A CONSERVATION ASSESSMENT FOR LOLO CREEK CANYON, CLEARWATER AND IDAHO COUNTIES, IDAHO

by

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Introduction

Lolo Creek is a tributary of the Clearwater River located in north-central Idaho. The project area encompasses the rugged Lolo Creek canyon, extending for approximately 24 miles, from its mouth, to the Clearwater National Forest boundary. Public access in the canyon is limited. Canyon vegetation is dominated by conifer forest. Riparian floodplain habitats are restricted to near the mouth and then the upper half of the canyon. The Nature Conservancy identified Lolo Creek as an area of potential conservation action, and contracted the Idaho Conservation Data Center to conduct a biological/ecological survey of the canyon as a means of assessing its conservation values. The assessment consisted of four main parts - a plant community inventory and associated broad-scale vegetation map, a more detailed riparian community inventory, rare plant surveys, and the compilation of fish and wildlife resource information. Field investigations concentrated on plant species and plant community elements with high biodiversity ranks, as well as other high quality plant community elements.

Most of the Lolo Creek canyon supports common and widespread forest community types. All of the forest community types occurring in the canyon are well represented in other areas that confer a level of conservation and protection, such as Research Natural Areas. The least disturbed part of the canyon occurs within the Bureau of Land Management's Lower Lolo Creek Area of Critical Environmental Concern (ACEC), along the lower 7.5 creek/canyon miles. The abundance of Pacific ninebark in many riparian communities makes them different from other regionally classified types. The implication is that several of the riparian types may be uncommon or unique and deserve high element ranking. Further studies are needed to determine if this is the case. No rare plant populations were discovered within the project area and potential habitat is minimal.

For purposes of discussing conservation planning, the canyon is divided into seven segments based on physical and ecological condition, and land ownership patterns. Lolo Creek is an important anadromous fish stream. Primary conservation values of the Lolo Creek canyon corridor are associated with water quality and fisheries, and habitat for big game and other wildlife species. Conservation efforts anywhere in the canyon would likely focus on protecting or enhancing these values.

Acknowledgments

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LOLO CREEK CANYON

Location

Lolo Creek canyon is located in north-central Idaho, in both Clearwater and Idaho counties. Lolo Creek forms a segment of the boundary between the two counties, with Clearwater County lying on the north side, and Idaho County, the south side of the creek. The mouth of Lolo Creek is located approximately nine miles south of Orofino, near the small community of Greer (Figure 1). The Lolo Creek project area (project area) encompasses the steep canyon slopes of Lolo Creek and extends from the mouth of the creek to the Clearwater National Forest (NF) boundary (Figure 2). The project area boundary follows near the canyon rim, along the 2,600 to 3,200 foot elevation contours along most of its length. The project area does not include the gentle sloped or rolling, mostly forested adjacent uplands.

There is some discrepancy over the length of Lolo Creek between its confluence with the Clearwater River and the Forest Service boundary. USGS 7.5' quadrangles give a distance of about 24 miles. However, careful measurements of stream length taken from the quadrangles indicate a length of 28.2 miles, and length based on measurements taken during an intensive stream habitat survey is 31.02 miles (Inter-Fluve 1993). For purposes of this report, references to stream mileage are based on USGS map stream station markers.

Land ownership

The lowermost 0.5 mile of Lolo Creek canyon is privately owned. The Bureau of Land Management (BLM) owns most of the canyon corridor between approximately creek mile 0.5 and 7.5. Continuing upstream to the National Forest boundary is a combination of private, Idaho Department of Lands (IDL), BLM and Clearwater NF lands. An ownership map with individual landowner names is contained in Appendix 1. Private and IDL lands comprise nearly all the land north and south of the project area, while upstream (east) is Clearwater NF land.

Physical setting

Lolo Creek flows within a narrow, steep, V-shaped canyon through the project area. The canyon is roughly 1,500 feet deep along much of its lower half, moderating to about half this depth by the time it reaches the Clearwater NF boundary. Elevations in the project area range from approximately 1,100 to 3,660 feet, with most of it below 3,200 feet. Lolo Creek flows in a west/northwesterly direction through the project area which results in a preponderance of south-facing slopes on the north side of the creek and northerly aspects on the south side. Canyon vegetation is dominated by conifer forests. Cliffs, rock outcrops and talus fields are common, dominating the canyon along some sections. Well developed riparian habitats are restricted to near the mouth and the upper half of the project area.

The majority of the project area is located within Bailey's Palouse Prairie (331A) section of the Great Plains-Palouse Dry Steppe Province described by McNab and Avers (1994). The very upper portion of the canyon is located within their Bitterroot Mountains section of the Northern Rocky Mountain Forest Steppe-Coniferous Forest-Alpine Meadow Province. As outlined by Ross and Savage (1967), nearly all of the project area occurs in the Tri-State Uplands section of the Columbia-Intermountain Geomorphic Province, with the very upper part found in the Northern Idaho section of the Northern Rocky Mountain Province.

Figure 1

Figure 2

The Lolo Creek area is considered part of the Northern Rockies Ecoregion of the Pacific Northwest by Omernik and Gallant (1986).

Geology

The geology of the lower ten miles of Lolo Creek canyon is mapped as metamorphic rock (Rember and Bennett 1979a). This metamorphic rock continues along the south side of the canyon until about creek mile 17, near Crocker Creek. On the north side of Lolo Creek canyon, above approximately creek mile 10, and above Crocker Creek on the south side, the canyon is mapped as Grande Rhonde Basalt (Rember and Bennett 1979b). These geologic units are periodically interrupted; for instance, there are outcrops of basalt in portions of the lower canyon.

Metamorphic rocks are primarily part of the Orofino Series, consisting of a succession of metamorphosed intrusive granitic rocks and metamorphosed Precambrian Belt Supergroup sediments. These rocks are thought to predate intrusion of the Cretaceous-aged Idaho batholith. The important rock types include quartz-dioritic orthogneiss and biotite-hornblende-plagioclase (Kopp 1959; Shea 1970). In portions of the canyon, rocks of the Orofino Series are overlain by basalt representing the Grande Rhonde Basalt flow. This formation is part of the Columbia River Basalt Group, a series of Miocene lavas that covered much of eastern Washington, northern Oregon and adjacent parts of Idaho. The vicinity around Lolo Creek lies within a geologic area known as the Clearwater Embayment, the remnant of basalt flows that reached into west-central Idaho (Bond 1963). Impressive pillows of basalt occur in places along the upper half of Lolo Creek canyon and occasionally are eroded into odd shapes.

Granitic rocks of the Idaho Batholith were observed on the south side of the canyon in the vicinity of the Carrot Ridge Road and in a few other places within the project area. Idaho Batholith granite is uncommon in the project area, although it dominates the geology of the Lolo Creek drainage upstream of the Clearwater NF boundary.

Soils

Soils in Lolo Creek Canyon are derived mostly from course-grained metamorphic rocks in the lower half of the project area and acidic igneous rocks in the upper half. They are developed largely from residual or colluvial material, although wind-lain material has also contributed to some soils. Soils have been mapped in the Idaho County portion of the project area and are part of the Lochsa-Yakus Association (Soil Conservation Service 1971). Soils in this association are characterized as very deep to shallow, moderately to very steep, on canyon sides, and course sandy loam or loam throughout. Soils belonging to the Lochsa, Klicker and Brody series, and rock outcrops are the most commonly mapped units along north-facing canyon slopes. Gwin and Helmer series soils are locally common in portions of the upper project area, and Nicodemus Series soils are common along Lolo Creek, from Cottonwood Flats to the Clearwater NF boundary (Soil Conservation Service 1971).

Soils along the southerly canyon slopes in Clearwater County have not been mapped. They are also very steep, but probably tend to be more shallow than deep. In general, they appear to be well-drained, often skeletal, and with course sandy or silty textures.

Climate

West-central Idaho has a modified continental, subhumid to humid, microthermal climate (Soil Conservation Service 1971). The area's climate is characterized by cool moist winters and warm dry summers. In the vicinity of the project area, summer high temperatures average around 90^0 F (32^0 C) in the valleys, and low 80's (30^0 C) for the uplands. Winter low temperatures average between 25^0 to 30^0 F (-4 to -1^0 C) in the valleys and about 20^0 F (-7^0 C) in the uplands. July is the hottest and January the coldest months of the year (Johnson 1978; Clearwater Soil and Water Conservation District *et al*. 1991).

Precipitation patterns change markedly with elevation. The average annual precipitation ranges from 25 inches (64 cm) at Orofino (elev. 1,029 ft.), to 43 inches (109 cm) at Pierce (elev. 3,188 ft.), to more than 70 inches (178 cm) at Hemlock Butte (elev. 5,810 ft.) at the head of Lolo Creek. The July to September summer months receive the least precipitation throughout the area. December and January are usually the wettest months, while precipitation is relatively evenly distributed the remainder of the year (Johnson 1978; Clearwater Soil and Water Conservation District *et al*. 1991).

Vegetation

Vegetation within the project area consists primarily of conifer forest. The steep south-facing slopes on the north side of the canyon support a ponderosa pine woodland interspersed with rocky, grassy openings, and sparsely vegetated cliffs and rock outcrops. Herbaceous vegetation dominates the pine understory. Shrubs are uncommon, except in draws, or in association with some other rocky habitats. Canyon grassland openings tend to be dominated by invasive annual grasses such as ventanata (*Ventenata dubia*) and bromes (*Bromus* spp.). Intact native bunchgrass understories or canyon grasslands containing bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*) are apparently rare. The steep southerly slopes moderate a bit around the Schmidt Creek drainage and again further upstream beginning near creek mile 12. At these points the pine woodlands give way to mixed conifer forest communities. Douglas-fir becomes common and is the dominant or co-dominant conifer in most places, along with ponderosa pine, all the way to the Clearwater NF boundary. This change to mixed conifer vegetation coincides with the point where timber harvesting has been widespread. Shrubs such as common snowberry (*Symphoricarpos albus*), mallow ninebark (*Physocarpus malvaceus*), and oceanspray (*Holodiscus discolor*) also become widespread. On these southerly aspects, grand fir (*Abies grandis)* is locally common only towards the upper end of the project area. Other conifers such as lodgepole pine (*Pinus contorta*), western larch (*Larix occidentalis*) and western redcedar (*Thuja plicata*) also occur in places.

The steep north-facing slopes on the south side of the canyon support a closed canopy Douglas-fir forest along the lower half of the project area. Timber harvest has been minimal here, in contrast to adjacent forests above the canyon. Shrubs such as mallow ninebark, common snowberry, oceanspray, Rocky Mountain maple (*Acer glabrum*), and others are common in the understory and forest openings. Large rock outcrops are frequent along the canyon face. Further upstream, the canyon forest continues to be largely dominated by Douglas-fir, but to varying degrees and timeframes, much of the area has been logged. Grand fir dominates some stands, especially approaching the Clearwater NF boundary. Western redcedar can also be locally common, but is usually more scattered.

Riparian vegetation is best developed in floodplain areas. White alder (*Alnus rhombifolia)* occurs along very lower Lolo Creek. Communities characterized by thinleaf alder (*Alnus incana*), black cottonwood (*Populus trichocarpa*), Pacific ninebark (*Physocarpus capitatus*), or other deciduous tall shrubs are common in

floodplain zones further upstream. The strongly confined channel of Lolo Creek along the lower half of the project area prevents development of much floodplain habitat. This stretch is characterized by an often indistinct thin band of riparian shrubs intermixing with upland conifer species.

Large diameter trees are apparently uncommon throughout the canyon and large stands of such trees nonexistent. The ponderosa pine woodlands characterizing the lower canyon's steep south slopes contain a majority of pole to medium size class trees that are generally under 50 feet in height. Douglas-fir stands on north-facing slopes are usually dominated by pole or smaller-sized medium sizes class trees. Fire evidence is common in the canyon forests, and has undoubtedly played a major ecological role in forming the forest in place at this time. No Pacific coastal disjunct or regionally endemic plant species were found during the assessment, indicating Lolo Creek canyon is not part of the Clearwater refugium ecosystem expressed further north in the North Fork Clearwater, and lower Lochsa and Selway and confluent Middle Fork Clearwater river canyons (Daubenmire 1969; Lorain 1988; Lichthardt and Moseley 1994).

Introduced weedy species are found throughout Lolo Creek canyon. Dry, rocky canyon slopes, areas disturbed by logging operations, and riparian sections grazed by livestock have been especially prone to weed invasion. Invasive annual grasses, notably ventanata and several species of brome dominate the grassy openings along the lower canyon's steep south-facing slopes. Pasture grasses such as orchard grass (*Dactylis glomerata*) and timothy (*Phleum pratense*) are common as a result of post-logging reseeding efforts and areas planted to pasture. Another forage grass, hedgehog dogtail (*Cynosurus echinatus*) is locally common in dry, rocky forest openings in the upper end of the project area. Yellow starthistle (*Centaurea solstitialis*) has a spotty, relatively sparse (in 1996) distribution on the north side of lower Lolo Creek. It is probably just a matter of time before it becomes more abundant in non-forested areas. Spotted knapweed (*Centaurea maculosa*) is common along open floodplain segments of Lolo Creek and in some open areas that were logged in the past. The most widespread weedy forb is erect cinquefoil (*Potentilla recta*). It occurs throughout the canyon in all but closed canopy habitats and is abundant in many places. Large to small swards of bracken fern (*Pteridium aquilinum*) are common in disturbed areas, especially in areas that have been logged. Plant nomenclature follows Hitchcock and Cronquist (1973) for this report.

Lolo Creek

The Lolo Creek watershed is roughly 156,000 acres in size (Clearwater Soil and Water Conservation District *et al*. 1993). Headwaters for Lolo Creek are in the Hemlock Butte area on the Clearwater NF. The creek is reported to be 42 miles long (Espinosa 1984). Annual discharge at the mouth ranges from an average spring peak of 500 cfs to a late summer base flow of 25 cfs. Elevation at the Clearwater NF boundary is approximately 2,775 feet, and 1,118 feet at the mouth, for an average gradient of 0.98% within the project area (Inter-Fluve 1993).

The BLM (Inter-Fluve 1993) conducted a stream habitat study in Lolo Creek, and based on gradient and channel confinement, mapped two distinct channel types within the project area. A-type channels (Rosgen 1985) comprise most of the lower 14 miles of the project area, where they are confined by the canyon walls. Gradient is relatively high and sinuosity low. Floodplain is found only in a few limited areas, and riparian vegetation occurs only in narrow strips near the channel. B-type channels are located at the mouth, near Schmidt Creek, and in the Cottonwood Flats area. They are characterized by relatively low gradient and low confinement, and a moderately to well developed floodplain.

Water quality and fish habitat in the Lolo Creek watershed has been degraded over the years primarily by

timber harvest, road building, placer mining, and livestock grazing activities. Major stream enhancement projects to improve anadromous fish habitat have been completed along Lolo Creek upstream from the Clearwater NF boundary (Espinosa 1984).

Lolo Creek was designated a Stream Segment of Concern under Idaho's Antidegradation Agreement of 1988 and listed as a high priority Stream Segment under Idaho's Agricultural Pollution Abatement Plan (Clearwater Soil and Water Conservation District *et al*. 1993). The Stream Segment of Concern program no longer exists in Idaho, and Lolo Creek is now on the state's 303D list (brought about by a lawsuit by the Idaho Conservation League and others against the Environmental Protection Agency), where it is ranked a medium priority stream. Under the auspices of the Idaho Soil Conservation Commission, stream monitoring, and work with local landowners developing erosion control programs and establishing best management practices have been implemented for the watershed, mostly on tributaries to Lolo Creek (M. Hoffman, Water Quality Resource Conservationist, Idaho Soil Conservation Commission, pers. comm., 1996). There are no small dams or diversions along Lolo Creek, and instream flows are not appropriated by outside interests at any point along the stream (Espinosa 1984).

Land use and access

Timber harvest has been limited within the lower half of the project area. An exception is the Schmidt Creek drainage, which has been extensively logged. Large sections of the project area upstream from about Grouse Creek have been subject to some level of logging over the years, including large clearcuts. Timber harvest has been much more widespread and intensive outside the project area, on lands above the steep canyon face. Logging access and other roads are most common upstream of Grouse Creek. Road intensity Dryland agriculture is the dominant land use in the lower watershed on the rolling plateaus above the canyon rim.

Recreational use along Lolo Creek is limited due to difficult access. Fishing, swimming, and other gatherings occur mostly along the lower 0.5 mile and then further upstream where access permits, such as near Schmidt Creek, the Woodland bridge area (near creek mile 12) and lower Rock Creek. Along Lolo Creek, cattle grazing is concentrated in a few accessible areas with relatively broad riparian floodplains. Cottonwood Flats is the most intensively grazed area, but other places where cattle were observed to be adversely affecting riparian and upland vegetation includes upstream from the mouth of Schmidt Creek, near creek mile 18, upstream from the mouth of Rock Creek, and bottonlands near the Clearwater NF boundary.

Access along the project area is limited. There are five public access routes to Lolo Creek below the Clearwater NF boundary.

1) Take Highway 11 for 0.5 mile east of Greer to the first gravel road to the right (Carrot Ridge Road). Follow this road for approximately 0.75 mile to the bridge over Lolo Creek near creek mile 0.3.

2) From Highway 11, 1.8 miles east of Fraser Park (about four miles west of Weippe), turn south onto the graveled Schmidt Mill Road. At 0.5 mile bear right at Y. Continue 0.5 mile further, turn right (west) and go about 0.25 mile to the unmarked green BLM gate. This is a BLM public access road even though it may be posted. Proceed through the gate along a dirt road (impassable in poor weather) 1.7 miles to a barb wire gate, bearing left at a Y along the way. The access road is washed out past the gate and must be walked the final mile or so down to Lolo Creek near creek mile 7.

3) A county road leads down and crosses Lolo Creek at the Woodland Bridge near creek mile 12. Access from the north is via the county road leading directly south from Weippe (past the Weippe Cemetery) for about three miles. A road heading south off the Carrot Ridge Road about three miles east of Harrisburg provides access from the south.

4) The Cottonwood Flats area near creek mile 16 can be accessed via a series of roads from Weippe to the north. A 4-wheel drive vehicle is required to descend to Lolo Creek, and the road would be impassable in poor weather.

5) The Rock Creek Bridge crosses Lolo Creek onto private lands near creek mile 21. Access from Weippe to the north is via the main gravel road that continues east past Lacey Meadows. When descending Rock Creek, the road turns to dirt at the gravel pit. Access from the south is blocked by locked gates. The Lacey Meadow Road can also be accessed from the east via Forest Service Road 5112, which leaves Forest Service Road 100 about 0.5 mile north of Lolo Campground.

CONSERVATION ASSESSMENT

Objective

The Nature Conservancy (TNC) has identified Lolo Creek as an area for potential conservation action, and contracted the Idaho Conservation Data Center to conduct a biological/ecological survey of the canyon as a means of assessing its conservation values. This assessment was our primary objective and consisted of four main parts: (1) a plant community inventory and the production of a broad-scale vegetation map; (2) a more detailed riparian community inventory; (3) rare plant surveys; and (4) a compilation of fish and wildlife population information about the area. Field survey results form the basis for considerations regarding possible conservation planning for Lolo Creek canyon.

Methods

Information about Lolo Creek was collected from various sources prior to initiating field work. Field work was conducted July 27 and July 28, and September 3 to September 10, 1996. Most of the project area has very limited access. This is complicated by the large amount of private land and “no trespassing” signs. Field investigations were usually conducted by driving to a point that allowed a portion of the canyon to be surveyed via hiking. Therefore, accessibility played a large role in dictating the location and extent of surveys. Direct field surveys were conducted in the following areas: (1) riparian and canyon slopes from the mouth to creek mile two; (2) upper slope areas on the south side of the canyon accessible along the Carrot Ridge Road (the road that climbs from the first bridge over Lolo Creek to the Woodland area); (3) riparian and upland slopes along eastern portions of the Schmidt Creek drainage; (4) upper Incendiary Creek; (5) riparian and canyon slopes near the county road (Woodland bridge road) that crosses Lolo Creek near creek mile 12; (6) Cottonwood Flats area; (7) riparian and canyon slopes in the vicinity of creek mile 18; (8) riparian and upland areas in the lower Rock Creek drainage; (9) the Yakus to Mud creeks areas; (10) riparian and upland areas in the vicinity of the Clearwater NF boundary. Most of the remainder of the project area was observed from various vantage points.

Field investigations concentrated on plant species and plant community elements with high biodiversity ranks (based on ranks assigned by the International Association of Natural Heritage Programs and Conservation Data Centres), in particular, Global (G) and State (S) ranks of 1, 2, and 3 (these ranks are defined on page 9 of this report). Additional priorities included riparian habitats, as well as more common plant community elements in high ecological condition.

Results

Plant community inventory - Twenty plant community types have been identified for Lolo Creek canyon. Upland and riparian plant communities and their associated global (G) and state (S) conservation ranks are listed in Table 1. Sixteen of the community types are based on descriptions found in published classifications, while four are not part of any regional classification. The cover type names used for the vegetation map are more generic and typically encompass more than one community type.

The Global and State conservation ranks found in Table 1 are from Bourgeron and Engelking (1994). Assigning accurate global and state ranks for the riparian community types not previously classified will require further field investigations. The Global rank is a numerical assessment of a plant association's relative rarity across its entire range of distribution assigned by the International Association of Natural Heritage Programs and Conservation Data Centres. Global ranks are determined primarily on the number of occurrences and total area of coverage by a plant association. Other factors considered are permanence, intrinsic fragility and vulnerability, historic trend in distribution, threats, geographic range, and number of occurrences protected. State ranks follow the same criteria and methodology as the Global ranks, except the information assessed for ranking is limited to the individual state, in this case Idaho. The interpretation of ranks is as follows:

1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences) or because of some factor making it vulnerable to extinction.
2 = Imperiled globally because of rarity (6 to 20 occurrences) or because of other factors demonstrably making it vulnerable to extinction.
3 = Either very rare and local throughout its range, or found locally in a restricted range, or because of other factors making it vulnerable to extinction (20 to 100 occurrences).
4 = Widespread, abundant, and apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery (usually more than 100 occurrences).
5 = Demonstrably widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery.
U = Unknown.
? = Not yet ranked.

Upland forest sites supporting plant community elements with high biodiversity ranks are limited in the project area. A possible exception is the ponderosa pine woodlands in lower Lolo Creek canyon, comprised of extensive ponderosa pine/bluebunch wheatgrass (G4/S3) and ponderosa pine/Idaho fescue (G4/S2) woodland forest types. The woodlands support an intact pine overstory, but invasive annual grasses have largely replaced the original native bunchgrasses in the understory, and compromise the ecological integrity of these sites. Nonetheless, these pine woodlands are of conservation interest because they are not fragmented. Large tracts of never, or very minimally logged ponderosa pine woodlands dominated by fairly large trees, are no longer common in the lower Clearwater drainage. Although tree sizes are too small to qualify the woodlands as old-growth, they probably represent the oldest forest stands in the canyon.

Most of the rest of the canyon is dominated by Douglas-fir, or mixed conifer forest stands. They are important for watershed and wildlife habitat purposes, but not from a plant community, rare plant, or rare animal conservation perspective. Sites supporting the grand fir/white spiraea (G3/S3) and grand fir/mallow ninebark (G3/S3) habitat types, are mid-seral and dominated by Douglas-fir, either due to fire or past

Table 1. Plant communities of the Lolo Creek canyon project area.

	Name	G-rank	S-rank	[1]Ref.
Uplands				
1.	Ponderosa pine/bluebunch wheatgrass (*Pinus ponderosa/Agropyron spicatum)*	G4	S3	1
2.	Ponderosa pine/Idaho fescue (*Pinus ponderosa/Festuca idahoensis*)	*G5*	S2	1
3.	Ponderosa pine/common snowberry (*Pinus ponderosa/Symphoricarpos albus*)	*G5*	S3	1
4.	Douglas-fir/elk sedge (*Pseudotsuga menziesii/Carex geyeri*)	G5	S5	1
5.	Douglas-fir/common snowberry (*Pseudotsuga menziesii/Symphoricarpos albus*)	G5	S4	1
6.	Douglas-fir/mallow ninebark (*Pseudotsuga menziesii/Physocarpus malvaceus*)	G5	S5	1
7.	Grand fir/white spiraea (*Abies grandis/Spirea betulifolia*)	G3	S3	1
8.	Grand fir/mallow ninebark (*Abies grandis/Physocarpus malvaceus*)	G3	S3	1
9.	Grand fir/queencup beadlily (*Abies grandis/Clintonia uniflora*)	G5	S3	1
10.	Western redcedar/queencup beadlily (*Thuja plicata/Clintonia uniflora*)	G5	S5	1
11.	Talus-shrub garland	?	?	2
12.	Mixed deciduous shrub	G?	?	*
13.	Bluebunch wheatgrass-Sandberg's bluegrass/balsamroot (*Agropyron spicatum-Poa secunda/Balsamorhiza sagittata*)	G3	S3	3
Riparian				
14.	Black cottonwood/thinleaf alder (*Populus trichocarpa/Alnus incana*)	GU	SU	4
15.	Black cottonwood/Pacific ninebark (*Populus trichocarpa/Physocarpus capitatus*)	GU	SU	*
16	Thinleaf alder/Pacific ninebark (*Alnus incana/Physocarpus capitatus*)	GU	SU	*
17.	Thinleaf alder/red-osier dogwood (*Alnus incana/Cornus stolonifera*)	G4	S3	5
18.	Thinleaf alder/mesic graminoid (*Alnus incana*/mesic graminoid)	G2G3	?	5
19.	Pacific ninebark (*Physocarpus capitatus*)	GU	SU	*
20.	White alder (*Alnus rhombifolia*)	G3	S3	6

[1] References (Ref.) Used to classify the vegetation are: 1 = Copper *et al*. 1991; 2 = Johnson and Simon 1987; 3 = Tisdale (1986); 4 = Crowe and Clausnitzer (1995); 5 = Padgett *et al*. (1989); 6 = Miller (1976); * = not

classified.

logging histories. Other forest community elements are ranked G4 or 5/S4 or 5. A majority of the forest in the upper half of the project area have been subject to some degree of timber harvest and second-growth dominates many areas.

There is very limited canyon grassland habitat outside of the ponderosa pine woodland mosaic in the lower canyon. All grassland sites probably supported a version of Tisdale' (1986) bluebunch wheatgrass-Sandberg' bluegrass/arrowleaf balsamroot habitat type (G3/S3). Idaho fescue was typically seen only in association with woodland or forest sites. Patches of remnant native bunchgrass communities were observed as part of the ponderosa pine parkland vegetation, but overall, canyon grassland sites are dominated by introduced grass species.

Riparian community inventory - Except for near the mouth, riparian vegetation is limited along the lower creek bottom upstream to Cottonwood Flats due to channel confinement by the steep canyon walls. Several of the plant communities comprising the riparian vegetation along Lolo Creek are not described in regional classifications. This is largely due to the significant amount of Pacific ninebark characterizing several of the communities. I came across no regional classifications that noted Pacific ninebark in their descriptions. The implication is that several of the riparian plant communities in the project area may be uncommon or unique and deserve high element ranking. Further studies are needed to determine if this is the case. Riparian communities were inventoried at a finer scale than upland sites. This is reflected in the relatively high number of riparian plant communities described for the limited riparian habitat.

The Cottonwood Flats area contains the most extensive floodplain in the project area. The ecological condition of all the riparian communities in Cottonwood Flats and most other areas with floodplain vegetation further upstream has been impacted by cattle grazing. One consequence is that the understory herbaceous layer has become dominated by weedy grasses and forbs. Grazing has also adversely affected black cottonwood and shrub regeneration in places. Black cottonwood tends to be patchy in the project area and no large stands were found.

Rare plant surveys - No rare plant populations were discovered within the project area. Rare plant habitat is very limited in Lolo Creek canyon.

Fish and Wildlife - No inventories were conducted for animal species. Lolo Creek does provide important habitat for many fish and wildlife species. Information regarding fish and wildlife is presented elsewhere in this report.

Lolo Creek canyon vegetation map

A broad-scale vegetation map has been prepared for Lolo Creek canyon, and encompasses portions of five 1:24,000-scale USGS topographic quadrangles - Orofino East, Sixmile Creek, Woodland, Weippe South, and Brown Creek Ridge. This report is the support document for the vegetation map submitted to TNC. Ground reconnaissance, supplemented by aerial photo interpretation was used to construct the vegetation map.

The vegetation map is based on cover types grouped into two broad categories - upland and riparian communities. Cover types reflect a site's existing vegetation. Cover types are described solely from field reconnaissance methods. Vegetation sampling was restricted to one plot in a black cottonwood/Pacific

ninebark community in the Cottonwood Flats area (Appendix 2). Because the map uses a broad-scale approach, each cover type is comprised of several plant community types. These plant community groupings are more or less ecologically related. The cover types are based on a single dominant species (e.g., Douglas-fir cover type), a group of related, intermixed dominants (e.g., mixed conifer forest cover type), or a mosaic of different life forms comprised of one dominant type (e.g., ponderosa pine woodland cover type). One affect of using a broad-scale approach is that nearly all polygons contain inclusions and other local variations to the vegetation that were not mapped separately. Polygon delineation is based primarily on broad-scale vegetation pattern homogeneity. Polygons (vegetation map units) are numbered consecutively from 1 to 64 and referenced using their unique number. Each has an assigned cover type. The vegetation map consists of 11 cover types, which are described in the following section.

Low-level flight infra-red aerial photographs used for this project were taken in 1993, under identification number ID-93-HI-1. Photos 8-1-1 to 9-15-4 cover all of Lolo Creek and large segments of the canyon slopes within the project area. Color copies of selected photos were taken into the field to help map the vegetation. These aerial photographs were graciously loaned by the BLM's Cottonwood Resource office. Upon completion of field work, polygons were delineated onto the five 1:24,000 orthophoto maps that cover the project area. These were then traced onto the corresponding 1:24,000 USGS topographic quadrangles, which provided the template for GIS digitization. Sets of both types of maps have been submitted to TNC. Figure 3 is a reduced rendition of the Lolo Creek canyon vegetation map.

Limited preliminary analysis of the vegetation map was conducted using GIS. The project area totaled approximately 16,335 acres. Polygons range in size from 2,264 acres for the extensive Douglas-fir forest cloaking most of the lower eight miles of the canyons south side, to less than five acres for a few riparian stretches. Average polygon size is 255 acres. Upland cover types comprise 98%, and riparian cover types 2% of the project area. Mix conifer (37%) is the largest cover type class, followed by the Douglas-fir (31%) and ponderosa pine (17%) types. A summary of cover type data are presented in Table 2.

Cover type descriptions

Upland Vegetation

Ponderosa pine woodland mosaic (*Pinus ponderosa*; PINPON) - this cover type mosaic is characterized by ponderosa pine woodlands interspersed with large to small swaths of canyon grassland vegetation and sections of rock outcrops, cliffs and bands of talus. No attempt was made to separately map the patchy grassland or rocky habitats occurring within the mosaic.

Canopy density of ponderosa pine ranges from very open savanna to pockets of closed forest. Within this range, woodland communities averaging 20-50% canopy coverage are the most common. Regardless of canopy density, herbaceous species dominate the understory. Shrubs are rare in most places, an exception being side slopes above draws, positions that also often have a higher tree canopy density. Introduced, invasive annual grasses dominate extensive portions of the herbaceous component and in sections of lower Lolo Creek canyon, have nearly totally replaced the native bunchgrasses. Ventanata (*Ventanata dubia*) and several species of annual brome (*Bromus* spp.) are abundant. Medusahead rye *(Taniatherum caput-medusea*) and several perennial pasture grass species are more locally distributed. Introduced weedy forbs are often more common in the understory than native forbs. I never encountered more than scattered patches of intact native bunchgrass understory. However, a number of inaccessible areas I did not survey, or other places that received only a cursory survey, may support ponderosa pine parklands with understories in better

ecological condition. South-facing canyon slopes from approximately creek mile 4 to

Figure 3

Table 2. Summary of cover type data for Lolo Creek canyon vegetation map.

Cover type	[1]Acres	% coverage	[2]frequency
Upland types			
PINPON	2,715	17	5
PINPON-log	728	4	2
PSEMEN	3,495	21	9
PSEMEN-log	2,676	16	8
MIX CONIFER	6,133	37	17
DECID. SHRUB	251	2	2
AG. LAND	235	2	7
	15,982	98	
Riparian types			
ALNRHO	3	<1	1
ALNINC	130	1	12
POPTRI	116	1	3
PHYCAP	82	0.5	6
	331	2	

[1]Acreage for riparian polygons are estimates (not digitized).
[2]The number of polygons containing each particular cover type (total of 64 polygons).

5, and 10 to 11 are likely candidates for the bunchgrass understory to be in better ecological condition.

Portions of this cover type are dominated by open grassland or rocky habitats. The canyon grasslands have soils too shallow for widespread tree establishment and tend to be associated with large rock outcrop areas. They are now commonly dominated by invasive annual grasses such as ventanata bromes. Late-seral, remnant bluebunch wheatgrass (*Agropyron spicatum*) communities are apparently absent.

Extensive series of dramatic rock outcrops, cliffs and talus are conspicuous throughout the lower canyon, and their aerial extent covers nearly 50% of some sections. Most are sparsely vegetated, if at all. The mosaic contains deciduous shrub stringers in draws that add structural and community diversity to the canyon face. Patches of bracken fern also occur, although not as extensive as found in disturbed forest openings further up the canyon.

This wooded and grassy/rocky canyon mosaic is best developed along the steep south-facing canyon slopes, from top to bottom, from the mouth of Lolo Creek, upstream to about creek mile 5, and also mile 10 to 11. Douglas-fir is absent throughout most of this area except in some of the ravines or other protected sites. Along the very lower canyon slopes it is common to find a narrow band of mixed conifer (Douglas-fir, grand fir, ponderosa pine and occasionally western redcedar and Engelmann spruce) forest associated with Lolo Creek and often mingling with the narrow strip of riparian vegetation immediately adjacent to the creek. These strips of mesic forest are considered inclusions, part of the cover type mosaic, and not delineated on the vegetation map. Vegetation included within this cover type has not been logged, or only minimally so.

The ponderosa pine woodland/grassland mosaic vegetation mapping unit includes the following habitat types, *Pinus ponderosa/Agropyron spicatum* (Cooper *et al*. 1991), *Pinus ponderosa/Festuca idahoensis* (Cooper *et al*. 1991), minor amounts of *Pinus ponderosa/Symphoricarpos albus* (Cooper *et al*. 1991), *Agropyron spicatum-Poa secunda/Balsamorhiza sagittata* (Tisdale 1986), and talus garlands (Johnson and Simon 1987). The presence of ponderosa pine invariably precluded any sites from being classified as Idaho fescue grassland. The composition and structure of the mixed deciduous shrub stringers are fairly similar to those outlined in Mancuso and Moseley (1994) for Craig Mountain.

Ponderosa pine - logged (*Pinus ponderosa*; PINPON-logged) - Areas formerly supporting ponderosa pine-dominated woodland or forest that have been logged. Present vegetation is largely open and generally consists of a few scattered individual or small clumps of trees not harvested, and a weedy understory.

Douglas-fir forest (*Pseudotsuga menziesii*; PSEMEN) - Douglas-fir dominated forests extend the length of lower Lolo Creek Canyon on northerly aspects, on the south side of the creek, often in nearly pure stands. This cover type includes areas that are largely unlogged. These closed canopy forests often have a shrub-dominated understory, with mallow ninebark, oceanspray, snowberry, and Rocky Mountain maple among the more common species. More dense shrubfields are common where the canopy is open. Ponderosa pine is more common along the lower canyon stretches than further upstream, and dominates inclusions of rocky, southerly-facing spur slopes. Grand fir and/or western redcedar may be present, or even locally common, especially in the upper half of the project area. This indicates that Douglas-fir is the climax conifer species only along the steep lower end of the canyon. Other conifers, such as western larch are spotty. Evidence of past fire is clearly evident in many places.

Large cliff faces and rock outcrops are common along the canyon. The exposed outcrops commonly support a luxuriant moss community dominated by *Rhytidadelphus triquetrus.* Other mosses such as *Hypnum subimponens, Dicranium scoparium,* and the clubmoss *Selaginella douglasii* are also present. These rock outcrop/moss communities are not differentiated on the vegetation map, but from a plant community perspective, are common and cover sufficient area to probably be considered a separate community type.

The Douglas-fir forest vegetation mapping unit includes the following habitat types, *Pseudotsuga menziesii/Symphoricarpos albus* (Cooper *et al*. 1991), *Pseudotsuga menziesii/Physocarpus malvaceus* (Cooper *et al*. 1991), *Abies grandis/Physocarpus malvaceus* (Cooper *et al*. 1991), *Abies grandis/Clintonia uniflora* (Cooper *et al*. 1991), and *Thuja plicata/Clintonia uniflora* (Cooper *et al*. 1991). Additional habitat types occur on the more gentle slopes above the canyon, outside the study area.

Douglas-fir forest - logged (*Pseudotsuga menziesii*; PSEMEM-logged) - Logged areas supporting forest strongly dominated by Douglas-fir are mapped as this cover type. Forest structure integrity is usually present in areas only selectively logged, or logged long enough ago to support a healthy second-growth. Areas subject

to more intensive logging are usually mapped in the mixed conifer forest, or mixed deciduous shrubfield categories.

Mixed conifer forest - This cover type is characterized by open to closed forests of mixed conifer species, and often intermixed with patches dominated by a single species, most commonly, Douglas-fir. Various size and age classes may be represented, but large diameter (>20 d.b.h) trees are uncommon. This cover type is common in areas that have been logged. Shrubfields and bracken fern glades are intermixed within the mixed conifer forest. This cover type dominates the Schmidt Creek drainage and large portions of the upper half of the project area.

Douglas-fir and ponderosa pine are the primary tree species in this cover type. Grand fir or lodgepole pine can be common in places, while western redcedar and western larch tend to be spotty. Deciduous shrubs are often common in the understory and form dense patches in open areas. Conifer or shrub regeneration is minimal in most of the bracken fern glades. Introduced annual grasses and pasture grasses are common, especially in disturbed areas. Native graminoids such as Idaho fescue, pinegrass (*Calamagrostis rubescens*), and/or elk sedge (*Carex geyeri*) can be common in the forest understory.

Due to disturbances, it was often difficult to assign habitat types to places with this cover type. Several habitat types are apparently represented, including *Pseudotsuga menziesii/Carex geyeri*, *Pseudotsuga menziesii/Symphoricarpos albus*, *Pseudotsuga menziesii/Physocarpus malvaceus*, *Abies grandis/Spirea betulifolia*, *Abies grandis/Physocarpus malvaceus*, and *Abies grandis/Clintonia uniflora* (Cooper *et al.)*. The study area does not include any grand fir mosaic habitats described by Ferguson and Johnson (1996).

Mixed deciduous shrubfield - This cover type is characterized by a multi-layered and diverse assemblage of deciduous shrubs. Tall shrubs include Rocky Mountain maple, mallow ninebark, serviceberry (*Amelanchier alnifolia*), oceanspray, bittercherry (*Prunus emarginata*), black hawthorne (*Crataeagus douglasii*), wild rose (*Rosa* sp.), and Scouler's willow (*Salix scouleri*). Common low shrubs include common snowberry, Oregon creeping grape (*Berberis repens*), thimbleberry (*Rubus parviflorus*), and pachistima (*Pachistima myrsinites*). Composition and ratios of shrub species can vary considerably from one site to the next. In many cases, no single species is a clear dominant. A mosaic of large shrub patches are often present in areas that have been logged and represent the most extensive examples of this cover type. Mixed deciduous shrubfield patches are common in many areas mapped as a forest type. Only a few of the large clearcut shrubfields are included as separate polygons on the vegetation map.

Less diverse versions of this cover type, generally dominated by mallow ninebark, are associated with rock outcrops in the canyon. Another version, dominated by black hawthorne, was observed in some rocky, ephemeral stream draws and dissections.

Huschle (1975) describes a "heterogenous shrub mixture" type containing many of the same shrub species. Similar cover types have been described for sections of the Snake River Canyon (Mancuso and Moseley 1994; Mancuso and Moseley 1995).

Agricultural land - This cover type pertains to areas that have been converted to cropland or livestock pasture. It is restricted to areas near the top of the canyon. Polygons of this cover type are usually connected to much larger parcels of farmland extending onto the adjacent prairie outside the study area.

Riparian Vegetation

White alder (*Alnus rhombifolia*; ALNRHO) - Very lower Lolo Creek supports a white alder-dominated riparian strip. White alder canopy cover varies from rather open to closed and most trees are less than 30 feet tall. There is some evidence of hybridization with thinleaf alder, which is common further upstream. Syringa (*Philadelphus lewisii*), rose, poison ivy (*Rhus radicans*), blackberry (*Rubus laciniatus*), and cascara (*Rhamnus pershiana*) are common shrub associates. A mix of introduced and native forbs and graminoids share the herbaceous layer. Miller (1976) sampled near Lolo Creek as part of his regional white alder study. Nonetheless, it is not clear which of Miller' white alder community types best applies to lower Lolo Creek.

Thinleaf alder/deciduous shrub (*Alnus incana*; ALNINC) - This cover type is characterized by a mix of thinleaf alder and other deciduous shrub species. As a tall shrub or small tree, thinleaf alder forms an open to closed canopy, while understory shrubs often form a dense thicket. Pacific ninebark is often the dominant associate, as the community type name *Alnus incana/Physocarpus capitatus* implies. Combinations of other shrub species such as black hawthorne, common snowberry, cascara, Rocky Mountain maple, red-osier dogwood (*Cornus stolonifera*), and wild rose may also be common, and in this regard appears similar to the *Alnus incana* community type described by Kovalchik (1987) . This cover type typically occurs as a narrow band adjacent to Lolo Creek. Along much of the lower half of the canyon, the riparian strip is only one or two shrubs wide and mixes with the adjacent forest vegetation. It is the most common riparian cover type along Lolo Creek.

Near the Clearwater NF boundary are some areas where red-osier dogwood is the dominant understory shrub, and the community share similarities with the *Alnus incana/Cornus stolonifera* community type described by Padgett *et al*. (1989). In a few places within braided stream channels, the small-tree form of thinleaf alder forms a more or less closed canopy without any associated shrubs. Only stray forbs and graminoids occur in the sandy, cobbly substrate. Along with seasonal flooding/scouring, livestock grazing may also be partly responsible for the sparse understory. This very minor community shares similarities with the *Alnus incana/*mesic graminoid community type of Padgett *et al*.(1989).

Pacific ninebark (*Physocarpus capitatus*; PHYCAP) - This cover type includes riparian shrub communities where thinleaf alder is a minor component or absent. One example includes the dense shrub patches overwhelmingly dominated by Pacific ninebark, the *Physocarpus capitatus* community type. This type has not been described in regional classifications, although Pacific ninebark is listed in the general species list in classifications by Kovalchik (1987) and Rowe and Clausnitzer (1995). Other examples are black hawthorne-dominated shrub bands where Pacific ninebark and snowberry are the most important associates, and a mixed tall shrub community where shrubs such as black hawthorne, cascara, Pacific ninebark and serviceberry are intermixed, with no single species being dominant. These communities are often linear in shape and most common sandwhiched between the alder-dominated vegetation closest to the waters edge and the adjacent upland vegetation. Because these variations are in close proximity and often small in size, no attempt was made to separate them for the vegetation map.

Black cottonwood/deciduous shrubs (*Populus trichocarpa*; POPTRI) - This cover type forms where topography and creek dynamics allow a floodplain to form. Large black cottonwood trees tend to be well spaced, with scattered patches containing a more continuous overstory. I did not observe any areas supporting extensive cottonwood gallery forests. Understory vegetation is often similar to the thinleaf alder/deciduous shrub cover type. The herbaceous layer is dominated by introduced grasses and forbs in most instances. Rocky, sandy terraces with few shrubs and no, or only scattered trees, are interspersed within the floodplain area and also very weedy. Scattered conifers (western redcedar, grand fir, Douglas-fir, ponderosa pine) often occur on the floodplain terraces and include the largest trees observed in the study area. Riparian areas where

thinleaf alder occurs in the understory represents the *Populus trichocarpa/Alnus incana* community type that appears related to a community with the same name described for montane forests to the west (Crowe and Clausnitzer 1995). On somewhat drier sites, Pacific ninebark forms the dominant understory shrub layer and represents the *Populus trichocarpa/Physocarpus capitatus* community type. This community type was sampled at Cottonwood Flats (Appendix 2). This type is not referenced in regional classifications.

On terraces subject to livestock grazing, cottonwood regeneration is very sparse in places, with only large, partly decadent trees remaining. Regeneration is usually better on point bars and other more active seasonal deposition zones, where patches of single age cohorts can sometimes be found. Overall, stands containing multiple canopy layers of cottonwood are uncommon. The largest examples of this cover type occur in the Cottonwood Flats and Rock Creek areas.

Polygon descriptions

The vegetation map contains 64 polygons, with #1 to #51 covering upland sites, and #52 to #64, riparian sites. Polygon numbering begins at the mouth of Lolo Creek on the north side of the creek and scrolls upstream. It then returns to the mouth on the south side of the creek and again scrolls upstream. Finally, the narrow riparian polygons start at the mouth and continue in an upstream direction. Polygons containing potentially high ranking riparian plant community types are highlighted in bold. Acreage for each polygon is provided in Appendix 5.

Polygon # **Polygon Description**

1 AGRICULTURAL LAND - cleared land associated with private home and property; generally weedy.
2 PINPON cover type - largely Pinpon/Symalb h.t. except for grassy openings on west side of draw.

3 PINPON logged cover type - selectively logged, with most trees removed from portions of polygon.

4 AGRICULTURAL LAND cover type.

5 PINPON cover type - an extensive series of steep, southerly-facing canyon slopes that extends from near the mouth of Lolo Creek, upstream for approximately six miles. This polygon encompasses most of the BLM's Lower Lolo Creek ACEC that occurs on the north side of the creek.

6 PINPON cover type - a narrow band of conifers occurs above this strip of rocky, weedy grassland vegetation. Piles of talus occur at base of rock outcrops within polygon. Few, if any ponderosa pine occur within the polygon.

7 AGRICULTURAL LAND cover type.

8 PINPON - logged cover type - portions of polygon support Douglas-fir habitat types; clearcuts present.

9 MIXED CONIFER cover type - selectively logged ponderosa pine and Douglas-fir forest; portions supporting Psemen/Phymal h.t.; some pockets of larger ponderosa pine trees; bracken fern patches and pasture grasses common.

10 AGRICULTURAL LAND cover type.

11 PSEMEN - logged cover type - selectively logged (intensely in many places); ponderosa pine is dominant tree in places; shrub patches common; majority of polygon contains Douglas-fir h.t.

12 AGRICULTURAL LAND cover type - pasture grasses with scattered bracken fern patches.

13 PSEMEN cover type - largely Clearwater National Forest land.

14 PINPON cover type - cliffs and rock outcrops common, dominating some sections of canyon; ecological condition of herbaceous understory undetermined.

15 PSEMEN cover type - limited logging has taken place.

16 PSEMEN - logged cover type.

17 MIXED CONIFER cover type - most of area has been logged.

18 AGRICULTURAL LAND cover type - seeded to pasture grasses.

19 AGRICULTURAL LAND cover type.

20 MIXED CONIFER cover type - mostly selectively logged, some small clearcuts; scattered stands of intact forest; ponderosa pine and Douglas-fir the predominant conifers.

21 MIXED CONIFER cover type - nearly all logged, including large clearcut areas.

22 PINPON cover type - rock outcrops, talus aprons and grassy openings common.

23 MIXED CONIFER cover type - area has been logged; Douglas-fir most common conifer.

24 MIXED CONIFER cover type - not logged; rocky, grassy opening common along lower slopes. Mostly Clearwater National Forest land.

25 MIXED CONIFER cover type - much of area logged, varying from clearcuts to minimal thinning; clearcut areas with conifer regeneration occurring within shrubfield matrix; Douglas-fir or grand fir dominate most areas.

26 PSEMEN cover type - series of large, raw basalt faces above creek, with pockets of rocky, grassy vegetation where not vertical; scattered deciduous shrub patches; spotty Douglas-fir forests along upper slopes with some limited logging.

27 MIXED CONIFER cover type - dominated by rock outcrops and talus with very few trees present.
28 PSEMEN-logged - clearcut area with Douglas-fir seedling regeneration; talus fields scattered across upper slopes; large moss-covered basalt ridge/slope along downstream end of polygon.

29 MIXED CONIFER cover type - unlogged portion of slope; talus fields present.

30 MIXED CONIFER cover type - area logged.

31 PSEMEN cover type - extensive, steep, northerly-facing lower canyon slopes; predominately Psemen/Phymal h.t.; rock outcrops, cliffs are common; unlogged, with a few minor exceptions; encompasses the BLM' Lower Lolo Creek ACEC on south side of creek. Boundaries of this polygon extend from the creek, upslope to the ACEC boundary line.

32 PSEMEN-logged cover type - upper slopes outside ACEC boundaries; some portions not logged.

33 PSEMEN-logged cover type - burn area with standing snags.

34 PSEMEN cover type - largely unlogged, lower to middle slopes; dominated by Douglas fir; upstream from ACEC boundaries.

35 PSEMEN-logged cover type - selectively logged in most cases.

36 PSEMEN cover type - slopes dominated by Douglas-fir, although largely grand fir series habitat types; limited logging in places.

37 PSEMEN-logged cover type - includes old clearcuts; shrubfields common.

38 PSEMEN cover type - mostly not logged.

39 MIXED CONIFER cover type - logged; Douglas-fir is most abundant conifer.

40 MIXED DECIDUOUS SHRUBFIELD cover type - southwest-facing slopes of Paunch Mountain; scattered herbaceous openings and conifers; area logged or burned in past.

41 PSEMEN cover type.

42 MIXED CONIFER cover type - area logged, including old clearcuts; shrubfields common.

43 PSEMEN cover type - Douglas-fir dominated, but grand fir and other conifer species present.

44 PSEMEN cover type - Douglas-fir dominated, but grand fir and other conifer species present.

45 MIXED CONIFER cover type - heavily logged area dominated by Douglas-fir.

46 MIXED CONIFER cover type - Douglas-fir or grand fir dominate most areas; some level of logging and/or fire has occurred throughout area in past, with secondary forest well established; active logging observed in one section; a few homes and associated access roads present; extensive series of moss-covered cliffs and rock outcrops above lower Yakus Creek.

47 MIXED CONIFER cover type - Douglas-fir dominates strip of forest on east-facing slopes above Yakus Creek, but grand fir more common on opposing west-facing slopes; inclusion of grassy bald vegetation (mostly converted to pasture grasses and grazed mainly by horses) near road; some talus and shrub patches present.

48 MIXED CONIFER cover type - portions logged; scattered deciduous shrubfields; inclusion of grassy

bald vegetation (signs of horse grazing).

49 MIXED CONIFER cover type - Douglas-fir dominates the lower section and grand fir the upper section of the polygon; some logging has occurred in the past; rock outcrops and cliffs occur in places.

50 MIXED DECIDUOUS SHRUBFIELD cover type - area clearcut, scattered mixed conifer regeneration.

51 MIXED CONIFER cover type - Western redcedar habitat type; portions logged in past.

52 ALNRHO cover type - extends from upstream of the mouth of Lolo Creek for approximately 0.3 mile; there is little white alder along the final 100 m or so of Lolo Creek, a disturbed black cottonwood community occurs along this stretch.

53 ALNINC cover type - this segment of Lolo Creek extends for approximately three miles to near creek mile 3.5. The strict confinement of Lolo Creek by the canyon walls restricts development of a riparian vegetation zone. Thinleaf alder and/or other deciduous shrubs, intermixed with coniferous trees, occur as a very narrow strip immediately adjacent to the creek. On a few small point bars this vegetation is better developed.

54 ALNINC cover type - extends from approximately creek mile 3.5 to 6.3, near the mouth of Schmidt Creek. Identical to polygon #53, but with a wider strip of riparian vegetation in places.

55 ALNINC and PHYCAP cover types - from near the mouth of Schmidt Creek to approximately creek mile 7, Lolo Creek is less confined and supports several riparian communities, including Alninc/mixed deciduous shrub (with common snowberry as a common associate) and Pacific ninebark (Cradou and Phycap are dominants); western redcedar and other conifers are common on parts of terraces; open beach areas are weedy; livestock use area.

56 ALNINC cover type - covers creek miles 7 to 12; steep canyon walls confine the creek; riparian development is the same as described for polygon #53.

57 ALNINC and PHYCAP cover types - a short creek segment in the vicinity of Woodland Bridge near creek mile 12; thinleaf alder and Pacific ninebark are common; this is a popular recreation spot; impacts to the stream and adjacent vegetation are local and not severe.

58 ALNINC cover type - another very narrow canyon bottom area between approximately creek miles 12 and 14; minimal riparian vegetation development, similar to polygon #53.

59 POPTRI, ALNINC and PHYCAP cover types - The Cottonwood Flats area contains the largest section of floodplain habitat in the study area and is located between creek mile 14 to 16.5. It is estimated that the floodplain vegetation is comprised of 40% POPTRI cover type, 50% ALNINC cover type, and 10% other vegetation such as weedy beaches and meadows. The large cottonwoods have a dispersed distribution pattern over much of the area, with scattered local stands supporting a more full canopy. Large western redcedar and other conifers are scattered about on the flat terraces between the upland vegetation and the creek. Plant communities observed in this area include Poptri/Phycap, Poptri/Alninc, Alninc/Phycap (and a mixed deciduous shrub version), Alninc/mesic graminoid, and Phycap. Scattered, small, weedy herbaceous meadows also occur.

60 ALNINC, POPTRI and PHYCAP cover types - A more discontinuous, less developed floodplain stretch compared to Cottonwood Flats, it extends from near creek mile 16.5 to 17.7. Thinleaf alder and other shrub communities are more common than black cottonwood along this segment. Open weedy areas and scattered individual or clumps of conifers also occur.

61 ALNINC and PHYCAP cover types - This polygon extends from about creek mile 17.7 to 20.7, downstream from the mouth of Rock Creek. In the vicinity of creek mile 18, deciduous shrub patches, including strips of Phycap, are common and become intermixed with conifers; a few large black cottonwoods occur, but no regeneration was seen. Livestock have used this area intensively. Upstream segments support narrow to wide riparian shrub communities. Western redcedar and other conifers are common along the creek, and there are several weedy dry meadows. Stretches where the canyon walls come right down to the creek are similar to polygon #53.

62 POPTRI, ALNINC and PHYCAP cover types - The terraces, floodplain and gravel bars between Rock and Yakus creeks and continuing to about creek mile 22.5, support discontinuous stands of Poptri/Alninc or Poptri/Phycap (mixed deciduous shrub) communities, interspersed with weedy herbaceous openings. Bands of Alninc/Phycap and Phycap vegetation occur in sections where black cottonwood is absent.

63 ALNINC cover type - the confined channel of Lolo Creek between approximately creek mile 22.5 and 23.5 supports only a narrow band of riparian vegetation.

64 ALNINC cover type - This polygon extends from near creek mile 23.5 to the Clearwater NF boundary (and continuing upstream), and supports Alninc/mixed deciduous shrub, Alninc/Corsto, and mixed deciduous shrub communities. Conifers are scattered within floodplain, and meadow openings are a mix of native and introduced grasses and forbs. Livestock graze this area.

Rare flora

Prior to this investigation, no rare plant populations were known from the project area. However, populations of nine rare plant species tracked by the Idaho Conservation Data Center (Conservation Data Center 1994) have been documented from nearby areas along the Clearwater River canyon and its tributaries, the Weippe Prairie area, and the Clearwater National Forest. The nine species and associated Global and State conservation ranks are provided in Table 3.

The moist meadow habitat favored by Leiberg's tauschia does not occur in the project area and it was dropped from the target list. Field work was conducted too late in the season to catch most of the target

Table 3. Rare plant species known from areas near Lolo Creek.

Name	Global rank	State rank	[1]EOR
Aster jessicae (Jessica's aster)	G2	S2	009,039,040,041 058,059,061
Blechnum spicant (deer-fern)	G5	S2	026
Calochortus nitidus (broad-fruit mariposa lily)	G3	S3	030*,096

Cardamine constancei (Constance' bittercress)	G3	S3	060
Carex leptalea (bristle-stalked sedge)	G5	S1	019
Leptodactylon pungens ssp. *hazeliae* (Hazel' prickly phlox)	G5T1	S1	005
Mimulus clivicola (bank monkeyflower)	G4	S3	085
Tauschia tenuissima (Leiberg's tauschia)	G3	S3	006,018
Trifolium plumosum var. *amplifolium* (plumed clover)	G3T2	S2	020

[1] corresponds to the reference Element Occurrence Record (EOR) number in the CDC data base.
* this occurrence along the Greer Grade is considered extirpated.

species in bloom. This affected the efficiency and reliability of searching for several species. Only limited suitable grassland habitat for broad-fruit mariposa lily and plumed clover is present in the project area, and neither plant was found. However, I suspect there may be small scattered populations of broad-fruit mariposa lily within the open ponderosa pine woodlands near the top of the lower canyon. There is some potentially suitable rocky cliff habitat for Hazel's prickly phlox in the canyon, most of it with very difficult access. Surveying for this species was opportunistic only and none was found. The same can be said for bank monkeyflower. Deer-fern and Constance's bittercress are forest species that can be readily recognized with vegetative material. For the most part, forests in Lolo Creek canyon provide only marginal habitat for these two species and they were not observed. Wet habitats along upper Lolo Creek provide very limited potential habitat for bristle-stalked sedge. These areas are grazed by cattle which can make flowering culms difficult to find. Only a few common sedge species were observed in the riparian areas.

Rare plant surveys concentrated on Jessica's aster. This Palouse region endemic is one of Idaho's most important plant conservation concerns. Deep soil, mesic prairie grassland, and forest-prairie transition zone habitats are rare within Lolo Creek canyon. Natural grassy openings within the canyon tend to be dry, rocky, shallow soil sites unsuitable for Jessica's aster. Potential habitat is restricted to some very upper slopes where ponderosa pine canyon woodlands meet grassy openings or deeper soil forest vegetation. This occurs in places along the north side of the canyon. The south side of the canyon supports little if any potential habitat except near the ridge separating the Clearwater River and lower Lolo Creek. No Jessica's aster were seen in this area. Nearly all potential suitable habitat is located outside the project area, where it is scattered along the gently sloping or rolling, usually forested uplands above the canyon rim leading to the broad, open, intensively farmed plateau tops. These areas are largely private land and have been subject to disturbances in the past. One new population of Jessica's aster (025) was discovered in the upper Schmidt Creek drainage. It occurs outside the project area and was found while accessing the canyon via the Schmidt Creek road complex (Appendices 3 and 4). Two previously known Jessica's aster occurrences (009 and 039) from just outside the project area could not be relocated (see Appendix 4). The actual location of occurrence 009 has been questioned by several investigators unable to relocate it. The location of occurrence 039 along Highway 11 is also questionable, although it may occur on some nearby private land I could not access.

Fish and wildlife resources

Fisheries - Lower Lolo Creek provides habitat for native rainbow trout, cutthroat trout, whitefish, and two anadromous stocks, summer steelhead trout, and spring chinook salmon. Bull trout are absent, although they may have been former residents. Two introduced species, brook trout and smallmouth bass, also occur in Lolo Creek; and the Nez Perce tribe has introduced coho salmon (A. Espinosa, retired fisheries biologist for Clearwater National Forest, pers. comm. 1996). Fishery management in Lolo Creek is primarily under the

leadership of the Nez Perce tribe. The Idaho Department of Fish and Game has a supporting role.

Lolo Creek is one of the major producers of anadromous fish for the lower Clearwater River. Summer steelhead and spring chinook salmon are produced naturally and have been intensively stocked in Lolo Creek (Inter-Fluve 1993). Lolo Creek serves as an important upstream and downstream passage corridor for both of these anadromous stocks. Most anadromous fish spawning takes place upstream of the Clearwater NF boundary, in both Lolo Creek and several tributary streams. Lower sections of the creek are used more for rearing habitat than for spawning. The Nez Perce tribe has identified Lolo Creek as an important stream in their restoration efforts for chinook salmon in the Clearwater River Subbasin. Yoosa/Camp creeks, tributaries of upper Lolo Creek, have been selected as a possible satellite facility site for part of the Nez Perce tribal hatchery program (Bonneville Power Administration 1996). Wild steelhead trout populations in the Clearwater River basin have been proposed for listing under the Endangered Species Act. The spring/summer chinook salmon are not federally listed as Threatened in the Clearwater Basin, but are still a priority conservation concern in Idaho. The Clearwater River downstream from the mouth of Lolo Creek is considered critical habitat for the federally listed Snake River fall chinook. However, only spring chinook salmon use Lolo Creek.

Rainbow/steelhead were the dominant salmonid found downstream of the Clearwater NF boundary during a survey contracted by the BLM (Inter-Fluve 1993). It was found that salmonid densities increased as the distance from the mouth of Lolo Creek increased, except for the section between approximately creek mile 11 and Grouse Creek. Rainbow trout tend to be distributed in areas of higher gradient, such as riffles and pocket waters. In contrast, chinook tend to occur in lower gradient areas such as pools and glides, the habitats most affected by land use impacts. Recent chinook salmon numbers in Lolo Creek are summarized by Hesse *et al*. (1995)

Water quality for fish habitat in lower Lolo Creek faces two main problems - high water temperatures and high instream sediment (Clearwater Soil and Water Conservation District *et al*. 1993). According to the 1988 Nonpoint Assessment, the status of the beneficial uses related to fisheries are (1) cold water biota - supported, but potentially at risk; and (2) salmonid spawning - partially supported (Clearwater Soil and Water Conservation District *et al*. 1993). Monitoring by the BLM has documented that high summer water temperatures are limiting fish production capabilities and rearing habitat in the lower reaches of Lolo Creek (Inter-Fluve 1993). Disturbances due to logging, road construction, agricultural practices and livestock grazing have all contributed to stream sediment problems. A total watershed analysis plan has been recommended to address non-point sediment and other impacts from these disturbances because they may be having a large affect on the fishery (Inter-Fluve 1993). Management recommendations for fencing have been made for areas with degraded streamside habitat due to livestock grazing (Inter-Fluve 1993). Improved fishery benefits that would accompany better riparian management include increased riparian stability, better development of pool-riffle periodicity, increased woody debris recruitment into the channel, reduction in fine sediments, and water temperature moderation. Cottonwood Flats has been identified as an area where habitat degradation due to livestock grazing is particularly acute. Reduction of livestock grazing impacts in the Cottonwood Flats reach is recognized as an important step to improve the quality of the creek's fish habitat (Inter-Fluve 1993). Other recommendations related to water quality problems are identified in the agricultural abatement plan for the Lolo Creek watershed (Clearwater Soil and Water Conservation District *et al*. 1993).

Wildlife - The steep and rugged slopes of Lolo Creek canyon provide important year-long habitat for big game animals such as elk, whitetail deer, mule deer, black bear and mountain lion. The maintenance of the canyon corridor, and security and escape areas for big game and other wildlife species, including several

special status animals, are key habitat characteristics. The canyon is critical winter habitat for elk and deer populations. River otter occur around Lolo Creek, although their level of use is unclear. Maintaining riparian habitat integrity is important for river otter. Many other mammals such as coyotes and bobcat are also found in the project area. Upland game bird species include Merriam' turkey, California quail, ruffed grouse, blue grouse, spruce grouse and chukar partridge.

Lolo Creek contains suitable habitat for harlequin ducks, a state Species of Special Concern. Sightings have been reported for Lolo Creek, but no systematic surveys have been conducted. Mountain quail, another state Species of Special Concern, were historically present in the area and a remnant population may still persist (Jim White, Idaho Department of Fish and Game, regional wildlife biologist, pers. comm. 1996). Riparian habitats have the highest priority in the state for neotropical bird conservation (Sharon Ritter, Idaho Department of Fish and Game, State coordinator for Partners in Flight Program, pers. comm. 1996). This is because of the large number of high priority species and general abundance of neotropical migrants that use riparian habitats in Idaho. The forests along the lower half of the project area provide relatively undisturbed and unfragmented habitat, conditions that are limited around the lower Clearwater River area. These ponderosa pine woodland and Douglas-fir forest habitats provide important bird habitat. In particular, low elevation Douglas-fir/western larch class of conifers have been identified as key habitat for Idaho' neotropical bird populations. A list of animals of conservation concern known or suspected to occur in the vicinity of Lolo Creek is found in Table 4. Most of these species are also Forest Service and/or BLM sensitive species.

CONSERVATION PLANNING

Conservation planning for Lolo Creek canyon

The primary conservation values of the Lolo Creek canyon corridor are associated with water quality and fisheries, and habitat for big game and other wildlife species, including several of conservation concern. Conservation efforts anywhere in the project area would likely concentrate on protecting or enhancing these values. Complex ownership patterns (see Appendix 1) would probably require coordination with several parties to ensure conservation actions have a chance to be successful.

Most of the project area supports common and widespread forest community types. All of the forest community types occurring in the canyon are well represented in other areas that confer a level of conservation protection. The upland community types have all been documented to occur in at least five

Table 4. Special status animals known or suspected to occur in the Lolo Creek area[1].

Name	Global rank	State rank	[2]State status	[3]Federal status
Fish				
Chinook salmon (*Oncorhynchus tshawytscha*)	G5	S3	T	T (spring)
Steelhead trout (*Oncorhynchus mykiss*)	G5	S4	SSC	
Mammals				
Fisher (*Martes pennanti*)	G5	S1	SSC	---
Gray wolf (*Canis lupus*)	G4	S1	E	E*
Lynx (*Lynx lynx*)	G5	S1	SSC	
Wolverine (*Gulo gulo luscus*)	G4	S2	SSC	

Birds				
Bald eagle (*Haliaeetus leucocephalus*)	G3	S3	E	E
Black-backed woodpecker (*Picoides arcticus*)	G5	S3	SSC	---
Harlequin duck (*Histrionicus histrionicus*)	G5	S1	SSC	---
Mountain quail (*Oreortyx pictus*)	G4	S2	SSC	---
Three-toed woodpecker (*Picoides tridactylus*)	G5	S3	SSC	---
White-headed woodpecker (*Picoides albolarvatus*)	G5	S2	SSC	---

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[1] Based on information from the CDC data base, and IDFG and BLM biologists.
[2] SSC - State species of special concern = native species which are either low in numbers, limited in distribution, or have suffered significant habitat losses in Idaho. T = any species likely to be classified as Endangered within the foreseeable future throughout all or a significant portion of its Idaho range. E = any species in danger of extinction throughout all or a significant portion of its Idaho range.
[3]T = Threatened Species - a species listed as Threatened under the Endangered Species Act. E = Endangered Species - a species listed as Endangered under the Endangered Species Act.
* = experimental nonessential population.

Research Natural Areas (RNA), proposed RNAs, or other natural area designated site in Idaho. No ecological "hot spots", old-growth, or high quality late seral communities were encountered within the project area. The least disturbed section of the canyon is found within the BLM's Lower Lolo Creek Area of Critical Environmental Concern (ACEC) along the lower 7.5 miles of the project area. The ACEC contains a large portion of the outstanding mid-seral Douglas-fir forest occurring in the lower half of the canyon. The ACEC also protects much of relatively high-ranked ponderosa pine parkland community types found in the canyon. Unfortunately, these parkland communities tend to have a disturbed grass understory. A few extensive riparian floodplain habitats are found in upper portions of the project area, beginning at Cottonwood Flats. The abundance of Pacific ninebark in most riparian communities makes them different from other regionally classified types. The uniqueness or not of these types along Lolo Creek will require further investigation. These riparian type elements are not known to be protected in RNAs or other areas with conservation-oriented designations. No rare plant populations are known from the project area and potential habitat is minimal.

I have given Lolo Creek Canyon a biodiversity significance (BIODIVSIG) rank of B4. This rank is based on criteria outlined in the Site Basic Record file of TNC's Biological and Conservation Data System. A B4 rank applies to sites of moderate biodiversity significance[such as a C-ranked occurrence of a G3 element, a B-ranked occurrence of any community, an A- or B-ranked or any state (but at least C-ranked) occurrence of a (G4 or G5) S1 element, an A-ranked occurrence of an S2 element, or a concentration (4+) of good (B-ranked) S2 or excellent (A-ranked) S3 elements]. A Site Basic Record for Lolo Creek Canyon has been generated by the CDC and is included in Appendix 6.

For purposes of discussing conservation planning, I have divided the canyon into seven segments (Figures 4 and 5) based on physical and ecological conditions and to a lesser degree, land ownership patterns. For each segment, I discuss biological/ecological values and related conservation planning and site design considerations, as well as disturbance factors. Conservation options that appear most applicable for TNC in Lolo Creek canyon include easements, brokering land transfers to the BLM, or coordinating incentives to minimize disturbances and foster restoration efforts within the watershed. The efficiency and productivity of these incentives may be increased by working cooperatively with the Idaho Soil Conservation Commission.

They are involved with stream monitoring and working with local landowners to develop erosion control programs and establish best management practices for the Lolo Creek watershed. Overall, I recommend that if TNC pursues conservation actions in Lolo Creek canyon, riparian habitats receive the highest priority. Cottonwood Flats and floodplain areas further upstream constitute most of the riparian habitat in the project area. Recommended priorities for conservation actions would be segments 5, 7, and 6.

Segment 1 (creek mile 0 to ca 0.5) - This short, lowermost segment is located downstream of the BLM's ACEC, and is the final piece connecting the Lolo Creek corridor with the mainstem Clearwater River. A county road parallels the creek's north side until it crosses Lolo Creek. The road cuts back on the south side, but is above the creek. The white alder-dominated riparian vegetation is generally intact, although it has been affected by road construction and is weedy in places. Small clumps of black cottonwood occur near the mouth. Extremely weedy vegetation occurs in the limited amount of open bottomlands on the north side of the creek. Conservation actions along this segment would likely focus on restoration of the uplands and minimizing further deterioration of the riparian habitat. Protection efforts along the creek would be difficult with all the public use associated with the road. The lower slopes have been cleared near the house on the north side of the creek, and portions of the middle and upper slopes have been logged.

Segment 2 (creek mile 0.5 to ca 7.5) - The BLM's Lower Lolo Creek ACEC covers nearly all of this segment. The ACEC encompasses the least disturbed canyon habitat in the project area, and is 3,464 acres in size. BLM management for the ACEC is compatible with the long-term conservation of the canyon. Management guidelines include the identification and possible acquisition of additional lands adjacent to Lolo Creek, from its mouth to the Forest Service boundary (Bureau of Land Management n.d.). Maintaining this area as an ACEC is recommended.

Portions of the project area above the elevation of the ACEC boundary have been subject to disturbances such as timber harvesting. Identifying and alleviating sources of ongoing sediment loading and limiting further disturbances along the canyon's upper slopes are conservation actions along this segment that would help water quality and associated values.

Segment 3 (creek mile 7.5 to ca 11.5) - The rugged canyon slopes that characterize much of this segment have not been very disturbed in the past. The less steep upper slopes grading into the adjacent rolling uplands have been logged in places. The vegetation map depicts the logged versus unlogged areas. Timber

Figure 4

Figure 5

harvest has been mainly selective, with clearcuts more common outside the canyon. Access to this segment of Lolo Creek is difficult.

Conservation of the relatively intact ponderosa pine parkland and Douglas-fir forest habitats along much of this segment should be a priority. The upstream portions of this segment may contain some ponderosa pine parkland habitat with a more intact bunchgrass understory than is the case in most of the ACEC. However, I was able to directly reconnaissance only a small portion of this segment and therefore, am uncertain of the ecological condition for most of the area. Conservation efforts along this segment might entail timber harvest practices, such as ensuring that only selective harvest silvicultural methods that minimize ground disturbance are used. There is an inholding of Clearwater NF land near creek mile 7.5 that has not been logged. This is one of several Forest Service inholdings located below the Forest boundary. All of these inholdings have a timber emphasis classification (E1) in the Clearwater NF Forest Plan (Clearwater NF personnel, pers. comm. 1996). In attempt to consolidate areas the Forest manages, the inholdings have also been identified as possible land exchange program parcels.

Segment 4 (creek mile 11.5 to ca 14) - Much of this segment has been logged to one degree or another, including some older clearcuts on the north side. Most of the Douglas-fir-dominated forest on the south side have not been logged where the topography is steep. Water quality and related fishery issues are key conservation concerns along the length of Lolo Creek. Snorkeling surveys (Inter-Fluve 1993) found reductions in fish numbers within this segment that may be related to habitat degradation noted in the area, especially upstream at Cottonwood Flats. This segment of Lolo Creek has been identified as an area where fish habitat problems may be more serious.

Segment 5 (creek mile 14 to ca 17.5) - The Cottonwood Flats area contains the most extensive riparian habitat in the project area. It supports riparian habitat valuable for wildlife, as well as some interesting black cottonwood, thinleaf alder and deciduous shrub plant communities. Intensive livestock grazing has adversely affected the understory layer, now dominated by weedy species, and cottonwood and possibly shrub regeneration. It is an area with the poorest stream stability and highest cobble embeddedness in the project area (Inter-Fluve 1993). Sediment problems in this segment may be having a large negative impact on downstream water quality. Conservation efforts around Cottonwood Flats would likely involve changes in livestock management and riparian restoration work. A portion of Cottonwood Flats is Clearwater NF land. Uplands on the north side of the creek have been logged, less so on the south side.

Segment 6 (creek mile 17.5 to ca 19.5) - The uplands along most of this segment (including BLM land) have been intensively logged, except for the Clearwater NF parcel at the upstream end of segment six. The National Forest parcel also contains over 0.5 mile of good floodplain riparian habitat dominated by deciduous shrubs. There are minimal amounts of other riparian vegetation within this segment. Maintaining the National Forest parcel in good ecological condition would be a conservation priority along this section.

Segment 7 (creek mile 19.5 to ca 24) - Most of the uplands have been logged (portions intensively) at some point in time. Riparian vegetation is extensive between Rock and Yakus creeks, before narrowing in the canyon between Yakus and Mud creeks. The floodplain broadens again near the Clearwater NF boundary. Black cottonwood interspersed with thinleaf alder and other deciduous shrub communities occur along this segment. The riparian zone upstream from Rock Creek is intensively grazed by livestock and would benefit from some management and restoration activities.

There are some wild basalt pillow bluffs upstream from the mouth of Yakus Creek. This area also is hard for

livestock to get to, and the riparian vegetation is in good condition. There is a large (>1 acre) moss community on the north side of the creek, adjacent to a clearcut, opposite the mouth of Mud Creek. It extends down a ridge of basalt leading to the sheer cliff that causes Lolo Creek to elbow at this point. The vegetation and many environmental conditions in this portion of the project area are more similar to the nearby Clearwater NF, than to the lower canyon. Some large and important tributaries such as Yakus Creek and Mud Creek enter Lolo Creek along this segment. This segment has overall easier access than downstream areas. In general, the topography is more moderate compared to the canyon further downstream and likely provides an important connection link between the canyon corridor and the Clearwater NF. Chinook salmon density reaches its highest level within this stretch of the project area (Inter-Fluve 1993), and spawning as well as rearing habitat is present. A property market valuation on 103 acres has been completed for land owned by Sharon Hatch around lower Mud Creek (Northwest Management, Inc.1995) that provides a reference for the monetary value of the land in the area.

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Appendix 1

Land ownership within Lolo Creek project area.

Land ownership within the project area has been divided into 111 numbered parcels (1-111). Parcel boundaries are delineated on Maps 1-9.

Map 1. Portion of the Orofino East USGS 7.5' topographic quadrangle.
Map 2. Portion of the Sixmile Creek USGS 7.5' topographic quadrangle.
Map 3. Portion of the Woodland USGS 7.5' topographic quadrangle.
Map 4. Portion of the Woodland USGS 7.5' topographic quadrangle.
Map 5. Portion of the Woodland USGS 7.5' topographic quadrangle.
Map 6. Portion of Weippe South USGS 7.5' topographic quadrangle.
Map 7. Portion of Weippe South USGS 7.5' topographic quadrangle.
Map 8. Portion of Brown Creek Ridge USGS 7.5' topographic quadrangle.
Map 9. Portion of Brown Creek Ridge USGS 7.5' topographic quadrangle.

Ownership for each parcel is listed below, with the numbers corresponding to the parcel numbers on the nine maps. Ownership was obtained primarily from maps on file at the Assessor and Land Records office in the Clearwater County courthouse, Orofino. Some ownership information was also obtained from the Idaho County counterpart in Grangeville.

1 Keith Burch
2 Keith Burch
3 Matthew and Susan Turner
4 William Bird c/o M. & . Turner
5 William Bird c/o M. & . Turner
6 Steve Schilling
7 Steve Schilling
8 Michael Beard
9 Marvel Mercer
10 BLM (Lolo Creek ACEC)
11 Glenn Smoliniski
12 Michael Beard
13 William Jackson
14 Nina Daniels *et al*.
15 Nina Daniels *et al*.
16 Laura Smoliniski
17 Gary Hibbard
18 Laura Smoliniski Trust
19 Jerry Moore
20 Royce and Evan Hicks
21 Jerry and Sandra Moore
22 Gary Hibbard
23 Landis and Rosena Aultz
24 Clearwater National Forest
25 Ed and Judy Berreth
26 State
27 John Smoliniski
28 unknown
29 Potlatch Corp.
30 BLM
31 E.D. Auer
32 Starin J. Young *et al*.
33 State
34 Starin J. Young *et al*.
35 Ronald D. Jay *et al*.
36 Starin J. Young *et al*.
37 BLM
38 Howard & M. Johnson Trust
39 BLM
40 Ken and Gail Hart
41 Ronald Stoffer
42 Peter Christle
43 BLM
44 Starin J. Young *et al*.
45 James Tuning
46 State
47 Arthur and Donna Kaspar
48 Gary Ketchum & Mark Longbrake
49 Barbara Johnson
50 Clayton Johnson
51 State
52 Ken and Linda Steigers
53 Lolo Creek Ranch
54 BLM

55 State
56 Ken and Linda Steigers
57 Ken and Linda Steigers
58 Oscar Theissen
59 William Jungert
60 Ken and Linda Steigers
61 State
62 Clearwater National Forest
63 Potlatch Corp.
64 Emil Snyder
65 BLM
66 Gary Meisner
67 Clearwater National Forest
68 Emil Snyder
69 Emil Snyder
70 Arlie Foss
71 Clifford Arnzen *et al*.
72 George Zellner
73 State
74 Potlatch Corp. ?
75 Potlatch Corp.
76 Bob Hyde
77 Potlatch Corp.
78 BLM
79 Clifford Arnzen *et al*.
80 Don L. Smith
81 State
82 Clearwater National Forest
83 Edgar Leach
84 David Cathcar
85 Potlatch Corp.
86 BLM
87 Max Motil *et al*.
88 George T. Meisner
89 Ray and Rita Payton
90 Jerry Roeder
91 BLM
92 William Hightower
93 Dennis MacMenamin
94 Stephen Theissen
95 Gertrude Anna Wagner
96 Henry Spooner
97 Ruth M. Millward
98 Jon A. Blanchfield
99 Charlotte Baylor
100 Gertrude Anna Wagner
101 Nicholas Jacobs
102 Robert E. Aldrich
103 Ken Fish
104 Elm Trust
105 ?
106 Potlatch Corp. ?
107 State
108 Sharon Hatch
109 Potlatch Corp. ?
110 Southern Dynamics Investment Co.
111 Potlatch Corp.

Appendix 2

Ecological plot data forms for Cottonwood Flats.

Appendix 3

Element Occurrence Record for *Aster jessicae* (025).

Appendix 4

Map locations for selected *Aster jessicae* occurrences near Lolo Creek canyon.

Map 1. *Aster jessicae* occurrence 025. Portion of the Woodland USGS 7.5' topographic quadrangle.
Map 2. *Aster jessicae* occurrence 009. Portion of the Sixmile Creek USGS 7.5' topographic quadrangle.
Map 3. *Aster jessicae* occurrence 039. Portion of the Orofino East USGS 7.5' topographic quadrangle.

Appendix 5

Size of Lolo Creek canyon vegetation map polygons.

List of acreages for polygons (1-64) delineated on the Lolo Creek canyon vegetation map.

Polygon #	Acres	Polygon #	Acres	Polygon #	Acres
1	16.2	23	460.2	44	126.1
2	108.8	24	203.4	45	245.5
3	408.6	25	381.4	46	667.1
4	72.3	26	64.6	47	26.9
5	1,765.9	27	22.5	48	72.6
6	40.6	28	46.9	49	185.9
7	42.1	29	24.2	50	63.7
8	319.3	30	154.7	51	89.8
9	270.0	31	2,263.9	52	3
10	28.9	32	886.8	53	4 (5529 m long)
11	237.6	33	58.6	54	4 (5230 m long)
12	5.9	34	653.6	55	10 (123 m long)
13	77.6	35	419.5	56	5 (8612 m long)
14	619.8	36	297.8	57	3
15	157.7	37	225.0	58	3 (3835 m long)
16	150.0	38	281.9	59	221
17	421.7	39	580.6	60	10
18	45.4	40	195.4	61	10 (7500 m long)
19	24.1	41	179.2	62	30
20	815.4	42	551.4	63	2 (1945 m long)
21	711.6	43	54.1	64	20
22	179.5				

Site Basic Record for Lolo Creek Canyon
(Generated by the Biological and Conservation Data System at the Idaho Conservation Data Center)