude animals. Population viability for Pacifc fisher would be maintained via the old growth in the Cold, Moist and Lodgeploe Forest types as well as the proposed system of Dedicated Old Growth (DOG), Replacement Old Growth (ROG), and Pileated Woodpecker Feeding Areas (PWFAs), as prescribed by the LRMP. Although the DOGs, ROGs and PWFAs are not specifically established for Pacific fisher, they would provide fisher habitat.

<u>Moist Forest Types</u>

Tables 12 and 13 display changes to Moist Forest due to timber harvest. Table 12 displays treatment by harvest prescription. Table 13 displays percentage of each structural stage for each alternative. HRV is displayed to indicate desired distribution. Alternative 1 displays the existing structural stages. The easiest way to summarize alternative effects on Pacific fisher habitat is to review changes in structural stage distribution.

BE Table 22 —(Table 12) - Percentage of Moist Forest type treated by silvicultural prescription and alternative.

TREATMENT	ALT. 2	ALT. 3	ALT. 4	ALT. 5
Moist Forest (11,500 acres)				
Commercial. Thinning (HTH)	1.6%	.7%		1.7%
Comm. Thin & Precommercial Thin (HTH/SPC)	0.8%	0.3%		2.0%
Comm. Thin in Connectivity Corridors (HTH1)	0.3%			0.3%
Comm. Thin & Precommercial. Thin in Connectivity Corridors (HTH1/SPC1)	0.1%			
Understory Removal (HUR)				0.5%
Shelterwood (HSH)	2.7%	2.1%		2.7%
Salvage (HSV)	1.6%	1.6%		1.6%
Precommercial Thinning (SPC)	1.3%	1.3%	2.1%	1.3%
Precommercial Thin in Connectivity Corridors (SPC1)			0.1%	
Total Treatment	8.5%	6.0%	2.2%	10.1%
No Treatment (HNT)	91.5%	94.0%	97.8%	89.9%

BE Table 23—(Table 13) - Moist Forest Structural Stage Distribution by Alternative

ALTERNATIVE	PRECENTAGE OF FOREST TYPE						
	SI	SEOC	SECC	UR	YFMS	OFSS	OFMS
HRV Range	10-30%	5-10%	10-20%	10-20%	10-20%	5-15%	15-40%
1 – Existing	6%	6%	4%	6%	39%	5%	34%
2	6%	6%	4%	10%	35%	5%	34%
3	6%	6%	4%	9%	36%	5%	34%
4	6%	6%	4%	7%	38%	5%	34%
5	6%	6%	4%	11%	34%	6%	33%

None of the action alternatives have significant effects on Moist Forest types. Alternative 2 harvests 940 acres or 8.5% of the Moist Forest types. As in the Dry Forest, canopy closure would be reduced below 40%. The most noticeable effect of the action alternatives would be the conversion of YFMS stands to UR stands. Habitat would be degraded or lost for species that prefer high canopy cover and complex structure stands, including the Pacific fisher. Harvest treatment does not fragment any large blocks of OFMS habitat, so the highest quality habitat for would be maintained.

Overall, the existing distribution of structural stages reflects HRV relatively well. There is an excess of YFMS structural stands and a deficiency in younger structural stages, i.e., the SI, UR, and SECC stages. In the future, it may be desirable to convert some of the YFMS stands into the younger structural stages to provide the historic range of habitats. The best approach would be to mimic the natural fire regime for the Moist Forest type, which tended to convert large blocks of habitat, 200 to 2000 acres in size, into the SI stage in a single event.

Population viability for the Pacific fisher would be maintained via old growth in the Cold and Moist Forest types as well as the proposed system of Dedicated Old Growth, Replacement Old Growth, and Pileated Woodpecker Feeding Areas as prescribed by the LRMP.

Prescribed burning would not be used in the Moist Forest types except in harvest units to reduce activity fuels. Stands would remain at risk for stand replacement wildfires; as this type of fire would remove much of the forest cover and stand structure required by species such as the pileated woodpecker and pine marten. This is not necessarily a negative habitat condition when disturbances are within the Historic Range of Variability. Pscofc fisher would be required to find habitats outside the burned areas. Given the low level of activity within the Moist Forest types, effects would be low and somewhat similar to those described in the no action alternative.

Connectivity Habitat

Alternative 2 would harvest timber on 171 acres or 2% of the LRMP2 corridors. A modified commercial thinning (HTH1) would reduce stocking, increase growth rates on the residual trees, and accelerate development of old forest structure, while maintaining connectivity. Thinning prescriptions would maintain the minimum standards required for movement and dispersal. Canopy closure would be maintained in the 1/3 of site potential; and a minimum of 180 trees per acre would be left on site. Whereas a standard thinning might leave about 60 square feet of basal area, the modified prescription could leave approximately 80 square feet. LRMP standards require that canopy closure meet the top 1/3 of site potential, but does not specify minimum tree density. Tops of trees would be yarded. Where understory stocking is high, a modified precommercial thinning (SPC1) would also be used to reduce stocking. Clumps of small trees would be retained to provide connectivity and horizontal as well as vertical diversity. Treatment units are 47,48, 49, 64, 600, 602, 603, 606 and 608. In units 64 and 606, slash would be hand piled and burned. Several travel corridors are being maintained in riparian areas. Timber harvest is being excluded within 100 feet of intermittent streams, 150 feet of perennial fish bearing, and 300 feet of major fish bearing streams. These riparian corridors would be widened to at least 400 feet to meet LRMP standards. Harvest on 171 acres would have negligible effects on the overall corridor system.

Prescribed burning would be conducted within LRMP2 corridors. Underburning would be used to reduce fine fuels. Burning could kill smaller trees or prune back branches that are near the ground, which could reduce hiding cover within corridors. Burning prescriptions would be designed to maintain canopy closure within the top 1/3 of site potential and stocking at a minimum of 180 trees per acre. Where these standards cannot be met, burning would be forgone. Several LRMP2 corridors are within RHCAs; fires would not be ignited within RHCAs, but would be allowed to creep in from the outer edges. Most of the area proposed for burning is in Dry Forest types with a history of high frequency/low intensity fires. Burning would begin to restore the natural fire regime, but it would reduce the quality of habitat in the corridor for at least few years. In the future, additional maintenance prescribed burning may occur in the project area and surrounding areas. This activity should remove accumulations of natural fuels from the uplands, remove decadent vegetation, stimulate regeneration of fire dependent plants, and maintain the area so natural fire cycles can be reestablished that create and retain mosaic habitat conditions.

New roads would be constructed across connectivity corridors at four locations. Three of the four new roads would remain open following harvest; one road would be closed. Two of the roads would be constructed as close to right angles to the corridors as possible to minimize effects. The other two roads would be constructed to relocate roads outside of RHCAs; these two roads would be *aligned* with the corridors, increasing potential effects. These two roads would remain open. This will adversely affect the quality of the affected corridors. About 22 miles of road would be decommissioned or relocated outside RHCAs, improving corridors for travel.

Management activities would reduce the risk that uncharacteristically severe disturbance events could reduce or alter connectivity habitat and isolate populations.

Pesticide and Herbicide Use

Tables 7 and 8 display treatment acres.

Strychnine baiting - Evans and Lindsey (1984) recommended using nontoxic alternatives in forest areas inhabited by special interest species such as fisher or marten. Although habitat exists in the project area, fisher are not known or suspected to occur in the project area. No impacts to Pacific fishers would occur.

Aluminum phosphide fumigation - Because the effects of fumigation are limited to those animals which actually inhabit the underground burrows, no direct effects to fishers would occur. The potential for secondary toxicity would be highly unlikely. Phosphine does not accumulate in animal tissue. Due to the mode of action - phosphine reacting within the respiratory system - and the extremely short half-life in target animals following death, residue levels present in animals directly killed by phosphine gas are not high enough to produce the same effect in a predator or scavenger.

Herbicide Applications –The US Forest Service contracted Syracuse Environmental Research Associates Inc. and the Syracuse Research Corporation to compile relevant studies on registered pesticides and to evaluate ecological risks (SERA, 1995, 1996 and 1997). Studies generally indicate that glypohosate, and hexazinine are characterized by relatively low toxicity to mammalian and avian species. These herbicides do not bioaccumulate in tissues of exposed animals, but rather are rapidly excreted in urine or feces (USDA 1992 and 1997).

See the Southeast Galena Restoration Project Wildlife Report for additional discussion on chemical effects.

Cumulative Effects

Similar activities - timber harvest, prescribed burning, and hardwood planting and protection - will be going on concurrently within the Middle Fork John Day Subbasin (see Appendix C- Projects Considered for Cumulative Effects).

The majority of the timber harvest and prescribed fire activities are being conducted in the Dry Forest types where much of the vegetation is outside HRV. Cumulatively, effects would be similar to those described in the previous section on direct/indirect effects, except they would be applied over a larger area. Treatments will reduce canopy closures and stand densities. Species, such as Pacific fisher could be affected by these activities. However, Dry Forests, even in the YFMS condition, are not particularly productive habitats for this species. Large diameter trees and dead wood habitats are notably lacking. Canopy closures are generally lower. Stands are dominated by ponderosa pine and Douglas-fir with a smaller component of grand fir. While structural stages will change from ones that are more suitable for theses species to ones that are less suitable, the overall impact will be much less because of the poorer quality of habitat as it currently exists. Impacts will be primarily to habitats used more for foraging than denning purposes. Cumulative impacts to higher quality Moist and Cold Forest habitats are low. Population viability for Pacific fisher would be maintained via old growth in the Moist, Cold and Lodgepole Pine Forest types as well as a system of Dedicated Old Growth (DOG), Replacement Old Growth (ROG), and Pileated Woodpecker Feeding Areas (PWFAs).

Determination of Impacts

This alternative may impact habitat, but because fisher have been extirpated from Oregon, this alternative will not contribute to the loss of species viability or contribute to federal listing (FSM 2670.24 – Exhibit 1. BIOLOGICAL EVALUATION PROCESS – THREATENED, ENDANGERED, PROPOSED AND SENSITIVE SPECIES PROJECT PROPOSAL). This alternative impact habitat, but will not likely contribute toward federal listing or loss of viability to the population or species (MIIH).

Alternative 3

Direct and Indirect Effects

Timber Harvest

The effects of timber harvest would be similar to Alternative 2, except less acres would be treated (see Tables 9, 10, 11, 12 and 13). In the Dry Forest types, 7,470 acres or 24.5% of the Dry Forest types would be treated. Alternative 3 converts ½ or less of each of the three large blocks of YFMS to UR and SEOC structure; implementation would potentially reduce the project area carrying capacity for fisher by one to two reproducing pairs of fisher. In the Moist Forest types, habitat for fisher would be degraded or lost on 740 acres or 6% of the Moist Forest types. Harvest treatment does not fragment any large blocks of OFMS habitat, so the highest quality habitat for fisher would be maintained.

Population viability for the Pacific fisher would be maintained via old growth in the Cold and Moist Forest types as well as the proposed system of Dedicated Old Growth, Replacement Old Growth, and Pileated Woodpecker Feeding Areas as prescribed by the LRMP.

Connectivity habitat

Alternative 3 does not propose harvest activities within LRMP2 corridors. Prescribed burning would be used to reduce fine fuels. Burning could kill smaller trees or prune back branches that are near the ground, which could reduce hiding cover within corridors. Burning prescriptions would be designed to maintain canopy closure within the top 1/3 of site potential and stocking at a minimum of 180 trees per acre. Where these standards cannot be met, burning would be forgone. Effects would be as described for Alternative 2.

New roads would be constructed across connectivity corridors at four locations. Three of the four new roads would remain open following harvest; one road would be closed. Two of the roads would be constructed as close to right angles to the corridors as possible to minimize effects. The other two roads would be constructed to relocate roads outside of RHCAs; these two roads would be *aligned* with the corridors, increasing potential effects. These two roads would remain open. This will adversely affect the quality of the affected corridors. About 22 miles of road would be decommissioned or relocated outside RHCAs, improving corridors for travel.

Pesticide and Herbicide Use

No pesticides or herbicides would be use to control competing vegetation, noxious weeds or pocket gophers (see Tables 7 and 8). No adverse effects to lynx would be expected.

Cumulative Effects

Cumulative effects would be similar to those described in Alternative 2.

Determination of Impacts

This alternative may impact habitat, but because fisher have been extirpated from Oregon, this alternative will not contribute to the loss of species viability or contribute to federal listing (FSM 2670.24 – Exhibit 1. BIOLOGICAL EVALUATION PROCESS – THREATENED, ENDANGERED, PROPOSED AND SENSITIVE SPECIES PROJECT PROPOSAL). This alternative impact habitat, but will not likely contribute toward federal listing or loss of viability to the population or species (MIIH).

Alternative 4

Direct and Indirect Effects

Timber Harvest

The effects of timber harvest would be somewhat similar to Alternative 2 and 3, except substantially less acres would be treated (see Tables 9, 10, 11, 12 and 13). In the Dry Forest types, 2,460 acres or 8.3% of the Dry Forest types would be treated. Alternative 4 treats only 2 of the 3 large blocks of YFMS. Treatment would fragment the Little Boulder and Vinegar blocks, but does not enter the Butte block; implementation would possibly reduce carrying capacity by one reproducing pair. In the Moist Forest types, 270 acres or 2.2% of the Moist Forest types would be treated. Harvest treatment does not fragment any large blocks of OFMS habitat, so the highest quality habitat for fisher would be maintained. In addition, precommercial thinning would limit tree removal to the smaller trees, so impacts to crown closure would be reduced compared to effects from a commercial harvest.

Population viability for the Pacific fisher would be maintained via old growth in the Cold and Moist Forest types as well as the proposed system of Dedicated Old Growth, Replacement Old Growth, and Pileated Woodpecker Feeding Areas as prescribed by the LRMP.

Connectivity habitat

Alternative 4 would precommercial thin 38 acres or 1% of the LRMP2 corridors. A modified precommercial thin (SPC1) would reduce tree stocking, bark beetle risk, and fuel loads. Thinning prescriptions would maintain the minimum standards required for movement and dispersal. The treatment units are #'s 602 and 603.

Prescribed burning would be used to reduce fine fuels. Burning could kill smaller trees or prune back branches that are near the ground, which could reduce hiding cover within corridors. Burning prescriptions would be designed to maintain canopy closure within the top 1/3 of site potential and stocking at a minimum of 180 trees per acre. Where these standards cannot be met, burning would be forgone. Effects would be as described for Alternative 2. Management activities would reduce the risk that uncharacteristically severe disturbance events could reduce or alter connectivity habitat and isolate populations.

New roads would be constructed across connectivity corridors at two locations. These roads would relocate roads outside of RHCAs. Both roads would remain open following harvest. The two roads would not be constructed at right angles to the corridor; rather, they would be *aligned* with the corridors, increasing potential effects. This will adversely affect the quality of the affected corridors. About 22 miles of road would be decommissioned or relocated outside RHCAs, improving riparian corridors for travel.

Pesticide and Herbicide Use

No pesticides or herbicides would be use to control competing vegetation, noxious weeds or pocket gophers (see Tables 7 and 8). No adverse effects to lynx would be expected.

Cumulative Effects

Cumulative effects would be similar to those described in Alternative 2.

Determination of Impacts

This alternative may impact habitat, but because fisher have been extirpated from Oregon, this alternative will not contribute to the loss of species viability or contribute to federal listing (FSM 2670.24 – Exhibit 1. BIOLOGICAL EVALUATION PROCESS – THREATENED, ENDANGERED, PROPOSED AND SENSITIVE SPECIES PROJECT PROPOSAL). This alternative impact habitat, but will not likely contribute toward federal listing or loss of viability to the population or species (MIIH).

Alternative 5

Direct and Indirect Effects

Timber Harvest

The effects of timber harvest would be similar to Alternative 2, except additional acres would be treated (see Tables 9, 10, 11, 12 and 13). In the Dry Forest types, 11,120 acres or 40% of the Dry Forest types would be treated. Alternative 5 degrades potential fisher habitat within the there large blocks of YFMS. Treatment essentially converts the entire Little Boulder and Butte blocks from YFMS to UR and SEOC structure, likely making these blocks unsuitable for denning. Alternative 5 also converts about ½ of the Vinegar block to UR and SEOC structure. Consequently, as in Alternative 2, implementation would potentially reduce the project area carrying capacity for fishers. In the Moist Forest types, 1,100 acres or 10% of the Moist Forest types would be treated. Harvest treatment does not fragment any large blocks of OFMS habitat, so the highest quality habitat for fisher would be maintained.

Population viability for the Pacific fisher would be maintained via old growth in the Cold and Moist Forest types as well as the proposed system of Dedicated Old Growth, Replacement Old Growth, and Pileated Woodpecker Feeding Areas as prescribed by the LRMP.

<u>Connectivity habitat</u>

Alternative 5 would harvest timber on 220 acres or 3% of the LRMP2 corridors. A modified commercial thinning (HTH1) would reduce stocking, increase growth rates on the residual trees, and accelerate development of old forest structure, while maintaining connectivity. Thinning prescriptions would maintain the minimum standards in the LRMP required for movement and dispersal. Canopy closure would be maintained in the top 1/3 of site potential. Unlike Alternative 2, tree densities could be reduced below 180 trees per acres as long as the canopy closure standard is met. LRMP standards require that canopy closure meet the top 1/3 of site potential, but does not specify minimum tree density. Tops of trees would be yarded. Where understory stocking is high, precommercial thinning (SPC1) would also be used to reduce stocking. Clumps of small trees would be retained to provide connectivity and horizontal as well as vertical diversity. Treatment units are 43, 47,48, 49, 64, 600, 602, 603, 606 and 608. In units 64 and 606, slash would be hand piled and burned. Harvest on 220 acres would have negligible effects on the overall corridor system.

Prescribed burning would be used to reduce fine fuels. Burning could kill smaller trees or prune back branches that are near the ground, which could reduce hiding cover within corridors. Burning prescriptions would be designed to maintain canopy closure within the top 1/3 of site potential and stocking at a minimum of 180 trees per acre. Where these standards cannot be met, burning would be forgone. Several LRMP2 corridors are within RHCAs; fires would not be ignited within RHCAs, but would be allowed to creep in from the outer edges. Most of the area proposed for burning is in Dry Forest types with a history of high frequency/low intensity fires. Burning would begin to restore the natural fire regime, but it would reduce the quality of habitat in the corridor for at least few years. In the future, additional maintenance prescribed burning may occur in the project area and surrounding areas. This activity should remove accumulations of natural fuels from the uplands, remove decadent vegetation, stimulate regeneration of fire dependent plants, and maintain the area so natural fire cycles can be reestablished that create and retain mosaic habitat conditions.

New roads would be constructed across connectivity corridors at four locations. Three of the six new roads would remain open following harvest; three roads would be closed. Four of the roads would be constructed as close to right angles to the corridors as possible to minimize effects. The other two roads would be constructed to relocate roads outside of RHCAs; these two roads would be *aligned* with the corridors, increasing potential effects. These two roads would remain open. This will adversely affect the quality of the affected corridors. About 22 miles of road would be decommissioned or relocated outside RHCAs, improving corridors for travel.

Management activities would reduce the risk that uncharacteristically severe disturbance events could reduce or alter connectivity habitat and isolate populations.

<u>Pesticide and Herbicide Use</u>

Affects would be as described for alternative 2, except that additional acres would receive chemical treatments (see Tables 7 and 8). No effects would be anticipated.

<u>Cumulative Effects</u>

Cumulative effects would be similar to those described in Alternative 2.

Determination of Impacts

This alternative may impact habitat, but because fisher have been extirpated from Oregon, this alternative will not contribute to the loss of species viability or contribute to federal listing (FSM 2670.24 – Exhibit 1. BIOLOGICAL EVALUATION PROCESS – THREATENED, ENDANGERED, PROPOSED AND SENSITIVE SPECIES PROJECT PROPOSAL). This alternative impact habitat, but will not likely contribute toward federal listing or loss of viability to the population or species (MIIH).

Bobolink (Dolichonyx oryzivorus)

Status: Federal - None
State - Sensitive
Region 6 - Sensitive

Biology and Ecology

Unless otherwise mentioned, the following information on bobolinks was derived from Dechant et al. (2001). Bobolinks breed from southern British Columbia across southern Canada to Nova Scotia, and south to eastern Oregon, central Colorado, central Illinois, western Virginia, and western North Carolina.

Bobolinks are found in native and tame grasslands, haylands, lightly to moderately grazed pastures, no-till cropland, small-grain fields, wet meadows, and planted cover. Bobolinks prefer habitat with moderate to tall vegetation, moderate to dense vegetation, moderately deep litter, and without the presence of woody vegetation (Dechant et al., 2001). They are found in areas with high percent grass cover and moderate percent forb cover, and avoid haylands with high legume-to-grass ratios; however, a forb component is beneficial for nesting cover. If habitat is not maintained, use by bobolinks declines significantly, possibly due to the accumulation of litter and encroachment of woody vegetation. Bobolinks respond positively to properly timed burning or mowing treatments, and moderate grazing.

Bobolink territories include both foraging and nesting areas. Average territory size ranged from 0.45 to 2.5 ha, depending on habitat variables. Bobolinks appear to prefer large grassland areas to small, having a minimum size of approximately 10-45 ha. Studies suggest bobolink abundance in tallgrass prairie fragments was positively related to area and/or fragment size.

Bobolinks generally are considered an uncommon or rare host of the brown-headed cowbird (*Molothrus ater*), but their nests may be multiply-parasitized as well. Nest depredation and brown-headed cowbird brood parasitism generally decreased farther from woody edges, and nest depredation rates were lower on large (130-486 ha) than on small (16-32 ha) grasslands. Nest productivity is usually highest in habitats far (>45 m) from a forest edge.

Keys to management are providing large areas of suitable habitat (native and tame grasslands of moderate height and density, with adequate litter), controlling succession, and protecting nesting habitat from disturbance during the breeding season. Avoid disturbing (e.g., haying, burning, moderately or heavily grazing) nesting habitat during the breeding season, approximately early May to mid-July. Treatments can be done in early spring (several weeks prior to the arrival of adults on the breeding grounds) or in the fall after the breeding season.

Environmental Baseline

Bobolinks are very local and scattered in the eastern one-third of Oregon and are known to breed on the Malheur National Wildlife Refuge, south end of Blitzen Valley, Harney County, Union County, and Wallowa County (Marshall 1996). Locally, sporadic nesting occurs in the Prairie

City, Mt. Vernon, Silvies Valley, and Bear Valley areas (Sweeney, 2001; Winters 2001). In the SE Galena project area, there has only been one reported sighting on the Middle Fork of the John Day River.

Bobolinks appear to prefer large grassland areas to small, requiring approximately 25-110 acres depending on habitat quality. Consequently, in SE Galena, habitat is likely limited to meadows and grasslands along the Middle Fork of the John Day River. About 615 acres of capable habitat exist, with the majority of the acres on private land. On National Forest Lands potential habitat is associated with the tributary streams and only at the lower reaches where they enter the Middle Fork. Along the tributary steams, habitat is considered marginal. Many of these acres are grazed and may not be providing tall enough grass for bobolinks. Meadows exit in the uplands, but they tend to be small or habitat is naturally dry and low in productivity.

<u>Direct and Indirect Effects – No Action</u>
No new activities would occur with this alternative.

Determination of Impacts

This alternative would not impact (NI) bobolinks or their habitat.

<u>Direct and Indirect Effects – All Action Alternatives</u>
In Alternatives 2 and 5, channel/floodplain rehabilitation projects would be conducted on 2 miles of Vinegar Creek and 1 mile of Deerhorn Creek. Projects would entail the use of heavy equipment to reestablish channels and floodplains by connecting relic channels or constructing new channels. Bobolinks may use open areas along tributary streams immediately adjacent to the Middle Fork of John Day River, including areas along Vinegar and Deerhorn Creeks. The channel/floodplain projects would be implemented in July and August. Effects would likely not last more than a year. Higher quality habitat on private lands along the Middle Fork of the John Day River would not be affected. Alternatives 3 and 4 would not implement these channel/floodplain rehabilitation projects.

Prescribed burning would occur only on National Forest Lands. Because little to no bobolink habitat is present on National Forest lands, effects would be inconsequential. Prescibed burning is proposed primarily in forested areas; it is unlikely that fire would be used in the floodplains of streams tributary to the Middle Fork. If fire does enter these streams, burning should stimulate grasses, which should improve the potential for bobolink habitat, and the effect should last for about 5 years post burn. Subsequent burns should have the same effect. Riparian openings probably would not burn during a spring burn, but would if burned during the fall. Upland meadows could also be improved by burning, but these meadows are smaller and considered unsuitable for bobolink.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting and Aluminum phosphide fumigation – Animal control would not be conducted in RHCAs. No effects would occur.

Herbicide Applications –There would be no effects bobolinks from herbicide application; herbicides would not be applied near any suspected habitat.

Determination of Impacts

Channel/floodplain rehabilitation projects proposed under the Alternatives 2 and 5 may impact individual bobolinks and their habitat in the short-term, (MIIH) but will not likely contribute toward federal listing or loss of viability to the population or species. Under Alternatives 3 and 4, there will be no impacts to bobolinks; management activities would not be implemented within suspected habitat in the area. Prescibed burning could improve potential habitat in smaller upland meadows, but effects would be inconsequential. Other proposed activities occur outside bobolink habitat, and will not affect bobolink or their habitat.

Sandhill Crane (Grus canadensis) and Long-billed curlew (Numenius americanus)

Status: Federal - None
State - Sensitive
Region 6 - Sensitive

Biology and Ecology

Both the sandhill crane and long-billed curlew use larger meadow habitats for their breeding, nesting and feeding needs. Sandhill crane habitat includes large, undisturbed wetlands with vigorous wetland vegetation, such as sedges and cattails. Foraging habitat includes grains, seedlings and animal matter found in agricultural fields and large wetlands. Long-billed curlews construct nests on the ground in short vegetation, usually grasses and annual forbs, on rolling topography (Bicak etal. 1980). They also need areas of tall vegetation to provide hiding cover for chicks.

Environmental Baseline

On the Malheur National Forest, these species have been seen at various locations, including Bear Valley and Logan Valley to the south and Phipps Meadow, Bridge Creek Meadow and Lobelia Meadow to the east. In the project area, cranes and curlews have been sighted along the Middle Fork of the John Day River, predominantly on private land. This area likely provides feeding habitat in the spring. None of the reported sightings along the Middle Fork confirmed nesting animals.

Direct and Indirect Effects – No Action

No new activities would occur with this alternative.

Determination of Impacts

This alternative would not impact (NI) sandhill cranes or long-billed curlews or their habitat.

Direct and Indirect Effects – All Action Alternatives

In Alternatives 2 and 5, channel/floodplain rehabilitation projects would be conducted on Vinegar and Deerhorn Creeks. Projects would be implemented on 2 miles in Vincent Creek and 1 mile in Deerhorn Creek and would entail the use of heavy equipment to reestablish channels and floodplains by connecting relic channels or constructing new channels. Cranes and curlews may use open areas along tributary streams immediately adjacent to the Middle Fork of John Day River, including areas along Vinegar and Deerhorn Creeks. The channel/floodplain projects would be implemented in July and August. No nesting individuals have been identified in the project area, but individuals may forage and could be displaced during operations. Effects would likely not last more than a year. Higher quality habitat on private lands along the Middle Fork of the John Day River would not be affected. Alternatives 3 and 4 would not implement these channel/floodplain rehabilitation projects.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting and Aluminum phosphide fumigation – Animal control would not be conducted in RHCAs. No effects would occur.

Herbicide Applications –There would be no effects to these species from herbicide application; herbicides would not be applied near any suspected habitat.

Determination of Impacts

Channel/floodplain rehabilitation projects proposed under the Alternatives 2 and 5 may impact individual sandhill cranes or long-billed curlews and their habitat in the short-term, (MIIH) but will not likely contribute toward federal listing or loss of viability to the population or species. Under Alternatives 3 and 4, there will be no impacts to sandhill crane or long-billed curlew; management activities would not be implemented within suspected habitat in the area.

Tricolored blackbird (Agelaius tricolor)

Status: Federal - None
State - Undetermined
Region 6 - Sensitive

Biology and Ecology

The average tricolor colony size has decreased dramatically (from 300,000 to 10,000 birds) since the 1930's. Overall population has decreased 89 percent during the approximate 50 year span from the 1930's to the 1980's. Despite the reductions in colony size and numbers, the distribution of tricolored blackbirds has not changed significantly since the 1930's.

The present winter range of the tricolored blackbird encompasses the San Francisco Bay area (including the Delta) and the central California coast (DFG 1990a).

Tricolored blackbirds feed on both plant and animal matter, depending mostly on season. In spring and summer the majority of their diet is composed of insects, grasshoppers, and spiders; in fall and winter, seeds and grain crops such as oats and rice constitute the dominant food items. Abundant, concentrated supply of insects is important to the success of tricolor breeding colonies. Foraging occurs on the ground in croplands, grassy fields, flooded land, and along edges of ponds.

Nesting usually occurs in dense stands of cattails (*Typha* sp.) and tules (*Scirpus* spp.), with nests located a few feet above water. Nesting colonies are sometimes transient, frequenting emergent marsh, blackberry thickets, or fallow agricultural fields overgrown with mustards (*Brassica* spp.). The nests are built out of mud and plant materials, and may be located as far as 6.4 km (4mi) from foraging areas. Tricolored blackbirds are highly colonial nesters, requiring nesting areas large enough to support at least 50 pairs. Colonies may breed in different locations from year to year. Roosting areas for large winter flocks usually are in extensive stands of marsh vegetation in the Delta.

Tricolored blackbirds are not migratory over most of their range. Breeding season ranges from mid April through mid July. Nomadic flocks occur in fall seeking food. Tricolored population declines are primarily due to the elimination of wetland habitat, which has decreased from 4 million acres in the 1850's to less than 245,000 acres today. The conversion of wetlands to agricultural and urban uses coupled with the control of formerly abundant insects by pesticides has reduced the reproductive success of tricolor colonies. In one older study conducted in the 1930s, over 90 percent of 250 plus observed breeding colonies were in freshwater marshes dominated by tules and cattails. By contrast, a little over 50 percent of reported colonies were in tules and cattails during the 70's and 80's. A higher percentage of observed colonies existed in marginal habitats with blackberry brambles, thistles, nettles, and other vegetation.

Because of their proximity to open water, marshes serve as a protective barrier for tricolor nesting colonies. As these optimal nesting sites decline in size and numbers, predation becomes more repetitive, resulting in increased loss and abandonment of colonies. In smaller marshes, many nests must be situated near edges that offer easy access for ground predators and humans. Increased competition with other species of marsh nesting birds also results from the decrease in habitat size. Enormous breeding colonies that once typified tricolor populations have been replaced by smaller, fragmented colonies, where higher rates of nesting failures and lower rates of reproductive success occur.

Tricolored blackbirds breed from southern Oregon east of the coast range south through interior California along the Pacific Coast from central California to northwest Baja California. They are Resident from northern California south throughout breeding range and adjacent agricultural areas. Some northern birds are migratory.

Their status is common in the heart of their breeding range such as in California. There are no known sitings on the Malheur National Forest. (Sweeney, Hunt 2001, pers. comm.)

Commonly breed in freshwater marshes of cattail, tule, bulrush, and sage. Roost in the strips along marshes between rice fields. Feed and roost in dense flocks, ranging from a few to 20,000 in a colony, throughout the year. In winter, they move through marshes, open cultivated lands, and pastures. Tricolored blackbirds require cattail or tule marshes as specific habitat needs.

Nests are built of cattails, sedges, grasses, or other aquatic vegetation collected from the surface or in shallow water, and attached to cattails or twigs in shrubs and blackberry thickets, usually near water. They prefer live emergent vegetation for nesting.

Food is gleaned from the ground and low vegetation, consisting of insects, spiders, and occasionally small tadpoles and snails. In winter, they eat rice and a variety of grain crops.

Environmental Baseline

In the Southeast Galena project area, habitat is considered limited. Habitat may be associated with the Middle Fork of the John Day River, but has not been confirmed. There are no known sightings on the Malheur National Forest (Sweeney, Hunt 2001, pers. comm.).

Direct and Indirect Effects – No Action

No new activities would occur with this alternative.

Determination of Impacts

This alternative would not impact (NI) tricolored blackbirds or their habitat.

Direct and Indirect Effects – All Action Alternatives

Habitat is on private land. All proposed activities would occur outside suspected habitat in the area.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting and Aluminum phosphide fumigation – Animal control would not be conducted in RHCAs. No effects would occur.

Herbicide Applications –There would be no effects tricolored blackbirds from herbicide application; herbicides would not be applied near any suspected habitat.

Determination of Impacts

There will be no impacts (NI)to tricolored blackbirds with the implementation of any of the action alternatives. Habitat is on private land. All proposed activities would occur outside suspected habitat in the area.

Columbia Spotted Frog (Rana luteiventris)

Status: Federal - None
State - Undetermined
Region 6 - Sensitive

Biology and Ecology

Spotted frogs are moderately threatened range-wide; habitat or community lends itself to alternate use. Great Basin population has been adversely affected by habitat degradation resulting from mining, livestock grazing, road construction, agriculture, and direct predation by bullfrogs and non-native fishes (NatureServe 2000). They are fairly resistant and tolerant of nondestructive intrusion. Recent intensive surveys indicate severe declines in the Great Basin populations.

Spotted frogs are highly aquatic and are rarely found far from permanent water. Breeding habitat is usually in shallow water in ponds or other quiet waters along streams. Breeding may also occur in flooded areas adjacent to streams and ponds. Adults may disperse overland in the spring and summer after breeding.

This species occurs in extreme southeastern Alaska, southwestern Yukon, northern British Columbia, and western Alberta south through Washington east of the Cascades, eastern Oregon, Idaho, and western Montana to Nevada (disjunct, Mary's, Reese, and Owyhee river systems), southwestern Idaho (disjunct), Utah (disjunct, Wasatch Mountains and west desert), and western and north-central (disjunct) Wyoming. Disjunct populations occur on isolated mountains and in arid-land springs. In Oregon, Columbia spotted frogs appear to be widely distributed east of the Cascade Mountains.

Environmental Baseline

The spotted frog is considered present in all subbasins on the Malheur National Forest. It is assumed widely distributed in the project area. No habitat surveys have been conducted specifically for spotted frog; however, habitat probably exists along most perennial and some intermittent streams. Fish surveys record incidental sightings of non-fish species. During 1996 fish surveys, spotted frogs were reported in the Davis/Placer subwatershed, along the Davis and Placer Creeks. It is likely that spotted frogs occur in other stream reaches.

Direct and Indirect Effects – No Action Alternative

No direct impacts would occur with this project. Roads in RHCAs would continue to confine stream channels and restrict frog habitat by inhibiting the expansion of wetlands that were reduced or degraded by road construction where these habitats were.

Cumulative Effects

Road construction, grazing, and logging within RHCAs have removed spotted frog habitat. Through various mechanisms, these activities have contributed to a lower water table, and some habitat has dried. This alternative will not contribute to cumulative effects.

Determination of Impacts

This alternative would not impact (NI) Columbia spotted frogs or their habitat.

Direct and Indirect Effects – All Action Alternatives

Commercial and precommercial harvest would have minimal adverse effects to Columbia spotted frogs of or their habitat. Overall, streams would be protected with PACFISH RHCA buffers. There will be limited commercial/precommercial thinning of conifer trees on 28 acres associated with aspen restoration. In the Vincent and Vinegar subwatersheds, trees blown down in a 1998 windstorm would be removed from 72 acres in the outer half of RHCAs in the headwaters of Vincent Creek. Felling or removal of trees may result in direct mortality to spotted frogs. Effects to habitat would be considered minimal.

Several road-related activities would be conducted within RHCAs. Approximately 0.12 miles of open road would be constructed, about 23 miles of road would be reconstructed or maintained, and about22 miles of road would be decommissioned. These activities have the potential to adversely affect spotted frog habitat by increasing fine sediments in the short-term. Best management practices (BMPs) are incorporated into standard road maintenance and reconstruction practices, and standard contact language. The proposed design criteria and application of BMPs would reduce the probability and magnitude of the short-term risks. In the mid- to long-term, reconstruction and maintenance would reduce the chronic sediment production of existing roads by improving drainage, removing ruts and rills from the driving surface, replacing or adding drainage structures, and adding less erosive surfacing material. Road decommissioning is designed to benefit water quality and habitat in the mid- to long-term by improving filtration, restoring ground cover, and reducing sediment yield. Actions that reduce sedimentation, such as dust abatement, would remove adverse affects of these alternatives.

Channel/floodplain rehabilitation projects on 2 miles in Vincent Creek and 1 mile in Deerhorn Creek would entail the use of heavy equipment in RHCAs to reestablish channels and floodplains by connecting relic channels or constructing new channels. Channel/floodplain rehabilitation would occur only in Alternatives 2 and 5. Seventy-two instream structures would be installed and 36 existing structures would be improved. In the short-term, these projects would create short-term sediment increases. Instream projects would improve aquatic habitat by creating deep, self-maintaining pools, decreasing width to depth ratios, reconnecting floodplains, improving base flows and maintaining stream temperatures.

Prescribed burning would occur in RHCAs. Ignition is not planned within RHCAs; rather, fire from upslope burning units would be allowed to back into RHCAs. This activity has low potential for causing adverse effects to spotted frogs and their habitats. Design criteria include retention of at least 95% of stream shade. The prescribed burning would be conducted under moisture and temperature conditions that would minimize the potential for a hot fire. With these planned low intensity burns, very little stream vegetation cover would be expected to burn under the more moist conditions encountered in riparian areas.

Riparian plantings and protection along 21 miles of stream would improve riparian habitat.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting and Aluminum phosphide fumigation – Animal control would not be conducted in RHCAs. No effects would occur.

Herbicide Applications –The US Forest Service contracted Syracuse Environmental Research Associates Inc. and the Syracuse Research Corporation to compile relevant studies on registered pesticides and to evaluate ecological risks (SERA, 1995, 1996 and 1997). Research on effects on amphibians is limited. For glyphosate, non-lethal or behavior effects on rough-skinned newts could not be detected following applications in Pacific Northwest forests (McComb 1990). Only one hexazinone study on amphibians is available in the literature and it suggest that amphibians are less sensitive to hexazinone than fish or aquatic invertebrates (SERA 1997). The SE Galena Restoration Project Fisheries Report indicated that risks to aquatic species would be low. In RHCAs, herbicides would be used on only 1.5 acres, using a wick applicator. No effects to Columbia spotted frogs would be expected.

See the Southeast Galena Restoration Project Wildlife and Fisheries Reports for additional discussion on chemical effects.

Cumulative Effects

Cumulative effects are the same as the no action alternative. These alternatives will reduce, but not eliminate, the cumulative effects of roads on spotted frog habitat by closing or decommissioning roads.

Determination of Impacts

The action alternatives may impact individuals or habitat in the short-term, (MIIH) but will not likely contribute toward federal listing or loss of viability to the population or species. In the long-term, riparian restoration would likely have a beneficial effect (BI) on spotted frogs.

Western sage grouse (Centrocercus urophasianus phaios)

Status: Federal – Species of Concern

State - Undetermined

Region 6 – Sensitive

Biology and Ecology

Sage grouse are residents of sagebrush habitat, usually inhabiting sagebrush-grassland or juniper (Juniperus spp.)-sagebrush-grassland communities. Meadows surrounded by sagebrush may be used as feeding grounds (Johnsgard 1973). Sage grouse use sagebrush of different age classes and stand structures as lekking, nesting, brooding, and wintering grounds. Neither expansive dense sagebrush nor expansive open areas constitute optimal sage grouse habitat. Sage grouse once occurred virtually everywhere there was sagebrush. Habitat loss, primarily due to overgrazing, sagebrush elimination, and land development, caused their decline (Hamerstrom and Hamerstrom 1961).

Environmental Baseline

On the Malheur National Forest, sage grouse habitat is primarily associated with the larger expanses of sagebrush habitat located on the southern end of the Forest. In the Southeast Galena project area, sagebrush habitats and juniper/sagebrush habitats are very limited, probably providing marginal habitat at best. About 1,650 acres of dry shrublands and 1,400 acres of juniper woodlands could potentially support sage grouse.

Direct and Indirect Effects – No Action

No new activities would occur with this alternative.

Determination of Impacts

This alternative would not impact (NI) western sage grouse or their habitat.

Direct and Indirect Effects – All Action Alternatives

Prescribed burning would be used primarily in forested areas. Fire may burn along perimeters of juniper/sagebrush openings, but the general intent is to not burn through these habitats. The more significant sagebrush areas are located at higher elevations, where prescribed fire is not prescribed. Habitat for western sage grouse is very limited in the project area and likely of low quality.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting and Aluminum phosphide fumigation – Animal control would not be conducted in habitat. No effects would occur.

Herbicide Applications –There would be no effects to grouse from herbicide application; herbicides would not be applied near any suspected habitat.

Determination of Impacts

The action alternatives would not impact (NI) western sage grouse or their habitat.

Gray flycatcher (Empidonax wrightii)

Status: Federal - N/A
State - N/A
Region 6 - Sensitive

Biology and Ecology

The gray flycatcher prefers relatively treeless areas with tall sagebrush, bitterbrush, or mountain mahogany communities, but is also associated with pinyon-juniper woodland with understory sagebrush, and open ponderosa pine forests (Csuti et al. 1997). This species in most abundant in extensive tracts of big sagebrush, often selecting areas along washes where the sagebrush is especially tall. In the western Great Basin, this species nests in tall big sagebrush shrublands (Ryser 1985).

During the nonbreeding season, this species commonly inhabits arid scrub, riparian woodland, and mesquite (NatureServe 2000).

Breeding range covers extreme southern British Columbia and south-central Idaho south to southern California, southern Nevada, central Arizona, south-central New Mexico, and locally western Texas (NatureServe 2000). In Oregon, this species is typically found east of the Cascade Mountains (Csuti et al. 1997).

Birds winter in southern California, central Arizona, south to Baja California and south-central mainland of Mexico (NatureServe 2000).

North American BBS (Breeding Bird Survey) shows a survey-wide significantly increasing trend of 10.2 percent average per year (n = 89) during the 1966-1996 sample period; a nonsignificant decline of -1.0 percent average per year (n = 22) during 1966-1979; and a significant increase from 1980 to 1996 of 10.0 percent average per year (n = 84) (Sauer et al. 1997). Data for Oregon reflects a strong long-term increase of 7.9 percent average per year (n = 29) during the 1966-1996 period (Sauer et al. 1997).

This species would be vulnerable to land clearing, but generally found in very arid environments that are not usually converted to agriculture (USDA Forest Service 1994). Clearing of pinyon-juniper in favor of grassland for livestock grazing or widespread harvesting of pinyon-juniper could be detrimental.

Environmental Baseline

About 1,400 acres of juniper woodlands, 1,450 acres of dry meadows and grasslands, 1,650 acres of dry shrublands, and 860 acres of moist meadows that could provide gray flycatcher habitat occur in the project area. All of these acres are not necessarily in a condition that will support this species. Quality sagebrush communities, for example, are relativity rare. Numerous mountain mahogany stands and some bitterbrush occur as small inclusions in other forested habitat types. Because they are small, they were not mapped separately; therefore, acres for these types are not available.

<u>Direct and Indirect Effects – No Action alternative</u>

No new activities would occur with this alternative.

Determination of Impacts

This alternative would not impact (NI) gray flycatchers or their habitat.

Direct and Indirect Effects – Common to all action alternatives

No commercial harvest is planned within gray flycatcher habitat. Prescribed burning is generally not proposed for woodland habitats. If prescribed fire in conifer forests does burn through adjacent woodlands, effects would be minimal. Because of the limited continuity of fuels, low to moderate burning would have little effect on junipers, grasses and forbs. Burning under these site conditions would result in a mosaic burn that would enhance conditions for the gray flycatcher. Hardwood, aspen and cottonwood, protection and restoration are planned and would be implemented by each action alternative. Hardwood sites are quite small, usually less than two acres. As hardwood reproduction matures and becomes suitable for perching and nesting, more habitat would be created by this activity. Aspen is expected to increase in stem density and, in some cases, the acreage covered by the stand will increase also.

Effects of Pesticide/Herbicide Use:

Tables 7 and 8 display treatment acres. Chemicals would only be applied under Alternatives 2 and 5.

Strychnine baiting and Aluminum phosphide fumigation – Animal control would not be conducted in habitat. No effects would occur.

Herbicide Applications –There would be no effects to flycatchers from herbicide application; herbicides would not be applied near any suspected habitat.

Determination of Impacts

Because habitat acreage would not change, this project will not impact (NI) the gray flycatcher or its habitat.

References

Akenson, H., and T. Schommer. 1992. Upland sandpiper survey protocol for the Blue Mountains of Oregon and Washington. Unpubl. Rep. Wallowa-Whitman National Forest, Baker City, OR.

American Ornithologists' Union. 1983. Checklist of North American birds. 6th ed. Lawrence, KS: Allen Press, Inc. 877 p. *in*: Howard, Janet L. 1996; Bushey, C. L. 1986. C*entrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Anthony, R.M., G.D. Lindsey and J. Evans. 1984. Hazards to golden-mantle ground squirrels and associated secondary hazard potential from strychnine for forest pocket gophers. IN: Proceedings Eleventh Vertebrate Pest Conference, Davis CA.

Autenrieth, Robert; William Molini, and Clait Braun, eds. 1982. Sage grouse management practices. Tech. Bull No. 1. Twin Falls, ID: Western States Sage Grouse Committee. 42 p. *in*: Howard, Janet L. 1996, and Bushey, C. L. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Bailey, Theodore N. 1981. Den ecology, population parameters and diet of eastern Idaho bobcats. *in*: Blum, L. G.; and P. C. Escherich, eds. Bobcat research conference: Proceedings; 1979 October 16-18; Front Royal, VA. NWF Science and Technical Series No. 6. Washington, DC: National Wildlife Federation: 62-69. *in*: Howard, Janet L. 1996; and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Banci, V. 1994. Wolverine. Pages 99-127 *in* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. U. S. Dep. Agric., Forest Service, Rocky Mountain For. and Range Exp. Sta., Gen. Tech. Rep. RM-254. Fort Collins, CO. 184pp.

Barnes, V.G., R.M. Anthony, J. Evans, and G. Linsey. 1982. Evaluation of zinc phosphide bait for pocket gopher control on forestland. Proceedings from Tenth Vertebrate Pest Conference, Davis CA, pp. 219-225.

Beck, D. I. 1975. Attributes of a wintering population of sage grouse, North Park, Colorado. Fort Collins, CO: Colorado State University. 49 p. Thesis. *in*: Howard, Janet L. 1996; and C. L Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Benson, L. A.; C. E. Braun, and W. C. Leininger. 1991. Sage grouse response to burning in the big sagebrush type. *in*: Comer, R. D., P. R. Davis; S. Q. Foster, [and others], eds. Issues and technology in the management of impacted wildlife: Proceedings of a national symposium; 1991 April 8-10; Snowmass Resort, CO. Boulder, CO: Thorne Ecological

Institute: 97-104. *in*: Howard, Janet L. 1996; and C. L Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Blaisdell, J. P.; R. B. Murray, E. D. McArthur. 1982. Managing Intermountain rangelands--sagebrush-grass ranges. Gen. Tech. Rep. INT-134. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 41 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Blaisdell, J. P. 1953. Ecological effects of planned burning of sagebrush-grass range on the upper Snake River Plains. Tech. Bull. 1975. Washington, DC: U.S. Department of Agriculture. 39 p. *in*: Howard, J. L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Call, M. W.; and C. Maser. 1985. Wildlife habitats in managed rangelands--the Great Basin of southeastern Oregon: sage grouse. Gen. Tech. Rep. PNW-187. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 30 p. *in*: Howard, J. L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Call, M. W. 1979. Habitat requirements and management recommendations for sage grouse. Denver, CO: U.S. Department of the Interior, Bureau of Land Management, Denver Service Center. 37 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Copeland, J. 1996. Biology of the wolverine in central Idaho. Univ. of Idaho, Moscow. M. S. Thesis.

Csuti B., A. J. Kimerling, T. A. O'Neil, M. M. Shaughnessy, E. P. Gaines, and M. M. P. Huso. 1997. Atlas of Oregon Wildlife, Distribution, Habitat and Natural History. Oregon State University Press, Corvallis, Oregon.

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, A. L. Zimmerman, and B. R. Euliss. 2001. Effects of management practices on grassland birds: Bobolink. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/literatr/grasbird/bobo/bobo.htm (Version 17FEB2000).

Dunkle, S. W. 1977. Swainson's hawks on the Laramie Plains, Wyoming. Auk. 94: 65-71. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Edminster, F. C. 1947. The ruffed grouse: Its life story, ecology and management. New York: The MacMillan Company. 385 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Wolf-related references listed below are as cited in:

Federal Register: July 13, 2000 (Volume 65, Number 135) [Proposed Rules] [Page 43449-43496]

Goldman, E.A. 1944. The wolves of North America. Part 2. Classification of wolves. *in* S.P. Young and E.A. Goldman. The wolves of North America. Dover, New York/American Wildl. Inst., Washington, D.C.

Hall, E.R. and K.R. Kelson. 1959. The mammals of North America. Vol. 2. The Ronald Press, New York, NY. 536 pp.

Mech, L.D. 1974. Canis lupus. Mammalian spec. No. 37. Am. Soc. Mammal. 6 pp.

Michigan Department of Natural Resources. 1997. Michigan gray wolf recovery and management plan. Lansing, MI 58 pp.

Michigan Department of Natural Resources. 1992a. Recovery plan for the eastern timber wolf. Twin Cities, MN 73 pp.

Lindsey, G.C. and J. Evans. 1984. Toxic effects of strychnine-killed ground squirrels to caged mink, hawks and owls. US Fish and Wildlife Service, Job Completion Report. Forest-Animal Research project, Denver Wildlife Research Center, Denver, CO. 17 pp.

Gill, R. B. 1966. A literature review on the sage grouse. Special Report No. 6. Denver, CO: Colorado Department of Game, Fish, and Parks Game Research Division, Cooperative Wildlife Research Unit. 38 p. . *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Green, D.M., H. Kaiser, T.F. Sharbel, J. Kearsley, and K.R. McAllister. 1997. Cryptic Species of Spotted Frogs *Rana pretiosa* Complex, in Western North America. Copeia. 1997(1):1-8.

Gregg, M. A.; J. A. Crawford, M. S. Drut, and A. K. DeLong. 1994. Vegetational cover and predation of sage grouse nests in Oregon. Journal of Wildlife Management. 58(1):162-166. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus* *urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Hamerstrom, Frederick; Hamerstrom, Frances. 1961. Status and problems of North American grouse. Wilson Bulletin. 73(3): 284-294. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Herman, S. G., J. W. Scoville, and S. G. Waltcher. 1985. The upland sandpiper in Bear Valley and Logan Valley Grant County, Oregon. Unpubl. Rep.

Johnsgard, Paul A. 1983. The grouse of the world. Lincoln, NE: University of Nebraska. 413 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Johnsgard, Paul A. 1973. Grouse and quails of North America. Lincoln,NE: University of Nebraska Press. 553 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Katzner, T. E., and K. L. Parker. 1997. Vegetative Characteristics and Size of Home Ranges Used by Pygmy Rabbits (*Brachylagus idahoensis*) During Winter. Journal of Mammalogy 78:1063-1072.

Kindschy, R. R. 1986. Rangeland vegetative succession--implications to wildlife. Rangelands. 8(4): 157-159. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Klebenow, D. A. 1973. The habitat requirements of sage grouse and the role of fire in management. *in*: Proceedings, annual Tall Timbers fire ecology conference; 1972 June 8-9; Lubbock, TX. No. 12. Tallahassee, FL: Tall Timbers Research Station: 305-315. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Klebenow, D. A. 1969. Sage grouse nesting and brood habitat in Idaho. Journal of Wildlife Management. 33(3): 649-662. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest

Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Koehler, G.M. 1990. Population and Habitat Characteristics of Lynx and Snowshoe Hares in North Central Washington. Canada Journal Of Zoology. 68: 845-51.

Mangan, L. and R. Autenrieth. 1985. Vegetation changes following 2,4-D application and fire in a mountain big sagebrush habitat type. *in*: Sanders, K., and J. Durham, eds. Rangeland fire effects: a symposium: Proceedings of the symposium; 1984 November 27-29; Boise, ID. Boise, ID: U.S. Department of the Interior, Bureau of Land Management, Idaho State Office: 61-65. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Marshall, D. B., M.W. Chilcote, and H. Weeks. 1996. Species at risk: sensitive, threatened and endangered vertebrates of Oregon. 2nd edition. Oreg. Dept. Fish and Wildl., Portland, Oreg.

Martin, R. C. 1990. Sage grouse responses to wildfire in spring and summer habitats. Moscow, ID: Univeristy of Idaho. 36 p. Thesis. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Martin, N. S. 1970. Sagebrush control related to habitat and sage grouse occurrence. Journal of Wildlife Management. 34(2): 313-320. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Mattise, S. N. 1995. Sage grouse in Idaho: Forum 94'. Technical Bulletin No. 95-15. Boise, ID: U.S. Department of the Interior, Bureau of Land Management, Idaho State Office. 10 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

NatureServe: An online encyclopedia of life [web application]. 2000. Version 1.1. Arlington, Virginia, USA: Association for Biodiversity Information. http://www.natureserve.org

Oregon Natural Heritage Program. 2001. Rare, threatened and endangered plant and animals of Oregon. Oregon Natural Heritage Program, Portland. Oregon. 94 pp. (98 pp. PDF).

Patterson, R. L. 1952. The sage grouse in Wyoming. Federal Aid to Wildlife Restoration Project 28-R. Denver, CO: Sage Books, Inc. 341 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Phillips, R. L.; and A. E. Beske. 1990. Distribution and abundance of golden eagles and other raptors in Campbell and Converse Counties, Wyoming. Fish and Wildlife Technical Report 27. Washington, DC: U.S. Department of the Interior, Fish and Wildlife Service. 31 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Rasmussen, D. I.; and L. A. Griner. 1938. Life history and managementstudies of the sage grouse in Utah, with special reference to nesting and feeding habits. *in*: Transactions, 3rd North American Wildlife Conference: 852-864. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Redmond, R.L., and D.A Jenni. 1986. Population ecology of the Long-billed Curlew (*Numenius americanus*) in western Idaho. Auk 103(4):755-67.

Rogers, G. E. 1964. Sage grouse investigations in Colorado. Tech. Publ. No. 16. Denver, CO: Colorado Game, Fish and Parks Department, Game Research Division. 132 p. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, eds. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. U. S. Dep. Agric., Forest Service, Rocky Mountain For. and Range Exp. Sta., Gen. Tech. Rep. RM-254. Fort Collins, CO. 184pp.

Ryser, F.A. 1985. Birds of the Great Basin: a natural history. University of Nevada Press, Reno, NV.

Sauer, J.R., J.E. Hines, G. Gough, I. Thomas, and B.G. Peterjohn. 1997. The North American Breeding Bird Survey Results and Analysis. Version 96.3. Online. Patuxent Wildlife Research Center, Laurel, MD. http://www.mbr.nbs.gov/bbs/bbs.html.

Schneegas, E. R. 1967. Sage grouse and sagebrush control. Transactions, North American Wildlife Conference. 32: 270-274. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Scoville, J. W. 1991. Census of upland sandpipers of Grant, Umatilla, and Union counties, Oregon. Unpubl. Rep. Oregon Dept. Fish and Wildl. Project #91-4-04.

SERA (Syracuse Environmental Research Associates, Inc.). 1996. Selected Commercial Formulations of Glyphosate – Accord, Rodeo, and Roundup: Risk Assessment: Final Draft. SERA TR 96-22-02. Prepared for USDA Forest Service under Contract No. 53-3187-5-12, Order No. 43-3187-6-0085. USDA Forest Service, Arlington. VA.

SERA (Syracuse Environmental Research Associates, Inc.). 1997. Selected Commercial Formulations of Hexazinone – Human Health and Ecological Risk Assessment: Final Draft. SERA TR 95-21-04. Prepared for USDA Forest Service under Contract No. 53-3187-5-12, Order No. 43-3187-6-0085. USDA Forest Service, Arlington. VA.

Sime, Carolyn Anne. 1991. Sage grouse use of burned, non-burned, and seeded vegetation communities on the Idaho National Engineering Laboratory, Idaho. Bozeman, MT: Montana State University. 72 p. Thesis *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

SJMSCP. (2000). Environmental setting: tricolored blackbird (Ch. 2.1*). San Joaquin County Multi-Species Habitat Conservation and Open Space Plan.* http://www.sjcop.org/habitat/habitat_adb/c2final.pdf. (19 Mar. 2001).

Snyder, S. A. 1991. *Falco peregrinus*. *in* Fischer, W. C., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

References listed below by number are as cited in:
Snyder, S. A. 1991. Canis lupus. in: Fischer, W. C., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.
http://www.fs.fed.us/database/feis/animals/mammal/calu (28 Nov. 2000)

1. Ballard, W. B.; J. S. Whitman, and C. L. Gardner. 1987. Ecology an exploited wolf population in south-central Alaska. Wildlife Monographs No. 98. Washington, DC: The Wildlife Society. 54 p. [13865]

6. Cohn, J. P. 1990. Endangered wolf population increases. Bioscience. 40(9): 628-632. [13887]

10. Fritts, S. H., and L. D. Mech. 1981. Dynamics, movements, and feeding ecology of a newly protected wolf population in northwest Minnesota. Wildlife Monographs No. 80. Washington, DC: The Wildlife Society. 79 p. [13863]

11. Fuller, T. K. 1989. Population dynamics of wolves in northcentral Minnesota. Wildlife Monographs No. 105. Washington, DC: The Wildlife Society. 41 p. [13864]

16. Herman, M. and E. E. Willard. 1978. Rocky Mountain wolf and its habitat. Missoula, MT: U.S. Department of Agriculture, Forest Service, National Forest System Cooperative Forestry, Forestry Research, Region 1. 17 p. [16522]

21. Mech, L. D. 1973. Wolf numbers in the Superior National Forest of Minnesota. Res. Pap. NC-97. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 10 p. [13885]

23. Mech, L. D.; and P. D. Karns. 1977. Role of the wolf in a deer decline in the Superior National Forest. Res. Pap. NC-148. St. Paul, MN: U.S. Department of Agriculture,

Forest Service, North Central Forest Experiment Station. 23 p. [13886]

25. Meehan, W. R. 1974. The forest ecosystem of southeast Alaska: 4. Wildlife habitats. Gen. Tech. Rep. PNW-16. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 32 p. [13479]

27. Ream, R. R.; and U. I. Mattson. 1982. Wolf status in the northern Rockies. in: Harrington, F. H., and P. C. Paquet, eds. Wolves of the world: Perspectives of behavior, ecology, and conservation. Park Ridge, NJ: Noyes Publications: 362-381. [13871]

33. Voigt, D. R.; G. B. Kolenosky, and D. H Pimlott. 1976. Changes in summer foods of wolves in central Ontario. Journal of Wildlife Management. 40(4): 663-668. [13862]

34. Young, S. P., and E. A. Goldman. 1944. The wolves of North America: parts I and II. New York: Dover Publishers. 636 p. [13861]

Sweeney, Pat. 3/19/2001. Pers. comm. Status of bobolinks and tricolored blackbird in Grant County, Oregon.

Unknown. (1999). Fisher: *Martes pennanti*. Living landscapes: endangered species and spaces. http://www.livingbasin.com./endangered/Mammals/fisher.htm (29 March 2001).

USDA Forest Service. 1992. Hexazinone Herbicide Information Profile. USDA Forest Servie, Pacific Northwest Region. 13pp.

USDA Forest Service. 1997. Glyphosate Herbicide Information Profile. USDA Forest Service, Pacific Northwest Region. 13pp.

USDA Forest Service. 1994. Neotropical Migratory Bird Reference Book. USDA Forest Service, Pacific Southwest Region. 832 pp.

USDI Fish and Wildlife Service. 1986. Recovery Plan for the Pacific bald eagle. USDI Fish and Wildlife Service. 160 pp.

USDI Fish and Wildlife Service. 1991. 50 CFR Part 17. Final rule: Endangered and Threatened Wildlife and Plants; Determination of Experimental Population Status for an Introduced Population of Red Wolves in North Carolina and Tenesess(sic) / RIN 1018-AB62. Effective Date: 11/04/91. *Rules and Regulations* . FEDREGISTER 56 FR 56325 11/04/91; 1219 lines. Item Key: 27167

USGS-Patuxent Wildlife Research Center. 2000. Oregon Trend Results: North American Breeding Bird Survey Trend Comparative Results. www.mbr-pwrc.usgs.gov

USGS. (1998). Natural history and habitat use: tricolored blackbird. *Forest and rangeland birds of the United States*. Northern Prairie Wildlife Research Center. http://www.npwrc.usgs.gov/resource/1998/forest/species/ageltric.htm (19 Mar 2001).

Verts, B. J. and L. N. Carraway. 1998. Land Mammals of Oregon. University of California Press, Berkeley and Los Angles, CA. Pp. 455-458.

Wallestad, R. 1975. Life history and habitat requirements of sage grouse in central Montana. Helena, MT: Montana Department of Fish and Game. 65 p. In cooperation with: U.S. Department of the Interior, Bureau of Land Management. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The

Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Wallestad, R. and D. Pyrah. 1974. Movement and nesting of sage grouse hens in central Montana. Journal of Wildlife Management. 38(4): 630-633. *in*: Howard, Janet L. 1996 and C. L. Bushey. 1986. *Centrocercus urophasianus*. *in*: Simmerman, D. G., compiler. The Fire Effects Information System [Data base]. Missoula, MT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Magnetic tape reels; 9 track; 1600 bpi, ASCII with Common LISP present.

Washington Department of Fish and Wildlife. 1995. Washington State recovery Plan for Pygmy Rabbit. Wildlife Management Program. Olympia. 73pp.

Whisenant, S. G. 1990. Changing Fire Frequencies on Idaho's Snake River Plains: Ecological and Management Implications. pages 4-10 *in* E. D. McArthur, E. M. Romney, S. D. Smith, and P. T. Fuller, editors. Proceedings of a Symposium on Cheatgrass Invasion, Shrub Die-off, and Other Aspects of Shrub Biology and Management. USDA Forest Service, Intermountain Research Station, Ogden, Utah.

Winters, Tom. 3/19/2001. Pers. comm. Status of bobolinks and tricolored blackbird in Grant County, Oregon.

Witmer, G. W., S. K. Martin, and R. D. Sayler. 1998. Forest carnivore conservation and management in the Interior Columbia Basin: Issues and environmental correlates. USDA For. Serv., Pac. Northwest Res. Sta., PNW-GTR-420.