Lower Joseph Creek Watershed Assessment

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ORGANIZATION OF THIS DOCUMENT

This document is a comprehensive assessment of the Lower Joseph Creek Watershed (LJCW) prepared through a collaborative process by the Lower Joseph Creek Watershed Community Planning Group. The Lower Joseph Creek Watershed Assessment is the second watershed assessment completed through the countywide Community Planning process. Upper Joseph Creek Watershed (UJCW) Assessment was completed in 2005. It identified priority restoration and stewardship projects – most of which have been implemented.

Like the UJCW, the Lower Joseph Creek Watershed assessment is intended to accurately and objectively assess conditions on the ground, and identify opportunities to achieve agreed goals to healthy watershed function from the perspective of the various resource sectors.

The document begins with introductory and background information about the watershed and the process used to complete the assessment. The document chapters integrate resource group assessments to summarize current watershed conditions and desired future conditions as well as recommendations toward restoration that promote the desired conditions.

The overall assessment document is organized into ten sections:

I. Environmental Setting
II. Integrated Issues and Recommendations
III. Cultural Assessment
IV. Forest Condition Assessment - Silviculture
V. Forest Condition -Fire and Fuels Analysis
VI. Rangeland Condition Assessment
VII. Riparian Condition
VIII. Wildlife Species and Habitat Assessment
IX. Roads and Recreation Assessment
X. Socio-Economic Analysis

Wallowa County and its Natural Resources Advisory Committee agreed to the following Watershed Stewardship Principles to guide its Community Planning Process at initiation in 2001. These principles continue to guide the County's watershed assessment and restoration effort under the County's Land Use Plan.

Stewardship Principles

At the beginning of the Lower Joseph Creek Watershed assessment, the Wallowa County Natural Resources advisory committee re-confirmed the following principles to guide the collaborative planning process. These principles were originally drafted to guide the Upper Joseph Creek Watershed assessment.

The ecological systems in the Lower Joseph Creek Watershed are disturbance-adapted systems. Competition within and between species, and natural disturbance regimes of fire, insects, disease, wind, flood, and herbivory, create mosaics of vegetation cover and structure that change over time and space. The native biological diversity of the landscape is adapted to these dynamics.

In this context, habitat diversity is important. The alteration of disturbance regimes (through the control of disturbance or resource use) can lead to a simplification of vegetation patterns and riparian systems, which may impair watershed functions and jeopardize the persistence of many native species. Processes that lead to simplification increase the risks for larger scale disturbances (such as uncontrolled fire, insects, and disease occurrences).

These principles provide a framework to exercise continuing responsibility for maintaining and enhancing watershed conditions. In some areas, restoration is needed to reestablish both structure and function within the watershed. These principles guide the development of specific management recommendations, and facilitate the collaborative efforts already taking place in the community.

Stewardship efforts should:

- Begin with analysis of the current and historic ecological conditions at the watershed level – ridgetop to ridgetop.
- Incorporate the social, cultural, and economic dynamics of the community;
- Maintain spatial and temporal patterns of species composition, structure, and seral stages that are within a resilient range for the landscape;
- Address not only symptoms, but also the causes of habitat loss and modification which exceed normal ranges and cycles for these disturbance-adapted systems;
- Avoid strategies likely to entail recurring high maintenance costs;
- Define clear, achievable and measurable management objectives;
- Use adaptive and flexible management, supported or modified by feedback from monitoring – with multi-party monitoring being an important tool for collaborative processes on public lands.

Stewardship should draw from passive and active management strategies that address specific issues and conditions within the watershed. A broad range of resource management tools needs to be available, including but not limited to: prescribed burning; pre-commercial and commercial logging; revegetation using both native and non-native plant species; managed grazing, restoring channel morphology and structure, use of herbicides and pesticides; riparian and rare plant community protection; as well as permanent and temporary road closures.

I. ENVIRONMENTAL SETTING

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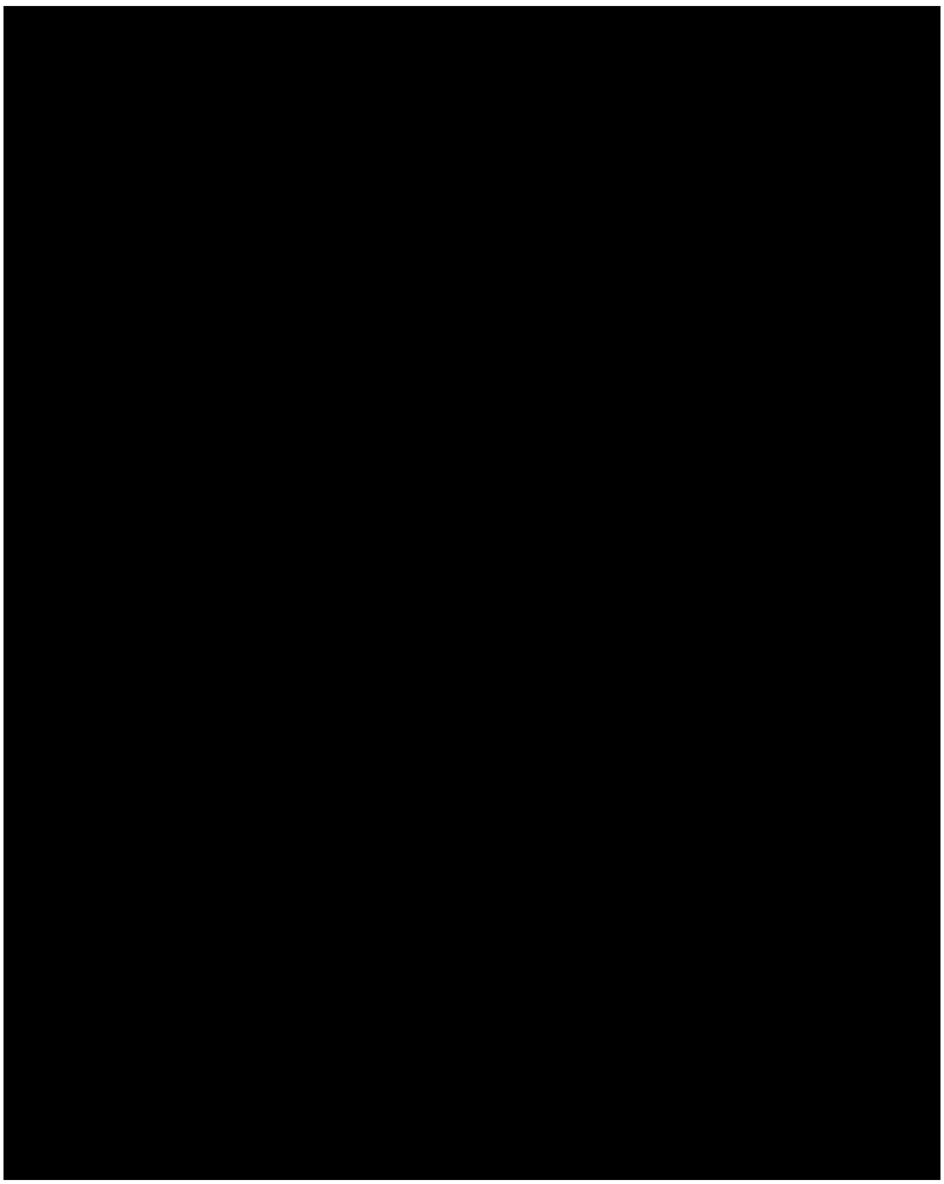
ENVIRONMENTAL SETTING

The LJCWA is one of 20 watersheds that fall within or partially within Wallowa County. It covers 9% of the county, exerting significant ecological and economic influences on the area.

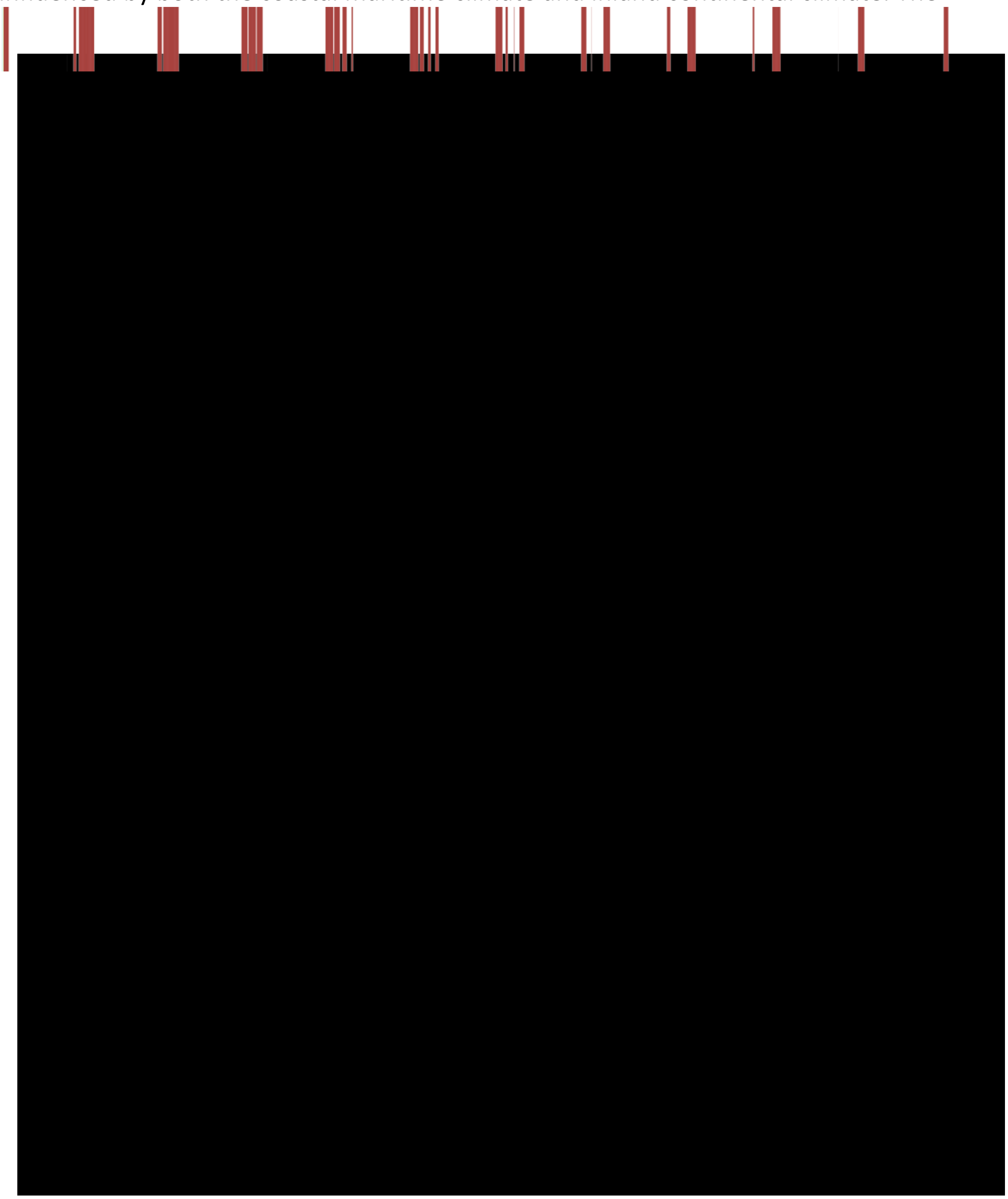
The Lower Joseph Creek Watershed (LJCW) is located in the Blue Mountains of northeast Oregon on the Wallowa-Whitman National Forest (W-WNF). The LJCW lies within the Lower Grande Ronde Subbasin in Wallowa County, Oregon and Asotin County, Washington, and is part of the larger Snake River Basin, a major tributary system of the Columbia River.

Figure I-1. Lower Joseph Creek Watershed Vacinity Map Relative to Oregon State



Joseph Creek is the main river flowing through the watershed and is formed at its upstream end by the convergence of Chesnimnus and Crow Creeks. It is 49 miles long and is fed by two major tributaries – Swamp Creek and Cottonwood Creek – as well as several smaller creeks: Sumac, Cougar, Davis, Peavine, Rush and Tamarack Creeks. It enters the Grande Ronde River approximately 4 miles upstream from its confluence with the Snake River.

The area is located in the eastern part of the Blue Mountains and is in a semi-arid climate influenced by both the coastal maritime climate and inland continental climate. The

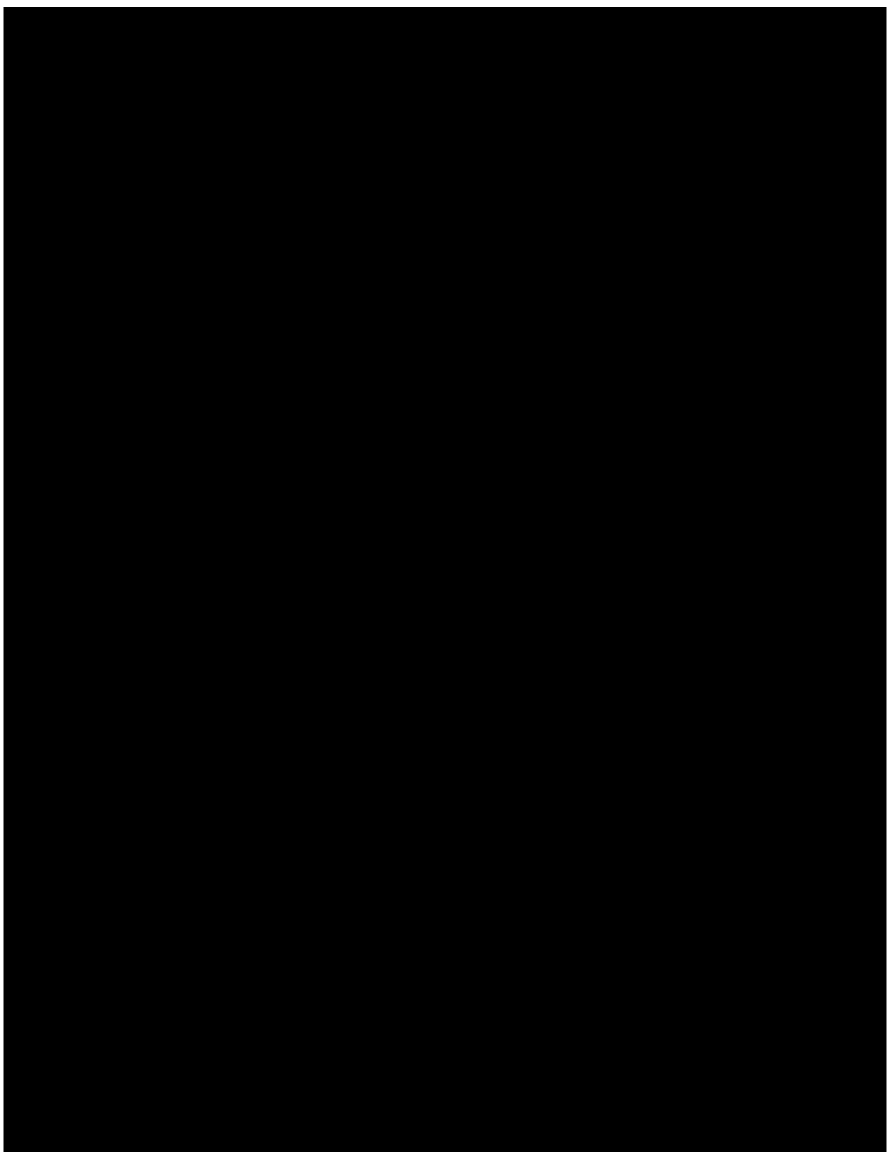


climate is characterized by warm, dry summers and cold, moist winters.

The average annual temperature in the LJCW is 24 °F in January and 63 °F in July at the start of Joseph Creek, but because of the great elevation differences in the basin, temperatures can dip to less than 20 °F during winter months in high elevations and rise to over 100 °F in summer at lower elevations. Temperature and precipitation vary with elevation, which ranges from approximately 900 ft. at the confluence with the Grande Ronde River to near 5,400 ft. at the headwaters of Cottonwood Creek.

Figure I-3 illustrates the geographic variations in annual precipitation within the watershed. Average annual precipitation at the mouth of Joseph Creek is 12-14 inches; mid-watershed it is 18-20 inches; and it is 20-24 inches at the headwaters of Cottonwood Creek and at various other locations above 4,000 ft. Swamp and Davis Creeks are anomalies in that their

Figure I-3. Lower Joseph Creek Watershed Average Annual Precipitation.



upper watersheds receive less rain than their mid-watershed areas (16-18 inches in the upper watershed vs. 20-24 inches mid-watershed). Approximately 90% of the precipitation falls from September through June.

Snow falls typically from November through April, with as much as 5 feet accumulation above 5,000 feet elevation. Winters are generally cold enough to sustain a snowpack above 4-5,000 feet through the winter months, but the snow tends to be transient throughout the mid and lower elevations of the basin (approximately 44 percent of the watershed is lower than 4,000 feet elevation). Warm frontal systems from the west can quickly raise the freezing level to 7,000 feet or above. If these fronts are associated with moisture, rain falling below the freezing level can result in rapid melting of the snowpack and flooding. These fronts generally affect the hydrology of small intermittent and perennial tributaries more than they do large main stem channels because of the isolated location of the storm cells and the increased flow capacity of streams and larger rivers.

Watershed Assessment areas for the Joseph Creek system were developed prior to the last iteration of watershed delineations and therefore do not match current 5th field HUC watershed boundaries. Prior to 2010, the Joseph Creek system was split into the Upper Joseph Creek and Lower Joseph Creek Watersheds.

Today, the Joseph Creek system is composed of three 5th Field HUCs:

1) Lower Joseph Creek Watershed (HUC 1706010606), 104,789 acres in size;
2) Upper Joseph Creek Watershed (HUC 1706010605), 125,190 acres in size; and
3) Chesnimnus Creek Watershed (HUC 1706010604), 122,764 acres in size.

The old LJCW boundary included all of the current LJC Watershed and portions of the new UJC Watershed that empty into Joseph Creek proper, downstream of the Chesnimnus and Crow confluence.

For the purposes of this document, “Lower Joseph Creek Watershed (LJCW)” shall refer to the watershed delineation of 177,929 acres in size.

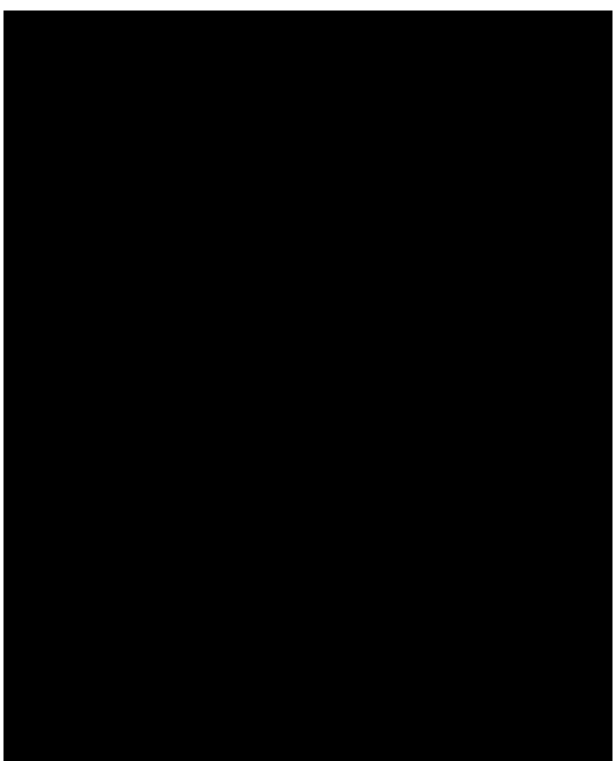
SUBWATERSHED DESCRIPTIONS

The LJCW consists of twelve subwatersheds (SWS), ranging in size from 10,000 to 22,000 acres. Five of these subwatersheds are now in the new Upper Joseph Creek Watershed denoted by the “05” in the New 5th Field HUC number placement.

Table I-1. LJCW Subwatersheds with New and Old Hydrologic Unit Codes and Acres

Subwatershed Name	New 5th & 6th Field HUCs (last 4 digits)	Old 5th & 6th Field HUCs	ACRES
Green Gulch - Joseph Creek	170601060607	02A & 02B	15,128
Lower Cottonwood Creek	170601060606	02C & 02E	14,991
Horse Creek	170601060605	02G	12,337
Broady Creek	170601060604	02D	13,559
Upper Cottonwood Creek	170601060603	02F	13,508
Rush Creek - Joseph Creek	170601060602	02H	20,482
Peavine Creek - Joseph Creek	170601060601	02I & 02J	14,727
Cougar Creek - Joseph Creek	170601060508	02N & 02O	13,429
Lower Swamp Creek	170601060507	02K & 02M	21,824
Davis Creek	170601060506	02L	10,621
Upper Swamp Creek	170601060505	02M & 02K	15,842
Sumac Creek - Joseph Creek	170601060504	02P	11,085

Figure I-4. Subwatersheds and Roads within LJCW



ROADS

Road systems within the subwatersheds vary due to terrain. Those roads that do exist are located primarily in two areas: the more gentle slopes and from early construction practices of following stream channels. Many drainage roads on USFS lands are no longer in use and have naturally closed; those that remain open are often primary access to private inholdings within the watershed.

GREEN GULCH – JOSEPH CREEK

Green Gulch-Joseph Creek SWS is 15,128 acres and the lowest Sub-Watershed within the LJCW. Most of its land area falls within the State of Washington. Green Gulch and Cottonwood Creeks are the only major tributaries within this subwatershed. A county road parallels Joseph Creek to Cottonwood Creek.

LOWER COTTONWOOD CREEK

Lower Cottonwood Creek SWS is 14,991 acres and receives the tributaries of Broady, Horse, Basin and Bear Creeks. With the exception of their headwaters, these streams flow through steep canyons, some of which can be viewed from Teepee, Wildhorse and Bear Ridges. On the private portion of this SWS, Cottonwood Creek and Basin Creek have roads that parallel them up to the FS boundary, as well as up into the Upper Cottonwood Creek SWS.

HORSE CREEK

Horse Creek SWS is 12,337 acres and is a tributary to Cottonwood Creek. Cabin Creek is its major tributary. Approximately half of Horse Creek is privately owned. This SWS has the fewest roads of all subwatersheds. Primary access in this SWS is the road along Horse Creek and a couple more on top of Cold Spring Ridge. Aside from those roads, and the one road connecting the ridge with Horse Creek through private land, this SWS is limited in road access.

BROADY CREEK

Broady Creek SWS is 13,559 acres and a tributary to Cottonwood Creek. The Broady SWS is comprised of three forks: West Fork Broady, East Fork Broady and mainstem Broady. In addition to some headwater roads on the plateau, the only roads in the canyons are along mainstem Broady, West Fork Broady, and one mid-slope road in West Fork Broady. The northern third of the SWS is privately owned.

UPPER COTTONWOOD CREEK

Upper Cottonwood Creek SWS is 13,508 acres and mostly owned by the FS. Deadhorse Creek is its major tributary. There are very few roads in Upper Cottonwood Creek and they are all in the headwaters. Anecdotal evidence suggests that once Cottonwood Creek drops into its canyon on FS land, the riparian area is inaccessible and very difficult to move through due to lots of down wood from the 1988 TeePee Butte fire. On the private portion of this SWS, Cottonwood Creek has a private access road that runs parallel to it until the FS boundary.

Rush Creek-Joseph Creek

Rush Creek-Joseph Creek is the largest SWS at 20,482 acres. Tamarack Creek and Brushy Gulch are other substantial tributaries to Joseph Creek in this SWS. Most of the roads in this SWS are on the plateau along Hunting Camp Ridge; one road follows East Fork Tamarack Creek down to Tamarack Creek to Joseph Creek, and then up Joseph Creek. Most of the private land in this SWS are the Precious Lands owned by the Nez Perce Tribe.

Peavine Creek-Joseph Creek

Peavine Creek-Joseph Creek SWS is 14,727 acres containing the lower section of Joseph Creek designated as Wild and Scenic ("Wild"), which stops at the FS boundary. Peavine Creek is the major tributary to Joseph Creek in this SWS, and Lupine Creek is the only named tributary of Peavine Creek. According to GIS layers, the only roads in this SWS is the access road to Table Mountain (FSR 4650) in the headwaters of Lupine Creek, and an old private road along Joseph Creek at the bottom of the canyon. That private road may now be a trail.

Cougar Creek-Joseph Creek

Cougar Creek-Joseph Creek SWS is 13,429 acres. The upper section of Joseph Creek designated as “Wild” starts at the private-FS boundary and continues downstream through some private inholdings along Joseph Creek to the FS boundary in the Peavine Cr-Joseph Cr subwatershed. The Joseph Creek valley narrows into Joseph Canyon just beyond Cougar Creek. Roads parallel most streams and ephemeral draws in this SWS, including Joseph Creek. Most do not show up on map layers, but are present on the landscape.

Lower Swamp Creek

Lower Swamp Creek SWS is 21,824 acres. Swamp Creek meanders within a broad alluvial valley for the first half of its length before entering a narrow canyon where its gradient increases to approximately 2%. The upper valley is primarily a meadow system with what used to be a well-developed floodplain, originally built and maintained by beavers. The former floodplain that used to be “swamped” often is now a terrace and does not get flooded. The meadows still help store water and provide late summer streamflow, but they are not functioning as a wetland due to stream conditons. This meadow system was privately owned until the late 1990s when the FS acquired an 8-plus mile portion of Swamp Creek extending from the FS boundary to Cow Camp, with the exception of a ¼ mile, 40-acre private in-holding. Several restoration projects have been implemented along this section of Swamp Creek in the past 10 years, including riparian planting and in-stream structure modification. Swamp Creek has no major tributaries but it has a moderately high base flow that remains relatively constant throughout the year.

Davis Creek

Davis Creek is the smallest SWS at 10,621 acres. Davis Creek flows within a broad alluvial valley – not quite as wide as Swamp Creek – for the first half of its length, and has a well-developed floodplain-now-terrace originally built and maintained by beavers. Davis Creek is not as incised as Swamp Creek, but it is still incised enough to not be able to access the terraces on both sides of the creek. It too has experienced historic railroad logging, homesteading, and grazing. Restoration projects in the Davis SWS include riparian exclosures, which have improved bank stability and riparian vegetation, and some riparian planting that did not succeed because the bank was too high above the creek level due to incising. Davis Creek has no major tributaries and goes dry annually in the upper portion of the subwatershed. The uppermost section is under private ownership, with areas managed for grazing and timber. Located in the upperportion of the subwatershed is a small community of Davis Creek, and considered a priority 3 treatment recommendation under the Community Wildfire Protection Plan as wildland urban interface do to the occupied structures.

Upper Swamp Creek

Upper Swamp Creek SWS is 15,842 acres and the only subwatershed with the majority of its land under 35% slope as well as the only SWS to be entirely privately owned. It is managed for agriculture and grazing, but has experienced railroad logging and homesteading historically. County and private roads run adjascent to Swamp Creek for its entire length as well as up 3 of its tributaries.

Sumac Creek-Joseph Creek

Sumac Creek-Joseph Creek SWS is 11,085 acres. Joseph Creek flows from south to north dividing the SWS down the center through a relatively wide valley. The drainage bottom portion of this SWS is privately owned along Joseph Creek with the exception of one 40-acre parcel that is FS-owned. Historically, access for logging was gained through road construction parallel to the drainage bottoms, as evidence of the relic roads in most streams and ephemeral draws. Most roads do not show up on FS road maps or GIS layers as they are "decommissioned" or have been dropped off the road system. The primary use of these relic roads today is by domestic livestock and wildlife.

OWNERSHIP

Ownership for the LJCW is 55% USFS (97,433ac), 36% Private (63,918 ac), 2.5% BLM (4,775 ac), and 0.5% ODF (775 ac). The Private acreage includes 10,460 acres owned by the Nez Perce Tribe through salmon habitat mitigation agreements with Bonneville Power

Administration. Private ownership is divided among 65 landowners with almost 66% of the private land held by 5 landowners.

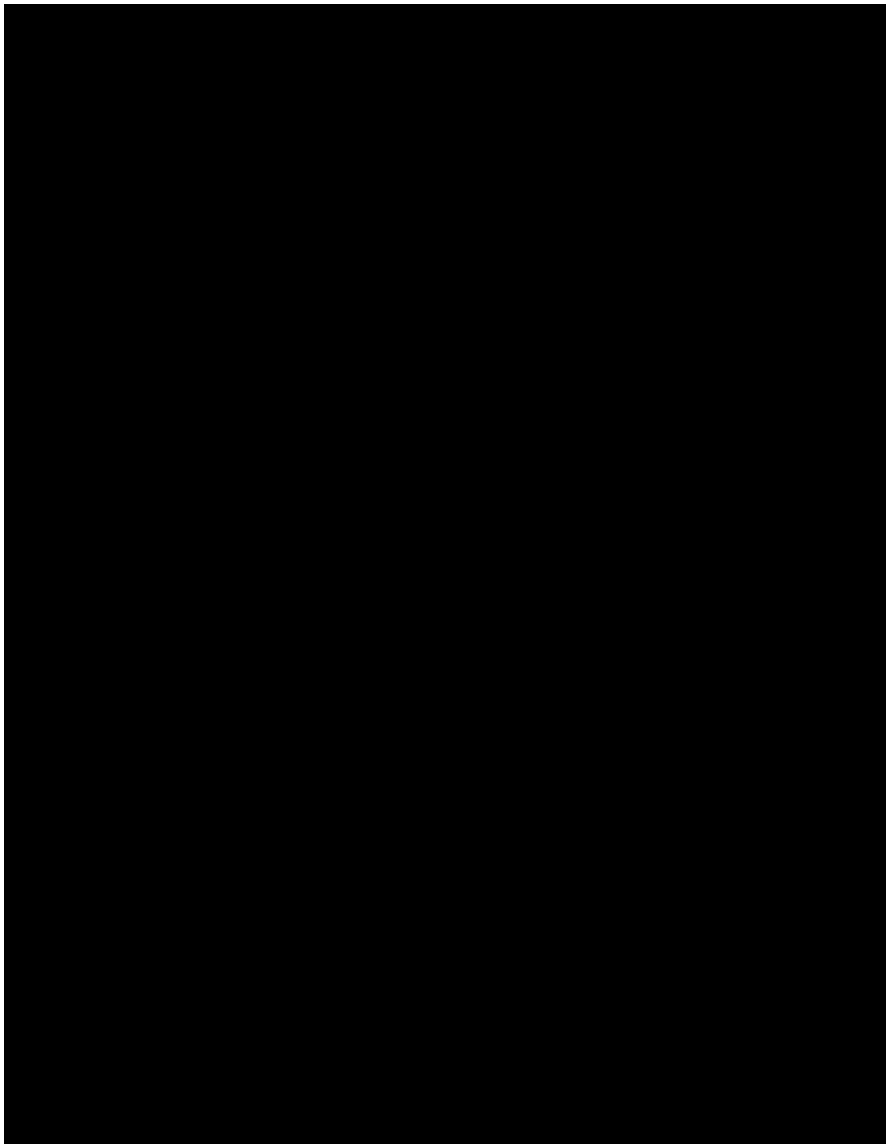
Approximately 6% of the watershed (11,028 ac) lies within the state of Washington.

The Wallowa Valley Ranger District & Hells Canyon National Recreation Area (HCNRA) of the WWNF administers all USFS land in the LJCW, which lies partly in the Wallowa Valley Ranger District and partly within the Hells Canyon National Recreation Area.

The Precious Lands Wildlife Management Area (PLWMA) is land owned by the Nez Perce Tribe and covers 6% of the private land in the watershed. These lands are managed to protect wildlife and wildlife habitat. Overlooking Joseph Creek Canyon is the Joseph Canyon Overlook approximately 30 miles north of Enterprise. This viewpoint looks deep into Joseph Creek from along Oregon Route 3 on the west boundary of the watershed. It is one of 38 sites that form the Nez Perce National Historical Park.

The USDA-Forest Service (FS) owns 55% of the watershed and management is divided in ten management areas (MAs). The Forest Service is responsible for managing wildlife habitat on all its lands but there are two MAs that specifically emphasizes wildlife habitat management; MA 15 Old Growth Preserve (3,079 acres) and MA 3 Wildlife/Timber Winter Range (37,691 acres).

Figure I-5. LJCW ownership and designated Wild and Scenic or "Wild"



WATERSHED CHARACTERIZATION

GEOLOGY AND SOILS

The Grande Ronde Basalt flow of the Columbia River Basalt Group is the dominant geologic unit in the LJCW and is generally thick bedded, fine-grained and highly resistant to weathering. It is characterized by a large number of dikes (estimates range up to 20,000) collectively called the Chief Joseph Dike Swarm through which the lava upwelling occurred. Many of the dikes were 5 to 10-meter wide fissures, allowing for huge quantities of magma to spread across the landscape. Grande Ronde basalt flows and dikes are evident in the exposed 2000-foot walls of Joseph Canyon along Oregon State Highway 3 that runs from Enterprise, OR to Clarkston, WA. The LJCW has been sculpted by streams and rivers down-cutting through those thick basalt flows interspersed with flow breccia and older plagioclase-phyric basalt to create a trellis pattern of stream-cut canyons dissecting the watershed.

The LJCW slopes west and north, with the highest point in the watershed in the headwaters of Cottonwood Creek to the east, and the lowest point at the confluence of Joseph Creek and the Grande Ronde River to the north. Cottonwood Creek along with Chesnimnus Creek (a headwater of Joseph Creek) and Swamp Creek are the three major drainages contributing flow to Joseph Creek.

The northeastern part of the watershed is bordered by Cold Spring Ridge on the Snake River rim and the eastern part is bordered by the UJCW. The western edge of the LJCW is bounded for most of its length by State Highway 3, which is on the plateau bordering Mud Creek – Grande Ronde River Watershed.

The southern part of the watershed is drained by Swamp Creek and differs from the typical steep stream-cut canyons seen throughout most of the watershed. The headwaters of both Swamp Creek and its tributary Davis Creek are a gently sloping mix of forest, grassland and lush valley bottoms separated from the Upper Wallowa River Watershed by a low plateau. The Davis and Swamp Creek valleys get progressively steeper and more incised as they flow north toward Joseph Creek. This is true for most of the streams in this watershed.

In the central part of the LJCW, Joseph Creek collects its water from the UJCW where Chesnimnus Creek ends and Joseph Creek begins and flows northwest, collecting Swamp Creek before flowing north and northeast through a deeply incised canyon surrounded by steep canyon walls to its confluence with the Grande Ronde River.

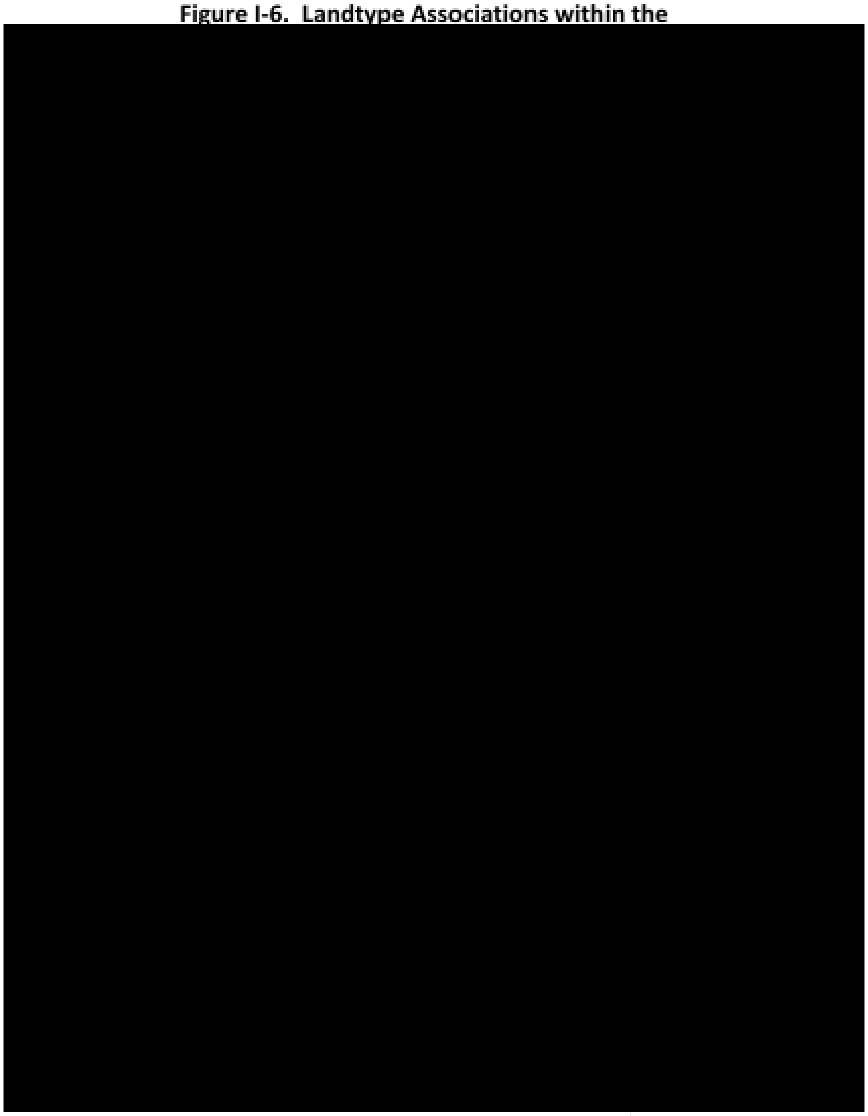
ASSESSMENT METHODOLOGY

LANDTYPE ASSOCIATIONS (LTA)

Landtype Associations (LTA) of the Blue Mountain Province is an ecological land unit inventory for use in interpreting physical and biological processes across the Blue Mountain landscape. This tool was used for analysis of the LJCWA. The focus of the inventory was to identify significant changes in the landscape and to aggregate landscape elements that have interpretative similarities. LTAs represent a landscape scale of hundreds to thousands of acres, and are primarily used in forest-wide planning or watershed analyses.

LTA map units were developed by integrating three major landscape features: a) landform patterns were grouped to represent a unique set of geomorphic processes; b) geology types were grouped to represent similar regolith and bedrock features and their influence on physical and biological processes; and c) potential natural vegetation was grouped to infer similar climatic environments.

Figure I-6. Landtype Associations within the



Note: LTA information is only available for public lands within the watershed.

Soils are related to landform, vegetation, weathering, and temperature, and vary across the landscape with deep soils on flatter, valley bottoms and shallow skeletal soils on the shoulders of ridges and steep slopes (USFS LJC 2001). Soils tend to be deeper on north and east slopes and shallower on south and west facing slopes. Most soils in the LJCW are basalt derived, with a loam to silt loam texture. LTAs are comprised of a combination of soil series that help describe their physical properties.

No quantifiable data is available on the distribution, density, diversity, or condition of biological crusts throughout the area including LJCW. A biological crust is a living community of lichen, cyanobacteria, algae, and moss growing on the soil surface that bind the soil together. Soil crusting is also associated with biological and chemical factors. Biological crusts are important pioneer species, especially following fire. In addition, they provide surface stability and retention, and are essential for nutrient cycling and availability.

OVERVIEW OF LTA CONDITIONS

The WWNF portion of the LJCW has twelve LTA map units that describe the landscape (Table 1-2). TThese LTA's exhibit a variety of soil types due to the high variation of landforms, temperatures, and annual moisture across the landscape.

The most acreage is covered by **LTA 318** (31,000 ac) which is characterized by steep canyons and encompasses most of the Joseph Creek canyon and the lower portions of its tributaries: Cottonwood, Basin, Bear, Broady, Cougar, Davis, Peavine, Rim, Rush & Swamp Creeks. LTA 318 is made up of Anatone (30%), Bocker (15%) and Imnaha (10%) soils as well as rock outcrops (25%). Anatone soils are shallow, very cobbly silt loams found on mountain side slopes, plateaus and ridge tops. Bocker soils are very shallow, very cobbly silt loam soils found on plateaus, hills and mountains. Imnaha soils are moderately deep, gravelly ashy silt loams found on stable mid-slopes of plateaus and canyons. Rock outcrops are not associated with soils.

LTA 116 has the next largest acreage (16,841 ac) and is characterized by gentle mountain slopes and is found in the headwaters and plateau tops of most streams in the LJCW. LTA 116 is made up of Limberjim (30%), Syrupcreek (25%), Mountemily (15%) and Troutmeadows (10%) soils. Limberjim soils are deep, ashy silt loams and Syrupcreek soils are moderately deep, ashy silt loams found on stable ridge tops and side slopes of mountains and plateaus. Mountemily soils are very deep, ashy silt loams found on ridge tops, side slopes and shoulders of mountains. Troutmeadows soils are moderately deep ashy silt loams found on ridges and upper side slopes of mountains.

LTA 216 and LTA 217 are the next largest LTAs found in the WWNF portion of the LJCW. They have mixed ash soils and are associated with gentle and steep mountain slopes, respectively. The dominant soil series in LTA 216 are Larabee (40%), Bennettcreek (25%) and Wonder (15%), and Klickson (40%), Larabee (25%) and Bigcow (15%) are the dominant series in LTA 217. Larabee soils are moderately deep, ashy loams found on hills and canyons. Bennettcreek soils are moderately deep, ashy silt loams found on south-facing slopes. Wonder soils are moderately deep, stony ashy silt loams found on ridges and shoulder slopes of mountains. Klickson soils are deep or moderately deep, ashy silt loams found on north-facing side slopes of canyons, escarpments on hills, structural benches and the lower slopes of mountains. Bigcow soils are deep and very deep, gravelly ashy silt loams found on north-facing mountain slopes.

LTA 316 is another gentle mountain slope landform found primarily in the headwaters of Sumac Creek. Like LTA 318, it is dominated by the Anatone (50%) and Bocker (30%) soil series, but without the rock outcrops.

LTA 117 is comprised of the Limberjim (30%), Mountemily (20%), Bennettcreek (15%), Rebarrow (10%) and Syrupcreek (5%) soil series and is found scattered across the LJCW on steep mountain slopes, generally right above LTA 118.

LTA 118 is in canyon landforms and is comprised of the Harl (30%), Limberjim (25%), Larabee (15%) and Bocker (10%) soil series. Rebarrow soils are very deep ashy silt loams found on stable north-facing mountainsides. Harl soils are deep, gravelly ashy silt loams on side slopes of plateaus, canyons and mountains.

LTA 317 is characterized by steep mountain slopes with Anatone (30%), Imnaha (25%) and Bocker (10%) soils as well as rock outcrops (15%).

Swamp Creek and Davis Creek valley bottoms have their own **LTAs, 233 & 133** respectively, which are associated with alluvial valley floors and a depth to bedrock of over 20 feet. LTA 233 is characterized by the Stevenscreek (40%) and Ranes (40%) soil series that have minor amounts of ash in the profile. Stevenscreek soils are very deep sandy loams found on alluvial fans, while Ranes soils are very deep gravelly ashy silt loams found on relic alluvial terraces. LTA 133 is characterized by both the Verdeplane soil series (30%) which has no ash in it and the Digit soil series (25%) which has a thick ash mantle, as well as Bullroar (15%) and Bigbouldercreek (10%) soil series. Digit soils are very deep, ashy silt loams found on alluvial terraces, swales, mountain valleys and dissected plateaus. Bullroar and Bigbouldercreek soils are very deep ashy silt loams found on terraces of mountain valley floors.

LTA 218 is characterized by canyons with Klicker (30%), Fivebit (20%), Klickson (15%), Anatone (10%) and Larabee (5%) soils series. Klicker soils are moderately deep, stony ashy silt loams found on drier forested sites on mountains, plateaus and benches. Fivebit soils are shallow, extremely stony loams on ridgetops and mostly south-facing side slopes of mountains.

LTA 518 is a rock outcrop canyon landform and is found in the lower eastern section of Joseph Creek at the FS boundary. It is likely that LTA 518 covers many more acres downstream on private land than is shown in the table below.

Table I-2. LJCW Landtype Association information for FS portion of watershed from GIS

LTA	SHAPE AREA (AC)	LANDFORM	SLOPE GRADIENT	ASH MANTLE	SOIL EROSION - BARE SOIL	SOIL EROSION-NATIVE VEGETATION COVER	LANDSLIDE – SHALLOW/ RAPID
318	30,956	Canyons	60 to 90	mixed	H	H	H
116	16,841	Mountain Slopes, Gentle	0 to 30	thick	L-M	L	L
216	11,783	Mountain Slopes, Gentle	1 to 30	mixed	L-M	L	L
217	9,994	Mountain Slopes, Steep	30 to 60	mixed	H	L-M	L
316	8,208	Mountain Slopes, Gentle	1 to 30	mixed	L-M	L-M	L
117	6,528	Mountain Slopes, Steep	30 to 60	thick	H	L	M
118	5,139	Canyons	60 to 90	thick &mixed	H	M	H
317	4,729	Mountain Slopes, Steep	30 to 60	mixed	M-H	M	L
233	2,084	Alluvial Valley Floors	0 to 15	mixed & thin	L	L	L
218	1,712	Canyons	60 to 90	mixed	H	M	H
133	1,251	Alluvial Valley Floors	0 to 15	no influence & thick	L	L	L
518	795	Canyons	60 to 90	n/a	H	H	H

Note: "L"=low; "M"=moderate; "H"=high.

Soil surface erosion is directly linked to slope and vegetation, with bare soil and steep slopes at the most risk for eroding, and vegetated gentle mountain slopes and alluvial valley floors at the least risk.

GIS analysis revealed that 60 percent of the land base has a slope greater than 35 percent (106,381 acres). Only Upper Swamp Creek and Davis Subwatersheds have more than 50% of their land base in slopes less than 35 percent.

Deep-seated landslides are very unlikely in the LJCW; however the potential for shallow/rapid landslides is quite high in canyon landforms on slopes over 60%. Shallow/rapid landslides tend to originate where there is a complex of deep soil pockets (usually in colluvial channels), shallow soils and bedrock. They are formed by soil saturation following periods of prolonged or intense rainfall, usually associated with 100-year or greater storm event.

Roads and other severely compacted areas have the potential to accelerate natural rates and frequency of shallow landslides as they have a reduced infiltration capacity and often are areas where overland flow concentrates into rills and gullies and provides excess water to soils.

Debris flows were recorded in Sumac, Tamarack, Broady and Cougar Creek drainages after a January 1997 storm event, some of which caused sections of road to be blocked or buried.

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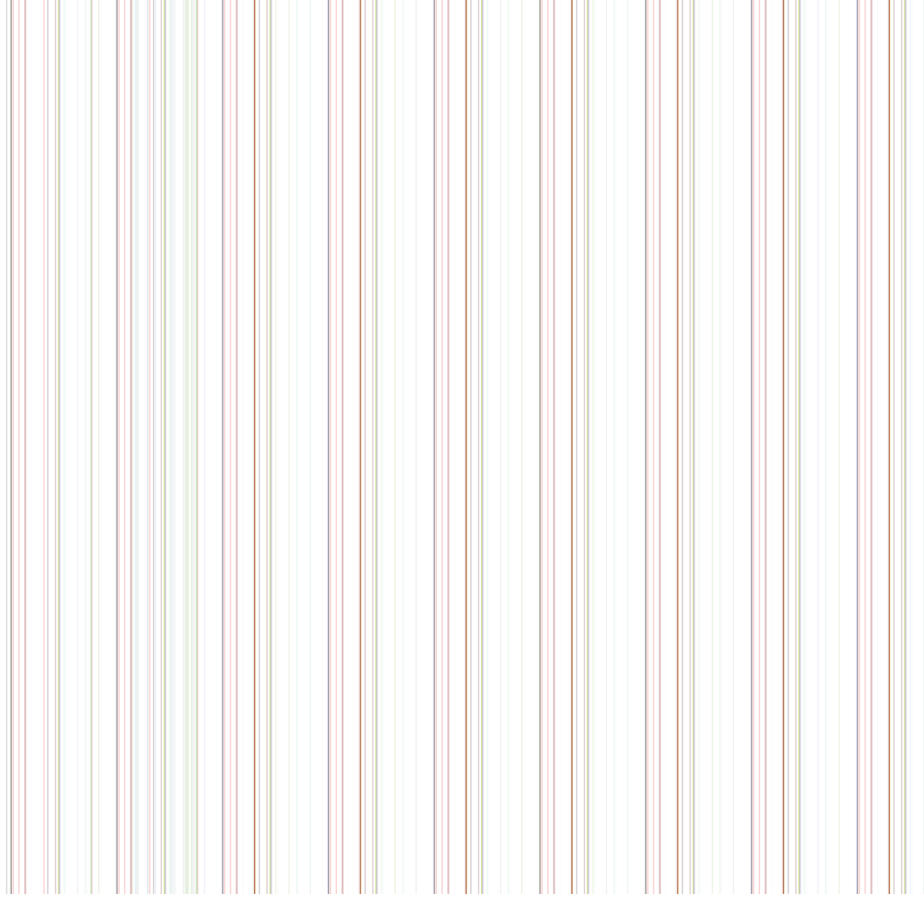
Figure I-7. Slopes within the LJCW



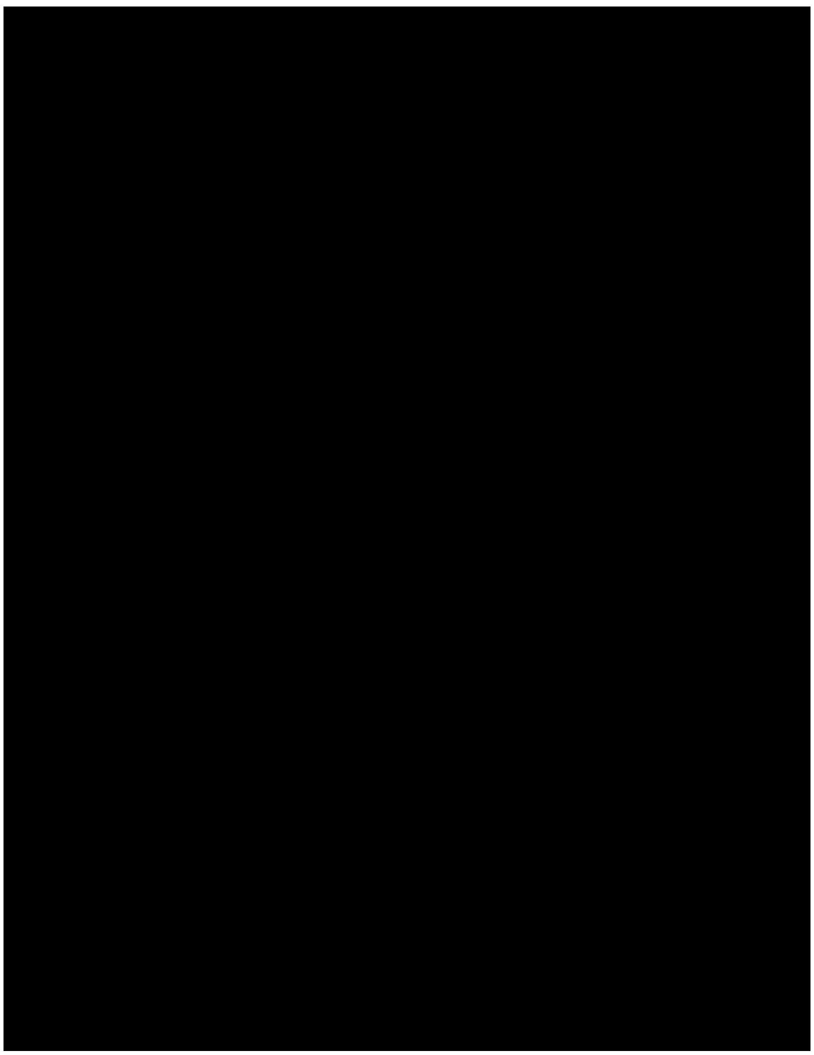
are areas where overland flow concentrates into rills and gullies and provides excess water to soils. Debris flows were recorded in Sumac, Tamarack, Broady and Cougar Creek drainages after a January 1997 storm event, some of which caused sections of road to be blocked or buried.

MANAGEMENT ALLOCATIONS ON PUBLIC LANDS

The Wallowa Whitman National Forest Land and Resource Management Plan (LRMP) (USFS 1990) allocates NFS (National Forest System) land within the LJCW to 10 distinct management areas (MA): 1, 3, 7. 9, 10, 11, 12, 12-7, and 15. (Refer to Figures I-8 and Table 1-3).

Management areas are diverse spatially across the landscape contributing to complex management of the watershed.

Figure I-8. Lower Joseph Forest Service Management Direction



A 6-mile segment of Joseph Creek was designated as a Wild River in 1988 to be managed according to the Wild and Scenic Rivers Act of 1968 (Public Law 90-542). This segment begins at the northern boundary of the Joseph Creek Ranch and extends to the northern National Forest boundary and is approximately 0.5 miles wide.

The outstandingly remarkable (OR) values identified within the wild river portion of Lower Joseph Creek are fisheries, recreation, scenic, geologic, cultural resources, and wildlife. Implementation of the Act and management of the river corridor is described in the Joseph Creek Final Management Plan (USFS 1995).

Table I-3. Management Access within LJCW Adding to Complexity

MA	MANAGEMENT STRATEGIES	ACRES
1	Timber production	30,724
3	Wildlife/Timber Winter Range	37,691
7	Wild and Scenic River	2,309
9	Dispersed Recreation/ Native Vegetation - HCNRA	5,624
10	Forage Emphasis	14,195
11	Dispersed Recreation/Timber Management – HCNRA	8,891
12	Research Natural Area	705
12-7	Research Natural Area/ Wild and Scenic River (WSR) - HCNRA	56
15	Old Growth Preserve	3,079
15-7	Old Growth Preserve/WSR	8

SUMMARY

The Lower Joseph Watershed is located in the eastern part of the Blue Mountains in a semi-arid climate influenced by both the coastal maritime climate and inland continental climate. It is characterized by steep canyons, ridgelines and plateaus stretching from 900 to 5400 feet in elevation creating a highly diverse landscape. Topographic features play a role in soil types in the watershed that vary from silt loams to a thick ash mantle. Sixty percent of the landbase in the watershed is over 35% slope limiting some areas to specific methods of access.

The LJCW is comprised of twelve subwatersheds, crosses boundaries of both Wallowa County in Oregon and Asotin County in Washington, with the highest land mass in Oregon. The primary landownership belongs to the Forest Service with private lands divided amoung 65 landowners. The Forest Service lands emphasize10 different management areas with the largest area emphasis in Wildlife/Timber Winter Range.

The LJCW is part of the larger Snake River Basin, a major tributary system of the Columbia River. Joseph Creek flows for 49 miles and is the main river flowing through the watershed entering the Grande Ronde River approximately 4 miles upstream from its confluence with the Snake River.

II. Integrated Issues and Recommendations

Table of Contents

PURPOSE AND ORGANIZATION OF THIS SECTION

This section provides a description of planning phases used by the collaborative group to identify watershed conditions, restoration needs, and implementation strategies. This section emphasizes the concepts, steps, and outcomes of the planning process when identifying conditions, issues and recommendations of the working groups, particularly where their recommendations could be integrated. The strong emphasis on the planning process conveys the extensiveness of work multiple agencies and stakeholders have contributed in making this assessment a success.

Integrated Issues and Recommendations summarize the existing and desired future conditions for the LJCWA along with recommendations for activities that promote those conditions. These recommendations are based on the best available knowledge of the watershed ecology, interest in managing habitat for the full range of species within the watershed, and interest in bringing socio-economic benefits to the community. This section also summarizes the monitoring prescribed as a basis for community-wide progress evaluation and as a guide for adaptive management.

COMMUNITY PLANNING PROCESS (CPP) OVERVIEW

WALLOWA COUNTY LEADERSHIP AND NATURAL RESOURCE ADVISORY COMMITTEE

Collaboration is challenging but it is often the best way to resolve conflicts in the management of public lands. Wallow County has been collaborating for decades on resource issues. Under the leadership of County government, the initial group was organized in 2000 in response to job losses, declining school enrollment, newly listed endangered species, and dramatic shifts in the way national forests were managed. The Community Planning Process has since become a national model of community collaboration.

The Wallowa County Natural Resources Advisory Committee (NRAC) was – and remains - the natural body to guide this process. The Wallowa County NRAC is composed of diverse groups working under the common goal of watershed stewardship, salmon habitat restoration, and community benefit. While initially hoping to conduct assessment and planning at a larger landscape scale, the scarcity of current ecological, social and economic data resulted in a watershed-by-watershed approach. NRAC expanded its stakeholder group to begin these watershed assessments. Additional federal and state agencies, private landowners, environmental organizations, community organizations, and local businesses were brought to the table. To ensure common direction, the stakeholders established shared stewardship principles to guide their collaborative process. This step proved critical to early on-the-ground success. Today, stakeholders continue to lead watershed scale assessments, direct on-the-ground work, and strengthen local knowledge.

Upper Joseph Creek Watershed (UJCW) was an ideal location to start collaborative work. It was relatively easy to access. The lands were not constrained by special management designations (i.e. wilderness), and were known to have forest and riparian ready work valued by all the participants. First, the stakeholders invested in data collection and analysis, which occurred from 2000 to2005. They discovered that much of the existing condition data was out-dated, which limited its validity for planning. Thus, the stakeholders adopted standardize protocols tied to a common assessment and restoration goal. Data sheets were designed for easy integration with federal databases. Field assessment effort focused on four primary resource sectors: riparian, rangeland, forest and fuels, roads and recreation. These assessments were subject to quality control, targeted focus groups (environmental groups, recreation groups, permittees, etc.) and external peer review. Once the field assessments were completed, the stakeholders integrated recommendations and viable solutions, and proposed projects.

Proposed projects included elements from each assessment area so restoration efforts were well coordinated. With consensus secured, organizations, like Wallowa Resources, began to implement the management recommendations immediately. During and following implementation, stakeholders organized field tours to view the projects in process and assess the results. Federal, State, Tribal and non-profit organizations have partnered on technical monitoring to generate on-going knowledge about project designs and results.

NRAC expanded its stakeholder group to begin these watershed assessments. Additional federal and state agencies, private landowners, environmental organizations, community organizations, and local businesses were brought to the table. To ensure common direction, the stakeholders established shared stewardship principles to guide the collaborative process. This step proved critical to early on-the-ground success.

The Community Planning Process worked because shared stewardship principles were established in the beginning and restoration projects were implemented quickly. These two things were critical. The stewardship principles helped keep the stakeholders together when different values and interests emerged. It provided sideboards to work through the conflict. The early on-the-ground work maintained interest in the process – since it produced tangible results. Collaborative field assessments built trust and common knowledge of watershed conditions. This social learning generated mutual understanding of restoration priorities and facilitated integration across disciplines. The process was based on understanding of the importance of addressing not only the symptoms, but also the causes of poor watershed condition.

The LJCWA is the second watershed completed through this collaborative process. It was selected based on its vicinity to the previously completed Upper Joseph Creek Watershed Assessment, as well as, lack of updated data and information for the area, and low number of listed fish species based on the high number of river miles. The end goal is that each watershed will have a collaborative assessment and work plan. This helps organizations, especially the US Forest Service, with project implementation, outside funding, updated information, and community support. The work has benefited both public and private lands and created more consistent management practices across the landscape. The Community

Planning Process also creates the desire to learn from one another, and stronger partnerships for the future.

ASSESSMENT STAGES

This document is the result of field assessment, working group analysis and planning, and collaborative integration by the six resource groups. Ultimately, project implementation is the end-goal for all involved. Figure II-1, Making Decisions through Collaboration and Integration, emphasizes a bottom up start to finish planning process taken by community collaboration to achieve a final document through integration.

The planning process consists of three levels of collaboration in watershed analysis: assessment, integration, and implementation.

Figure II-1. Illustration of Three Levels of Collaboration in the Watershed Analysis

Implementation

- Seek Funding
- Begin NEPA
- Supple

ntal DataC

lection

- Monitor

te and agree on:

- consensusre

Integration

commend.(multi-res

ource benefit.)

- Revisits – of Recomm.
- Areas to Avoid

- Identify Stakeholders
- Steering committee
- Resource group
- Writer/editor

Assessment

Identify

- Watershed
- Data Gaps
- Standards

Collection of Field Data

Resource Groups Identify Issues and Recommendations

Lower Joseph Creek

ORGANIZATIONS/PARTNERS IN REGULAR ATTENDANCE

Numerous individuals, organizations and agencies shared a commitment to the Lower Joseph Creed Watershed Assessment and maintained engagement throughout the lengthy process. These included Wallowa Resources, Wallowa County Commissioners, Oregon Department of Fish and Wildlife, Oregon Department of Forestry, Wallowa-Whitman National Forest, Oregon State University Extension – Ag/NR, Wallowa County NRAC, Nez Perce Tribe, Nature Conservancy, Hells Canyon Preservation Council, local permittees and landowners, Soil and Water Conservation District, other interested parties.

Resource groups were developed with anticipation of collaboration and watershed document development occurring simultaneously. Members of the resource groups were identified based on a best representation of interests groups along with knowledge and expertise of the watershed. Resource groups consisted of individuals from diverse agencies, interests groups, and backgrounds that participated with a goal of developing their particular resource assessment of current conditions, issues, and recommendations. These individuals and organizations played significant roles in making LJCWA a success.

METHODOLOGY

The assessment of the watershed is the foundation for integration and implementation. The collective learning process generated a foundation for common understanding of watershed conditions and trends, from which the group could generate management recommendations.

Seven resource groups were developed based on ecological diversity. Areas or issues/opportunities that could be ecologically grouped enabled streamlined data collection and assessment. Further, this responded to connectivity of landscape conditions. The resources groups were:

- Cultural resources and history – provides an overview of historic settlement and use in the area dating back several thousand years, as well as a description of culturally important natural resources and heritage considerations. The group also described how cultural resources are managed and protected by existing laws and policies affecting national forest system lands.
- Forestry, Fire and Fuels – assessed forest conditions with reference to historic conditions and disturbance systems influencing this landscape, and provided management recommendations.
- Rangeland – assessed rangeland conditions with reference to historic conditions and disturbance systems and provided management recommendations. This work also included an assessment of noxious weeds.
- Riparian – assessed riparian conditions with reference to riparian management objectives, and provided management recommendations.
- Wildlife – a summary of existing information and knowledge about species known to occur in the watershed, with specific information and guidelines relevant to T&E species and other species of concern.

- Roads and recreation – summarizes the current condition of the road network in the watershed based on the detailed survey conducted by members of the Wallowa County Natural Resources Advisory Committee, and provides recommendations based on the results of this work, consideration of other resource and user needs, and direct input from diverse stakeholders.

Following the completion of this work, and the generation of watershed management recommendations, analysis was initiated on the social-economic impacts of the watershed restoration plan.

DATA COLLECTION AND ANALYSIS

Protocols for information gathering could not be assimilated until gaps in date and knowledge were identified. Data gaps were identified through consultation with local private landowners and Forest Service employees, and others as a critical part of the initial collaborative process. Knowledge of needed data allowed for development of collection forms and standards for upcoming field assessments. The stakeholders then adopted standardize protocols tied to information needs and common assessment goals. Data sheets were designed for easy integration with federal databases.

Field assessment efforts focused on six primary resource sectors: riparian (Riparian and Fish), rangeland (Range and Weeds), Forestry (silviculture & fuels/fire), roads & recreation, wildlife, and cultural. These assessments were subject to quality control through targeted focus groups (environmental groups, recreation groups, permittees, etc.) and external peer review.

Figure II-2. Field trip/meeting

Data was collected by knowledgeable individuals, which also proved to be important in developing the group's confidence to move forward with the analysis. Local experienced contractors, Forest Service employees, and other members of the collaborative group conducted the data collection. The employment of contractors initiated the first revenue for the community under this collaboration.

Once field data was obtained, resource groups were responsible for consolidating and analyzing the data. Existing conditions were then presented to the collaborative group through several planning meetings. Each resource group utilized this information to develop documents depicting the existing conditions. Once all the documents were written and agreed upon, they were collectively incorporated into this document; this initiated the individual resource chapters of the watershed assessment.

The comparison of existing conditions to historic was the basis for identifying important landscape issues within Lower Joseph Creek watershed (LJCW). The desired conditions were founded on resource group's current understanding of existing conditions that have deviated from historic or reference conditions and the ecological processes that should function to sustain healthy forestlands and rangelands. Desired condition provided the step for groups to identify issues confronting the landscape and the development of overall landscape goals necessary for ecosystem balance.

Finalized assessment of existing conditions by resources allowed groups to meet periodically to develop issues and recommendations with the intent of bringing them forward to full resource integration meetings. Individual resource group consensus of issues and recommendations was an important part of the collaboration process for moving forward. Full participation within individual resource groups occurred through an agreed protocol that allowed equal floor time for discussion, document development, reviews and edits. Lists were identified by groups containing each resources landscape issues with collectively agreed upon recommendations for those issues. The individual resource groups were tasked to reach agreement prior to bringing forward the recommendations to the combined integration group.

The Illustration of Integration Process of Resource Groups (Figure II-3) is a visual interpretation of how each separate resource group individually collected data and information, identified its goal then met as part of the larger collaborative group to share ideas, define common interests, and assess restoration recommendations. This approach allowed individual resource groups to work collectively on watershed restoration. Figure II-3 shows how individual resource goals could potentially overlap resulting in integrated recommendations and common desired conditions.

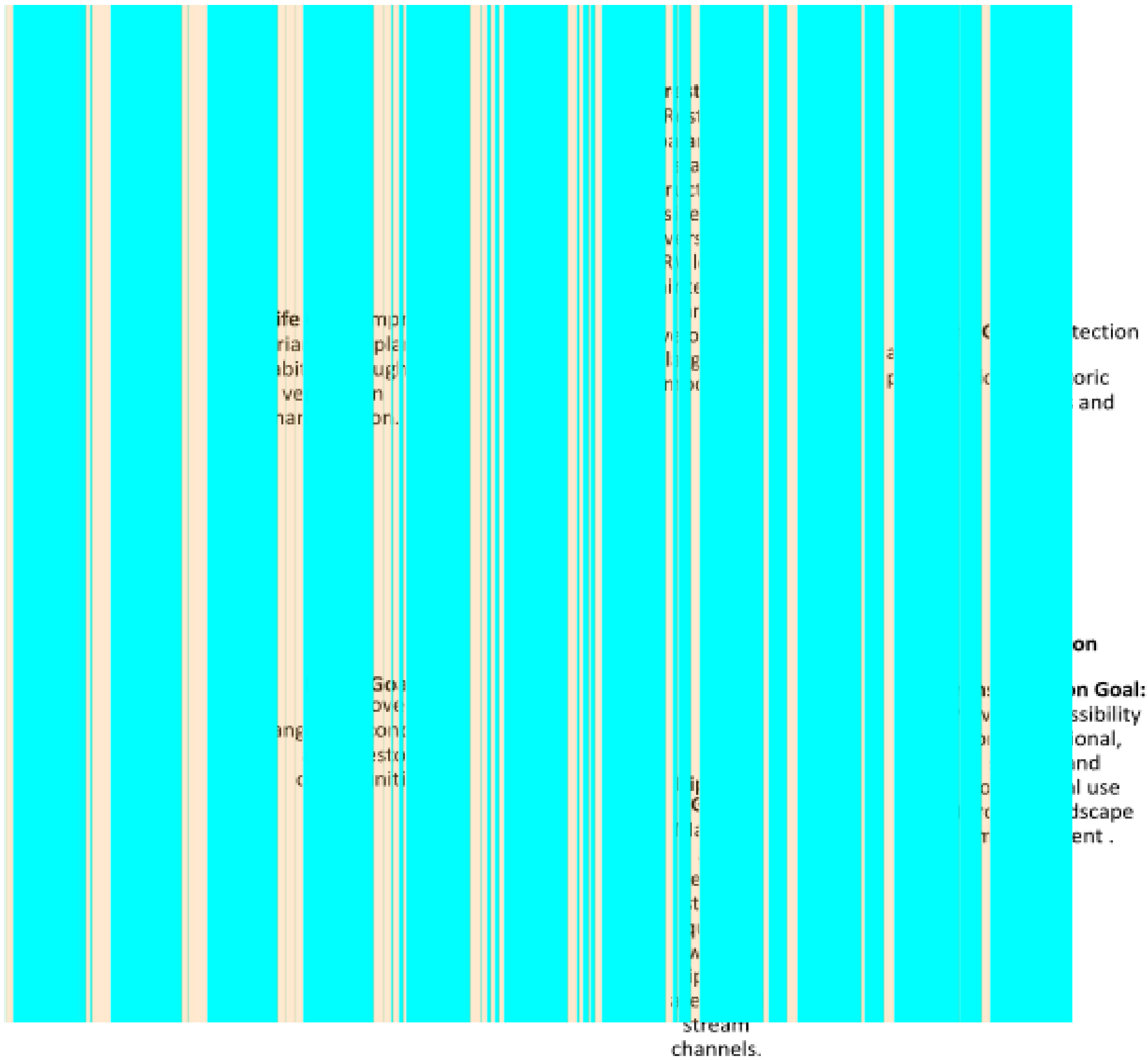
INTEGRATION

Full Integration working group members consisted of available resource group members and interested members of the public. Collaboration brought a highly diverse number of involved participants that consisted of 11 different organizations, multiple private citizens and interest groups.

Resource group and full integration level discussions emphasized an open and balanced environment that encouraged participation and promoted trust through accurate input and honest feedback processes.

Initial resource integration meetings were designed for resource groups to share watershed findings, issues, and recommendations. Numerous meetings provided chances to fully understand the watershed conditions and necessary actions proposed to correct detrimental landscape concerns. Each resource group provided findings to the larger groups revealing subsequent issues facing the watershed. The integrated working group, through discussions would adopt an overall collection of significant driving watershed issues. These resource issues can be interpreted as the central or most important landscape concerns in need of attention.

Figure II-3. Illustration depicting resource groups working toward common landscape goals and objectives.



A wide range of watershed issues were brought forward by the resource groups. All combined there were approximately 51 issues presented during integration. Issues ranged from significant landscape fixes to centralized geographic problems such as: large blocks of homogenous timber stands needing structural diversity: detrimental road conditions contributing to in stream sediment delivery.

As integration proceeded, it was discovered that various resource groups shared common watershed issues, resulting in mutual benefit outcomes for multiple resources.

Integration of issues and recommendations resulted in shared landscape restoration needs. Examples of some mutual overlapping issues included:

- The need for reduction in stand density to promote ground cover and landscape diversity of stand structures. (Wildlife, Forestry, Range, Riparian)
- Road Maintenance and culvert replacement. (Riparian, Roads, Range)
- Restoration of Aspen (Forestry, Wildlife)
- Protection of water sources (Wildlife, Riparian, Range)
- Lack of late old structure and large tree component. (Forestry, Wildlife)

As issues began to overlap for resource groups so too did the recommendations for fixing those issues. One landscape issue could potentially have several corrective measures identified in the form of recommendations. Recommendations can be defined as: the actions that resources proposed to improve a specific watershed issue. Several individual resource group recommendations were found to potentially provide improvement of other resource issues.

Recommendations that addressed mutual integrated issues were considered particularly important because funding of restoration efforts have been scarce and funding priority was given for restoration projects that achieved multiple goals. Also, a wider arena of support was found among committee members for recommendations that address integrated ecologically-based issues.

DETERMINATION OF MUTUAL BENEFIT OR ADVERSE IMPACTS:

During the recommendations review process, specific issues were listed with suggested actions for improving that particular issue. The recommended action(s) under each resource issue were rated by all other resource groups in terms of positive and detrimental impacts to their own resource. Recommendation(s) for restoration of a particular issue were rated on their impending impacts to other resources. If that particular action proposed potential for improvement to another resource, a positive number was assigned; if there was potential for adverse impacts, a negative number was assigned. The recommendations assessment was where benefits and impacts were discovered.

Issues with multiple recommendations could potentially move forward if any one of the recommendations had all positive benefits for all the resources. The recommendations with adverse impact ratings would be set aside for revisit at a later time. These revisits could be addressed through possible mitigation options in order to create overall resource benefits.

The numerical ratings evaluation system developed and applied in the issues and recommendations excel spreadsheet proved beneficial. The following ratings were used in determining integrated effects of each recommendation toward total watershed restoration.

Table II-1. Numerical rating used to rate individual resource recommendations listed under identified issues.

NUMERICAL RATING VALUES/MEANINGS	
-3	Creates a barrier to addressing resource needs on landscape/creates increased obstacles toward our resource's restoration
-2	Consequences of this recommendation will likely lead to negative results for our resource
-1	Effects on our resource are perceived as minor, unsure of overall impacts at this time
0	No impact
+1	Contributes some improvements toward our resource
+2	Potential to improve our resource through this recommendations
+3	Our resource sees multiple benefits under this recommendation, complements multiple restoration recommendations

Once every resource group rated the other group's recommendations, results were consolidated and displayed across the spreadsheet and presented at the integration meeting to review and discuss. See the example table below:

Table II-2. Example of a Fuels issue with three recommendations for improving the issue as it was rated by other resource groups.

FORESTRY GROUP FUELS	FORESTRY	FUELS	WILDLIFE	RANGE	RIPARIAN	RECREATION	ROADS
ISSUE: Fuel Loadings in riparian creates increased potential for stand replacement fire.							
Recommendations:							
Handpile and/or low intensity prescribed burning	1		3	1	-1	2	3
Alternative types of removal (including commercial) methods within riparian treatments.	1		-2	3	-1	2	3
Redirect larger material into streams	1		1	3	1	2	3

It was agreed that the recommendations "Ratings" would fall into the following 3 categories; 1. Multiple mutual benefits would fall into a low conflict easy to endorse category, where all ratings were zero or positive; 2. Recommendations would need to be revisited in cases where benefits and conflicts fell into both positive and negative ratings from groups; 3. Recommendations with numerous high conflicts (negative ratings) helped identify areas to avoid or areas in need of extensive mitigations.

Each resource group developed their issues and recommendations for the spreadsheet. The spreadsheet was assembled and labeled according to individual resource groups. Issues and recommendations were then listed with corresponding worksheets containing reference maps of proposed recommendations. The geographical display allowed for spatial evaluations of recommendations. The spreadsheet's numerical rating provided resources opportunities to understand watershed conditions and suggested actions proposed across the watershed.

Resources groups were then sent the full integration spreadsheet addressing ALL resource issues identified for evaluation. The groups were assigned to provide ratings to other resource worksheets by applying their knowledge of the watershed toward the possible benefits/impacts of each proposed recommendation. This was helpful in creating a thought process for resource groups to thoroughly evaluate the other proposed recommendations. Once all the resource group ratings were submitted, all the ratings were then consolidated onto a single spreadsheet where mutual benefits could quickly be identified.

Throughout the integration process, resource groups continued to submit their written detailed descriptions of watershed conditions, restoration needs and corresponding maps for their chapters. The end result is that the LJCWA provides land owners and managers with identified landscape issues and restoration actions necessary to promote healthy watershed ecosystems.

RESOURCE CONDITIONS - CRITICAL ISSUES

The overlap of ecosystem restoration recommendations within the LJCW are a result of a variety of past planned and unplanned activities. Past planned activities such as timber harvest, successful fire suppression, grazing, recreational hunting, combined with unplanned disturbances of wildfire, insect and disease, drought, and other weather climatic conditions has exacerbated the spatial and temporal conditions of the watershed. An overview of landscape conditions by resource group is summarized below while individual chapters provide specific detailed resource assessments of conditions and management recommendations.

Disclosure of watershed issues revealed commonalities between restoration recommendations and desired condition of the resources. Critical issues for watershed restoration began to recur as the watershed evaluation process moved forward. From the several issues brought forward key points became obvious.

Examples include: a lack of ecosystem diversity throughout the watershed in both surface and over story vegetation, as well as in terms of spatially located homogeneous large blocks of vegetation, over stocking of stands has led to lack of forage in high density areas, aspen and riparian hardwood species are depleted, and additional water sites are needed to alleviate stress to streams.

It became evident that most issues were not exclusive to any one resource group but many recommendations to improve issues were beneficial for several groups.

FORESTRY

The LJCW ecosystem is dominated by dry forest types with micro-sites of moist forest types scattered at higher elevations where greater precipitation from snow occurs. Historically the primary early seral species compositions in these forest ecosystems included Douglas-fir/ninebark, Douglas-fir/snowberry, grand fir/spiraea, and grand fir/huckleberry. These species supported an overstory of fire tolerant, shade intolerant trees with diverse ground cover resulting from pre-historic frequent fire disturbance.

Significant shifts have occurred throughout the watershed over the past century. Changes in species composition, structure, and ecosystem process are no longer corresponding to the pre-historic settings. Overall, current circumstances are unnatural and inconsistent with healthy landscape environments once present within the watershed.

An abundance of multi-storied stands with little to no large tree component persists across the landscape regardless of moisture or temperature zones. Shade tolerant species are replacing dry forest species over much of the landscape creating significant deviations from historic open stand type conditions. A substantial depletion a large tree component, late old structure, and species diversity is prominent throughout the area. This has created unnatural stands of ill health with susceptibility to large-scale stand replacement fires and insect and disease.

Natural disturbances such as fire and localized flooding have historically played vital ecological roles in the watershed by being the catalyst for nutrient cycling and habitat creation. Pre-historic fires for this area are ones of low to moderate intensities that resulted in fire tolerant, shade intolerant species, with much of the overstory remaining intact post natural fire events.

Forest vegetation now is characterized by contiguous blocks of shade tolerant, multi-storied stands lacking early seral component, combined with abnormal levels heavy down woody material. Current stands are more likely to support high intensity stand replacement fires similar to fire behavior that occurred in this area in 1986 and 1988. These fires resulted in large burned areas supporting heavy regeneration and stem initiation with little to no overstory intact.

Pre-historically, fire return intervals averaged from 10 – 50 years putting the watershed in an overall very frequent low intensity fire regime. Past practices of successful fire suppression have caused the majority of the timbered stands to miss from 2 to 6 fire intervals at a minimum. Missed fire intervals have resulted in shade tolerant species populating the understory creating multiple levels of ladder fuels. Current expected fire behavior in these stands are anticipated, based on recent fires, to display moderate to high intensities with fire effects severities of high mortality in all age classes.

The recurring droughts (1986-1994, and 1999-2003) affecting Northeast Oregon exacerbate the impact of these factors on forest ecosystem functioning. The recent long-term drought appears to be the most severe since the dust bowl years of the 1930's. Overstocked stands compounded by drought are further susceptible to unacceptable disturbance effects of wildfire and insect and disease.

RANGE

The first known use of the LJCW for grazing livestock was by the Nez Perce, who grazed their horses in the vicinity as early as the 1730s. In the late 1800s, Euro-American settlers began grazing livestock including sheep, horses and cattle. Because the area was homesteaded, many landowners wintered livestock in the LJCW and continued grazing for as long as weather, water, and forage conditions permitted. Little is known about stocking numbers or season of grazing in the LJW prior to 1940. By the 1940s permitted grazing was practiced on the National Forest System lands, by the 1960's management of permitted livestock was in full swing, this management has continued to today, with the 1990's and 2000's focusing on restoration and conservation practices on riparian areas, and upland sites. The net effect of these management changes has been an improvement in grassland and stream condition and function over conditions found in the early 1900s. Historic land use practices, modified soil conditions, and vegetation community changes have resulted in the site conditions observed today.

Timbered areas that once supported open stands of large trees have converted to multi-layered stands of high density to the point of little sunlight reaching the forest floor and an accumulation heavy down woody and timber litter. These factors are impacting forage opportunities as open stands that once supported ungulate grazing are now too thick with multi-aged timber stands to allow vegetative growth in the understory. These forest conditions are re-directing livestock and wild ungulate grazing into just the open rangeland acres within the watershed increasing grazing competition on the same acres.

Fence repair, rebuilds, and new fence allow for easier rotation of livestock off pastures to provide resting of pasturelands as well as livestock distribution. Site maintenance and creation provide numerous benefits including additional watering opportunities for livestock and wildlife. Through the distribution of livestock there is less resource damage potential by overgrazing, residency in riparian areas, competition with wildlife. Alternative water sources, fencing, grazing practices can provide relief and preventative measure for reduced impacts.

Both natural and human disturbance activities have contributed to the introduction and expansion of noxious weeds. Weeds threaten ecological integrity by reducing biodiversity, altering native plant communities, altering stream nutrient release cycles, and increasing soil erosion. The presence of weeds can often be correlated with range condition. Areas with poor range condition and/or the absence of native plant communities typically have a high proportion of nonnative annual grasses. This change in vegetation is typically a result of ground disturbance by livestock or natural causes, drought conditions, and non-native seed sources. The annual invasive grasses disrupt successional processes by precluding the establishment of native perennials grasses. Once the area is dominated by annuals, the root structure that holds the soils together is also lacking, leading to further disturbance of the areas. Annual grass dominated sites primarily exist on south facing slopes within LJCW.

Available forage is inconsistent with reference conditions due to increased presences of noxious weeds, non-native species, and timber stand densities, particularly timbered stands in the upper elevations of the watershed. Vegetation components on the landscape are converting from native species to a more non-native component including noxious and non-native weeds, resulting in reduced foraging opportunities and nutritional value for livestock and wild ungulates. Grasses such as Bluebunch Wheatgrass and Idaho fescue have been replaced with less palatable species of cheatgrass and Medusahead.

Figure II-4. Dry site with overstocked stands impeding ground vegetation growth.

[redacted] weeds list” [redacted] as (A), (B), [redacted] There are [redacted] ughout the [redacted] ment due [redacted] high [redacted] f the 12 (A [redacted] e most [redacted] w star- [redacted] v

[redacted] ne noxious [redacted], or control [redacted] e taken. If available, bio controls should be incorporated with herbicide treatments.

New focus on inter-jurisdictional coordination, new herbicide technologies, wildland restoration, and the expanded use of biological controls gives current weed management efforts a much better rate of success. Monitoring changes and trends in weed populations and species composition is an important tool to measure treatment efficiency and success. Monitoring sites should be developed and incorporated in the treatment process and be located in areas that represent conditions existing throughout the watershed.

WILDLIFE

Vegetation diversity and landscape stand mosaic conditions are essential for meeting the numerous wildlife habitat needs. Diverse landscapes provide a variety of accommodations from cavity nesting, hiding cover, nesting for migratory birds to forage for grazers, browsers and various types of predators. The lack of habitat diversity and large tree component is one missing key factor for wildlife.

Forests have been simplified and stocking levels significantly higher limiting much needed habitat in the watershed. Historically the single stratum (SSLT) older ponderosa pine habitat type would have occurred on 25 to 40% of the warm/moist and warm/dry forest types in the watershed. Wildlife habitat is now limited within the watershed with no SSLT stands on Federal lands. A variety of species relies on mature and old growth type stands for forage and nesting.

For example, timber harvest has been considered the primary threat to nesting populations of goshawks (Squires and Reynolds 1997). A disruption in fire return intervals may have also reduced foraging and nesting habitat (Marshall 2003).

Big game is prevalent throughout the watershed and consists of deer, elk, bear and sheep. The primary concerns for the big game are hiding cover, landscape diversity, and year round open road densities. Large game is also in competition with domestic livestock for forage particularly in the summer range where timbered areas are most prevalent and stand densities are at their highest. Stems per acre are so numerous that ground vegetation is non-existent in many cases, creating a reduction of forage availability compared to historic range of variability (HRV) levels.

An abundant number of birds and amphibians are dependent on various types of riparian habitat such as streams, wetlands, ponds, springs, aspen and willow stands. A balance of conifer and hardwood component diversity is necessary to meet wildlife needs. Priority hardwood species for riparian health include cottonwood, alder, aspen and willow. Lower Joseph Creek Watershed is deficit in all four hardwood species due to past management activities including timber harvest, grazing and fire suppression.

CULTURAL

The travels of Lewis and Clark identified seven bands or divisions of the Nez Perce, one of which was referred to as (5) Wil-le-wah Band on the Wallowa River in Oregon, population 500, (Thwaites, Reuben Gold, ed., 1905: Vol.8).

Plant resources were the second mainstay and made up approximately 25-40% of the Nez Perce diet. Plants were collected for both medicinal and industrial purposes, but edible plants were by far the most important. Marshall identifies 34 plant species consumed by the Nez Perce (Marshall, 1977:47). Jerold Hustafa, USDA FS Botanist, reviewed Marshall's list of plant resources for fit with the LJCW. Hustafa identified twenty plants from Marshall's list as having a high probability of occurring within or adjacent to the watershed.

At the time of white man encroachment into the Wallowa country, ca. 1860, the Nez Perce may have already played a significant role in shaping the physical environment of the watershed. With thousands of head of horses and cattle, the range was already being managed and or impacted by livestock. Add to the mix, Nez Perce practiced the indigenous use of fire and the mechanics of harvesting plant resources over thousands of acres. The LJCW and surrounding area, has therefore been a culturally managed landscape for thousands of years.

Large areas of the county were still unpatented as of 1902 when President Theodore Roosevelt made the first withdrawals of public domain land in what would become the Wallowa Forest Reserve and, later, the Wallowa-Whitman National Forest. In 1905 the Wallowa Forest Reserve was established on 747,200 acres in and around the Wallowa Mountains, including those portions of the range in neighboring Union and Baker Counties (Tucker 1981).

The entry of the federal government as a major landowner in Wallowa County set in motion a number of changes, the implications of which would not be fully realized until nearly a century later. Rangers in the young Wallowa National Forest largely worked to meet the needs of local landowners and resource users by attempting to regulate grazing access to what had previously been open range, protecting timber stocks from fire, and providing timber to local mills (Tucker 1981; Langston 1995).

Cultural concerns for this area include the need of protection of known archeological sites during recreational and management activities. The principal disturbance occurs from activities that can lead to damage or destruction of sites, such as heavy equipment or repetitive overuse of an area. Restoration actions that move watershed activities away from known sites will aid in sustaining important local heritages.

AQUATICS - RIPARIAN

Riparian areas support a disproportionate amount of species, both specialists and generalists, as compared to upland areas. The LJCW does not support any natural lakes, but many springs are scattered throughout it and some wetland areas. While the exact number of springs is unknown, stock ponds and water developments (troughs with spring boxes) are common. They convert groundwater to surface water at spring sites. There are 140 named spring sites, many of which are developed, and 126 pond sites identified in the USFS, GIS database.

Stock ponds keep animals dispersed and decrease congregation in stream riparian areas. Developed springs, generally speaking, offer cleaner, cooler water than ponds do. Maintenance and management of upland water sources is key to keeping them functional, this may include spring re-development or cleaning out the sediment that has accumulated on the pond bottom.

Management activities that potentially threatening stream riparian habitat are: stream bank stability, channel downcutting, sedimentation of fish spawning gravels and reduction of deciduous stream shade, timber harvest (mostly historic, when there were no riparian buffers), road construction (mostly past construction), grazing, catastrophic fires and natural events, recreation and other agriculture activities. The cumulative effect of these disturbances is incised creeks, increased sediment loads, widening of stream channels, increased water temperatures, and water leaving the watershed quicker, which decreases ground water storage and the ability of the watershed to recharge and/or contribute to late summer flows.

There are approximately 132.3 miles of steelhead habitat in the LJCW. There is 56.2 miles of spawning and rearing habitat present on the Forest Service Lands and 68.4 miles present on non-FS lands. There is an additional 7.7 miles of migration habitat present on the lower reach of Joseph Creek. Aquatic habitat is necessary for achieving or maintaining healthy fish populations. Viable, stable populations require abundant, high quality, and diverse habitats that satisfy requirements for all life stages.

In many streams, degradation of the riparian areas has decreased the habitat diversity and complexity necessary to support strong fish populations to mitigate effects from extreme temperatures, fires, floods, and other natural or human-caused events. Healthy riparian areas require preserving water quality, diverse and complex vegetative communities, and stream channel morphology.

Fine sediment inputs can come from stream bank trampling by ungulates, overland flow across adjacent burned areas, but often result from roads impacts. There are several roads in the LJCW that contribute fine sediment to the stream network, specifically the numerous Sumac and Cougar Creek roads that run right next to each tributary and along the main stems of each creek. East Fork Sumac Creek has jumped its banks and is currently running down 40 feet of the road next to it before diverting back to its channel.

Habitat modification has occurred within the LJCW through channel straightening and through stream simplification. Habitat modification results in:

- Reduced availability of fish habitat as it increases stream gradient,
- Decrease in habitat features (such as large wood),
- Decreased stream channel stability,
- Decreased allochthonous inputs into the creek, which decreases the number of macro-invertebrates able to survive.

About 26% of the LJCW is located in inventoried Roadless areas, resulting in the assessment area having relatively few passage issues due to the relatively low road densities and prevalence of ridge top and mid-slope roads.

Six culverts in the LJCW have been identified as partial and full fish passage barriers through the Fish Passage Culvert Assessment conducted by the Forest Service and Nez Perce Tribe in 2001. These six culverts impede passage during various times of the year through a combination of excessive gradient, being undersized (flow is too fast) or having a perch greater than 4 inches. Habitat connectivity can be increased by removing and/or replacing these full and partial barriers.

ROADS AND RECREATION

The Lower Joseph Creek Watershed location in itself provides a certain level of protection from human caused detriments such as over development of roads. The Lower Joseph Creek Watershed is a difficult landscape for motorized recreational activities except on the southern portion. Much of the canyon terrain is dissected and steep creating access difficulty. Few regions in the continental United States can match the combination of large scale, undeveloped areas and low human population density, however demand for natural appearing landscapes and a recreational opportunity is expected to outpace demand for modified landscapes.

Use by hunters remains the heaviest of all recreation activities. Other activities include pleasure drives, wildlife and bird watching, dispersed camping, OHV riding, biking, mushrooming and firewood gathering with an expected increase in all of these.

There is approximately 41.6 miles of developed Forest Service trails with an additional nine miles on NFS lands not part of the current trail system. Trail use occurs primarily during hunting season with horse and foot travel. There are three outfitter guides on the watershed consisting of two cougar/bear guides and one mountain biker outfitter. Numerous hunting opportunities occur in the watershed with the biggest attractions being big game.

Recreational camping is primarily associated with hunting activities with Coyote Springs providing the best developed location, but a great deal of camping is dispersed. Projections of increased desire for recreational opportunities may warrant development of Teepee Lake Area into a campground and opportunities for handicap access motorized recreational activities in the watershed.

ROADS

A recent road assessment shows current open roads, open OHV trails, administrative closed roads, physically closed roads, and roads that are naturally closed. The assessment also discusses road uses and maintenance needs. At the time of integration, issues of roads were brought forward by several resource groups.

At the time of this assessment, total road density in the watershed was 1.64 miles per square mile and open road density was 1.34 miles per square mile. There was less concern, for wildlife, on road density and higher issues regarding seasonal access, particularly during hunting season (Oregon Department of Fish and Wildlife (ODF&W)).

A multitude of issues surfaced for both administrative management and public use. Roads offer important access for cost effective restoration. Access allows for a wider range of treatment, utilization, and equipment options for management consideration. Roads provide access for permittee allotments and private inholdings. Additionally, a large number of recreationalist access their favorite camping, hunting, or resource gathering areas such as: mushrooms, firewood, and berries from roads in the LJCW. The main route Forest Service road 4600 is the primary scenic loop road from highway 3 to Zumwalt Prairie to the east with numerous photo opportunities.

Past management practices placed some roads in or near RHCA's creating the potential for riparian issues. When heavy rains or spring runoff occurs there is potential for road rutting resulting in sediment delivery into the stream. Additional issues occurring include ineffective culvert sizes, shallow or incorrect culvert types needed for fish passage.

A total of 46 road segment recommendations were identified for various treatments such as: maintenance, decommissioning, closure, and culvert work. Roads conditions were reviewed and identified for implementation if the recommendation was consistent with the “current road use status”.

Consistent with current road use status means the recommendation did not change the access or type of vehicle use on that road that existed at the time of the assessment. Twenty-eight road recommendations fit the “current road use status” condition of which 16 were under a previous NEPA document, allowing for implementation funding requests. The remaining 12 are pending a current NEPA document. Any road segments with treatment recommendations that will change the current road use status need further site specific analysis and public input through the Travel Management Plan.

COMPLEMENTARY RESOURCE MANAGEMENT GOALS AND OBJECTIVES

Through integration, resource groups were able to develop landscape goals and objectives, supported by current management direction, to guide the project level planning, implementation of recommendations, monitoring and evaluation.

Many management issues and recommendations were found to blend across multiple resource groups. Integration meetings provided the awareness of complementary landscape recommendations, producing watershed goals designed toward a wide range of ecological needs. These landscape goals can be viewed as an overall future watershed condition while resource objectives are specific approaches identified to meet landscape goals and measure success toward that goal.

Landscape goal: Establish the orderly process of plant community development that involves changes in species composition, structure, and community processes both spatially and temporally. *Benefitting resource group(s): Range, Wildlife, Forestry (Silviculture/fuels), Riparian*

- Resource objective: Treatment of 100% of all priority areas over a 16-year period through commercial, hand treatment, and prescribed burning. Treat the remainder of recommended lower priority areas immediately following the completion of priority acres.
- Resource objective: Increase aspen grove size and numbers by promoting sprouting in all known aspen stands.
- Resource objective: Prioritized noxious weeds with managing agencies taking an eradication, containment, or control treatment strategy approach. Monitor changes and trends in weed populations and species composition to measure treatment efficiency and success.
- Resource objective: Develop mosaic landscape of timber structures and diversity through skips, gaps and feathering of treatment areas.

Landscape goal: Develop landscape diversity by moving the watershed toward natural historical range of variability of timber stands through creation of resilient stands of early seral fire tolerant species and late old structures supporting large tree component. *Benefitting resource group(s): Wildlife, Forestry, Range, Recreation, Cultural*

- Resource objective: Move multistoried stands lacking large tree components to a multi-storied large tree closed and single storied large tree stands in dry forest type with a representation of; 43% of the stands supporting a large tree component in warm/moist stands, 55% in warm/dry, and 40% in cool/dry.
- Resource objective: Improve landscape condition for low severity fire effects to overstory and conditions supportive of wildfire behavior exhibiting more low intensity surface burning in dry forest types on the landscape.
- Resource objective: Monitor effects of large wildfires to estimate residual overstory post wildfires occurrences.

Landscape goal: Develop healthy and diverse riparian habitat with the ability to support complex vegetative communities, improve water quality, and stream channel morphology. *Benefitting resource group(s): Riparian, Wildlife, Range*

- Resource objective: Establish hardwood component in appropriate locations of riparian areas.
- Resource objective: Increase habitat connectivity through culvert replacement to promoting fish passage.
- Resource objective: Maintain and promote use of alternative water sources for big game and livestock throughout the watershed.

Landscape goal: Design road management decisions where road systems are safe, responsive to public needs and desires, minimally impacting ecologically, and fulfilling administrative management needs. *(All Resources)*

- Resource objective: Implement approved recommended roads treatments to reduce sediment delivery. Monitor sites for estimated sediment reduction.
- Resource objective: Reduce road use instead of road density reduction to allow for administrative, recreational, and seasonal use through gating, signs, and access monitoring.
- Resource objective: Apply geotextile and 12 – 14 inches of road base in instances where unimproved, native surface roads pass through archeological sites.

IMPLEMENTATION

Implementation is perhaps the longest phase of the planning process. Once the assessment is complete, landowners and managers will review the restoration recommendations and apply them to the watershed. This phase can take decades or longer to fully meet the goals and recommendations of this assessment.

The collaboration process and watershed recommendations are designed to assist landowners and managers awareness and provide tools to move forward with restoration with few obstacles. By using a collaborative start to finish approach in watershed restoration, the process will:

- Create a method designed to deliver organized, on the ground, ready to implement restoration projects.

- Provide a collaborative model for other places and groups to use to successfully work together toward a common goal.
- Bring together interest groups in advance of the final assessment to discuss concerns in an attempt to avoid last minute objections and/or appellant concerns on projects.
- Assist the Forest Service NEPA interdisciplinary teams with up to date data, on the ground restoration needs, and collaborative community approval prior to the NEPA process.
- Result in a more cost efficient process of planning, easier acquisitions of implementation dollars, and combined restoration efforts across ownership boundaries.
- Continually offer and build an open conduit of communication for all parties to participate and develop a stronger collaboration group over time.

The Lower Joseph Creek Watershed steering committee will present the completed document to Wallowa County Commissioners for approval. Once approved, the watershed document will be provided to the Forest Service and landowners for implementation. The landowners and administrators can then begin to implement the management recommendations immediately.

During implementation, the following will occur to secure restoration actions:

- Annual acquisition of funds for implementation.
- With consensus secured, organizations like Wallowa Resources can begin to implement the management recommendations immediately.
- Stakeholders will periodically organize field tours to view the projects in process and assess the results. Federal, State, Tribal and non-profit organizations have partnered on technical monitoring to generate on-going knowledge about project designs and results.
- Resource group coordination contributed to identifying restoration efforts that were complimentary for the watershed. This provided a smooth transition from recommendations identification into implementation. The "Agreed to Recommendations Summary", describes the volume of activities approved for implementation. Implementation recommendations were identified as both broad and specific activities depending on the resource group.

SUMMARY OF AGREED RECOMMENDATIONS

FORESTRY

The acres in the table are Priority acres where stand conditions are critically outside of historic conditions. It does not include areas of lower priority still in need of treatment.

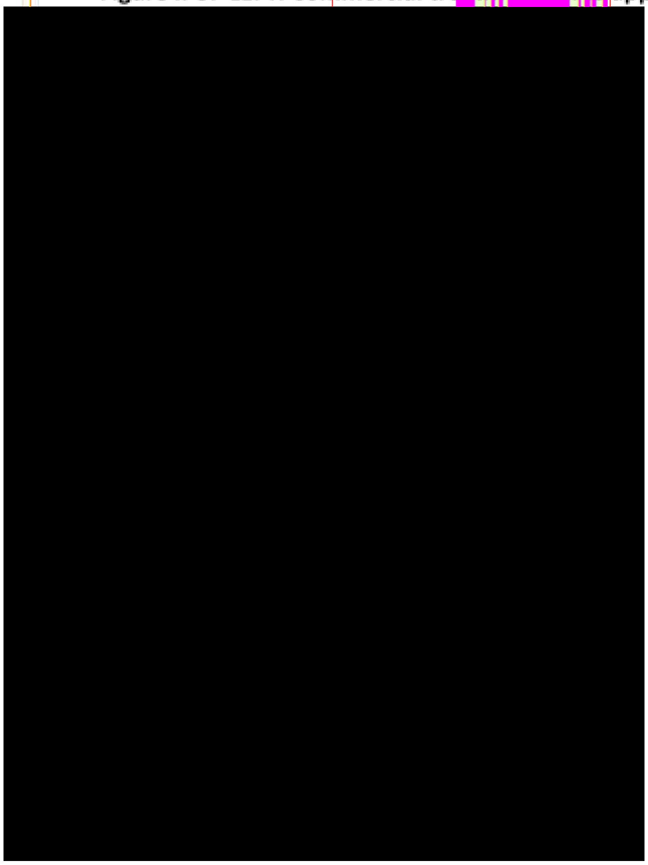
Specific Silvicultural treatment prescriptions can be found in the Forestry section of chapter IV. The table below explains the general stand recommendations and contains a recommendation column listing the item amount proposed, and a column identifying the integrated agreed upon amount. The “Further Discussion” column requires future information and discussion prior to implementation.

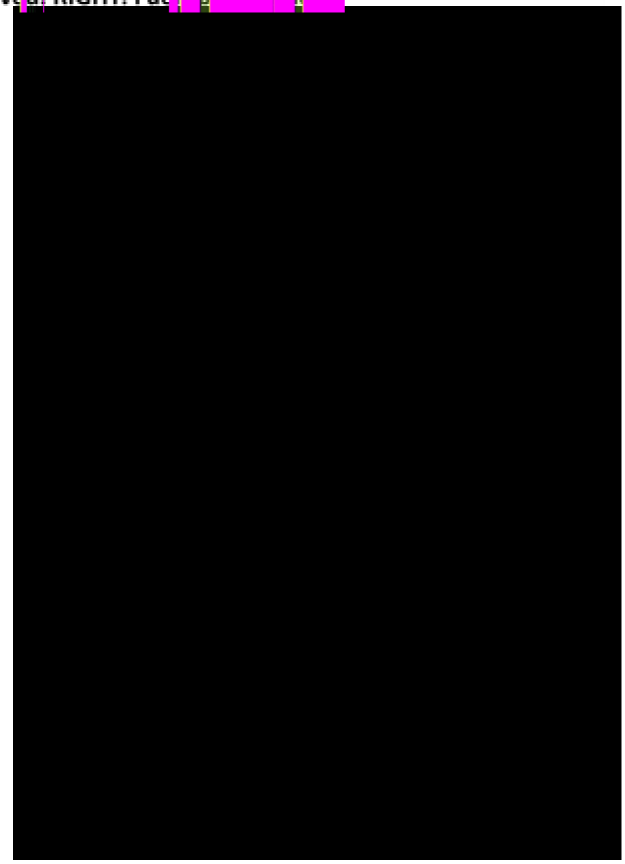
Fuels acres are based on high density areas of fires starts and hazardous fuel stands that support all three of the following conditions: 1. Heavy down wood, 2. multiple layers of live trees (ladder fuels), 3. Degree of overlapping of tree crowns (55% + crown density). Once the fire density and stand conditions were overlapped then ridge tops, streams, and roads were identified as priority boundaries for fuels and fire. Treatment areas for fuels were not limited to timbered stands resulting in larger size treatment blocks. Fuels recommendations include both timbered and grasslands, utilizing tools such as mechanical and hand treatment-mechanical as well as prescribed burning. Overlay of silviculture and fuels acres revealed approximately 6,150 acres of timbered areas proposed for dual treatment.

Table II-3. Forestry resource group overview of integrated agreed acres and acres for further discussion.

RESOURCE GROUP FORESTRY	RECOMMENDED ACTION	INTEGRATION AGREED TO PRIORITY ACRES	INTEGRATION FINAL AGREED TO ACRES	FURTHER DISCUSSION ACRES	COMMENT
Silviculture	Restore stand structural stages to HRV distributions in watershed	20,632 ac	16,076 ac.	4,556 ac.	(Warm Dry PP/DF), (Warm Dry DF/PP), (Cool/Dry DF/GF/WL) *
Fuels	Restore priority area to historical structural distribution and fire regime conditions	28,200 ac	28,200 ac		Overlapping Silv. and Fuels priority = 6,150 acres. Treatment types are limited in HCNRA Roadless
*Biophysical groups = Warm Dry-PP/DF = Ponderosa pine/Douglas-fir; DF/PP = Douglas-fir/ponderosa pine; Cool Dry-DF/GF/WL = Douglas-fir/grand fir/western larch. NOTE: The “Further Discussion” column requires future information and discussion prior to implementation.					

Figure II-5. LEFT: Commercial tre tr s app ove d. RIGHT: Fue p





RANGE

Like all resource groups, the range group involved participation from a diverse group of stakeholders. Unlike other resource group, range was very strong in private landowner participation and permittee representation. This was essential with a large area of the watershed supporting grazing allotments and private and federal rangelands.

Weeds were considered a subset of the range group, and have a high presence within the watershed. Three primary approaches were taken to address the weeds issue: containment, control, and eradication. Emphasis should be placed on early detections, aggressive treatments, and diverse options types of treatments that coincide with approaches used by the Wallowa County Weed Board.

Table II-4. Outcome from integration of recommended, agreed, and items for further discussion for Range.

RECOMM. ACTION	RECOMM. QUANTITY	INTEGRATION AGREED TO	FURTHER DISCUSSION	COMMENT
Fence	23.5 miles	20.5	3 miles	Includes repair, new fence, rebuild
Trail work	10 miles	3 miles	7 miles	Tee Pee Ridge Cattle Trail maintenance will be a revisit at later time.
Clean and Maintenance Ponds	21 ponds	21 ponds	0	If pond is in a draw or creek would not prefer it to be maintained and would be negative effect to Riparian; need more info – site by site basis
Spring Development	6 locations	5 locations	1 location	Rock Creek Spring Development in draw- need further info
Rock water gap; water development	1 location each	All approved		
Weed Treatments	Entire Watershed			Follow weed treatment protocols.
Timber thinning for forage	8,100 acres	8,100		5,200 acres that overlapped with Silviculture Recommendation

Figure II-6. Range approved fence, trail, and water

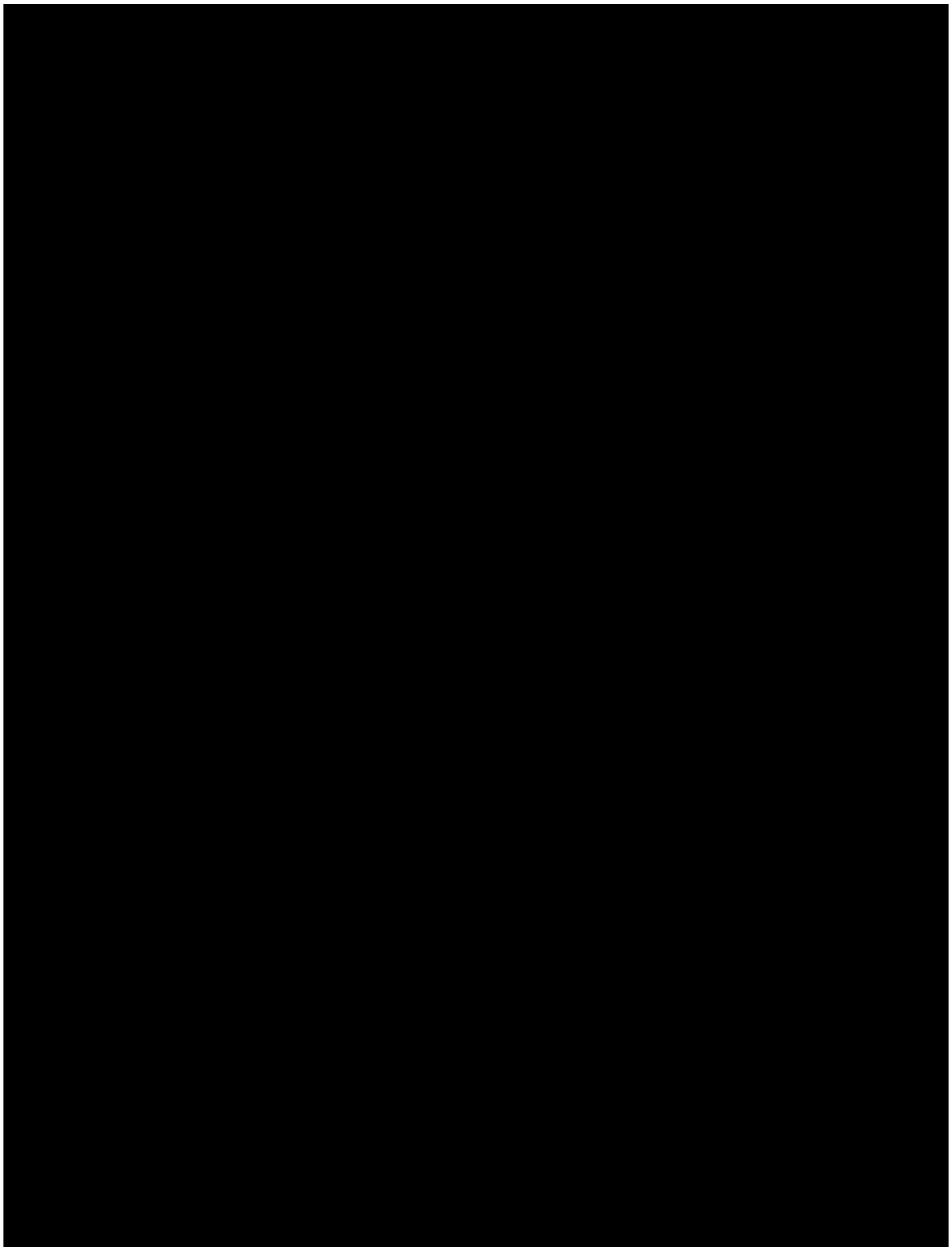
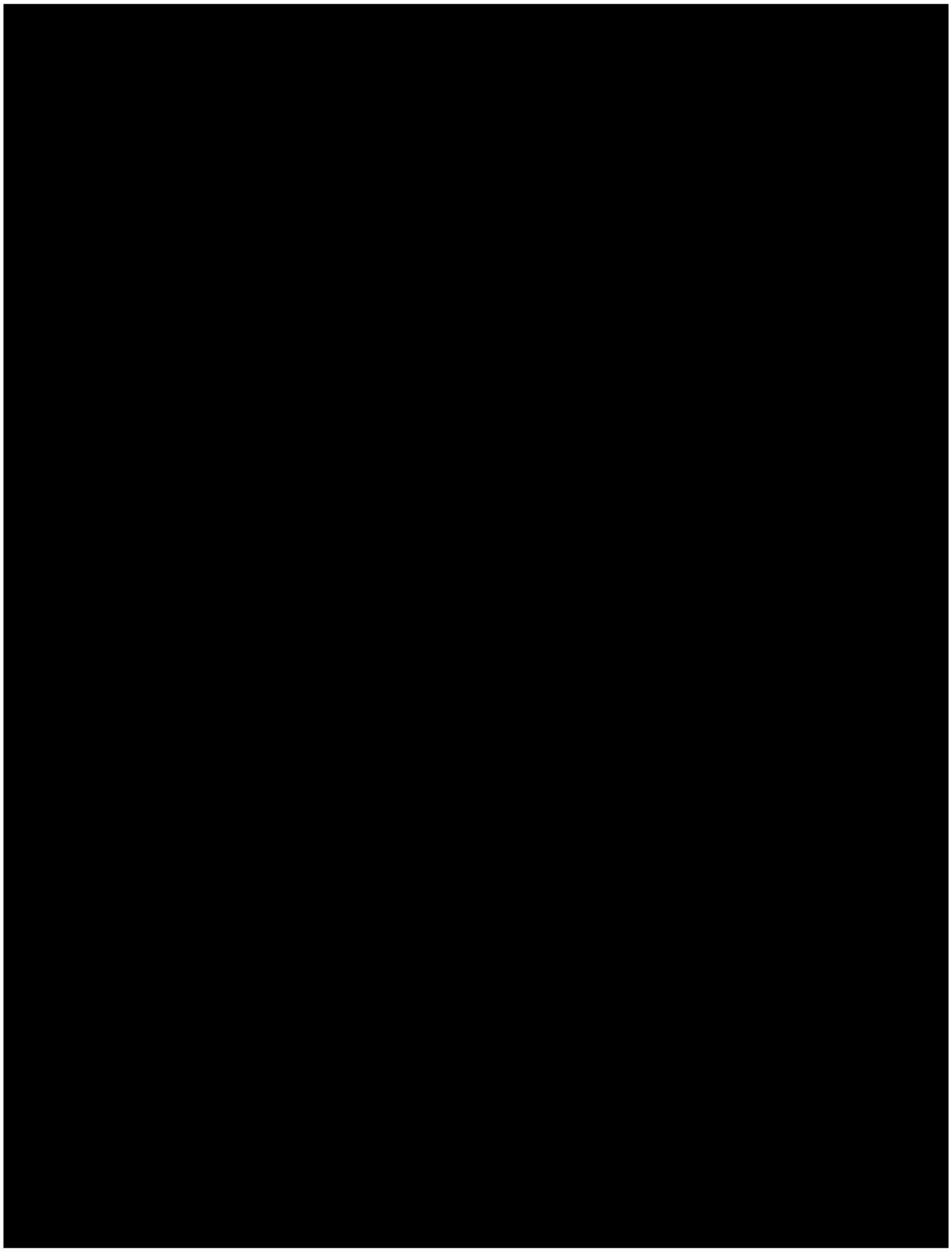
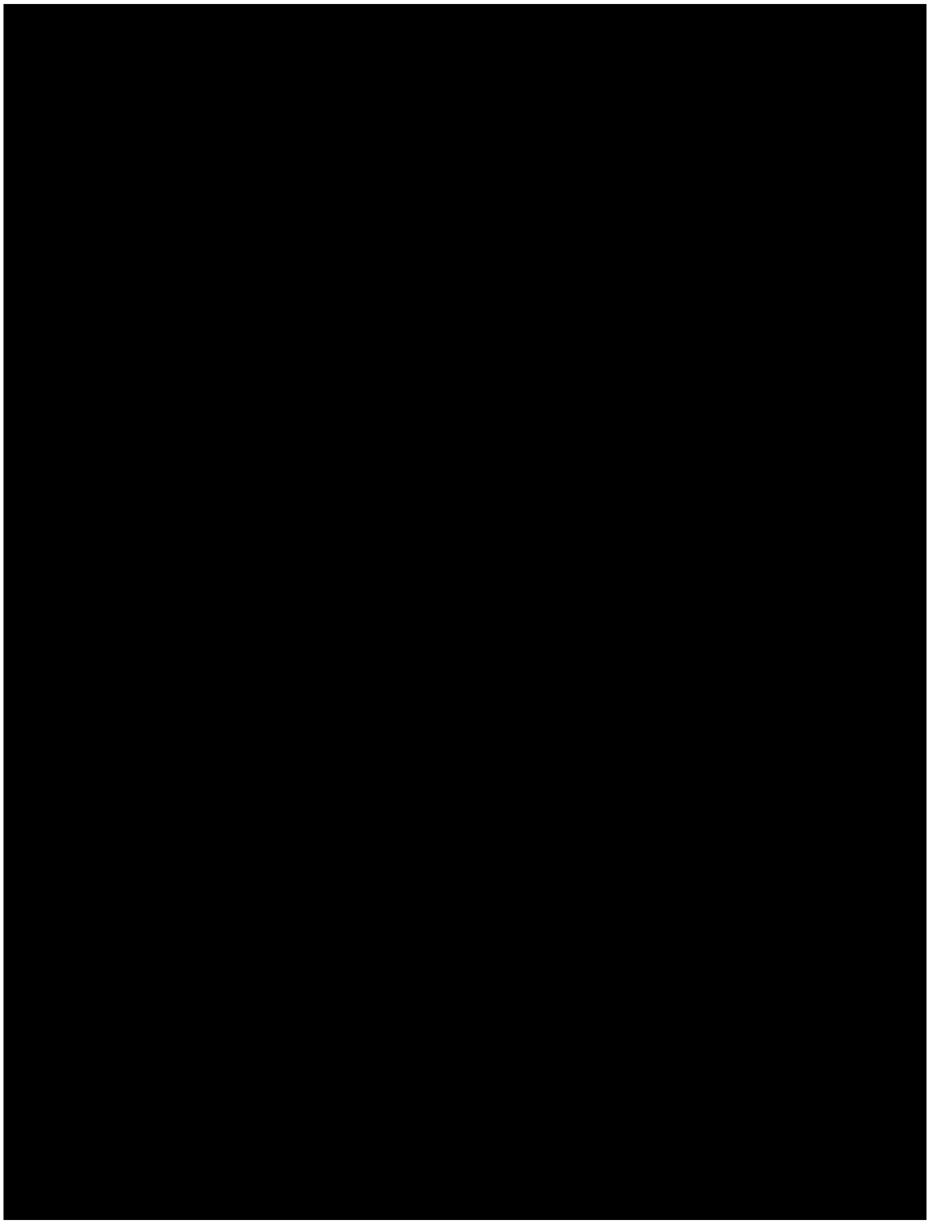


Figure II-7. Range approved springs and ponds

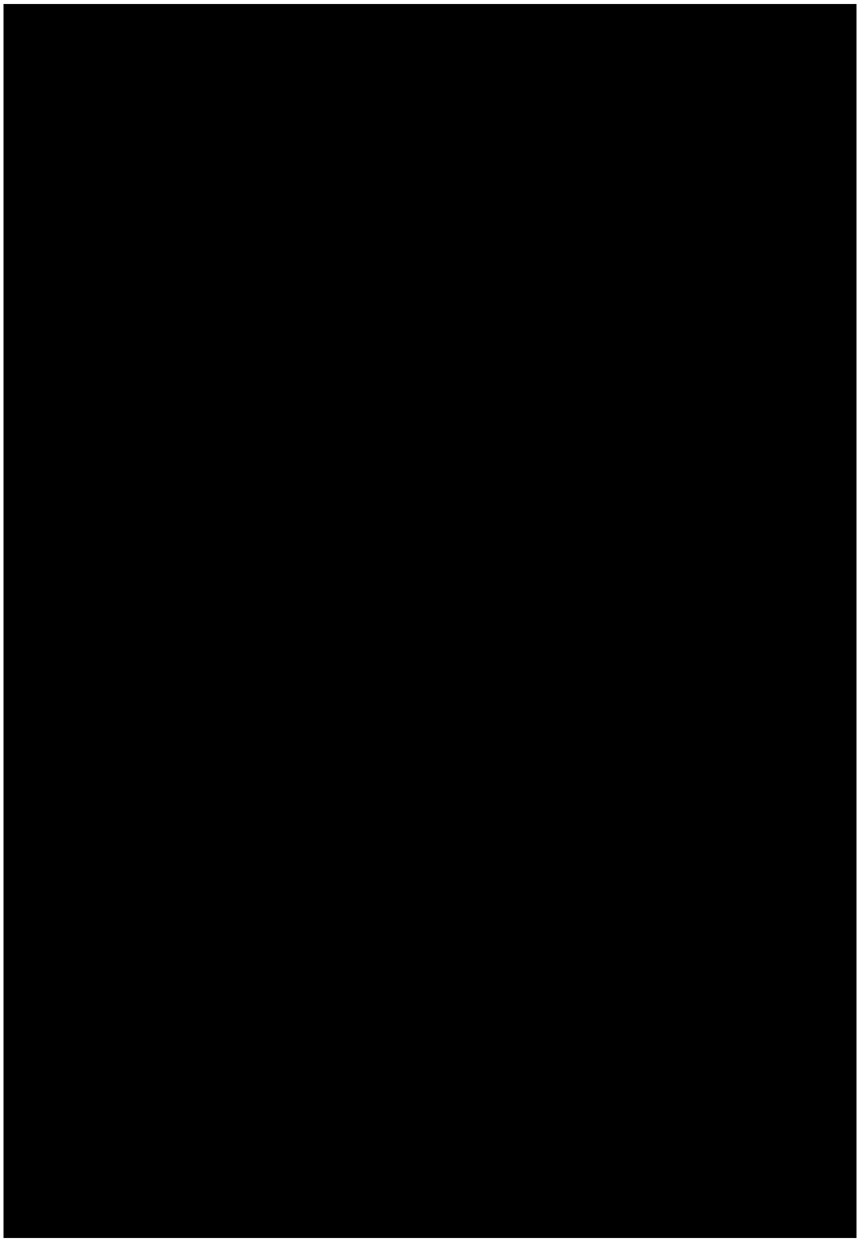


Maps reflect approximate location of range approved recommendations. Maps DO NOT reflect the areas that are listed for further discussion.

Figure II-8. Range approved timber-thinning acres



FigureII-9 Range, weeds distribution



WILDLIFE

Wildlife implementation actions were not designed to any specific geographical areas or acres, but recognize the overall restoration needs of the watershed as it pertains to wildlife and habitat diversity. The overall endorsements for watershed restoration are treatments that promote healthy and diverse ecosystem habitat. Through integration, all resource groups agreed to a number of restoration needs.

Many watershed wildlife habitat improvements were strengthened through other resource restoration needs providing a complimentary basis for implementation. Wildlife restoration recommendations in timbered stands focused on creating mosaic structures, promoting large tree component, and riparian shrubs consistent with the Forestry and Riparian groups respectively.

A summarized list of recommended watershed restoration needs has been provided, indicating the extensiveness of resource improvements proposed.

Habitat restoration:

- Develop a mosaic forest on the landscape
- Base stand and landscape improvements on biophysical type.
- Develop healthy upland and riparian shrubs
- Restore healthy grassland ecosystems
- Manage for MSLT single stratum
- Restore SSLT in dry forest types; retention of large trees
- Retain snags or defective trees (cracks, broken tops, cavities for habitat); all stages of decomposition and wide distribution on landscape

Aspen habitat restoration:

- Decrease competition of other species
- Prescribed burn in aspen stands where fencing is ineffective in protecting
- Re-establish aspen in appropriate habitat

Reduce forage competition with domestic livestock

- Open up dense mixed conifer stands to improve forage production
- Increase forage quality and quantity through prescribed burns

Increase riparian habitat (nests, forage, springs, and streambanks)

- Fence or use natural barriers (down logs or boulders)
- Restore shrub/hardwood habitat in lower gradient streams
- Create small reservoirs near good quail cover

INCREASE DEADWOOD HABITAT – SNAG RECRUITMENT

- Offer firewood sales or units to meet public demand

DISTURBANCE FROM MOTORIZED VEHICLES

- Maintain road stability especially in riparian areas.

INVASIVE SPECIES AND REDUCE DISEASE TRANSMISSION

- Practice early detection and rapid response protocols

MANAGE FOR RECREATIONAL IMPACTS ON WILDLIFE

- Provide public with information of area (activities, road access, camping areas, wildlife, and projects)
- Manage rock features to avoid conflict with recreationalists
- Manage bat roost sites to avoid conflict with recreationalists

In addition to restoration recommendations, mitigation measures were supported to improve watershed condition for wildlife habitat.

IMPROVED STREAM INTEGRITY

- Protect Streams and Springs by providing alternative water sources for cattle

REDUCE FORAGE COMPETITION WITH DOMESTIC LIVESTOCK

- Where feasible deferred and rest pastures with a rest-rotating grazing system.

Increase amount riparian habitat (nests, forage, springs, and streambanks)

- Provide for alternative water sources for cattle
- Plan and locate recreation facilities away from riparian habitat;
- Maximize contiguous areas of riparian habitat.

CULTURAL

Implementation projects and actions for cultural resource were primarily focused on protection of known sites or newly discovered sites. These actions are mitigation-type measures for implementation prior to and during management activities. Proactive project management for site protection is proposed in the form of fuels reduction projects. Specific sites needing treatment have not been disclosed but are expected to be identified during the project level NEPA process, after the completion of this assessment.

IMPLEMENTATION PROJECTS APPROVED ON OR NEAR ARCHEOLOGICAL SITES:

- Removal of excessive fuels through; thinning by hand felling, and transfer off cultural site.
- Implementation of low intensity/short duration fires.

MITIGATIONS APPROVED FOR IMPLEMENTATION ARE:

- Use of Geotextile and 12-14 inches of road base applied where road passes through site.
- In areas where there is potential for damage to cultural sites associated with springs. Locate all cattle congregations in areas of previous ground disturbance.
- Protect with fireline around sites.

RIPARIAN

Spring protection and improvement were recommendations identified during integration. Sites should be evaluated on a site-by-site basis for causal factors and appropriate actions. Condition could be enhanced by re-vegetation (e.g. grasses or shrubs), off-site water developments, exclosures, fencing and trough replacement if appropriate.

Table II-5. Riparian spring protection and improvements

RECOMM. ACTION	DESIRED CONDITIONS	INTEGRATION AGREED TO	FURTHER DISCUSSION	COMMENT
Protection of headwaters and stream channels.	Provide spring protection near headwaters. Improve vegetation cover and riparian conditions of hot spots. Evaluate needs on a site by site basis to reduce fine sediment inputs into stream channels.	4 Sites	None	Sites: Rush Creek, North Cabin Spring, Road Bend Spring, and Wildhorse Spring Utilization should be limited (by herding, barriers such as large woody debris, fencing, or change in the season of use).

Figure II-10. Riparian approved spring locations

Riparian issues were found to be primarily the result of road locations and their effect on riparian areas and water quality. Twenty-nine road segments had recommendations that included decommissioning, culvert replacement, maintenance, spot rocking, and reinforcement of bank stability. Recommendations for restoration were largely for fish passage and connectivity. Approved riparian road recommendations were consolidated with road recommendation efforts of roads/recreation and range resources. (See Roads Integration below for more information).

ROADS

Roads issues and recommendations were presented by the following resource groups: riparian, roads/recreation and range.

The approval of roads recommendations were decided upon after lengthy integration discussions. Several factors came into play when determining which roads would be approved for restoration. (See Roads Integration)

During integration it was acknowledged that the Travel Management Plan (TMP) was forthcoming with potential to impact any decisions proposed for implementation.

Agreement was made for the Lower Joseph Creek Watershed Steering Committee to determine the best approach on roads recommendations. The Steering Committee identified the following criteria for use:

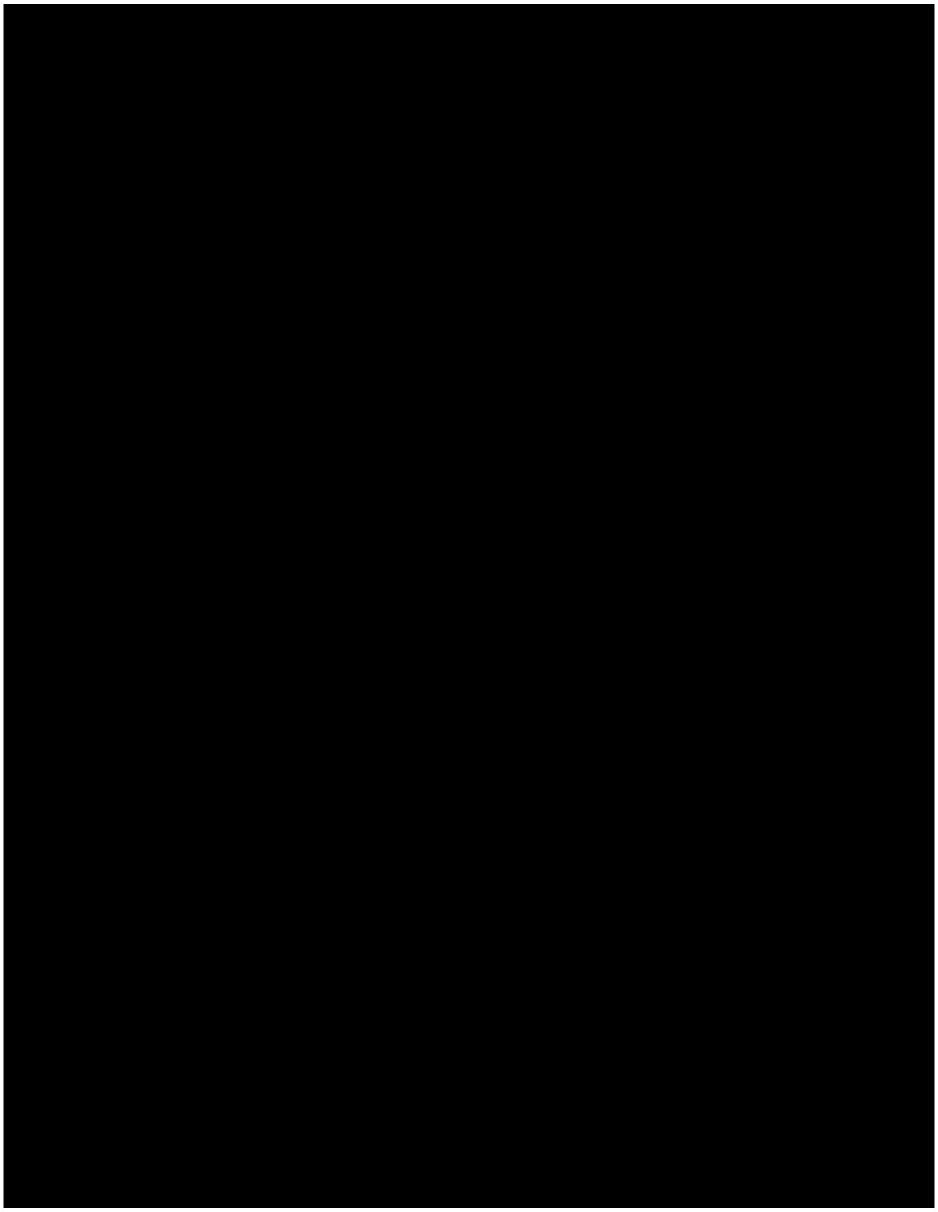
- Any proposed recommendations to change the current road use status would be left for the TMP decision. Example: A Lower Joseph Creek Watershed recommendation to decommission a road that is currently an open road and in use, the LJCWA decision is leave this for the TMP.
- If the proposed recommendation was consistent with the current road use status move forward with implementation. Example: Culvert replacement on an existing open road and road remains open after completion of work.
- To identify roads currently under an existing NEPA environmental document that could potentially be "shovel ready" for implementation.
- Catalog the roads with the following information and identify; if the road segment is currently covered under NEPA, requires NEPA for implementation, what resource made the recommendation, what the recommendation was, and is recommendation consistent with or will it change the current road use status.

Roads recommendations that met the listed criteria above were divided further based on whether an existing NEPA document allowed for immediate implementation or implementation was pending NEPA completion. Sixteen road segment recommendations were identified as ready for implementation with completed NEPA and 12 would need NEPA completed.

Table II-6. Approved roads recommendations in the LJCWA that where consistent with current road use status.

ROADS RECOMMENDATIONS SUMMARY	
Treatments recommendations **consistent** with Current Road Use	
TOTAL road recommendations = 28	
NEPA done	NEPA needed
16	12
Available for funding and implementation	Next step complete NEPA Evaluate conditions on segment by segment basis.

Figure II-11. Geographic display of road recommendations consistent with current road use.



Multiple recommendations may apply to one specific road number.

There were 46 road segment recommendations put forth from multiple resource groups. Twenty-eight recommendations were identified as consistent with current road use status. Some roads received more than one recommendation depending on specific issues for that area of road. For instance, road segment 4600-347 received two recommendations: 1. Riparian – maintenance on multiple sections of road within 200 feet of the stream. 2. Roads and Recreation – pull culverts and rock crossing.

MONITORING AND EVALUATION

Monitoring recommendations developed through the LJCWA appear in various approaches from treatment effectiveness to economic impact monitoring. A list of monitoring and evaluation needs was developed throughout the LJCW analysis. First, a list of additional data needs was identified, followed by a list of monitoring items helpful in verifying expectations made and to evaluate how well the recommendations served at bridging the gap between existing and desired conditions.

FORESTRY

1. Verify that implementation acreages are consistent with expectations of meeting roughly 25% of priority acres every 4 years.
2. Validate field measures of residual basal areas are meeting prescribed and agreed upon biophysical group basal areas recommendations.
3. Monitor unit treatments on steep ground for cost effectiveness.
4. Monitor both fuels reduction and prescribe burning treatments for changes in canopy base height and surface fuel loads with retention and/or promotion of a large tree component.
5. Evaluate treatment effectiveness toward achieving low to moderate intensity fires with low over-story mortality post wildfire.

RANGE

1. Monitor for early detection of weeds through aerial and ground methods.
2. Monitor for effectiveness of fencing and ponds as alternative water sources for distribution of livestock.
3. Continue monitoring of C&T and IIRH plots to detect change in conditions.
4. Monitor the timing of seasonal grazing by cattle and elk to understand their effects on restoration efforts.
5. Coordinate with USFS Fire Staff to monitor fire effects on plant populations.
6. Revisit all know rare plant sites and update site reports.
7. Focus future Spalding's catchfly (*Silene spaldingii*) inventory work on canyon slope supporting Idaho fescue habitat in lower portions of Davis, Swamp and Joseph Canyons. Use modern techniques/newer data for a new habitat prediction model.
8. Wallowa needlegrass *(Achnatherum wallowaensis)* occurrences: Re-evaluate sites every 3 to 5 years, collect data according to Region 6 T&E and Sensitive plant 2005 field guide.
9. Rough *Pyrrocoma* or Rough Goldenweed (*Pyrrocoma scaberula*): Continue to inventory suitable habitat and revisit known populations for site changes. Monitoring selected populations verifying whether current management is adequate to perpetuate the species at these sites.
10. Monitor the impacts to *Pyrrocoma scaberula* from aggressive weed infestation, possible herbivores, overgrazing, and fire suppression.

11. Evaluate weevil impacts to both *Pyrrocoma liatriformis* and *Pyrrocoma scaberula*. Suitable plant habitat below 4500’, within 10-15 miles of the northern boundary of the HCNRA should be prioritized for future inventory.
12. Continue to inventory suitable habitat and revisit all known populations of Davis’ fleabane (*Erigeron davisii* – formerly Engelman’s daisy, *E. engelmanii* var *davisii*) and the Snake River Daisy, (*Erigerion disparipilus*) in the watershed. Where patch size will allow, make collections from these sites for taxonomic expert verification.

WILDLIFE

1. Inventory the effectiveness of aspen and riparian hardwood treatments.To determine site-specific potential for growth and species diversity of deciduous vegetation; compare conditions within and outside of existing riparian exclosures.
2. Monitor the timing of seasonal grazing by cattle and elk to understand its effects on restoration efforts.
3. Monitor effectiveness of firewood sales on snag retention.
4. Evaluate effectiveness of seasonal closures for big game.
5. Monitor for types and numbers of Management Indicator Species (MIS) with current and progressive treatment conditions.
6. Inventory wildlife presence including MIS, their use of designated old growth and late old structure stands, and their movement between such stands.

CULTURAL

1. Evaluate impacts to cultural sites of all levels of fire intensities post burning.
2. Assess protection effectiveness of re-location of cattle congregations (water developments, salt licks, etc.).
3. Continue building database of newly discovered sites.

RIPARIAN

1. Monitor effectiveness of spring maintenance in upland and riparian areas.
2. Monitor effectiveness of culvert replacement for fish passage.
3. Continue to inventory fine sediment on known road maintenance areas.
4. To determine seasonal flow and runoff patterns, a stream flow gauging station should be reestablished on Joseph Creek. During the mid-1930’s a gauging station was established near Sumac Creek, and records were kept for three years. A site near this location is preferred.
5. To determine site-specific potential for growth and species diversity of deciduous vegetation, compare conditions within and outside of existing riparian exclosures.

ROADS AND RECREATION

1. Inventory visitor-use days through permit sales, campground use and hunting tags.
2. Inventory of road access needs for approved recommendations from LJCWA.
3. Monitor TMP roads with roads recommendations from LJCWA.
4. Inventory roads needs verses administrative needs particularly for times such as elk rifle season.

SUMMARY AND TABLES

The planning process provided a progressive method of assessment and integration resulting in identifying and pursuing implementation of recommendations toward watershed restoration. Throughout the planning process collaboration occurred both within individual resource groups and full integration meetings in a collective and collaborative sequential manner.

Current watershed conditions provided the springboard for identifying issues on the landscape. These issues covered six primary resource groups with equal emphasis on each. Watershed issues ranged from isolated specific sites to broad based landscape concerns in order to move conditions toward representative reference and historic conditions.

Resource integration of landscape needs identified many parallel benefits toward restoration during the planning process. A multitude of common themes for restoration occurred through issues and recommendations. The most repetitive recommendation was the desire for a mosaic, diverse landscape in both upland and riparian areas that benefit water, wildlife, and vegetation species.

The Lower Joseph Creek Watershed assessment has yielded an extensive amount of work available for implementation with multiple resources benefits. Maintaining forward motion toward implementation of groundwork is imperative for success of this watershed assessment. Through the assessment design, multiple opportunities of watershed restoration will provide community based revenues and involvement through work in the watershed, products, and monitoring. Having a socio-economic benefit provides community stability and sense of belonging in a time when many communities are struggling to maintain.

Table II-7. Cultural - Approved Through Integration

CULTURAL - APPROVED THROUGH INTEGRATION			
ISSUE	**DESIRED CONDITION**	**RECOMMENDATION**	**COMMENT(S)**
Heavy Equipment Use (• In instances where unimproved, native surface roads which pass through archaeological sites	Protection of archaeological sites during heavy equipment use and where road base passes through a site.	1. Geotextile and 6 to 8 inches or road base applied where road passes through site.	Integration Increased the road base to 12 to 14 inches to meet best protection measure.
Above ground cultural resources within treatment units: Excessive fuels near sites; removal of excess fuels often protects these sites from wildfire.	Adequate protection measures are completed in advance of natural and prescribed fire disturbances.	1. Hand fell, thinning, and manual removal of excess fuels 2. Remove fuels for wildfire protection	Above-ground resources such as historic cabins, corrals, or mining features are within treatment units. These types of sites are often highly susceptible to fire damage.
Threats directly related to fire intensity and duration [based on the studies by William Knight (1994), and Hal Keeling (1993)]	Minimal down woody and live vegetation at and near cultural site; protection measures identified in advance.	1. Prescribed burn with low intensity/short duration fires. 2. Protect sites with wooden/perishable material.	Lithic scatters/can dumps/deep buried deposits.
Desire to protect and/or achieve low intensity short to moderate burn duration.		1. Hand-thin/manually remove excess fuels to reduce intensities 2. Construct fire line around the cultural resource. (Under supervision of Archaeologist)	Close Coordination with fuels, range, cultural on locations.
Damage to cultural sites associated with springs.	Alternative locations for livestock watering and salt licks, etc.	Locate all cattle congregation Features, stock tanks, salt licks, troughs, etc., in areas of previous ground disturbance such as old road beds.	
Inadvertent Discoveries	Follow established Protocols.	Notify local Archaeologist immediately	Typically occurs during the implementation of an undertaking.

Table II-8. Forestry – Silviculture – Approved Through Integration

FORESTRY –SILVICULTURE – APPROVED THROUGH INTEGRATION							
ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATION	BIOPHYSICAL GROUP				INTEGRATION RESULTS AND COMMENTS
			G4	G5	G6	G7	
Existing Multi-storied large tree uncommon (MSLTU) stand structure types surpasses historic numbers. Large tree representation is lacking in these stands and basal area well exceeds HRV	Move stands toward MSLTC and SSLT shifting landscape to Historic ranges of stand distribution while promoting large tree component and Late Old Structure. Create a healthier more resilient landscape. Improve health and vigor of existing multi-layered structures of diverse species composition, age and size classes.	Individual tree selection regimes. Design to maintain & improve health and vigor of existing multi-layered structures of diverse species composition, age and size classes.		X	X	X	Wildlife comment: Maintain vegetation buffers with higher basal area with widths of 25-50 feet along high use roads. Suppression utilizes roads for safe firefighting strategies; less treatment along the road side for buffers is contrary to these suppression tactics.
		Retain and protect large trees of early seral species & trees with old-growth physical characteristics consistent with our HRV goals.	X	X	X	X	
		Favor early seral species, fire resistant trees.	X	X	X	X	
		Uneven-aged management favoring vigorous PIPO, LAOC, PSME, ABGR in order of preference.	X				
		Thin from below in mixed conifer, 2^{nd} growth stands dominated by PSME/ABGR and PIPO/LAOC.	X				
		Conversion of stands from MSLTU to SSLT and SSLTC moving landscape toward more historic ranges.	X	X	X	X	Create landscape mosaic. Heterogeneous landscape is more beneficial for wildlife
Overstocking in MSLTU. Stand structure exceeds HRV by 14,115 acres.	Move MSLTU stands toward Multi-storied Large tree Common	Commercial harvest to improve health and vigor of stands. Move stands to representation of Historic Ranges.	X	X	X	X	Botany may have areas of no ground disturbing activities – site basis.

FORESTRY - SILVICULTURE - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

SILVICULTURE

ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATIONS	BIOPHYSICAL GROUP				INTEGRATION RESULTS AND COMMENTS
			G4	G5	G6	G7	
Forests are more susceptible to disturbances: uncharacteristic wildfires, insects and disease. A large % of the forested landscape is now dominated by dense, multi-layered conifer stands and species not well suited for the area.	Restore insect and fire resilient conditions commensurate with HRV's and dominant fire regimes.	Thin stands favoring the retention of the shade in-tolerant conifers (ponderosa pine, western larch, and Douglas-fir).	X	X	X	X	Sequence with subsequent road recommendations will need reviewed for access purposes. Wildlife interested in importance of maintaining stand mosaic on the landscape; heterogeneity is important. Where there is homogenous size blocks they should be reviewed for treatment to provide needed diversity. Treatment will result in improved stand health and vigor.
		Provide opportunities to include fiber utilization; allow for fiber use whenever possible.	X	X	X	X	
		Select stand structures dominated by residual PIPO over a mixed conifer, multi-layered understory of seedling to medium size ABGR, PIPO, PSME, and LAOC in order of occurrence.	X				
		Proactive management within the overstocked mid seral structural stages (MSLTU) would provide the best opportunity to begin the process of increasing the representation of MSLTC structures within the cool/dry sites.	X				

FORESTRY – SILVICULTURE - APPROVED THROUGH INTEGRATION (CONTINUED . . .)							
SILVICULTURE							
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**BIOPHYSICAL GROUPS**				**INTEGRATION RESULTS AND COMMENTS**
			G4	G5	G6	G7	
Inability to treat all stands.	Work with fuels/fire to strategically locate, if necessary, treatments that would provide the highest level of landscape protection.	Created shaded openings along ridges and access areas for fire control purposes.	X	X	X	X	There is concern on failure to address the broader landscape. Check opportunities for forage improvement. Walking away from remainder of stands potentially takes away from vegetation opportunities for wildlife and range. Support from all resources.
		Small inclusions of cool/ moist sites should be given special consideration as to their need for treatment and/or protection.	X	X	X	X	Provides mosaic and diversity. Evaluate on a stand by stand basis.
		Previously un-logged sites should be given additional consideration prior to entering.	X	X	X	X	Interest for preserving stands with no past harvest history. Reviewed on a stand by stand basis.

FORESTRY – SILVICULTURE- APPROVED THROUGH INTEGRATION (CONTINUED . . .)		
Biophysical Group		
G4 – Cool/Dry Grand fir/huckleberry		
BIOPHYSICAL GROUP	**STRUCTURAL STAGE**	**Moderate Need Basal Area >110**
G4	UR	184
G4	SECC	81
G4	MSLT	3075
G4	MSLTU	4471
		7811
Warm/Dry G5 – Grand fir/spiraea and G7 – Douglas-fir/snowberry		
BIOPHYSICAL GROUP	**STRUCTURAL STAGE**	**Moderate Need Basal Area >80**
G5/G7	UR	388
G5/G7	SI	27
G5/G7	SECC	512
G5/G7	MSLT	2767
G5/G7	MSLTU	3888
G5/G7	SSLT	0
		7582
G6 – Warm/Moist Douglas-fir/ninebark		
BIOPHYSICAL GROUP	**STRUCTURAL LSTAGE**	**Moderate Need Basal Area > 100**
G6	SI	6
G6	SECC	264
G6	MSLT	1336
G6	MSLTU	3593
		5199

Table II-9. Forestry - Fuels and Fire – Approved Through Integration

FORESTRY – FUELS AND FIRE - APPROVED THROUGH INTEGRATION			
FUELS AND FIRE			
ISSUE **CURRENT CONDITION**	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Fuel Loadings in riparian areas creates increased potential for stand replacement fire. Both dead and Down Woody and Standing Live trees are contributing factors.	Reduction of fuel loads within riparian habitat conservation areas (RHCA) to allow for low intensity fires. Fire behavior in the riparian areas that burn with lower intensities result in reduced effects to RHCA.	Redirect larger material into streams	All in favor of this option. Several stands in riparian showing uncharacteristic conditions. Could encourage deciduous vegetation. Intensity of work may play a factor.
Down woody fuels significantly exceeding historic levels.	Reduction of ladder fuels, heavy down woody, and crown density will accomplish the following desired conditions: 1. Reduce dead and down tons per acre 2. Lower fire burning intensities (heat generated) and duration of fire burning in one area. 3. Decrease mortality in residual large trees during fires.	Move stands to HRV basal area and down woody fuel loadings.	
		Hand pile and/or prescribe burn to reduce down woody fuels exceeding historic levels.	
		Provide opportunities to include fiber utilization during commercial treatment or stand alone projects; allow for fiber use whenever possible. Skid material – use various methods for disposal	All in one single entry treatments with equipment were preferred over commercial entry with additional follow up entry for fuels treatment. Utilization preferred approach and provides environmental benefit trade-offs.

FORESTRY - FUELS AND FIRE - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

FUELS AND FIRE

ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATION	INTEGRATION RESULTS AND COMMENTS
Ladder fuels layering exist in high percentage of forested stands with 3+ layers.	Open stands with resilient fire tolerant large tree species consistent with historical fire regimes -condition classes. Raise the canopy base height of lower limbs on residual trees in the stands. Provide space between canopy of overstory through crown density reduction. Decrease percent of mortality in residual large trees during wildfires. Lower probability of crown fires.	Whip fell and hand piling (first) in areas outside of commercial opportunities where stand conditions will not support first entry prescribed fire.	This is particularly important in Designated Roadless and Old-growth areas where commercial opportunities were tabled for further discussion as well as areas of inaccessibility due to access.
		Provide opportunities to include fiber utilization during commercial treatment; allow for fiber use whenever possible.	Highly supported during integration.
		Commercial and non-commercial thinning. Favor retention of vigorous PIPO, free LAOC, PSME, and ABGR in order of preference. Reserve basal area meeting HRV goals, favoring the early seral species.	
		Develop opportunities for separate fiber sales, post/pole, or fire wood opportunities to encourage biomass utilization.	

FORESTRY - FUELS AND FIRE - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

FUELS AND FIRE

ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATIONS	INTEGRATION RESULTS AND COMMENTS
Continued…… Ladder fuels layering exist in high percentage of forested stands with 3+ layers.		Prescribed burning. Periodic, low intensity ground fires to control species composition, maintain stocking levels. Allowance for maintenance treatments.	Cultural would like flexibility on burn blocks locations to avoid and/or protect sites. Certain cultural sites will tolerate low intensity fires. Coordinate burn blocks with permittees on location, size, and block changes to evaluate allotment impacts.
		Availability of green tree firewood for public use (particularly in pole and small diameter material).	Provides environmental trade-off over on site disposal.
Crown density is high for biophysical ecosystem types. Basal area well exceeds HRV in all Plant Associations.	Raise canopy based height of on residual trees and increase space between canopies of overstory through crown density reduction. Decrease mortality in residual large trees fires. Lower probability of crown fires. Restore fire regime and condition class to historic levels. Increase of ground cover species.	Whip fell and commercial removal of small diameter material, creating opportunities to include fiber utilization over on site disposal. Mechanically treat areas both commercial and non-commercial to reduce stand density.	
		Re-introduce fire to the landscape through low intensity burning. Prescribed burn where ever possible and appropriate.	

FORESTRY - FUELS AND FIRE - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

FUELS AND FIRE

ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATION	INTEGRATION RESULTS AND COMMENTS
Continued…. Crown density is high for biophysical ecosystem types. Basal area well exceeds HRV in all Plant Associations.		Most fire-resistant trees should be given preference during treatments to protect valuable legacy. Treatments should enhance growing conditions for these trees and increase their likelihood for long-term survival into the future.	
Inability to treat all stands	Strategically locate, if necessary, treatments that would provide the highest level of landscape protection. Mimic historic conditions across the landscape. Landscape mosaic to lower probability of large scale high intensity fires. Achieve conditions of maintenance treatments. Protect investment of work on the ground.	Create shaded openings along ridges and access areas for fire control purposes.	There is concern on failure to address broader landscape and opportunities of forage improvement. Walking away from remainder of stands potentially takes away from vegetation access for wildlife and range.
		Strategically locate treatments to interrupt potential wildfire spread on landscape through commercial removal and prescribed burning.	Resources not willing to accept the risk of losing stands to wildfires. Support from all resources. Cultural resource would like some flexibility for adjusting burn block boundaries to excluded and or protect Arch. Sites.
		Mechanically treat areas to mitigate stand vulnerability during wildfire disturbance, treat aggressively on first entry.	
		Focus initial treatments on fire density areas with high probability of starts.	

FORESTRY - FUELS AND FIRE - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

FUELS AND FIRE			
ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATION	INTEGRATION RESULTS AND COMMENTS
Continued…. Inability to treat all stands.		Establishing an implementation plan for periodic treatments to keep fuels from re-accumulating to unnaturally high levels. Provide avenues for maintenance treatments.	Resources expressed importance of continued maintenance treatments to retain the investment of work on the ground. There is a need for development of assessment or monitor plan to ensure long term resource benefits are being met.
		Manage conifer species reflecting historic patterns, and to restore fire resilient conditions commensurate with dominant fire regimes favoring fire tolerant species.	

Table II-10. Rangeland – Approved Through Integration

RANGELAND - APPROVED THROUGH INTEGRATION				
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**		**INTEGRATION RESULTS AND COMMENTS**
Fence conditions and current design of pasture fences reduce cattle distribution.	Develop ways to create a more evenly distributed livestock on landscape. Minimize stream access continue efforts toward cattle distribution	**SWAMP CREEK**	Approx. Length	Ex-closures will help protect stream banks and water quality – explore options. Concern of ability to maintain additional fence lines in regard to riparian and spring protection. Competition occurs with poor mgmt. of pastures or if livestock begin to browse. Utilization standards for Browse in place for Range. Cattle can potentially precondition pasture for elk to graze. Vacant allotments should be utilized. No identified objections.
		5 sections of fence	6.60 miles	
		Riparian fence repair	1.6 miles	
		New fence	1.4 miles	
		STARVATION RIDGE		
		Rebuild of fence	3.86 miles	
		DAVIS CREEK		
		New –North of Chico Trail	1.5 miles	
		COTTONWOOD CK.		
		Repairs	1.4 miles	
		MILLER RIDGE		
		Rebuild	.2 miles	
Water sites need improvements. Upland water is limited creating the potential for animal congregations in riparian areas.	Healthy RHCA's. Protect riparian areas and springs through development of alternative water sources.	**SWAMP CREEK** Rock Water Gap Red Fir Pond # 16024736 – Spring needs trough development. Lower Swamp Creek – whole pasture needs water source.		If Ponds are in a draw or creek there is a preference that it not be maintained. – Riparian will need more information. Protect springs with fencing where cultural sites exist have potential to damage area from elk/livestock. Fence design is key – size, type, etc.
		STARVATION RIDGE Pond Maintenance – Blow Out Pond, Starvation ridge # 16034702, Bear Pond, Childer Pond		

RANGELAND - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATION	Integration Results and comments
Continued…. Water sites need improvements. Upland water is limited creating the potential for congregations of animals in riparian areas.	*Continued….* Protect riparian areas and Springs through development of alternative water sources.	MILLER RIDGE Water Development Needed	If Ponds are in a draw or creek there is a preference that it not be maintained. – Riparian will need more information Long Ridge – One of the few access roads on this ridge; it would be good to spot rock road for trough work, water settling on road. Protection of springs with fencing where cultural sites exist have potential to damage area from elk/livestock. Fence design is key – size, type, etc. Consult local archeologist.
		LONG RIDGE Spring development – trough; along FS rd. 4600 - 570	
		HUNTING CAMP Rebuild springs at road 4655-200, 4655-150. Also clean Pond here.	
		ROCK CREEK SPRING Spring repair/Pond or trough	
		COLD SPRINGS RIDGE Seven (7) ponds on Cold Springs Creek in need of pond maintenance	
		FROG POND Located along road 4680	
		HORSE CREEK Two (2) ponds	
		TRAIL CREEK Located on road 4880-212	

RANGELAND - APPROVED THROUGH INTEGRATION (CONTINUED . . .)			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Continued…. Water sites need improvements. Upland water is limited creating the potential for congregations of animals in riparian areas.	*Continued….* Protect riparian areas and Springs through development of alternative water sources.	ROAD GULCH Maintenance needed on Pond	If Ponds are in a draw or creek there is a preference that it not be maintained. – Riparian will need more information
		BULL CANYON and THORN HOLLOW Three (3) ponds identified for cleaning.	
		TELEPHONE RIDGE WATER GAP Need to form new pastures.	<u>These 4 items IMPACT LOWER JOSEPH WATERSHED but lie outside of watershed boundary</u>: pasture overlaps both Upper and Lower Joseph Creek Watershed. Both watershed analysis were completed through the same community planning process. If Ponds are in a draw or creek there is a preference that it not be maintained. – Riparian will need more information
		WEST SIDE OF PEAVINE Needs heavy repairs.	
		CROW CREEK JOHNSON CANYON Water development and maintenance.	
		CHESNIMNUS CREEK Degradation; needs improvement.	
Overstocked forested areas. Stand densities are limiting plant diversity and/or preventing growth of ground vegetation in timbered areas.	Increase availability of plant diversity for forage in terms of grasses and brush component.	Thin stands to lower basal area, remove ladder fuels to open stand canopy to promote ground vegetation in the following locations: ● SWAMP CREEK – 1139 acres ● DAVIS CREEK – 266 acres ● ASPEN FORK – (west of Red Hill) - 295 acres ● TWO BIT FORK – 134 acres ● KIRKLAND lookout/campground – 768 acres ● W. FORK BROADY/COYOTE – 1442 acres	Wildlife concern: Maintain vegetation buffers with higher basal area 25-50 ft wide along high use roads. Suppression utilizes roads for safe firefighting; less treatment for road side buffers is contrary to these tactics <u>Stand treatments will meet recommendations and prescriptions outlined in the Silviculture section.</u>

RANGELAND - APPROVED THROUGH INTEGRATION (CONTINUED . . .)			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Continued…. Overstocked forested areas. Stand densities are limiting plant diversity and/or preventing growth of ground vegetation in timbered areas.	Increase availability of plant diversity for forage in terms of grasses and brush component.	Thin stands to lower basal area, remove ladder fuels to open stand canopy to promote ground vegetation in the following locations: (continued)….. ● BALDWIN SPRINGS – 634 acres ● PEAVINE CK/ N. KIRKLAND LO TOWER – 243 acres ● HUFFMAN CAMP SPRING – 614 acres ● LUPINE CREEK – 490 acres ● TABLE MOUNTAIN – 493 acres ● W. KIRKLAND CAMPGROUND – 88 acres ● E. FORK SUMAC/N. MUDDY RESERVOIR – 495 acres	High level of overlap acres with Vegetation: Silviculture overlap 4,123 acres. Fuels overlap 3,312 acres Wildlife is also interested in forage improvement; actions can be complementary to wildlife as well.
TRAIL MAINTENANCE Limited access in some areas.	Use existing trails for improved access to identified locations.	● LOWER DAVIS CREEK - cut out existing mid-slope trail; improve access. 3 miles	

Table II-11. Rangeland – Weeds – Approved Through Integration

RANGELAND – WEEDS - APPROVED THROUGH INTEGRATION			
WEEDS			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Early detection for aggressive treatment. Inability to cover large areas to detect new weed locations in high risk areas.	Identify and treat areas immediately.	Utilize air and ground detection methods for inventory and spread.	Overall support for continuing with current weed program and development of new ways to treat area. Avoid controlling noxious weeds with domestic livestock – wildlife concern.
Accessibility of steep canyons. Inability to cover large areas and/or access areas.	Provide a diversity of application methods is steep areas. Mitigate personnel safety in rugged terrain.	Utilize aerial spray methods for mitigating safety in steep canyons and cover large acres at once.	
Yellow star thistle occupies much of northern canyon lands of the watershed. Greatest distribution in Joseph, Cottonwood, and Horse Creek drainages.		Use Herbicidal treatments.	
Rush Skeleton weed dispersed in isolated pockets through much of watershed.	Aggressive management to prevent/minimize windborne seed.	Provide opportunities and option for changes in management strategies toward treatment of sites.	

RANGELAND – WEEDS - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

WEEDS

ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATION	INTEGRATION RESULTS AND COMMENTS
Weeds located across boundaries of managing agencies. (Wallowa County, Oregon Dept. of Agriculture, Asotin County, and Washington Dept. of Agriculture)	Plan activities across jurisdictional boundaries when implementing weed treatments.	Develop documents and MOU's to allow for maximizing effectiveness and leverage of funding sources	Overall support for continuing with current weed program and development of new ways to treat area. Avoid controlling noxious weeds with domestic livestock
Common crupina is an "A" listed weed dispersed over roughly 1500 acres in Joseph Creek.	Stop spread of weed to the north and continue treatment.	Implement containment strategy to stop northern spread.	

Table II-12. Rangeland – Botany – Approved Through Integration

RANGELAND – BOTANY - APPROVED THROUGH INTEGRATION			
BOTANY			
ISSUE **CURRENT CONDITION**	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Impacts and potential impacts to known populations and habitats from management activities.	Minimize impacts to known sites.	1. Provide maps to permittees of all rare plant locations and instruct them to not salt within ¼ mile of any Forest Service region 6 sensitive rare plant population. 2. Work with fire staff to monitor impacts of prescribed fire on populations. 3. Revisit all known sites of rare plants and update site data. 4. Work with weed management staff to prioritize weed treatments that benefit rare plant occurrences to the degree feasible.	Botany monitoring and mapping is important for other resource recommendations. Monitoring and map known and newly discovered sites. Monitor for treatment effects. Some of the recommendations of no ground disturbing activities will need to be on a site by site basis. A map of these areas (no ground disturbance) is needed.
The National Forest (NF) land surveys for Spalding's catchfly (*Silene spaldingii*) were limited focusing on ridgeline Idaho Fescue (*Festuca idahoensis*) habitats.	Survey and identify species in canyon areas of David, Swamp, and Joseph Canyons.	Future inventory work should be focused on the canyon slope Idaho Fescue habitat. Utilize more modern techniques and newer data to develop a new habitat prediction model.	

RANGELAND – BOTANY - APPROVED THROUGH INTEGRATION (Continued . . .)			
BOTANY			
ISSUE CURRENT CONDITION	**ISSUE CURRENT CONDITION**	**ISSUE CURRENT CONDITION**	**ISSUE CURRENT CONDITION**
Exotic ventenata grass (*Ventenata dubia*) is invading scabby areas and is potential threat to Wallowa needlegrass *(Achnatherum wallowaensis)* habitat.	Identify sites where ventenata grass is threatening Wallowa needlegrass habitat. Treat accordingly.	Unknown on historical ranges and long-term trends. Continue to inventory suitable habitat and revisit all known populations	Measuring the reproductive patterns, and recruitment rate of Wallowa needlegrass should be included in any monitoring plans that are developed on the Forest. At a minimum, include the sites identified in Botany section.

RANGELAND - BOTANY - APPROVED THROUGH INTEGRATION (CONTINUED . . .)			
BOTANY			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Continued…. Wallowa needlegrass *(Achnatherum wallowaensis)* occurrences have not been revisited since discovery. Potential for disturbance of species.	Maintain current species populations. Identify and map known species.	1. Re-evaluate sites every 3 to 5 years, collect data according to the Region 6 Threatened, Endangered, and Sensitive Plant field guide (USDA 2005). 2. Protect large population in Boner Gulch to maintain diverse gene pool in one area. 3. To prevent impacts to known sites in Sumac Creek avoid herding, fencing, salting, water developments. 4. Develop a monitoring protocol that can identify population trends and threats to habitat, particularly from non-native invasive plant species.	Measuring the reproductive patterns and recruitment rate of Wallowa needlegrass should be included in any monitoring plans that are developed on the Forest. At a minimum, include the sites identified in Botany section. Some of the recommendations of no ground disturbing activities will need to be on a site by site basis. A map of these areas (no ground disturbance) is needed.
Rough Goldenweed (*Pyrrocoma scaberula*) or Palouse Goldenweed (*Pyrrocoma liatriformis*) 1. The trends, health, or longevity *Pyrrocoma scaberula* populations are unknown.	Continue to Inventory suitable habitat and revisit all known populations of this species. Need to maintain open canopy Ponderosa pine (Pinus ponderosa) at Palouse Goldenweed sites.	Identification and mapping of known and newly discovered sites. Avoid ground disturbing actions to known or suitable habitat for this species. Prescribed fire may be required to maintain the open *Pinus ponderosa* canopies at these *Pyrrocoma scaberula* sites.	Unclear on true threats to Palouse Goldenweed habitat loss. Prioritize inventories in suitable habitat below 4500’, within 10-15 miles of the northern boundary of the HCNRA. Monitoring known sites could provide valuable information about whether current management is adequate to perpetuate the species at these sites.

Table II-13. Rangeland – Botany - Monitoring

RANGELAND - BONTANY - MONITORING			
BOTANY			
ISSUE CURRENT CONDITION	**MONITORING - DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Palouse Goldenweed and Rough Goldenweed - Weevils have been noted boring into and deposting eggs in both species.	Healthy plant communities.	Monitor Determine means of plant protection against Weevils.	Larvae feed inside flower head damaging the plants. Suitable should be prioritized for future inventory.
Davis' fleabanes (*Erigeron engelmannii* var. davisii and and Snake River daisy or white cushion fleabane (*Erigeron disparipilus*) hybridizing with each other with potential for evolution into new species.	Increase knowledge base of these species and their evolutionary development.	Work with researchers to study plant genetics, evolutionary processes, and modern techniques in plant taxonomy. Continue inventory of suitable habitat. Revisit all known populations of these two fleabanes in the watershed. Where patch size will allow, make collections from these sites for taxonomic expert verification.	Research possibilities - This species presents opportunities to study evolutionary processes. Collect data according to the Region 6 Threatened, Endangered, and Sensitive Plant field guide (USDA 2005).
Nez Perce Mariposa Lily (*Calochortus macrocarpus* var. *maculosus*)	Gain knowledge and potential impacts to the species.	Continue to inventory suitable habitat and revisit all known populations of these two fleabanes in the watershed.	Evaluate livestock impacts. Genus of Calochotus in general, is reported to be very palatable to livestock. Knowledge of impacts is limited. For each population, collect data using Region 6 Threatened, Endangered, and Sensitive Plant field guide (USDA 2005).

Table II-14. Wildlife – Approved Through Integration

WILDLIFE – APPROVED THROUGH INTEGRATION			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Habitat Loss	Heterogeneity on the landscape is important in all vegetation types.	Create and maintain mosaic of forested habitats. Habitat restoration should be based on Biophysical type. Restore healthy grasslands, upland and riparian shrub habitat. Manage MSLT to increase single stratum structure. Manage to increase single story Large Tree in all biophysical types with emphasis in dry forest types. Retain/recruit snags/defective trees in all stages of decomposition across the landscape.	Large homogenous areas should be treated to create more diversity in stand structures. This is consistent with forestry. Riparian habitat of brush is important for migratory birds. Much of riparian areas are overgrown and showing uncharacteristic conditions. Research is limited on riparian treatments.
Loss of Aspen Habitat	Re-establish of aspen stands. Develop healthy stands to promote diversity on landscape.	Decrease competition by removing competing tree species. Utilize prescribed fire where fencing is ineffective or unrealistic.	High support of this issue and recommendation.
Stream Integrity compromised due to increased sedimentation and temperature.	Healthy stream function.	Protect stream and riparian areas by providing alternative water sources for cattle.	Support from all groups. Install guzzlers.

WILDLIFE - APPROVED THROUGH INTEGRATION (CONTINUED . . .)			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Forage competition with domestic livestock. Some stands are overstocked preventing opportunities for ground cover.	Abundant, healthy, and diverse ground cover in timbered areas and grasslands.	Open up dense mixed conifer stands to improve forage production. Increase forage quality and quantity through prescribed burning. Use deferred and rest rotation of pastures in grazing allotments.	Competition occurs when there is bad pasture management. Range has utilization standards that they follow. Improving forage can reduce competition on private lands and improve elk distribution and use. Oregon Department of Fish and Wildlife suggested vacant allotments should be stocked for use.
Loss of riparian habitat (nests, forage, springs, and stream banks).	Increase of riparian . diversity on landscape. A range of habitat . variations supportive of multiple wildlife . species.	Protect springs, streams and riparian areas by providing alternate water sources for cattle. Restore and protect spring areas by fencing or using natural barriers (down logs or boulders). Restore shrub and hardwood habitats in lower gradient streams. Plan and locate recreation facilities away from riparian habitat Create small reservoirs near good quail cover. Maximize contiguous areas of riparian habitat. Put emphasis on hardwood species restoration such as: cottonwood, alder, aspen and willow. Develop baseline population estimate for Columbia Spotted frogs - resence/absence	All recommendations were approved. Riparian important habitat for some species ie. Migratory birds. Agreement on positive benefits of treating riparian areas. Concern over intensity and correct management applications of treatments. The range of mountain quail has been reduced from historical accounts with populations declining significantly in Northeastern Oregon.

WILDLIFE - APPROVED THROUGH INTEGRATION (CONTINUED . . .)			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Need for retention of deadwood habitat – snags and down wood.	More even landscape distribution of snags and down wood (all decomposition stages) of various tree species and sizes.	Offer firewood sales or units to meet public demand.	There were three recommendations on this topic that were not agreed upon and will need re-visited.
Disturbance to wildlife from motorized vehicles	Reduction of disturbance by motorized vehicles.	Maintain road stability especially in riparian areas.	Five recommendations did not have agreement. Road density will be left to Travel Management Plan (TMP). Key is seasonal use over actual road densities – (Oregon Dept. of Fish and Wildlife) ODF&W. Some roads are already naturally closed.
Invasive species competing with native vegetation.	Eradication of invasive species.	Practice early detection rapid response protocols.	See weeds write-up and weed Issues under Range.
Recreational activities impact wildlife and wildlife habitat.	Balance public forest use with wildlife.	Provide public with information of area (activities, road access, camping areas, wildlife, and projects). Manage rock features and bat roost sites to avoid conflict with recreationalists.	Key is seasonal use over actual road densities – ODF&W. Some roads are already naturally closed.

Table II-15. Riparian – Approved Through Integration

RIPARIAN – APPROVED THROUGH INTEGRATION			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Some areas showing degradation of ecological functions.	Properly functioning conditions of vegetation cover and hydrological developments.	Evaluate utilization and consider: fencing, large woody debris placement, seasonal use. Enhance conditions through re-vegetation where appropriate (e.g. grasses or shrubs). Rush Creek – Protect headwaters next to the 045 road: installation of off-site water development needed. North Cabin Spring – end of 4650-135 road in draw; protect upstream of trough; extend exclosure fence Road Bend Spring – near start of 4655 road; rehabilitate the headcut in channel downstream from road; provide protection; reconstruct fence where needed or possibly move existing trough and create rock dip/drain. Wildhorse Spring – Re-develop spring; fence off; replace trough and spring box.	Evaluate on site-by-site basis for causal factors and appropriate actions. Options for Rush Creek could include using down woody material for natural fence and nose pump for off-site water Road Bend Spring protection from road to exclosure. Wildhorse Spring private landowner proposal – located along 4600-598 road or Trail # 1693. Focus on key hot spots in riparian areas.
Modified stream channel habitat creating reduced fish habitat and connectivity availability.	More complex stream channels conditions and increase of aquatic habitat connectivity.	Replace current culverts to improve fish passage and habitat connectivity. Road Issues were deferred to Lower Joseph Executive Committee for decision: It was decided that if the road was consistent with the "current road use", status the road would be moved forward for treatment. **	All resources agreed fish passage and habitat connectivity is important. SEE ROADS and RECREATION TABLE FOR DETAIL INFORMATION

RIPARIAN - APPROVED THROUGH INTEGRATION (CONTINUED . . .)			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Due to road locations numerous road systems are contributing to erosion and extension of drainage network. Fine sediment delivery occurring as result.	Improve road conditions to reduce sediment delivery and degradation to streams.	Road Issues were deferred to Lower Joseph Executive Committee for decision: It was decided that if the road was consistent with the "current road use", status the road would be moved forward for treatment. **	Road issues and recommendations were deferred to the LJCW Executive Committee for decision due to parallel occurrence of local Travel Management Plan. SEE ROADS and RECREATION TABLE FOR DETAIL INFORMATION ** NOTE: Consistent with current road use status is when the recommendation did not change the access or type of vehicle use on that road that existed at the time of the assessment.

Table II-16. Road and Recreation – Approved Through Integration

<table>
<tr><th colspan="4">ROADS AND RECREATION – APPROVED THROUGH INTEGRATION</th></tr>
<tr><th>ISSUE
CURRENT CONDITION</th><th>DESIRED CONDITION</th><th>RECOMMENDATION</th><th>INTEGRATION RESULTS AND COMMENTS</th></tr>
<tr><td rowspan="6"><u>NEPA COMPLETED</u>
Road Systems are contributing to stream degradation from sediment delivery, road slough, etc.</td><td rowspan="7">Road systems that are not contributing negative impacts to streams and riparian areas.</td><td>Road Issues were deferred to Lower Joseph Executive Committee for decision: It was decided that if the road was consistent with the “current road use”, status the road would be moved forward for treatment. **</td><td rowspan="7">All listed roads match the current road use status.

The resource name in front of the recommendation is the group proposing the recommendation.

Road segment length <u>does not</u> indicate the length of treatment; treatment may be a culvert or specific location on the segment identified.

** NOTE: Consistent with current road use status is when the recommendation did not change the access or type of vehicle use on that road that existed at the time of the assessment.</td></tr>
<tr><td>4655-000 RIPARIAN - "needs rocking above cattle guard"; not sure of comment originator</td></tr>
<tr><td>4650-030 RIPARIAN - Maintenance on section within 200 feet of stream (see map)</td></tr>
<tr><td>4600-545 RANGE - Broady Cr., Leave open to 4 wheeler access 4600-545; 1.3 mile segment</td></tr>
<tr><td>4600-420 RIPARIAN - Maintenance per Baldwin* - drainage, spot rock for subgrade reinforcement 0.4 miles in length</td></tr>
<tr><td>4600-460 RIPARIAN - Maintenance per Baldwin* - drainage, spot rock for subgrade reinforcement 0.5 miles in length</td></tr>
<tr><td>A new road exists; people drive around the tree in road; major gully created in road. Near end of road. It is carrying sediment off the road.</td><td>4655-050 RIPARIAN - Horse Pasture Ridge: needs to be fixed. Township 5N, Range 45E, Section 26</td></tr>
</table>

ROADS AND RECREATION - APPROVED THROUGH INTEGRATION (CONTINUED . . .)			
ISSUE CURRENT CONDITION	**DESIRED CONDITION**	**RECOMMENDATION**	**INTEGRATION RESULTS AND COMMENTS**
Road Systems are contributing to stream degradation from sediment delivery, road slough, etc.	Road systems that are not contributing negative impacts to streams and riparian areas.	Road Issues were deferred to Lower Joseph Executive Committee for decision: It was decided that if the road was consistent with the <u>current</u> road use status the road would be moved forward for treatment.	All listed roads match the current road use status. The resource group proposing the action is listed in front of the recommendation. 4600 – 270 Open Passable with 4x4; Maintenance under NEPA.
		4600-475 RIPARIAN - Maintenance per Baldwin* - flare junction, drainage, spot rock for subgrade reinforcement; 1.8 miles in length	
		4600-495 RIAPARIAN - Maintenance per Baldwin* - flare junction, drainage, spot rock for subgrade reinforcement; 0.4 miles in length	
		4600-505 RANGE - Broady Cr., Leave open to 4 wheeler access 4600-505; 8.5 miles in length	
Multiple sections of road needing treatment that lies within 200 feet of stream. .	Road systems that are not contributing negative impacts to streams and riparian areas.	4600 – 190, 4600-347, 4600-200, 4600-270 RIPARIAN - Maintenance on multiple sections of road within 200 feet of stream (see map)	
		4602-000 RIPARIAN - Maintenance on sections within 200 feet of road; mostly last mile. 1.1 miles segment distance. RANGE - spot rocking, rolling dips, DO NOT CLOSE	

ROADS AND RECREATION - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATION	INTEGRATION RESULTS AND COMMENTS
Road Systems are contributing to stream degradation from sediment delivery, road slough, etc.	Road systems that are not contributing negative impacts to streams and riparian areas.	Road Issues were deferred to Lower Joseph Executive Committee for decision: It was decided that if the road was consistent with the <u>current</u> road use status the road would be moved forward for treatment.	All listed roads match the current road use status. The resource name in front of the recommendation is the group proposing the recommendation. 4600-200 - Available for Implementation and Funding - 100 feet @ lower Tamarack Spring. Proposed by Riparian and Roads & Recreation; Currently Open 4600-390 - needed for range. Open ATV
Sediment being delivered to Davis Creek from -120 road around creek crossing;		4602-120 RIPARIAN - fix road drainage to not drain directly into Creek but onto forest ground approx. 30 feet from creek; combine with culvert replacement. 4600-505, 4600-545 RANGE - Broady Cr., Leave open to 4 wheeler access	
<u>NEPA NEEDED</u> several springs intercept road along ~80 feet until get to Lower Tamarack Springs trough; .	Complete NEPA on the roads listed from this point forward. Road systems that are not contributing negative impacts to streams and riparian areas.	4655-200 RIPARIAN - Hunting Camp Ridge: direct springs across road with 4 rolling dips or rocked dips, including overflow from trough. ROADS and RECREATION - fix creek crossing, rock	
		4600-390 ROADS and RECREATION - pull culverts, rock crossing-ATV access	
		4600-347 ROADS and RECREATION - Pull culverts, rock crossing	
		4600-381, 4600-394, 4600-382 ROADS and RECREATION - Pull culverts, rock crossing-ATV access	

ROADS AND RECREATION - APPROVED THROUGH INTEGRATION (CONTINUED . . .)

ISSUE CURRENT CONDITION	DESIRED CONDITION	RECOMMENDATION	INTEGRATION RESULTS AND COMMENTS
Road Systems are contributing to stream degradation from sediment delivery, road slough, etc. .	Road systems that are not contributing negative impacts to streams and riparian areas.	Road Issues were deferred to Lower Joseph Executive Committee for decision: It was decided that if the road was consistent with the <u>current</u> road use status the road would be moved forward for treatment.	All listed roads match the current road use status. The resource name in front of the recommendation is the group proposing the recommendation. Road segment length does not indicate the length of treatment; treatment may be a culvert or specific location on the segment identified. ** 4600-560 - closed by earthen barrack
		4600-192 ROADS and RECREATION - Pull Culvert, rock crossing and fix slide area	
		4655-045 ROADS and RECREATION - Fix creek crossing, rock	
		4600-640 RANGE - Cottonwood Cr., Road slough - Gravel PVT lands	
		4600-560 RANGE - Long Ridge road, Leave open to 4 wheeler access	

III. Cultural Assessment

Table of Contents

INTRODUCTION

The ethnohistoric and ethnographic data presented below have a degree of application far greater than the Lower Joseph Creek Watershed (LJCW), which is but a tiny fraction of territory occupied by the Nez Perce Indians. The following sections provide a general summary of the late prehistoric (prior to human records) and early historic Nez Perce occupation of the Joseph Creek Uplands and Wallowa County. The discussion of the archaeological resources will be more specific, and will be based on previous archaeological investigations within and adjacent to LJCW. In order to understand the prehistory and archaeology at the watershed level, it is necessary to look at broader, regional patterns. For this reason, adjacent archaeological resources may refer to sites twenty-five miles distant, particularly those located within Hells Canyon. Wherever possible the ethnohistoric, ethnographic and archaeological data are brought to bear on the future management of significant cultural resources located within LJCW.

CULTURAL ASSESSMENT PRE-1877 SETTLEMENT PREHISTORY AND ARCHAEOLOGY

The LJCW national forest lands have been intensively surveyed for heritage/cultural resources, largely because of the USDA Forest Service timber sale program. As a result of these surveys, over 143 archaeological sites have been identified and evaluated within or immediately adjacent to the NF segment of the watershed. Only one of these sites yielded a radiocarbon age estimate. Radiocarbon aging uses the decay of carbon-14 (14C) to estimate the age of organic material, such as wood and leather, up to about 58,000 to 62,000 years. If the archaeology and prehistory of the area are to be understood within the framework of the regional prehistory, the watershed cannot be viewed in isolation.

To the north and east of the watershed lie the Imnaha and Snake River Canyons. They represent some of the most rugged topography in western North America, and contain some of the most significant archaeological resources in Eastern Oregon. The Hells Canyon Archaeological District contains well over 600 prehistoric archaeological sites. As the crow flies, most of these sites are less than twenty-five miles from the LJCW. They have contributed significantly to our understanding of the regional archaeological patterns. It is probable, that the occupants of some of these sites may have visited the LJCW area.

Since stone tools and the transport and trade of tool stone is a facet of every site discussed below, it is necessary to discuss the bedrock geology of the areas in and around LJCW. The watershed's uplands are dominated by the Miocene, Columbia River Basalts to the extent that no other pre-quaternary geological formations are present. The basalt flows are poorly expressed within most of the watershed. The rock types associated with the basalt flows, primarily basalts and andesite/basalts are exposed as outcrops on steeper slopes or as jointed bedrock in ridge top scabs. The basalts flows in and around the watershed are noted for the occurrence of extremely fine-grained glassy materials often referred to as glassy basalts. Although jet black, these materials are in fact andesite/basalts. They occur primarily as cobble-sized nodules and are most often found in ridge top scab environments. Although bedrock exposures of this material are unusual, it does outcrop on the ridge immediately south of forest service road 4600 near Starvation Springs.

The source of the glassy andesites is probably Elk Mountain, which lays approximately four miles southeast of Starvation Springs. Elk Mountain is the largest of eighteen Pliocene shield volcanoes collectively referred to as the Joseph Volcanoes (Kleck, 1976). To most people, they are simply known as The Buttes. Beyond Elk Mountain, notable volcanoes adjacent to LJCW, (north to south), are Haskins Butte, Greenwood Butte, Brumback Butte. Roberts Butte is most northern butte located in the watershed and Findley Buttes is the furthest south of the buttes sitting approximately 7. 5 miles east of LJCW. The above volcanoes cut diagonally across the landscape. Other buttes include Nedham, Harl, Morgan and Miller Buttes located southeast of

Wallowa Lake, in the Upper Imnaha Watershed. Harl Butte is located approximately eight miles southeast of Enterprise. Buttes best known for their association with fine grained, andesite tool stone are Elk Mountain, Roberts Butte and Harl Butte. The material associated with Elk Mtn. and Roberts Butte is jet black while those from Harl Butte consist of reddish orange andesite. While the black andesites predominate, the reddish orange material is present in most excavated sites. The glassy andesite/basalt deposits were a major source of lithic raw materials for prehistoric hunters and gatherers. Consequently, the area around the LJCW contains some of the highest densities of lithic scatter sites on the Wallowa- Whitman National Forest.

ETHNOHISTORY

In the summer of 1806, on their return trip east, the Lewis and Clark expedition would spend more than a month with a group of American Indians near what is now Lewiston, Idaho. Referring to this group as the Chopunnish or Nez Perce, the expedition interviewed a number of Indian informants. From these interviews, Lewis and Clark identified seven bands or divisions of the Nez Perce, one of which was referred to as Wil-le-wah Band on the Wallowa River in Oregon, population 500, (Thwaites, Reuben Gold, ed., 1905). Based on this information, the expedition developed a crude map displaying the general locations of the various Nez Perce bands. The Wil-le-wah band is depicted as being located on a long, straight river flowing directly northeast into the Snake River. Per Chalfant (1974:6), this may be either the Imnaha or Grande Ronde River. Spinden (1908:174) identifies over forty divisions or bands of Nez Perce. Those most germane to the LJCW include those bands at the Imnaha River; Wallowa Valley; mouth of the Grande River; near Zindels, on the Grande Ronde River; mouth of Joseph Creek; and, above Joseph Creek on the north side of the Grande Ronde. In reporting the ethnohistory of the Joseph Band, Vern Ray (1974:87) notes, “Joseph’s Band was a rather isolated part of the Nez Perce Tribe but it was the best situated, in terms of the native economy, and the wealthiest of the several bands. ” Chief Joseph’s winter village (In-nan-toe-e-in) was located near the mouth of Joseph Creek along the

Grande Ronde River (Sappington et al. 1995). It was here that the settlement and subsistence pattern of the Joseph Band was anchored.

In the winter of 1834, the expedition led by Captain Benjamin Bonneville reached the breaks of the upper Imnaha River. Based on information gained from previous contacts with The Upper Nez Perce, Bonneville was aware of the existence of the Indian group known as the Joseph Band, also referred to as the Wallowa or Imnaha Band. Proceeding downstream, the expedition finally encountered the Joseph Band occupying a winter village on the Lower Imnaha River. Referred to by Ray (1974:5) as the most isolated of the subdivisions of the Nez Perce, Bonneville's encounter would be the first meeting between whites and the Wallowa Nez Perce to occur on the Indian's home ground. Already conversant to some degree in the Shahaptia dialect, Bonneville was able to converse freely with members of the band. Per Ray (1974:6):

> *Among the early explorers Bonneville was one of the better ethnographers and in the present instance he was to record data of great value about the band now known as the Joseph's during the many days he was to spend with them. Particularly, he noted the range of territory they occupied, the economic pattern**Lower Joseph Creek Watershed Assessment**with summer use of the uplands, winter occupation of the wooded lower valleys, and the location of the villages and the nature of band leadership.*

With Joseph/Wallowa/Imnaha Band Nez Perce as his guides, the Bonneville expedition reached Fort Walla Walla on March 4, 1834. The ethnographic data collected by the Lewis and Clark expedition, 1805-6 and that of Captain Benjamin Bonneville, 1834 would come to have a profound impact in delineating the aboriginal territory of the Nez Perce Indians, in which the LJCW lies, and serve as the base line, ethnographic data for future Nez Perce ethnographers and ethnohistorians.

By 1850, white migration into Nez Perce territory had increased dramatically. In 1855, a treaty was concluded between the Nez Perce, including the Joseph Band, negotiated by Issac I. Stevens, Governor of the Washington Territory and Joe Palmer, Superintendent of Indian Affairs for the Oregon Territory. The Treaty of 1855 reduced the aboriginal territory of the Nez Perce by almost fifty percent. However, due to the persuasiveness of Old Joseph, all of the aboriginal territory of the Joseph band was retained. This included all of the Imnaha, Grande Ronde and Wallowa River basins, including the LJCW area. Other than Indian Agency personnel, all non-Indians were excluded from Joseph band territory. The treaty was ratified in 1859. In 1860, gold was discovered on the Clearwater River.

By 1861, a tent city with over a mile of streets had sprung up in what is now Lewiston, Idaho. As occupation of reservation lands continued unabated, white miners and settlers began to pressure public officials for the removal of the Indians. The results would be the Treaty of 1863. Negotiated by Superintendent Calvin H. Hale and S. D. Howe and Charles Hutchins representing the United States, the territory controlled by the Nez Perce would be reduced dramatically. Indian participation in the negotiating process was led primarily by Chief Lawyer of the Northern Nez Perce. The Treaty of 1863, concluded on June 9, 1863 would reduce the size of the Nez Perce Reservation created under the 1855 treaty by approximately ninety percent or over 90,000 square miles. The majority of the ceded lands constituted the aboriginal territory of the Joseph band. When all was said and done, there were fifty-one Indian signatures to the 1863 treaty. Not one of the fifty-one signers was a Joseph Band member. Old Joseph tore a copy of the treaty to shreds and destroyed his long-treasured New Testament, and departed for the Wallowa (Ray, 1974:21-23). At the time of the 1863 treaty, white encroachment was limited primarily to the Clearwater basin in the northern portion of the reservation. The Wallowa country was for the most part untouched by white settlement, but this was soon to change.

Within a few years, white settlers began to make inroads into Joseph Band territory. Although relatively few in number, hostile contacts between whites and Indians did occur and were reported to Indian agents in Idaho. The growing tension between Indians and whites led to the appointment of an investigation commission consisting of Agent Monteith and Oregon Indian Superintendent T. B. Odoneal. In March 1873, Monteith and Odoneal held a joint meeting with white settlers and members of the Joseph Band. The original intent of the meeting was to bring about removal of Joseph and his people from the Wallowa Valley to the reservation at Lapwai. It quickly became apparent to Monteith and Odoneal that such a move would be both impractical and undesirable (Ray 1974:30). This observation was based on a series of factors, the most important of which was that neither believed that the 1863 Treaty was binding on Joseph, since he was not a party to it. Further, the white bureaucrats could not help but notice that:

> *While Joseph, and most of his people seem very friendly, and well disposed, they manifest a very strong determination to hold the valley. . . The Band is composed mainly of young men, who are well armed, and mounted, and whose bravery is unquestionable. It would require a strong force to remove them. We did not feel authorized to say to the Indians that they must do anything in particular, so we confined our efforts to ascertaining their views, and, wishes, and facts upon which their claims are based. (Ray, 1974:33)*

The investigation findings, along with a recommendation that the Joseph Band be allowed to remain in the Wallowa Valley and that whites be prohibited entering or settling therein, was submitted to Secretary of the Interior Delano. The investigation commission also requested the issuance of an Executive Order setting apart the Wallowa Valley for the exclusive use of the Joseph Band. The submission included a proposed reservation with meets and bounds. On June 11, 1873, Secretary Delano presented these recommendations to President Grant, and on June 16, the President set aside the Wallowa Reservation for the roaming Nez Perce Indians and supposedly withholding these lands from entry or settlement by whites. The Reservation would consist of approximately half of the aboriginal territory of the Joseph Band. In essence, the new reservation included the rugged, deeply dissected Grande Ronde and Imnaha River basins but excluded the Wallowa Valley, opening the heart of Joseph Band territory to white settlement. In the end, it would not matter. The prohibition against white settlement of the new reservation would not be enforced. Due to political pressure, the proposed Wallowa Reservation would be withdrawn in 1875. By 1877, the Joseph Band would be at war with the United States.

After fighting a running battle that would last for months and inflicting heavy losses on the US Army, the Nez Perce were forced to surrender on October 5th 1877, at the Bear Paw Battlefield in Montana. Approximately 400 Nez Perce, including the Joseph Band, surrendered and would be sent to the Indian Territory in what is now Oklahoma. More than one fourth of those Nez Perce would die en route to or within Indian Territory. Only women and children and those deemed to pose no future threat would ever return to Idaho. Most of the Joseph band including Joseph would eventually be sent to the Colville Reservation in Washington. The now famous Chief Joseph died at Nesplem, Washington on September 21, 1904.

THE INDIAN CLAIMS COMMISSION/ABORIGINAL TERRITORY OF THE NEZ PERCE INDIANS

On August 13th 1946, Congress created the Indian Claims Commission, (60 Stat. 1049; 25 U. S. C. 70 et seq.):

> *By the 1946 Act, Congress created a special judicial tribunal to hear and determine claims by Indian tribes in an effort to settle once and for all, the claims of the Indians. . . . The Congress imposed one important limitation: The Commission could render only a money judgment in favor of the tribes. It could not return any land to them, which might have been taken wrongfully, nor could it give them any land to supply a land base. (Ralph A. Barney: preface to Chalfant and Ray 1974)*
>
> *Occupancy necessary to establish aboriginal possession is a question of fact to be determined as any other question of fact. If it were established as a fact that the lands in question were, or included in, the ancestral home of the Walapais in the sense that they constituted a definable territory occupied exclusively by the Walapais (as distinguished from lands wandered over by Many tribes), then the Walapais had "Indian title". (United States vs. Santa Fe Pacific R. Co., 314 U.S. 339 345,1941).*

The primary purpose of the Indian Claims Commission was to determine the value of monetary awards owed to the Indian tribes, including the Nez Perce. A key to settlement of most Indian claims would be the determination of the extent of the ancestral homeland of each tribe. A crucial test would be the best approximation of the areas occupied by the various tribes aboriginally or "for a long time". Further, there was a distinction between lands occupied exclusively by a particular tribe as opposed to lands occupied jointly, by two or more tribes. There would be no monetary remuneration for losses involving jointly occupied territory. In the case of the Nez Perce, Spinden (1908:173):

> *There are no traditions of migration, and so far as can be determined, the tribe has dwelt within these boundaries from time beyond memory. The meaning of most of the place names has been forgotten.*

Based on the ethnographic information collected by Lewis and Clark (1805-06), Bonneville (1834), Spinden (1908) and the ethnographic data provided by Stuart Chalfant (1974), Verne Ray (1939), Joel Berreman (1937) and others, the aboriginal territory, the lands occupied by the Nez Perce Indians would be defined and accepted by the Indian Claims Commission, Defendant's Exhibit 24-A, Docket No. 175 (Map). The LJCW lies wholly within those lands occupied exclusively by Nez Perce Indians.

SETTLEMENT AND SUBSISTENCE

The LJCW lies within the aboriginal territory of the Joseph Band of the Nez Perce (Chalfant and Ray, 197; Ray, 1938; Spinden, 1908). There are numerous, documented, ethnographic Nez Perce camps and villages within close proximity to the watershed (Chalfant and Ray, 1974: Exhibit 24-A (map); Fletcher, 1892:35-38; Schwede, 1966; 42-44). Schwede (1966): recognizes two types of Nez Perce settlements, the village and the camp. The village is defined as the smallest group of people that live on a seasonal basis in a given named geographical area they are thought to own. A camp is defined as the smallest group of people that live on a seasonal basis in a given named geographical area they are thought to own by use right only.

They only own it when they are in the area. Marshall (1977: 159) notes that villages are found primarily at or near salmon fishing stations. Further, he indicates that the smallest residential groups were found on hunting grounds and small root grounds, which would correspond with a camp, rather than a village. Schwede's (1966:9) analyses were based on the location of 295 settlements, 132 villages and 26 settlements, which are probably camps. Villages occur at lower elevations than camps. Schwede's analysis found that 98% of all villages were located below 2500 feet, and that the majority of camps occurred between 2500 and 6500 feet in elevation. Within the LJCW, elevation ranges from 900 feet at the confluence of Joseph Creek and the Grande Ronde River to 5200 feet near Coyote Camp Ground area. Both villages and camps or sites associated with camps were likely represented within the LJCW. Both Marshall (1977:139) and Schwede (1966:3) indicate that the locations of camps and or villages are determined by biophysical factors, primarily the availability of resources, i. e. energy necessary to sustain the group. Both agree that the primary sources of the energy would be fish, roots, game and water.

Both Marshall (1977), and Schwede (1966), recognize only two settlement types, the Village and the Camp. There is a minor problem with applying this model too tightly to the watershed, because in this case, that would leave out the majority of the black andesite, lithic resource procurement areas. Binford, 1980: 9-11 recognizes five settlement types rather than two. Benford recognizes the residential bases (villages) and field camps of Marshall and Schwade, but includes *Caches, Locations* and *Stations*.

- Caches refer to the storage or concealment of goods, valuables, e.g. excess supplies of fish, meat, roots, tool-stone etc. for later use. Caches generally occur near camps or stations.
- Locations are sites where extractive activities such as collection of lithic raw material are the focus of the subsistence activity. In the case of the LJCW, most locations would occupy waterless, exposed, near ridge top positions in open scabs, not a particularly suitable location for extended or even short term camping. It is important to note, that the small and large ridge top scabs, which contain lithic raw

material, also contain some amounts of culturally significant plants, particularly, Lomatium cous.

- Stations are sites where special purpose task groups gather information, such as monitoring the movement of game or other humans. The physical manifestation of a station could include a hunting blind or an observation post, usually located on a prominence such as Findley Buttes. Neither Marshall, Schwade, nor Binford include a category for religious or spiritual sites (vision quest). Like stations, religious or vision quest sites would likely be located on landforms offering panoramic views, such as Buckhorn Lookout, Poison Point, Red Hill, and of course, the Findley Buttes.

The periodicity, length of availability and extent of resource would have a significant bearing on the overall size and importance of the village or camp and therefore the importance of the people occupying it. Villages in the lower end of river systems like the Snake or Columbia would have access to more and better fish. These villages could and did support larger numbers of individuals and often had higher status as a result. It would be extremely important for villages located further up the system to maintain strong trade ties with the lower, more well off villages. Per Marshall (1977:37), the food resources most important to the Nez Perce were fish, a wide variety of plants and large game mammals. Anadromous fish are thought to have comprised 50% of the Nez Perce diet. Prehistorically 25-40% of the diet was derived from plant resources and the remaining 10-25% from big game.

FISHING

The fisheries most important to the Nez Perce were the anadromous salmonids, Chinook, silver and blue back salmon and steelhead. These were followed by the non-anadromous fish, whitefish, chiselmouth, suckers and trout. Both anadromous and non-anadromous fish were targeted when they were most vulnerable, during spawning season. Of the three anadromous fish species, Chinook were the most important, spawning in August and early September. Hewes (1947; 1973) estimates that as much as 330 pounds of salmon were consumed by every person, every year. Based on Nez Perce population densities thought to exist in pre-contact times, Hewes believes that the Nez Perce may have caught upwards of 1,200,000 pounds of salmon per year.

EDIBLE PLANT RESOURCES

Per Marshall (1977:46) plant resources were the second mainstay of the Nez Perce diet and made up approximately 25-40% of the Nez Perce diet. Plants were collected for both medicinal and industrial purposes, but edible plants were by far the most important. Marshall (1977:47) identifies 34 plant species consumed by the Nez Perce. Marshall's list of plant resources was reviewed by Jerold Hustafa, USDA Forest Service district botanist, for fit with the LJCW. Hustafa identified twenty plants from Marshall's list as having a high probability of occurring within or adjacent to the watershed.

The plants will be identified by common English name and scientific name. Plant names follow Hitchcock and Cronquist (1973). Voucher specimens for many have been deposited in the Marion B. Ownbey Herbarium at Washington State University and were identified by Joy Mastrogiuseppe (personal communication 12 II 1974).

- *Lomatium dissectum*--refers to the ultimate potato shaped root of this plant. The upper root of the plant is very oily and consequently not eaten. It is abundant on the slopes of the major river canyons where fine textured soils are well drained. It was not a preferred food because of its poor texture and bad taste. Moreover, the root is difficult to gather. Modern informants call it starvation food, and said that it was gathered in January and February. It was difficult to locate because the above ground parts were deteriorated, leaving only a small dry stock.
- *Lomatium salmoniflorum*--is the earliest blooming food plant in the region. It first appears in late January to late February in the Lewiston area, growing in very rocky soils, inactive talus slopes, and in shallow soils. Both the herbaceous above ground parts and the stout root were eaten. The leaves served "as a kind of garnish" while the roots, though not tasty, were fresh food in the spring. They were especially prized when stores were depleted.
- *Lomatium canbyi*--this was the most valued spring plant. It is especially common in "lithosolic" habitat types as discussed by Daubenmire (1970:39). Relatively dense stands occur on the gentle slopes of ridge tops, which are most common in the Lapwai-Lewiston area. They ripen latest and in least profusion towards Kamiah. The Kamiah area residents rarely stored them but the downstream groups did dry them for winter use.
- *Lomatium gormanii* is distinguished from *Lomatium canbyi* by the presence of many fine rootlets on the bulb. Both plants apparently occur in the same habitat. In my experience, one species dominates the other. What leads to this dominance is unknown, but it seems related to the intensity of soil disturbance.
- *Yellowbell (Fritillaria pudica)*--blooms shortly after *Lomatium canbyi*, but at lower elevations. It is common on steep slopes where the soil is relatively deep, moist, and stable. It was primarily a supplementary food plant because its bulb is small.
- *Lomatium grayi*--unlike other *Lomatium* species, which were prized for their roots, the stems were eaten in March or April since, after blooming, the plants become hard and woody. It is very abundant in some limited areas, and grows singly throughout the canyons.
- *Balsamroot sunflower (Balsamorhiza sagittata)*--balsamroot sunflower was collected from April to May. The root was baked and the stems were eaten fresh. It is sometimes profuse on relatively high ridges within the canyons; in such cases, it borders a plant community rich in *Lomatium grayi*, which generally grows just downslope. This was primarily a seasonal food.
- *Hackberry* (*Celtis douglasii*)--is especially abundant on the low alluvial fans of the primary streams. It is a primary floristic feature of a distinct habitat type (Daubenmire, 1970:73). The large seeded fruit was crushed and dried for winter use. It was collected in late April or May.
- *Serviceberry* (*Arnelanchier utahensis*)--is common throughout the Nez Perce region. Those that grew in the mountains were most favored, and great quantities were gathered and stored for winter food. They ripen first in the canyons, about late June,

and are ready at their highest elevations during August and early September. Like other berries found in the forest, it favors fire and becomes most productive 10 to 15 years after a burn.

- *Serviceberry (Amelanchier alnifolia)*--grows throughout the region, but it is best known from the canyons. It was not preferred to *A. utahensis*, which is generally found at higher altitudes. Serviceberry blooms in March to April, and matures in May or June.
- *Golden currant (Ribes aureum)*--is also known as a canyon plant. It bloomed in late March or April, and its fruits were available from May to June. It was less preferred than serviceberry.
- *Wild hyacinth (Brodiaea douglasii)*--is a common, though not abundant, plant. It grows in moist, deep soils in both the canyons and plateaus; consequently, the bulb was gathered over a long period. Partly because it does not grow closely bunched together, and partly because it has a relatively small bulb, it was primarily a supplement to other plant foods. It was nevertheless highly valued.
- *Elderberry (Sarnbucus cerulea)*--is a common shrub, which carries great numbers of flowers and berries. This lowland elderberry produces as many as three generations of flowers between June and September. Presently, shrubs are found in well watered, generally protected spots in the canyons and plateaus of the region. In the Clearwater area elderberries were commonly stored for winter use.
- *Biscuitroot (Lomatium cous)*--was one of the most intensively gathered food plants. It is found on well-drained soil, generally ridge tops. It grows in great profusion in the canyons, on the plateaus, and in restricted areas of the Clearwater River bottoms. On the river bottoms it blooms earliest, but does not produce large roots. May and early June is the main collection season, after the seed had matured. This root, along with camas, formed the bulk of the plant foods stored for winter use. A good digger gathered 50-75 pounds of biscuitroot in a single day.
- *Wild onion (Allium spp.)*--blooms from May through June. They are found in shallow rocky soils or soils subject to frost heaving. It was not generally collected for winter storage, but was a supplement during their season. Spinden (1908), reports that some Nez Perce cooked it like camas.
- *Lomatium triternatum var. triternatum*--also was a supplementary source of vegetable food. It, too, grows in rocky soils, which are well drained or subject to frost heaving. It grows at roughly the same elevations as *L. coos* and seems to have been collected at the same time.
- *Frasera (Frasera fastigiata)*--grows both in the lower ponderosa pine forests and in wet meadows within pine forest. This species may have also grown in wet prairie meadows, which are now farmed. It was thus a plateau resource. It was collected as a supplementary plant food in late June and early July while the Nez Perce were at the great root grounds of Camas prairie.

- *Gooseberry (Ribes spp.)*--were plateau and foothills resources. They were collected while still green in late June and early July as well as when ripe in August. They were eaten fresh and dried and stored for winter use.
- *Chokecherry (Prunus virginiana var. melanocarpa)* -- is found both in the canyons and plateaus. They bloom from May through June, and have an equally long period during which the fruits are ripe. They were eaten fresh, and ground, including the stone, for drying and storage.
- *Elk thistle (Cirsium scariosum)*--is a 3 to 4 foot high thistle, is solitary, and grows throughout the area's plateaus and mountain meadows. Both the stalk and root were eaten, but the root was especially favored. They were gathered before the flower had set seed in late July or early August. It was a seasonal supplement, and the roots were not generally stored for winter use.
- *Sego lily; mariposa lily (Calochortus eurycarpus; C. nitidus;* probably others)--is found in seasonally dry marshes and flood plains from the canyons into the mountains. However, it is known primarily as a prairie and mountain plant. In the mountains it is found mostly on the terraces of rivers, especially near McCall, Idaho. It was collected from late June through August as a seasonal supplement.
- *Spring beauty (Claytonia lanceolata)*--is now confined to open ponderosa pine forests and mountain stream terraces. Formerly, it grew on the prairies near Craigmont, Idaho. There the roots of this perennial were an inch or more in diameter. These were dug in late June or early July, and formed a supplementary part of the diet.
- *Camas (Camassia spp., especially Camassia quamash var. quamash)*--is the best known of the roots used by the Nez Perce. Their territory was especially well known for the vigor and abundance of the camas growing there. Numerous other groups are believed to have visited and exploited these grounds. The most famous of the camas meadows was at Weippe, Idaho. The Camas Prairie, too, was well-known, and even today small "lakes" of camas bloom near Grangeville. Different locations had camas marshes, which matured at different times; the lowest, warmest ones were exploited in early to mid-June; the highest, coolest ones could be worked until September. As Daubenmire noted (1970:78) the disturbance caused by digging may have aided the establishment of seedlings. Further, he felt there was no evidence to indicate "overexploitation" of these grounds. *Camas* was, along with *biscuitroot*, the primary root stored for winter use. A winter supply could be gathered in 4 to 5 days. A good digger could gather 80-90 pounds per day of hard labor, while less intensive work would yield 40-50 pounds easily. A week of hard, undivided labor would produce about 500 pounds of cooked roots suitable for winter use. Many other activities were also performed when people were living at these main grounds.
- *Sunflower* (*Balsamorhiza incana*)--plant is found in dry soils during middle and late July, especially in the plateaus. Its root was not favored, and though some may have stored it, it was primarily a supplementary food at the time it was collected.

- *Wild carrot* (*Perideridia gairdneri*)--was a highly favored food plant. The roots, which have the size, texture, and flavor of young carrots, were gathered in July before they set seed. Afterwards, the root becomes hard and flavorless. These grow over the prairies and in open pine forests. It is not, at least, abundant. It was stored for winter use.
- *Rose hip* (*Rosa nutkana var. hispida; R. woodsii* and other species)--was not a favored food. Fertile plants producing rose hips grew in thickets throughout the moist grasslands of the area, but they were especially abundant south of the Snake and Clearwater Rivers. Rose hips were collected as a supplement, except in years when other fruits were in short supply. Then it was gathered and dried in quantity for winter use. Late July and early August was the collection time.
- *Thimbleberry* (*Rubus parviflorus*)--grows throughout Nez Perce territory. Those found in the mountains, however, were favored. It is particularly abundant in the early stage of post-fire forest succession. They apparently were not gathered in quantity by many people, though some were dried and stored for winter use.
- *Huckleberry* (*Vaccinum globulare*)--were picked in August and September. Along with *Amelanchier utahensis,* huckleberry was the major berry collected by the Nez Perce and was highly valued. The huckleberry's productivity increases as a result of fire.
- *Fireberry; Grouseberry* (*Vaccinium scoparium*)--was another valued high altitude plant. It is found in secondary growth timber stands or in openings on high mountain ridge tops. Its production from year to year seems more variable than other berry crops. In years of high production the berry patch is bright red, hence the Nez Perce name. The berries are small, and the Nez Perce made wooden combs to rake the berries from the plants into baskets. These berries were dried for winter use when abundant. Fire favors the growth of *V. scoparium* through the removal of taller plants, which suppress its growth.
- *Pine moss, lichen* (*Alectoria jubata*)--is found throughout the forests of the Nez Perce area. The preferred plants are found in the high mountains. "Pine moss" grows on a variety of tree species, but those found on larch were especially favored. Those of pine are also edible; on the other hand, lichens growing on fir trees are considered inedible. It has been called famine food (Spinden, 1908:205; Haines, 1955:14). Both sources cite Lewis and Clark's journals that report the Nez Perce using lichens from pine trees during famine. The identification of the lichen is uncertain, however, since they were gathered in the winter at relatively low elevations. Given the amount of labor required in obtaining pine moss, and the fact that it is gathered in summer at high altitudes, and requires considerable effort to prepare, it seems unreasonable to assume that it was a famine food.
- *Hawthorn* (*Crataegus columbiana*)--and (*C.uvuglasii*)--were collected late in the summer in the canyons and plateaus. As noted in the previous section, hawthorns are so abundant along streams that they form their own peculiar habitat type. Hawthorn fruits were ground and dried for winter use (Marshall,1977:48-59).

Chalfant (1977:99) notes that the inner bark of the lodgepole pine was sometimes used as an emergency food. However, there are hundreds of peeled ponderosa pine trees (cambium peeled trees) in the adjacent watershed to the east, primarily near Thomason Meadows. Marshall (1977) makes no reference to the use of inner bark and the purpose for peeling these trees remains unclear. Based on the age class of the trees and the tree ring dates obtained from a few of the trees, ca.1850, it is highly likely that they were peeled by the Nez Perce.

Citing Skirmisher's (1967:64-69) data, Marshall notes that some of the plant foods collected by the Nez Perce had higher nutritional values than fish. Of the two primary root crops, camas had the highest nutritional values, possessing 5.4 ounces of protein, or 1695 calories per pound. Steelhead trout possesses only 3.4 ounces of protein, or 885 calories per pound. It is estimated that a Nez Perce family would require approximately 450 pounds of stored camas per year, assuming it was the only source of plant food (Marshall, 1977:62-63).

Intentional or not, while collecting plant resources, the Nez Perce were manipulating the environment. Most roots, particularly camas and biscuitroot were not collected in quantity until their seeds had ripened. In the process of digging roots, soil disturbance would be extensive. Most of the above mentioned plants thrive in disturbed soils. By digging roots after the seeds had ripened, the Nez Perce insured that plant seeds would be distributed in prepared seedbeds, therefore furthering the survival and/or propagation of culturally significant plants (Marshall, 1977:61).

Since the Nez Perce villages were located with respect to primary salmon fishing sites, movement away from the village was in response to the maturation of the above plants, through spring and summer. If the village represents the smallest group that live on a seasonal basis at a given geographical location, then movement to a primary root ground such as Weippe Prairie would constitute one of the largest aggregations of the Nez Perce. Per Chalfant (1974:100), the Joseph band often traveled to Weippe for the purpose of digging camas.

GAME / LIVESTOCK RESOURCES

Approximately 15-30% of the Nez Perce diet was obtained through hunting. They categorized game species into three sub-classes, hoofed animals, pawed furry animals and flying animals. Only hoofed animals were hunted extensively. The other animals constituted a much smaller portion of the subsistence economy. They were caught or killed in hunting activities in which hoofed animals were the primary target, or for ritual purposes. Pawed animals were occasionally eaten, but were not usually hunted for food. Per (Marshall 1977:63), the major food animals of the Nez Perce consisted of six species, elk (*Cervus canadensis*), whitetailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), mountain or bighorn sheep (*Ovis canadensis*), mountain goat (*Oreamnos americanus*), and moose (*Alces alces*). Two additional species, bison (*Bison bison*) and antelope (*Antilocapra americana*) are referenced as being hunted on the Great Plains, however, both appear to have been present within Wallowa County. All of the above species were hunted either by ambush or driven into traps.

Marshall (1977:67) places considerable emphasis on elk as a primary prey species and downplays the importance of big horn sheep in the subsistence economy. Within and adjacent to the Joseph Creek Watershed, the opposite appears to have been the case. The faunal assemblages obtained from archaeological excavations in Hells Canyon, located only a few airline miles from the northern portion of the watershed, contain significant quantities of big horn sheep bone and are notable for their lack of elk remains. In many of the sites in Hells Canyon, particularly the southern portions of the canyon, big horn sheep appear to be the predominant prey species. As one moves north towards Pittsburg Landing, deer takes the lead, but big horn sheep runs a close second. Within the faunal assemblage obtained from Downey Lake, bighorn sheep and pronghorn antelope represent 80% of the identifiable elements (Reid, 1988:60).

The occurrence of bighorn sheep within or adjacent to the watershed is not surprising given the name of Big Sheep Creek located to the south-east of the watershed. According to Horner, (Bartlett, N.D.), this creek was named in the early 1880's for the many mountain sheep that roamed on its breaks. In the winter these sheep would come in droves out on the high point between Imnaha and Big Sheep Creek.

The excavations at Downey Lake also yielded a large molar, which may be that of a bison. According to Fern Warnock, several bison skulls were found along the Upper Imnaha River. These skulls were unearthed during a bridge construction project (Gildemeister, 1992). Gildemiester also refers to several undocumented bison finds in Union county. In 1985, one these sites near the town of Union, Oregon was surveyed for the presence of prehistoric cultural materials. An extensive bone bed, entrapment area and drive lanes were identified. The bone bed is contained within a semicircle of stones, which may have once been a stone fence. The bone bed and enclosure lie at the base of a cliff. A stone fence, or drive lane extends away from the top of the basalt cliff. Bone specimens collected from the bone bed were submitted to the University of Washington for analysis. They were positively identified as bison or modern bison (Womack and Francy,1985). Temporally diagnostic artifacts recovered from the site suggest that the kill occurred between two and three thousand years ago, about the same time that the Downey Gulch site was occupied.

By the mid 1870's, the Joseph Band of the Nez Perce had also acquired extensive cattle herds. Per 1876 US Census data, the treaty Nez Perce possessed 9,000 head of cattle in 1876, or 3.2 cattle/person. Applying this same value to the Joseph Band, they would have possessed approximately 1,600 head of cattle. The degree to which domestic livestock (cattle) contributed to the historic Nez Perce diet and therefore hunting and gathering activities is unknown. However, if the 1876 US Census estimates for cattle herds among the treaty Nez Perce is correct, and can be extrapolated to the Joseph Band, the impacts would have been significant.

INTRODUCTION OF THE HORSE

Acquisition of the horse by the Nez Perce ca.1730 (Haines, 1938:429-436) had a profound impact on Nez Perce socio-political organization and other cultural systems. Within a few generations, the Nez Perce had become horse pastoralists. According to Chalfant (1974:110), in post horse times, the Nez Perce traveled extensively outside their aboriginal range. The horse increased the range of the Nez Perce and other Plateau groups. Trade networks were increased by hundreds of miles, and, by hunter-gatherer standards, huge quantities of goods could be transported with relative ease.

At the time of the Nez Perce War in 1877, each family was thought to possess between 50 and 100 horses. U.S. census figures for the year 1876 indicate that the Nez Perce in Idaho maintained 14,000 head of horses and 9,000 head of cattle. This equates to a horse, person ratio of 5:1. At the time of their surrender at Bear Paw in Montana in 1877, the Joseph band numbered approximately 450 individuals. If one allows for approximately 50+ casualties resulting from the various battles leading up to the Bear Paw Battle, the numbers would have been around 500 individuals in the pre-war setting. Given 5.0 horses/person per the above model, the Joseph Band of the Nez Perce would have had approximately 2500 head of horses.

Maintenance or reliance on large herds of horses probably had a significant impact on prehistoric settlement and subsistence patterns. Many Nez Perce village sites, particularly those within the more rugged portions of the Hells Canyon, which contains numerous village sites, appear to have been abandoned around the time of acquisition of the horse. These areas were simply too rugged and precipitous to be accessible to horses without a heavily constructed trail system which did not exist prior to Euro-American settlement. This tends to be substantiated by the almost total lack of European trade items or artifacts (coppers, gun flints, trade beads etc.) in archaeological assemblages recovered from numerous Hells Canyon sites. The few items that have been found are associated with sites in the lower portion of the canyon, such as the Pittsburg Landing area, which would have been accessible to horses, as well as provided forage for horse herds. The mobility afforded by the horse stimulated trade and brought the Nez Perce into more intimate relationships with Plains cultures. Initially, the prolonged trips to the plains were for the purpose of buffalo hunting. Eventually the Nez Perce would return with more than buffalo robes and meat.

Repeated contacts with Plains Indian groups resulted in the adoption of plains cultural traits, clothing, house style, and plains tribal structure, which was much more centralized. Per Chalfant (1974:34), tribal Organization in the eastern Plateau, which includes the area occupied by the Nez Perce is not of great age and is largely a result of plains contacts made possible by the horse. Prior to these contacts and or acquisition of the horse, the Nez Perce social structure operated at the band level, rather than the tribe. Per Chalfant (1974:37):

> *. . . Nez Perce history exhibits a change from an earlier, plateau-type political organization comprising loosely associated bands, each with its own chief, and functioning more or less independently; to a late Plains-like tribal organization characterized by the uniting of geographically grouped bands into larger, tribe-like entities, each coming under more and more control from a prominent band or war chiefs. . .*

Peter Marshall (1977:112), groups much larger than the village or band had little more than a vague reality to most Nez Perce. Larger, regional groupings may have been recognized, but consisted of other, distant peoples such as the Shoshoni or Piaute or simply the downstream or upstream people.

ABORIGINAL USE OF FIRE

Most Indian groups are thought to have used fire to manipulate the environment for various reasons. Those most likely to have been employed by the Nez Perce are as follows:

- Hunting: Burning of large areas to drive big game into smaller unburned areas.
- Crop Management: The Nez Perce relied heavily on various root crops, the majority of which grow in wet meadow or scab environments. Burning would retain or enhance both the extent and condition of open areas.
- Fireproof Areas: The Nez Perce may have burned around winter villages and seasonal camps to help reduce threat from wildfires.
- Improve Growth and Yields: Fire may have been used to improve forage for big game (deer, elk, antelope, bison and eventually horses and cattle), root crop production seed plants, berry plants, (especially huckleberries).
- Clearing Areas for Travel: Fires may have been started to clear trails for travel through areas that were overgrown with grass or brush.

In 1979 a cooperative study was initiated between the USDA Forest Service's Inter-Mountain Forest and Range Experiment Station and the University of Montana. The purpose of this study was to determine the relationship of Indian caused fires to the ecology of western Montana forests (Barrett, 1981). More specifically, the study focused on forests characterized by the presence of ponderosa pine, Douglas fir and grand fir. The researchers utilized fire scar data to determine fire frequency for selected stands. Stands were selected based on proximity to major, Indian travel routes and zones of occupation. Control stands were identified in areas of similar habitat type, but located away from high use zones. Not surprisingly, the researchers found that fire frequencies were much higher in areas adjacent to major travel routes and zones of occupation. They also found that fire frequencies were much higher prior to 1860, the approximate time after which Indian life-ways were interrupted by white settlement.

Specific reference to the use of fire by the Nez Perce is lacking within the ethnographic literature. However, historic accounts of Indian use of fire, e. g. those of Lewis and Clark, Peter Skene Ogden and others are abundant. One such account by a pioneer on Smith Mountain, northwest of the town of Wallowa notes as follows:

> *In the late 1800's and early 1900's, much wild hay was cut. The Indians had been hunting and berry-picking the mountain for ages. Every fall when they left they'd set everything afire that would burn, then hunt on that ground next year. There was a heavy growth of pine timber all over, but they kept it burned. There was no brush of any kind. You could take a mower and mow for days among the trees. (Riggle, 1983:37)*

Given the location within Wallowa County, it is highly likely that the "Indians" referred to in Riggle's account were Nez Perce.

The purpose of the above discussion involving Native American livestock and burning is to elucidate the often-held misconception that Euro-American settlers encountered a pristine landscape unaffected by other humans. Scientists are beginning to understand that the opposite is more likely the case. At the time of entry of the first white settlers, the grassland forest mosaic of the Blue Mountains and more specifically, the Wallowa country location was in large part a managed landscape. The Indians, or first Americans as they are often called, were the managers. They were an integral part of the ecosystem and to some degree this has probably been the case for the last 8-10,000 years. According to Shinn (1980:415):

> *Broadcast burning by the peoples of the inland Pacific Northwest was widespread and persisted over an extended primeval period. It may have dominated, perhaps largely pre-empted, natural burning in shaping aboriginal environments. The entry of European culture to the region interrupted native traditions in the use of fire, altered their role in nature, and distorted their prior relation to grazing phenomena, causing fundamental shifts in nature, which continue to this day.*

European settlers entered the Wallowa country in the 1860's. By 1870, their numbers had increased to the point that conflict developed between homesteaders and the Indians. By 1877, any meaningful interaction between the Indian community and the forest grassland ecosystems of Wallowa County had ended. From this point on, the dominant cultural force on the landscape would be that of white homesteaders.

SUMMARY AND CONCLUSIONS

The LJCW lies within the aboriginal territory of the Nez Perce Indians, more specifically, lands exploited exclusively by the Nez Perce. Prehistorically, the Nez Perce consisted of a loose confederation of independent bands. The band, consisting of several or more extended families was the key to Nez Perce social structure. Historically, the Joseph, Imnaha and Wallowa bands probably interacted the most intensively with the LJCW.

At the time of white encroachment into the Wallowa country, ca.1860, the Nez Perce may have already played a significant role in shaping the physical environment of the watershed. With thousands of head of horses and cattle, the rangeland was already being managed and or impacted by livestock. Add to the mix the aboriginal use of fire and the mechanics of harvesting plant resources over thousands of acres, leads to the LJCW and surrounding areas, being a culturally managed landscape for thousands of years.

Archaeological investigations conducted within and adjacent to the watershed place people within the area for the last 8,000 years and possibly longer. The location of seasonal camp sites, lithic workshops and cambium peeled trees were determined by the availability and or location of specific resources, water, food resources, tool stone and in the case of the cambium peeled tree groves, ponderosa pine trees. Campsites are almost always found adjacent to surface water, springs or streams, however numerous other factors, such as proximity to food resources, slope and aspect also play a role in site selection. One thing that all campsites share in common is that they all seem to be located within or adjacent to ecotones or plant community edges and was most commonly the forest grassland ecotone.

Probably 99% of all the prehistoric sites within the LJCW were located accordingly at these sites.

Edible plant resources important to the Nez Perce occur in significant quantities throughout the watershed. Among them are camas and biscuitroot, both mainstays of the Nez Perce diet allowing occupation of the watershed as hunters and gatherers. For the majority of these plants, and particularly camas and biscuitroot, Forest Service land management activities do not appear to have significantly degraded these resources.

Lithic resource sites and workshops are all found in near ridge top settings where tool stone is present, and as far as the LJCW is concerned, that tool stone is black andesite. The lithic scatters are in no immediate danger of disappearing. As noted above, all lithic scatters are not created equal. The majority of these sites possess limited data potential beyond defining or refining the lithic technology of the Joseph Uplands. Forest Service land management activities are not likely to significantly degrade the sites or data potential of these sites.

There is however, another type of significance, which does not always mesh well with scientific values and USDA Forest Manuals and Handbooks, programmatic memoranda of agreements (PMOAs), etc. That would be the intrinsic value placed on the resource by the American Indian community, in this case the Nez Perce. They do seem to believe that all sites are created equal and that all have a value greater than that which can be measured, weighed, dated etc. Just how intrinsic values can be woven into USDA FS land/resource management decisions is beyond the scope of this report. There is one thing for certain; it cannot happen without intensive, ongoing, person to person, Nez Perce involvement in the planning process, especially planning at the watershed level.

CULTURAL ASSESSMENT POST 1877

INTRODUCTION

Non-indigenous populations have frequented the vicinity of the Lower Joseph Creek watershed since the early 1800s. The first EuroAmerican visitors to present-day Wallowa County may have been Captain Benjamin L. E. Bonneville and his men in February of 1834. On a mission to bolster American representation in the British-dominated northwest beaver trade, the party climbed out of Hells Canyon, descending into the Imnaha valley where they received the same generous hospitality from the resident Nez Perce noted by earlier white explorers in Nez Perce territory (Josephy 1997). Nez Perce guides then led Bonneville's party to the junction of Joseph Creek and the Grande Ronde, where they met Tuekakas, the leader who would later be known as Old Chief Joseph (Josephy, 1997). There are reports of a Hudson's Bay Company trading post on Lost Prairie during the first half of the nineteenth century, and teams of British and American fur trappers worked extensively in local watersheds during this time (Tucker 1981).

The first wave of people that populated Wallowa County following the expulsion of the Nez Perce was a diverse lot. They were predominantly non-Hispanic Americans of European descent. However, local populations included African-Americans, particularly in the Maxville logging camp and later in the town of Wallowa, Chinese laborers working in the Snake River mining districts, Basque sheepherders working in the canyon country of the Imnaha, Snake, and nearby drainages, and others that came to Wallowa County over the years to make a living. These new residents, landowners, and visitors engaged in a variety of activities, including farming, ranching, mining, timbering, and wage labor associated with a range of industries. The thread tying these various populations and land uses together, and tying them to the Nez Perce, who occupied the region before them, is the central place the land played in their daily lives. The county's forests, waters, rangelands, canyons, plants, and wildlife formed the basis for people's livelihoods, provided them with food and medicine, and acted as their physical and spiritual home.

The demographic and settlement history from 1877 has diverse patterns of population, land ownership, and land use over time, but the connection between all these groups of people and the land has remained strong. The history can be divided into four broad periods: 1) the height of public land disposal and prior to industrialization of the county's forests, covering roughly 18711908; 2) the period of industrial expansion and population growth, roughly 1908-1930; 3) the period of contraction and consolidation of populations and landholdings, roughly 1930-1970; and 4) the period of differentiation and increasing complexity of land tenure, roughly 1970 to the present day.

EARLY RESETTLEMENT, 1871-1908

Early EuroAmerican immigrants to Oregon were initially drawn to the lush, well-watered valleys west of the Cascade Range. A combination of remoteness, difficulty of access, and short growing seasons, as well as the "clouded title" created by disputes over land tenure between the U.S. government and the Joseph Band of the Nez Perce, meant that the Wallowa country was among the last places in the Northwest to be settled. Permanent resettlement of what is now Wallowa County by non-indigenous populations began in the early 1870s, but expanded significantly following the 1877 expulsion of various Bands of the Nez Perce from their ancestral home.

Incoming settlers had to devise ways of securing a livelihood within the confines of existing public land disposal laws, which generally limited agricultural patents to 160 acres for homestead or pre-emption claims (in practice these could be combined for a total of 320 acres). In the early decades, a common pattern was for an individual or family to claim a homestead as deeded land and rely on the surrounding unpatented territory as livestock range. The following excerpt from an 1898 *Wallowa Chieftain* article on the Paradise region describes how early settlers used the topographic diversity of the region as part of their livelihood strategies:

> *Nearly every settler has a few head of cattle and hogs to which he feeds most of his hay and grain, which pays better than hauling the same to a market 40 miles distant. Paradise, in fact, is truly a stock-raising country. The deep canyons of Joseph and Deer Creek furnish a large amount of winter range, while the uncultivated highlands and timberland furnish summer range. In case of an*

exceptionally long and severe winter, the stock-raiser can fall back on the supply of hay which is ever on hand. (Barklow 1992, p.259)

Across the county as a whole, lands best suited to cultivation – areas with deep soils and access to water – were patented first, followed by less fertile farm ground, heavily forested areas, and then finally the deep, rocky canyons best suited to sheep and cattle grazing. As early as 1876 good homesteading land in the Wallowa Valley was becoming scarce, and incoming whites began settling away from the valley, including “on the hill land that lay adjacent to the valley” (Bartlett 1976, p. 50). Settlement patterns were diverse within the Lower Joseph Creek Watershed, with several homestead claims on upper Swamp Creek appearing prior to 1890, the first claims near Paradise appearing between 1890 and 1900, and lands within the northern reaches of Joseph Creek canyon, among the last in the county to be claimed, patented mostly after 1920.

Viable land uses for early settlers were somewhat limited by the Wallowa country’s short growing season, harsh winters, uneven topography, and isolation from outside markets. Most of the initial agricultural activity centered on stock raising; sheep and cattle were brought into the county by the hundreds in the early 1870s (Horner n. d. ; Bartlett 1976), and movement of people and livestock was facilitated by the completion of a bridge over the Wallowa River in 1873. Early settlers cut wild hay and grew a limited range of crops on their patented lands, relying on the abundant forage of the open range to supply feed for their stock throughout much of the year. Kooch, 2005, p. 110, describes the remains of past land use patterns in the rugged lower Joseph Creek canyon:

On each of these homesteads the remains of fences that used to enclose small pastures for the milk cows, pigs, and horses could still be found. Also there were abandoned pieces of machinery that had been used to till each “bottom” or bench...Each field had had its own set of equipment because it just wasn’t practical to disassemble and reassemble it to move it from one bench or field to another. The once tilled fields were later used for grazing.

On livestock operations throughout the county, sheep and cattle were seasonally moved to higher or lower elevations in response to forage availability. The first-come, first-served basis for allocating forage resources on open range eventually led both to fierce disputes between ranchers (particularly between cattle ranchers and sheepherders) as well as to significant ecological degradation (Allen 1906; Strickler and Hall 1980; Langston 1995). Many sheepherders that worked the mountains and rangelands of northeast Oregon were not local settled families but itinerant herders, some recent arrivals from California and Southern Oregon, refugees from overstocked ranges in search of undepleted forage. Others were wage earners working for out-of-county operations, whose claims to local forage resources were considered illegitimate by landed settlers (Langston 1995).

The Wallowa country was initially seen by settlers as profitable only for stock-growing, but by the late 1870s a few landowners were experimenting with the cultivation of grains and vegetables. In 1897 the county reported the production of 240,000 bushels of wheat, 80,000 bushels of barley, 48,000 bushels of oats and 16,000 bushels of rye (Western Historical

Publishing Company 1902). Development of agriculture within the county progressed rapidly as lands continued to be disposed of from the public domain. In 1898 citizens of the county reported 35,175 acres of tillable land, 112,917 acres of non-tillable land, 7,617 horses and mules, 15,873 cattle, 89,550 sheep and goats, and 5,551 swine (Western Historical Publishing Company 1902).

While timber was needed for local uses such as building structures and fencing and as a source of heating and cooking fuel, the supply of timber vastly outpaced the local demand. As a consequence, early homesteaders often spent considerable time burning and cutting forests to make way for farmland and pasture (Riggle 1983). However, the prospects of a rail line extension to Wallowa County from Elgin led to a great deal of speculation in the county's timbered sections in the early years of the twentieth century. Timberland locators in the employ of out-of-state timber barons flooded into the county, including into the forested terrain north of Enterprise near the headwaters of Swamp and Davis Creeks.

Large areas of the county were still unpatented as of 1902 when President Theodore Roosevelt made the first withdrawals of public domain land in what would become the Wallowa Forest Reserve and, later, the Wallowa-Whitman National Forest. In 1905 the Wallowa Forest Reserve was established on 747,200 acres in and around the Wallowa Mountains, including those portions of the range in neighboring Union and Baker Counties (Tucker 1981). Further, major Wallowa County withdrawals were made over the next five years, including those associated with the Chesnimnus and Wenaha Forest Reserves beginning in 1905 and the Imnaha Forest Reserve in 1907. By 1908 the Chesnimnus and Imnaha Reserves had been consolidated with the Wallowa and these were renamed the Wallowa National Forest (Tucker 1981). Additional lands were added to or released from reserve status until 1928 when the boundaries of the Wallowa National Forest largely stabilized.

The entry of the federal government as a major landowner in Wallowa County set in motion a number of changes, the implications of which would not be fully realized until nearly a century later. Rangers in the young Wallowa National Forest largely worked to meet the needs of local landowners and resource users by attempting to regulate grazing access to what had previously been open range, protecting timber stocks from fire, and providing timber to local mills (Tucker 1981; Langston 1995). Grazing activities on federally-owned forestlands were eventually regulated following the transfer of the nation's "forest reserves" to the Department of

Agriculture in 1905 and the establishment of the U.S. Forest in that same year, although for several years enforcement was nearly impossible due to the small number of forest rangers patrolling such an immense area of land. Even when violations were discovered, penalties were very light (Tucker 1981). The establishment of federal control over grazing on reserved lands was strongly supported by local irrigation-dependent farmers, who saw a threat to their livelihoods in the unregulated grazing and associated watershed deterioration that characterized the open range period (Langston 1995).

Local stockmen were also generally supportive of a federal role in regulating livestock grazing (Strickler and Hall 1980), and a proposal in 1916 to privatize grazing lands in the Imnaha area was strongly resisted by local ranching families (Tucker 1981). This support was due to the range deterioration and insecurity of tenure associated with unregulated grazing on public domain lands, and because federal grazing fees were typically far less than those on private ground (Bright 1914). Additionally, Forest Service allotments were soon established according to a ranchers' possession of "base property" or private lands, thereby favoring local landowners over itinerant or non-landowning ranchers. In practice, establishment of the forest reserves ended the open competition for forage that characterized the first come, first served policy of the open range, but it did not immediately reduce overgrazing. In the first years following establishment of the federal reserves, total animal numbers actually increased, and agency managers operated under the premise that any stubble left at the end of a season represented less than full utilization of range resources (Langston 1995). The ecological effects of increased herd numbers were less salient in the unusually wet years of the 1920s than in the 1930s when more typical rainfall patterns returned.

A1904 report on the proposed Chesnimnus Reserve by government inspector H.D. Langille, (Langille 1904), provides some insights into the land uses and social dynamics taking place at that time within the Lower Joseph Creek and adjacent watersheds. The withdrawal of lands from disposal carried a particular urgency because of an influx of locators flooding into the district to patent forested ground on behalf of an out-of-state timber baron. Langille reported that the withdrawal, along with the threat of scrutiny of any local Timber and Stone Act claims, resulted in the recall of "stage loads of intending locators" (p.3). At the same time, Langille noted that, unlike the Timber and Stone Act claims, "Most of the homesteads are occupied by actual settlers, and those which are not are held by stockmen for range purposes" (p.3). His assessment of current land uses focused primarily on grazing:

> *The entire area affords excellent grazing ground and is especially well adapted to cattle and horses, though the higher elevations could be used to better advantage by sheep. The lower portions of this part of Wallowa County are used as winter range for the large number of sheep owned locally, and in the spring the herds move upward to occupy the entire range until the arrival of the season when they can cross the valley and push on to the principal summer range in the proposed Wallowa Reserve.*
>
> *While the Wallowa Mountains have been conceded to the sheep men, the cattlemen look upon the Chesnimnus country as their especial range. During the past few years, however, sheep men have acquired land within this district and by virtue of these holdings claim rights within the cattle section.*
>
> *About 45,000 sheep range on these lands during part of the summer season and three or four bands remain throughout the year. From 15,000 to 20,000 cattle also frequent this section, coming in from the surrounding valleys or local ranches. (p.4)*

Langille also noted the existence of some small-scale timber cutting in the area, with one mill supplying timbers to mining operations along the Snake River and a second mill supplying local markets in the Wallowa Valley.

Incoming settlers affected a number of changes in their new home that helped to produce an environment they believed would increase their productivity, lower their risk, and add value to their properties. Along the same lines, incoming federal forest managers attempted to create a regulated, predictable forest that would be more productive and manageable than the native forests they encountered upon their arrival (Langston 1995). In the Lower Joseph Creek watershed, environmental alterations included clearing forests for agriculture, installing a dispersed system of stock ponds and watering troughs, suppressing forest fires, and reducing populations of unwanted species, including predators such as wolves, cougars, and coyotes. In the years prior to World War I, the Forest Service paid a full-time predator hunter whose sole job was to track and shoot bears, cougars, bobcats, coyotes, and other potential livestock predators (Tucker 1981). Likewise, ground squirrels, which were a nuisance to stockmen because of the holes they dug, were killed through poisoning and other means. Indeed, the first proposal to come before the newly-created Wallowa County court in 1887 was a petition for the county to pay a bounty of two cents per ground squirrel tail or scalp (Western Historical Publishing Company 1902, p.495). In the coming decades, the county would pay out bounties for animals such as coyotes, bobcat, lynx, and cougar (Bentz in Belew 2000). The April 29, 1909 Wallowa County *Chieftain* contains the following details on a predator bounty law: “There shall be paid by the State of Oregon and the counties thereof . . . the following bounties: each coyote or coyote pup, $1.50; for each gray wolf or black wolf, $5; for each gray wolf pup, black wolf pup, timber wolf or timber wolf pup, $2.50; for each bobcat, panther or cougar, $10. ”

INDUSTRIALIZATION, 1908-1930

The first decades of the 20th century were a transformative time for Wallowa County as it transitioned from an isolated frontier to an exporter of forest and agricultural commodities and underwent significant changes in land tenure and ownership. These changes corresponded with heightened interest on the part of capitalists from outside the local region who saw the potential for lucrative investments, particularly in timbering. The county saw its greatest spike in population during this time, increasing from 5,538 residents in the 1900 census to an estimated 11,695 in 1917 (Coffman 1984). Areas of the county outside the Wallowa Valley were still growing, but the greatest population increases were seen in and near the established towns. Many of the county’s in-migrants were drawn by specific wage opportunities in logging, rail building, and mill work, rather than by the promise of becoming landed farmers.

The railroad connecting the Wallowa Valley with Union County and markets beyond reached Joseph in 1908 (Bailey 1982). This “precipitated a minor boom” (Coffman 1984, p.84) in population and business activity and helped spur the development of an export-oriented timber industry. Previously, Wallowa County residents had to contend with the challenges of getting their agricultural produce to market. Most Wallowa County farms during the early decades of the twentieth century were still highly diversified, raising vegetables, fruits, grains, sheep, hogs, poultry, dairy cattle, and sometimes beef cattle. In addition to consuming much of their own produce, local families relied on wild fish and game, berries, mushrooms, and other natural produce for their sustenance and on wood for building and heating. Livestock producers continued to depend on a mix of deeded land, rental opportunities on local private land, and access to key summer and/or winter forage on public lands.

The Eastern Oregon Lumber Company (EOLC), headquartered in Kansas City, began purchasing timbered property in the country north of Enterprise in 1909. The company assembled around 42,000 deeded acres by 1914 and built a rail line roughly along the course of the present-day State Highway 3 between Enterprise and Lewiston (Tucker 1981). At least ten separate logging camps, including housing, stores, and schools, were located within EOLC's holdings near Davis Creek, Swamp Creek, and Sled Springs (Barklow 1992). The EOLC mill opened in Enterprise in November of 1915, much to the delight of local businessmen and boosters. The mill had a 35 million board foot annual capacity, and was supplied by a mix of EOLC lands and Wallowa National Forest timber sales (Tucker 1981), including some very large sales in the Sled Springs area (Griffin 1917). A total of 131.5 million board feet in the vicinity of Sled Springs was purchased and cut by EOLC over a twelve year period (Langston 1995). The EOLC mill burned to the ground in August of 1919, reopening the following May. By October of 1920, the company announced a 20% wage cut as a means of staying afloat. The mill shuttered in the fall of 1921 "pending an improvement in market conditions" (Coffman 1984, p.109). It reopened in 1922 with reductions in operations and employment and continued to operate in fits and starts for the next several years, finally shutting down for good in 1929. By this time the company had largely exhausted the prime timber from its own holdings north of Enterprise (Tucker 1981).

A number of other sawmills operated within the county during the first decades of the 20th century, but all fared poorly in the 1920s as markets in the eastern U. S. were supplied more cheaply with lumber from southern forests. Wallowa County's timber boom was short-lived and as jobs associated with logging, milling, and rail building declined, the county's population boom turned into a decline. During this brief period of activity, however, the populations and land uses of the county were transformed. Hundreds of thousands of acres of timberlands – some old homesteads, some poised for disposal from the public domain – were consolidated in the hands of timber companies. Millions of board-feet of old-growth ponderosa pine were cut across public and private ownerships annually, and thousands of loggers, mill workers, railroad workers, other laborers and their families came into the county, some of them staying in the area once the timber wave had crested.

Since at least 1910, Wallowa County has looked to tourism and recreation as a potential economic power, and the Lower Joseph Creek watershed has been an important setting for recreational activities since the 1930s. Horner (n. d.) notes that in 1933 there were as many as 500 elk hunters in the Chesnimnus area in a single day, having come from all over the western U. S. and overseas. The hunters included "Judges, Doctors, Dentists, Merchants, and one man from Germany" who had come over "to kill an Elk in Wallowa County" (Horner n.d., p. 275). That there were even elk to be hunted in 1933 was testament to the success of an elk reintroduction program that began in 1912, repopulating the county with elk from Wyoming (Tucker 1981). In coming years, the forests and canyons of the Lower Joseph Creek watershed would become one of the county's most significant hunting destinations.

CONTRACTION, 1930-1970

As the century progressed, changes on Wallowa County agricultural lands increasingly came to mirror dynamics taking place across rural America. Numerous, widely dispersed farm families producing a diversified mix of products came to be replaced by an era characterized by fewer, larger farms, each producing a smaller number of commodities for national and international markets (Danbom 2006). Local producers both reaped the benefits and bore the hardships as these markets swung in response to international trends and events. By the time the Great Depression hit Wallowa County, residents had already experienced economic hardship for nearly a decade (Coffman 1984). The collapse of the county's young timber industry in the 1920s sent hundreds of families looking for work elsewhere, and many of those who left the county to support the war effort, either at home or overseas, never returned. The Jeffersonian dream of independent farm families existing happily on 160-acre spreads was unattainable in some of the more marginal parts of the county, particularly as the depression took its toll on agricultural commodity prices. Curry and Thompson (1999), report that a number of farm families in the county's northern section left for good during the Great Depression, paying off local debts with title to their lands.

Even as many were leaving rural America, others were coming in. A number of sheepherders from the Basque region of Spain, fleeing economic hard times in their home country, found opportunity working in the remote canyon country of Wallowa County. Basque sheepherders had been working in the Hells Canyon region since around 1910, and while many worked only a few seasons in the county before moving on, a group of Basque families settled in the county after acquiring the Cherry Creek Ranch in the 1940s (Simon- Smolinski 2008). Wallowa County sheep ranchers often sought out Basque labor to handle the difficult task of shepherding bands of sheep for months at a time on the remote rangelands of the Snake, Imnaha, and other canyons. Like other local producers, Basque families in Wallowa County depended on a mix of private and public lands at different times of the year. An entry in *The History of Wallowa County, Oregon* describes how the sheepmen of the Cherry Creek ranch utilized a range of local environments for their operation in the mid-1900s:

> *They wintered their sheep at the Cherry Creek and Deer Creek ranches from November to June, then herded them, by foot, to Basin Creek the first seven years, later to Day Ridge some 50 miles away...Another 38-40 mile trek through the valley and up the mountain to Stanley Ranger Station for summer grazing...In August they herded the lambs to Wallowa where they were shipped to pre-contracted buyers. The men stayed in summer camp with the dry ewes, then made the long trip back to Cherry Creek. (Wallowa County Museum Board 1983, p.87)*

As the century advanced, beef cattle numbers in the county continued to climb while sheep numbers fell. As early as 1917, a government report noted that sheep were no longer being run on federal land near Swamp Creek (Griffin 1917). Several factors were responsible for this trend, the most important being the growing labor costs of sheep tending relative to cattle ranching during a time of slacking demand for wool and mutton. Itinerant sheepherders from the Basque region of Spain continued to be employed on short-term contracts in Wallowa County for several decades, but as economic opportunities improved in Spain, these workers increasingly chose to stay in their home country (McGregor 1980). General agricultural trends over the twentieth century show farms becoming less diversified, with farm operations increasingly dominated by a few major products, primarily beef cattle, hay, and frost-hardy grains such as wheat and barley. The county's once-thriving dairy industry went into decline beginning in the 1960s; the Wallowa County Creamery Association disbanded in 1971 after 40 years in business (Steele in Belew 2000), and the last creamery in the county closed in 1980. Overall a greater proportion of on-farm production was devoted to sales rather than to farm family consumption, particularly as farm family size declined and increased mechanization led to increasingly specialized farms dependent on high capital inputs rather than high labor inputs.

The Monument Ranch, straddling the Upper and Lower Joseph Creek watersheds, illustrates the changes in land ownership and use patterns typical of the mid to late twentieth century. The 42,000 acres of public and private ground that now make up the ranch were once a series of six separate ranches originally homesteaded between 1900 and 1920. These private holdings were several hundred acres in size, and each had its own grazing allotments on neighboring public land that effectively increased the size of the operation. In the early decades of the twentieth century these were diversified farms that yielded a variety of products for on-farm consumption (including pigs and dairy cattle), but farm income was largely based on sheep. Elevational ranges of these ranches, along with access to water and productive bottomlands, allowed for livestock rotation through a variety of habitats seasonally.

Claims to the waters of Joseph Creek are not well documented. Water rights filed after February 24, 1909 are handled by state permit through the Oregon Department of Water Resources.

Water usage also occurs without water right permits; these numbers are unknown.

There are five water withdrawal permits (Oregon and Washington State permits)) for Joseph Creek for a total of 3.6 cubic foot per second (cfs). Primary use is for irrigation and water for livestock. Approximately 22 water withdrawal permits exist for tributaries of Joseph Creek for a total of 9.9 cfs.

There are two spring developments and one water diversion under special use permit on NFS land. The Mervin Wingard Spring (T.3N, R.45E, Sec.25) consists of a spring on private land, with 0.5 mile of transmission pipe crossing NFS land before it terminates at the permittee's dwelling. The G.Darneille Spring (T.3N, R.45E, Sec 27) consists of a spring with a buried cement box and a pipeline buried three feet deep. The spring provides water for domestic use. The Chesnimnus Creek Diversion is used for summer irrigation and consists of 0.25 mile of ditch (T.3N, R.45E, Sec 26) with a water right of 0.35 cfs.

The Oregon Department of Fish and Wildlife (ODFW) has been filing for minimum high and low flow on Oregon's rivers since 1960. Application #70780, dated October 18, 1990, concerns the stretch of Joseph Creek from the mouth of Cougar Creek, downstream to the border between Oregon and Washington. It stipulates a minimum spring high flow of 120 cfs and a low flow of 47 cfs. The results of the filing and recent court decisions may deny the issuing of additional permits in upstream tributaries. There are no known commercial water uses within Lower Joseph Creek Watershed.

The various private holdings and their associated allotments were consolidated between the 1920s and 1960s, and ownership changed hands several times throughout the 1970s. During this time, herds of beef cattle replaced bands of sheep and the ranch was expanded with the addition of the nearby Hunting Camp allotment (Kooch 2005). This also occurred with other ranches in the LJCW. Structures from the former homesteads and farms are presently used as cow camps for seasonal use by permittees.

The events of the 1930s created an opening for a greater federal role in regulating rural land ownership and farm production practices. The New Deal included a new social contract for agricultural producers, asking them to exchange a degree of autonomy for a greater level of security. Farmers' adoption of New Deal programs was widespread. The three primary mechanisms of federal intervention in agriculture were crop price supports, limitations on acreage devoted to particular crops, and refinancing of farm mortgages to help prevent an epidemic of farm foreclosures (Danbom 2006). The New Deal also brought huge investments in rural electrification as well as improvements to the nation's public lands.

From 1933 to 1941 the Wallowa National Forest hosted Civilian Conservation Corps (CCC) camps every year except for 1938. CCC crews built roads and trails, fought fire, constructed lookout towers, strung telephone line, installed campgrounds, and built Forest Service facilities, among other things. While CCC crews the first year were mostly comprised of local young men, in the coming years crews would be brought to Wallowa County from Illinois, Minnesota, Massachusetts, Georgia, Alabama, and other parts of the country (Tucker 1981).

After a period of relative inactivity during the Great Depression, the local timber economy picked up somewhat in the 1940s and new corporate players entered the scene, most importantly the New Jersey-based J. Herbert Bate Company, which purchased mill and timberland holdings from Bowman-Hicks in 1945. A yearlong strike shut down operations at the mill in 1962 and 1963, and on Valentine's Day 1964, the Bate Company announced permanent closure of the mill. The company's announcement cited declining revenues due to competition from imported lumber as the chief reason for the mill's closure (Chieftain 1964). The Bate Company quickly sold the Wallowa mill and its forest holdings to the multinational timber corporation Boise-Cascade, which dismantled the mill. Boise Cascade continued to purchase timberlands throughout the 1960s and 1970s and eventually amassed 150,000 acres within the county.

The post-war years also heralded significant changes for the county's public lands. Following the massive nationwide timber harvests on private land to support the war effort, national forests across the country were tasked with providing a steady supply of logs to private industry (Hirt 1994). This placed public forests in a central role for providing local employment and created new alliances between the federal agencies and large timber companies. The new model for public lands-based rural development was one in which federal land management agencies supplied raw material inputs to industry, which then provided jobs to rural people (Kennedy, et al., 2001). Wallowa County federal forestlands, like those across the country, continued to be managed to replace high-value, but slow-growing and complex older forest with more regulated and efficient younger forests, and for many years timber harvest levels outpaced the capacity of the land to produce new volume (Hirt 1994; Langston 1995; Christoffersen 2005).

DIFFERENTIATION, 1970-PRESENT DAY

Since the 1970s a constellation of factors has affected land tenure and use in Wallowa County including: changes in public land policy that increased attention to broad societal environmental values by reducing forestry and agricultural production activities; a trend toward greater environmental scrutiny of the environmental impacts of private land uses; changes in the agricultural and livestock industries that has consolidated power in the hands of processors and corporate agribusiness at the expense of smaller producers; and growing trends in absentee and amenity-oriented private land ownership.

The corporate industrial model of rural development described above began to fall apart as increasing processing efficiencies meant ever fewer jobs per board foot milled. The rise of organized interest groups, particularly those associated with the environmental movement, brought regional and even national interests to bear on local land use decisions. As these groups and the courts took a stronger role in regulating land uses, rural places could no longer be seen as simply the domain of local residents, landowners, and community leaders.

The sum result of these changes, today, is that land uses have become more complex, as the trajectory of rural land-use patterns is no longer toward increasing integration into mass commodity markets and as federal land managers are no longer tasked with creating a regulated forest. Rather, a more diverse suite of landowners has staked claims to space in Wallowa County even as a more diverse suite of voices influences what happens on private and public lands as a whole.

A suite of environmental laws passed in the 1960s and 1970s, most importantly the National Environmental Policy Act of 1969 (NEPA), the Endangered Species Act of 1973 (ESA), the Clean Water Act of 1972 (CWA), and the National Forest Management Act of 1976 (NFMA), provided leverage for a range of stakeholders to intervene in public, and in some cases private, land management. The full impact of these policies in Wallowa County was felt in the 1990s when spring, summer, and fall Snake River Chinook salmon runs were ESA-listed in 1992, summer steelhead runs in 1997, and bull trout the following year. The result of these listings was a halt to public land timber sales for nearly two years and the consequent closure of two of the county's three sawmills, with the third shuttering for good a decade later. Grazing operations were affected as well, as legal protections for salmon spawning beds (redds) have led to increased federal oversight of livestock impacts on riparian zones.

Allotments for domestic livestock are administered by the Forest Service on public lands. There are fourteen grazing allotments and one administrative horse pasture, the Chico Allotment, providing forage for pack and riding stock that support Forest Service programs. Along with policy change were changes to accessibility of livestock to riparian areas for stream protection resulting in alternative water source development currently in practice today.

Federal environmental policies have affected county land use patterns in other ways as well. Listing of the prairie plant Spalding's Catchfly in 2001 has provided another avenue through which federal conservation agencies and citizen advocates have increased their role in governing land uses on private and public lands. Reintroduction of the Canadian Grey Wolf into Idaho in the 1990s was successful enough that wolves have since migrated west into Wallowa County and in 2010 several instances of calf depredation have occurred. Enforcement of CWA provisions has led to the closure or relocation of several cattle feedlots within the county that were found to have been polluting local waterways.

Management activity on federal lands, including those within the Lower Joseph Creek watershed, has slowed significantly since the early 1990s, precipitated by a combination of legal challenges to proposed projects, sharp reductions in agency staff, and weak local markets for wood products. This slowdown came at a time when scientists were beginning to document the severity of poor forest health conditions in the Blue Mountains and calling for an aggressive program of thinning and fire reintroduction to reverse the effects of decades of high-grading, clearcutting, and fire suppression (Mutch et al.1993; Johnson et al.1995).

By the early 1990's, stand management objectives shifted away from even-aged management based upon growth and yield objectives and focused on objectives to reduce horizontal and vertical fuel continuity, improve structural and species diversity, and improve stand health and vigor. To this end, the following vegetation management projects designed to meet these objectives were implemented within the watershed: Bugcheck Vegetation Management, Hungry

Bob Vegetation Management, Haypen Vegetation Management, Lone Dog Vegetation Management , and Baldwin Vegetation Management as the most recent in 2001.

Today, there are no active mining claims in the Lower Joseph River Watershed. The *Omnibus Oregon Wild and Scenic Rivers Act of 1988 (P.L.100-557, 102 Stat.2782)*, withdrew the Joseph Creek corridor (1/4 mile each side of the high water mark) from mineral entry. Other areas of the watershed are open to claims, although the unfavorable geology (basalt lava flows) limits this potential (Doran 1993).

The past two decades have also seen significant turnover in private ranches, farms, and forestlands across the county. These changes are part of a larger nationwide trend in which scenic rural lands have become increasingly desirable as second home properties, private hunting retreats, and retirement destinations. Many of the county's new amenity-oriented property owners have integrated well with their more traditional neighbors, but in other cases these changes have contributed to the overall loss of access experienced by the local population in recent years. This stems from the spike in property prices beyond their productive potential and, in some cases, closing off access for recreation, leasing, or movement of livestock across property boundaries. In line with national trends, forestlands once owned by vertically-integrated corporate timber companies have been sold to timberland investment firms, in this case the Timber Investment Management Organization (TIMO), Forest Capital Partners purchasing former Boise-Cascade lands in 2004. While this new landlord has continued to engage in forestry activities, the corporate structure of TIMOs such as Forest Capital raised questions about longevity of tenure and the possibility of timberland conversion into non-forestry uses such as residential real estate (Bliss et al. 2009).

In 2012 Forest Capital lands exchanged hands to new ownership. Forest Capital owned 259,000 acres in Baker, Union and Wallowa counties, with the majority of the acres in Union and Wallowa counties. The new company, The Hancock Timber Resource Group of Boston, Mass., acquired 573,000 acres of Forest Capital land in Oregon, 264,000 acres in Washington, 138,000 in Idaho and 376,000 in Louisiana.

Another new ownership trend is the emergence of the private conservation tenure, in this case the purchase of over 36,000 acres, primarily of prairie lands in the Zumwalt area, since 1984 by the nonprofit The Nature Conservancy. This organization has continued to graze cattle at a conservative level, but management activities focus on biodiversity preservation and ecological restoration.

Wood products employment declined sharply with the closure of three county sawmills since 1994, and relatively high-paying and high-benefit manufacturing jobs have been replaced largely by lower-paying and low- or no-benefit service sector jobs. Demographic implications of these economic trends include the out-migration of younger working class families and in-migration of retirement-aged couples and individuals (Christoffersen 2005).

Overall economic changes in the community have included the emergence of the art sector, particularly bronze casting, as a strong economic force, growth in the tourism industry, and an increase in the proportion of county income composed of transfer payments (total income from transfer payments has exceeded wage income since 1999).

Although changes such as these have, in many cases made the continuation of the county's cultural traditions more difficult, they have also created opportunities for new land uses and income streams and have helped to foster a more collaborative spirit to respond to contemporary challenges (Waage 2001).

Some examples of collaboration work include: the drafting of the Nez Perce-Wallowa County Salmon Habitat Recovery Plan in 1992, the creation of the Wallowa County Natural Resources Advisory Council in 1994, the founding of Wallowa Resources in 1997, implementation of a county-wide cross-boundary invasive weed management program, and collaborative work on the Upper Joseph Creek Watershed Assessment as well as the current Lower Joseph Creek Assessment. Over a century after being forced out of their home, the Nez Perce Tribe has returned to the county in significant ways, implementing an active salmon restoration program, taking ownership of private lands in the lower valley and in the lower Joseph Creek canyon, and sharing their cultural heritage with the community through an annual dance and feast, the Tamkaliks celebration.

SUMMARY

Much has changed in the Lower Joseph Creek watershed since the 1870s as people, land uses, and economic opportunities have come and gone. Despite these changes, the people of Wallowa County continue to rely on a close working relationship with the land for their livelihoods and sense of identity.

A recent economic analysis shows that 24% of all Wallowa County jobs depend on agriculture or wood products, with another 12% dependent on tourism (Sorte 2009). Contemporary livestock producers, like those of decades past, still rely on a combination of private deeded land, land rented from other landowners, and access to forage and water resources on federal lands at critical periods seasonally. Presently a third of the county's producing cowherds graze some part of the year on public lands (Christoffersen 2005). Agricultural producers continue to take advantage of the county's soil, water, and sunshine to grow a limited range of frost-hardy crops.

Local and non-local hunters still pursue deer, elk, bear, cougar, grouse, and turkey in the forests and canyons of the Lower Joseph Creek watershed, and non-consumptive recreationists still take pleasure in the opportunities for hiking, wildlife viewing, and solitude that the watershed affords. Nez Perce tribal members, multi-generational farm families, and recent arrivals to the county continue to have opportunities to learn from the land and each other and to celebrate their cultural traditions.

ISSUES AND RECOMMENDATIONS - MANAGEMENT OPTIONS

The ultimate goal of the cultural resource inventory and consultation process is to identify and protect cultural resources from the impacts of our undertakings. It is critical, therefore, to ensure that the protection measures are carried through the planning process all the way to project implementation. It is often years—and sometimes up to a decade—between the planning stages of a project, and the final aspects of project implementation. For example, the cultural resources inventory and consultation for the "Reservoir Vegetation Management Project" on the Wallowa-Whitman N.F. took place in September of 1998. It wasn't until the spring of 2010 that all proposed treatments were implemented.

As this example illustrates, centrally managed records and interdisciplinary communication are key to ensuring protection measures proposed in 1998 are carried out during implementation.

Section 2360 of the Forest Service Manual outlines that it is the responsibility of the heritage program to manage the following heritage collections: cultural resource inventory and evaluation records, documents, maps, photographs, and field notes. As well as electronic data and images derived from both the National Historic Preservation Act (NHPA) Section 106 and Section 110-initiated activities, and from Archeological Resources Protection Act (ARPA) investigations. Interdisciplinary communication relies on the professionalism of the people involved with implementation. It is the responsibility of the project proponent or manager to inform the heritage staff of project implementation. It is the responsibility of the heritage staff to provide input and ensure that the recommendations for cultural resource protection are in place during implementation.

Avoidance is the most common way of protecting cultural resources. However, absolute avoidance is not always possible or practical. Certain types of undertakings have potential impacts that are unique, and therefore, the protection stipulations proposed tend to be unique to those types of undertakings. Some of the most common issues concerning cultural resources are discussed below:

PROTECTING CULTURAL RESOURCES DURING TIMBER HARVESTING AND VEGETATION MANAGEMENT PROJECTS

Timber harvesting and vegetation management projects often have the greatest potential to impact cultural resources because the work is often done with heavy, powerful machinery on an industrial scale. In addition, this machinery often requires road construction, road improvement, and other engineering activities that have the potential to cause significant damage to cultural resources.

The following are typical cultural resource protection measures used during timber harvesting and vegetation management projects:

- Archaeological sites are typically avoided with a 30 meter (100ft) buffer.
- In instances where unimproved, native surface roads which pass through archaeological sites are proposed for use during project implementation, it is common to restrict the
- operation of heavy equipment to times when the ground is frozen. If that is not feasible, geotextile and 6-8 inches of road base may be applied to sections of the road which pass through cultural resource sites.
- In instances where above-ground resources such as historic cabins, corrals, or mining features are within treatment units, hand felling, hand-thinning, and manual removal of fuels is often recommended over total site avoidance. These types of sites are often highly susceptible to fire damage, and removal of excess fuels often protects these sites from wildfire.

CULTURAL RESOURCE PROTECTION DURING PRESCRIBED FIRE PROJECTS

The potential risk of fire related disturbances and activities to cultural resources are based on the studies by William Knight (1994), and Hal Keeling (1993). These studies indicate that there are three threats to cultural resources associated with prescribed fire:

Threats directly related to fire intensity and duration.

- Low intensity/short duration fires are a low risk for impacting lithic scatters, can dumps, stone features, earthen features, and sites with deeply buried deposits or features. However, these types of fires are a high risk for impacting historic and prehistoric sites with wooden or perishable materials, Rock art panels, and rock shelters.
- Moderate intensity/moderate duration fires are a low risk for impacting can dumps, earthen features, and sites with deeply buried deposits. However, they are a high risk for impacting lithic scatters, stone features, sites with wooden features, rock art panels, and rock shelters.
- High intensity/long duration fires are a low risk to earthen features. They are a high risk to all other types of cultural resources.

Threats from fire control activities such as bulldozer lines, hand lines, retardant drops, and staging areas.

- All Eligible and Unevaluated cultural resources will be avoided by bulldozer lines, hand lines, retardant drops, and staging areas for a distance of 30 meters.

Threats from post-fire erosion control or rehabilitation activities.

- All Eligible and Unevaluated cultural resources will be avoided by the construction of erosion control features such as water bars and check dams for a distance of 30 meters.

Typically, prescribed fires attempt to achieve low to moderate intensity/short to moderate burn duration. When fire intensities have the potential to become more intense on or near cultural resources the following actions may be taken:

- Hand-thin and manually remove excess fuels.
- Dig a fire line around the cultural resource. (This is usually done by hand under the supervision of an archaeologist).
- Re-draw burn blocks to avoid sites located near burn boundaries, as these are areas of high potential impacts.
- Apply water or foam
- Wrap the feature in fire resistant blankets and fire shields.

PROTECTING CULTURAL RESOURCES FROM GRAZING AND RANGE MANAGEMENT PROJECTS

Considerations for grazing are unique in that it is nearly impossible to control the movement of cattle and sheep without extensive and impractical fencing. Instead, most grazing related recommendations seek to redistribute and redirect grazing animals away from cultural resources.

- Overgrazing, cattle distribution/concentration problems, and insufficient pasture rest and rotation usually result in adverse effects to cultural resources. Sustainable grazing practices and adaptive management programs in general protect archaeological sites from trailing, compaction, and erosion.
- Where cattle are trailing over a cultural resource, crisscrossed small diameter logs can be placed to redirect cattle away from the site.
- Where cattle are loafing and deflating a cultural resource, crisscrossed small diameter logs and brush can be placed on the site to make it less attractive to loafing and congregation.
- Archaeological sites associated with springs often present the most challenging management situations as a result of other resource concerns such as wildlife, riparian habitat, and associated plan species that need to be protected. Typically, the most successful course of action is to construct a fence that encompasses both the riparian areas and the archaeological areas.
- It is generally advisable to locate all cattle congregation features (stock tanks, salt licks, troughs, etc.) in areas of previous ground disturbance such as old road beds.
- Site monitoring is an important tool.

INADVERTENT DISCOVERIES

According to Section 2360 of the Forest Service Manual, if discovery of cultural resources or human remains occurs during the implementation of an undertaking, the agency official should take prudent and reasonable steps to ensure that the undertaking does not harm newly discovered properties or affect human remains. The agency official should treat such discoveries in accordance with the unanticipated discovery protocols developed in accordance with NHPA Section 106 and Native American Graves Protection and Repatriation Act (NAGPRA) (FSM 2362.3). If such protocols are not in place, NAGPRA implementing regulations at 43 CFR 10.4 require a 30-day shutdown to allow for consultation with affected Indian tribes. During that time, the agency official should make reasonable efforts to avoid or minimize harm to a discovered property until:

- The property has been assessed for National Register eligibility and appropriate uses.
- Treatment measures have been carried out consistent with any treatment plan developed for the undertaking as a whole.
- The requirements of NAGPRA or State burial laws are met as applicable.

INTEGRATION

Cultural resource inventory and consultation process identifies, records, and protects cultural resources from numerous forest activities. Protection measures are designed to preserve site heritage. The collaborative and interdisciplinary planning processes are key avenues for communicating these measures prior to implementation of management recommended activities.

Through Lower Joseph Watershed collaboration there was strong agreement for preservation of local culture resources. Numerous issues and recommendations for protection measures were identified in the form of avoidance and site management. Management activity recommendations to address issues were distinctive to potential site impacts.

Key archaeological research and management priorities identified are:

- Significantly increase the involvement of the Nez Perce, including the Joseph Band in the management of archaeological resources and cultural significance of plants.
- Develop a management/research plan for watershed sites, particularly newly discovered sites.
- Provide direction for reducing fuel loads and utilizing heavy equipment within the most significant portions of a site. Develop monitoring process on effectiveness of treatments types.
- Provide management direction to include springs functioning as a major, stock water development. Example: If the current stock tank is located within boundaries of a site it should be relocated outside the site.
- Development of effective fence structures for site protection.

In certain circumstances recommendations were further augmented for added cultural protection such as:

- The recommended for geotextile and 6 to 8 inches of road based was increased during integration to 12-14 inches of road base.
- Allowance for moderate intensity short duration burning are low risk to lithic scatters/can dumps/deep buried deposits was not approved because some resource groups were concerned on allowing moderate intensity burning to occur on these sites. This recommendation was tabled for future discussion.
- Construction of fences to include sites would need discussion on appropriate fence design to deter both cattle and elk near cultural sites with existing springs and riparian areas. This recommendation was tabled for future discussion.

Integration discussions acknowledged some recommendations were in need of further information, while other dialogue occurred to improve opportunities for implementation of management activities, yet providing site protection. Nine recommendations were approved to move forward on while 12 recommendations are in need of additional discussion prior to approval. Avoidance is the most common way of protecting cultural resources; however, absolute avoidance is not always possible or practical. Management direction and archeological site category were primary drivers guiding protection recommendations.

Resource groups recognized that federal laws, federal regulations, and executive orders mandate the protection and stewardship of cultural resources. Section 2360 of the Forest Service Manual, provides direction to the heritage program to manage heritage collections. The legal framework of cultural resources management are a complex web of federal laws, federal and state regulations, and executive orders mandate the protection and stewardship of cultural resources. These regulations include Section 106 of the National Historic Preservation Act of 1966 (NHPA), Oregon's ORS 358.653, and possibly others.

These rules began taking shape in the early 20th century as people began to see that significant historic and archaeological sites were being lost due to looting and massive industrial infrastructure projects. Additional and more substantial laws were passed in the 1960s and 1970s during the civil rights and environmental rights movements. Information is largely from the Section 2360 of the Forest Service Manual (2008).

SUMMARY

The key issues and recommendations surrounding cultural resources were historical preservation through mitigation and protection of known sites. Opportunities exist for mitigating impacts from natural and management activities. For example: through fuels reduction the impacts of wildfires burning, in terms of residence time, can be lessened. Residence time is the length of time the flaming front of a fire burns in a given stationary point. The smaller diameter size of surface fuel the less burning time for a fire occupying that location. Another example would be, an increase in the road base to a range of 12 to 14 inches provides added protection from motorized equipment.

Proactive management practices toward protection will achieve best desired results for site preservation. Adhering to laws and regulations set forth for the protection of cultural sites was understood and accepted during integration. Cultural resource input will be paramount throughout the project development stages. Creating opportunities for monitoring and research will provide further information on best practices for protection of cultural resources and forest management.

Both county residences and visitors alike enjoy the local history of Wallowa County, including Lower Joseph Creek Watershed and the surrounding area. Integration of the resources demonstrated mutual support in preserving the local history for future generations.

IV. Forest Condition Assessment - Silviculture

Table of Contents

INTRODUCTION

LOWER JOSEPH CREEK WATERSHED OVERVIEW

The Lower Joseph Creek Watershed (LJCW) lies adjacent to State Highway 3 on the northern boundary of the Forest, approximately 20 miles north of Enterprise. It contains the upper reaches of the Joseph Creek drainage, including the tributaries of Swamp Creek, Peavine Creek, Rush Creek, Davis Creek, Sumac Creek, Cottonwood Creek, Broady Creek, Basin Creek, and Bear Creek. Joseph Creek continues in a northerly direction and empties into the Grand Ronde River some 15 miles north of the watershed analysis area. The watershed is bounded by Cold Springs Ridge to the northeast, Forest Road 46 to the east, and Elk Mountain to the south.

The area is noted as an example of the rugged topography in northeast Oregon, characterized by deep canyons with very steep, grass-covered side slopes interspersed with numerous exposed basalt layers. The general topography of the watershed is characterized by lower elevational (3600-4000 feet) basalt break lands, and mid elevational (4000-5000 foot) gently rolling uplands.

Warm/dry Douglas fir climax plant associations dominate the northern aspects of the break lands associated with contrasting bunchgrass communities occupying the southern aspects. Surface micro-relief is convex to smooth and surface and subsoil rock content is high.

Cool/dry grand fir climax plant associations dominate the gently rolling uplands. Slopes are generally less than 40%. Soils are considerably deeper, with less rock fragment content when compared to the relatively shallow soils encountered on the dissected slopes.

FOREST CONDITION ASSESSMENT METHODOLOGY

The Forest Condition Working Group working under the auspice of the Wallowa County's Lower Joseph Creek Watershed Assessment Process developed a forest condition assessment methodology patterned after the existing inventory system of the USFS. The assessment focused on the elements of forest structure, composition, function, and disturbance agents as the basis of the inventory protocol. Camp II Forest Management conducted the forest assessment on the timbered land base within the watershed (50,086 acres). The forested land base comprises 51% of the total of 98,561 acres of National Forest Land within the Watershed. The contractor completed the field assessment between April and November of 2008.

The stand mapping protocol combined the existing structural stage of stand development (refer to Appendix A) with the existing canopy closure to stratify the timbered matrix into stand types. The classification system resulted in a potential of 15 stratum/crown closure categories (refer to Appendix B). These categories were used as the basis to stand type the forested land base within the LJCW.

The contractor began the forest condition assessment by verifying the fitness of existing forest stand boundaries (as delineated on the 1988 EVG Stand Layer overlaid on 1990 Resource Orthoquads) in relation to the established stratum/crown closure categories. Next, the 1990 orthoquads were compared to 1997 resource photography (1:12000) to capture structural/density changes that may have occurred during the 7-year interval. The contractor re-delineated the 1988 polygons as necessary to reflect 1997 conditions. New polygons created as a result of structural updates were assigned a new polytag and delineated on the orthoquad base maps.

Field verification of the office stand delineation process was conducted in all stands accessible by road and on 15% of those stands inaccessible by road. Transects of at least 660 horizontal feet were established in stands less than 40 acres. Stands larger than 40 acres were assessed along transects of at least 1320 feet. A minimum of five observation points, readily identifiable by an azimuth and distance from established reference points, were inventoried on each transect. At each observation point, variable (20 BAF) and fixed plot (1/100thacre) sampling was conducted to determine specie composition, stand density, size class, and damaging agents and severity by layer. Snag densities, species, and condition class were derived with a 10 BAF variable plot sampling method. Fuel loadings were determined via ocular comparison with photo series for quantifying natural forest residues (USDA Forest Service GTR PNW 105, 1980). Damage, growth assessment, crown conditions, forest health evaluations, and wildlife habitat analysis were recorded in a written narrative prior to exiting the stand. USFS and Wallowa Resources staff performed periodic quality control in the field. Additional details of the assessment methodology and data parameters are provided in *Appendix XX*.

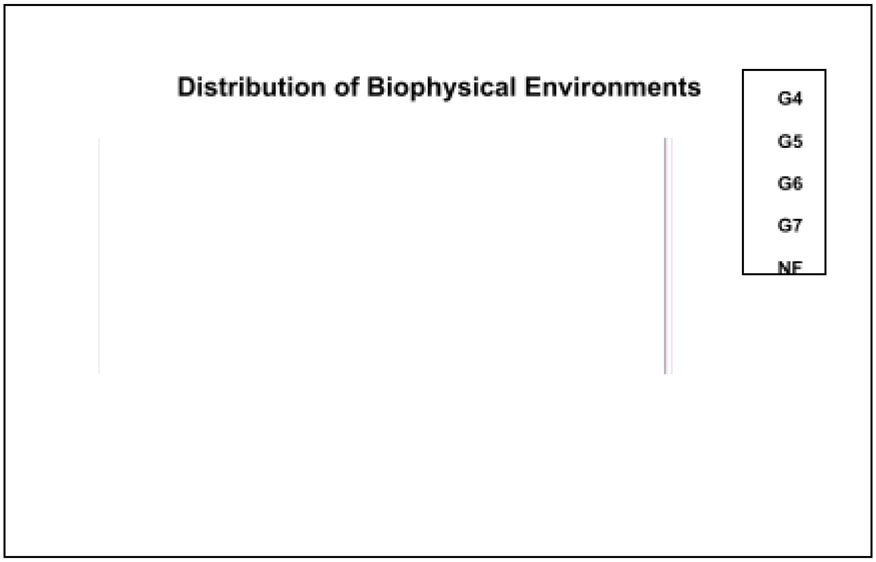
OVERVIEW OF CONDITIONS

The existing vegetation patterns within the LJCW have been categorized by plant association groups, temperature/moisture groups, and structural stages in order to evaluate historic and existing conditions. Plant associations are based upon “Plant Associations of the Wallowa-Snake Province” (Johnson and Simon, 1987) using potential plant associations as a basis for classification. Major plant association groupings occurring within the LJCW include: mixed conifer (grand fir climax), Douglas-fir, and ponderosa pine.

Temperature/moisture groups are a relative indicator of the climatic conditions of a given site. Temperature classifications are described as: hot, warm, cool, and cold; indicating the relative temperature characteristics of a site. Moisture classifications range from dry to wet indicating the relative moisture of a given site.

The vegetation series combined with the temperature/moisture groups is used to classify vegetation into biophysical environments. Biophysical environments are sites with similar characteristics and responses to disturbance and provide the foundation for deriving the historic range of variability for vegetation within a watershed.

Figure IV-1. Distribution of biophysical environments within the watershed.



Biophysical Environments: NF = non forested
G4 = Cool/dry G6 = Warm/moist
G5 = Warm/dry G7 = Warm/dry

Small micro-climates exist within all biophysical groups creating spatial structural and plant composition diversity across the landscape. Examples include high moisture pockets that contain spruce and yew wood or independent aspen clones. These unique features account for a small percentage of the inventoried area. These sites should be given special consideration, and approached on a site-by-site basis. Variable density thinning prescriptions should accommodate their maintenance and stewardship.

A holistic landscape management approach is recommended with specific consideration of the habitat requirements for effective fish and wildlife conservation, and for activities that maintain and enhance water quality. Treatments for different biophysical groups should reference historic stand patterns that were full of gaps, patches and clumps of trees of different ages.

The key forest resource management objective is to restore stand structural heterogeneity, both vertical and horizontal, and the size and arrangement of trees to meet historical range of variability (HRV) goals. Many changes to forest stand structure have occurred due to past disturbance including fire, timber harvest, grazing, insects and disease. There has been a loss of large (20 inches DBH and greater) and medium (15 to 20 inches DBH) trees across the landscape, as well as large snags. Dry old single-story stands have been greatly reduced from pre-1900 levels. Some of the most significant changes in forested structural stages have occurred in the dry forest environment. All of these changes have led to reductions in habitat for some species and increases for others.

Changing vegetative conditions have made forests more susceptible to disturbances, such as uncharacteristically severe fires, insects and disease. Several factors have contributed to the changes, including the cumulative effects of a periodic and sometimes extended drought, climate change, increasing vegetative density, shifts in forest species composition, and modified landscape patterns. A large percentage of the forested landscape is now dominated by dense, multi-layered conifer stands with tree species that are not well suited for the area.

Forested vegetation changes with succession, typically toward dominance by the most shade tolerant tree species that can occur. In the absence of subsequent disturbance events, succession after a stand-replacing event generally follows a sequence of structural stages of 1 through 6 below. The 6th stage of MSLTC and 7th stage of SSLT are often achieved through disturbance mechanisms:

- A non-forested condition dominated by shrubs or grasses and herbaceous or exotic plants,
- Stand Initiation (SI),
- Stem Exclusion stage with open canopy (SEOC) – additional trees limited by moisture
- Stem Exclusion stage with closed canopy (SECC) – additional stems limited by moisture and available sunlight; trees compete for site.
- Understory Re-initiation (UR) – competition induces mortality, a new age group establishes in the openings of the older overstory.
- Multistory Stands (MS) – several age groups of trees are established,
    - Without significant large trees (MSLTU)
    - With large trees present (MSLTC)
- Single Story Large Tree (SSLT) – Understory trees generally absent; large trees are present and significant in the overstory (e.g. Park-like Pine stands)

Forest management objectives need to be coordinated with fuels analysis to design treatments that will move forest stands towards resilient landscapes. Current structural stages of LJCW stands are inconsistent with historical ranges, particularly within the MSLTU and SSLT. Structural stage distribution by biophysical group is located at the end of this chapter in Figure IV-7.

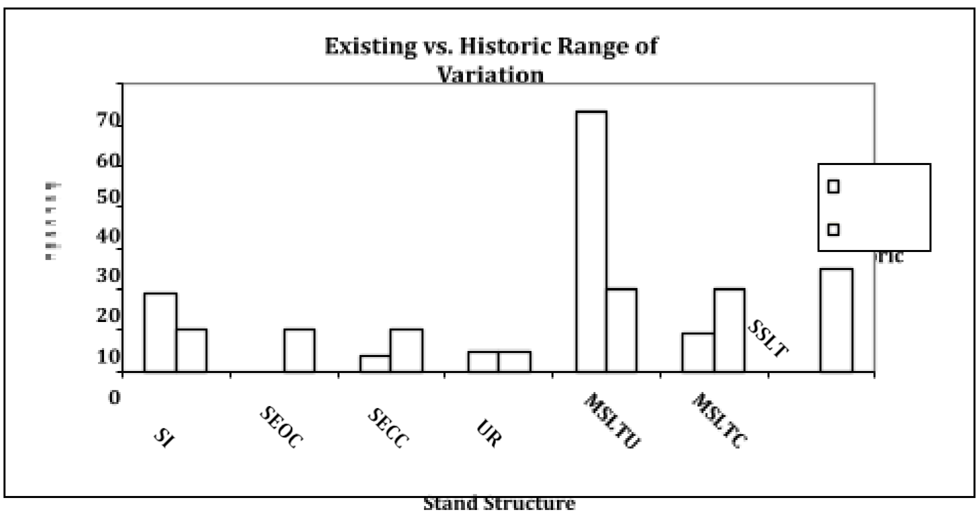
Management should accelerate the maintenance and development of resilient MSLTC and SSLT structures within the biophysical environment. Special consideration needs to be given to forest that meet late old structure characteristics. This may require active management to promote and sustain late old structure.

WARM/MOIST BIOPHYSICAL ENVIRONMENT (G6)

The warm/moist biophysical environment comprises approximately 42 percent of the timbered acreage within the LJCW (21,253 acres). The Douglas-fir/ninebark (PSME/PHMA) plant association (Johnson) most commonly represents this biophysical environment within the watershed. The type generally dominates the steep northern aspects of the forested canyon slopes. Generally, contrasting bunchgrass communities occupy the southern aspects. Stands are common from just below ridge tops to lower canyon positions on slopes ranging from 30% to over 90%. They are confined at the upper and mid-slope positions by the topographic configuration of steep canyon drainages. However, stands tend to widen toward canyon bottoms. Surface micro-relief is primarily convex to smooth, but undulating in the lower portions of the steep draws. Rocky outcrops are common and unconsolidated rock material may extend well beyond the soil depth. Surface soils have silt loam textures with greater than 15% rock fragments by volume.

Principle disturbance mechanisms operating within this environment are similar to those operating within the warm/dry environment. Cyclic bark beetle infestations, localized windthrow events, enlarging root rot and mistletoe infection centers, and periodic low-moderate fires burning every 20-40 years functioned to establish and maintain a mosaic pattern of “even-aged group” stand structures when viewed on the landscape scale.

Figure IV-2. Warm/moist current vs. historic stand structure comparison



G6 Douglas-fir/ninebark (PSME/PHMA) (most common)

As alluded to this type primarily occupies steep canyon slopes within the watershed. Approximately 71 percent of the G6 warm/moist habitat type within the LJCW occurs on slopes exceeding 35% (15,088 acres).

STRUCTURAL STAGE DISTRIBUTION

Approximately 19 percent of the timbered acreage within the warm/moist biophysical environment (G6) is representative of the stem initiation stage of stand development (SI). Historically, around 10 percent of the timbered landscape would be representative of this stage of development.

The bulk of the SI acreage occurs within the timbered east-west stringers of the Joseph Creek drainage and was the result of the Joseph Creek Fire of 1984. The non-plantable stringers were not replanted with nursery stock. Afforestation was reliant upon natural and helicopter seeding to accelerate regrowth on inherently poor sites where the stem initiation phase may exceed 30 years. This prolonged afforestation scenario is occurring within the stringers 25 years following the Joseph Creek Fire. The majority of the SI stands average only 4-5 feet in height and exhibit less than 40 percent crown closure.

Stands representative of the stem exclusion (both SEOC and SECC) stage of development are deficit when compared to historic numbers. This is largely because the stringer structures prior to the stand replacement fire event were SECC.

Multi-storied stands lacking a significant large tree component (MSLTU) dominate the structures within the habitat type. Existing MSLTU stands exceed historic by 43 percent. In general, the MSLTU structures are a result of past harvesting practices and normal mortality patterns. A large percentage of the steep side slopes of Swamp Creek and Hells Canyon were helicopter logged in the early seventies. Prescriptions emphasized overstory removal harvest.

Residual structures currently consist of medium-sized Douglas fir in association with ponderosa pine over a dense sapling to small diameter sized understory dominated by Douglas fir. The Douglas fir component exhibits moderate to heavy infections of dwarf mistletoe. Ninebark forms a mosaic with pinegrass on the forest floor.

Existing fuel loadings are relatively heavy due to the accumulation of untreated logging slash generated from the past helicopter logging operations and natural accumulations. The potential for significant stand loss to disturbance agents (especially fire and bark beetles) is high given the existing stand densities, fuel profile, and topographic position. Passive management would perpetuate species diversity loss and negatively impact functional interior wildlife habitat. It is estimated that the early seral component could be eliminated from the MSLTU stands within a period of 10-20 years in the absence of proactive management. Given this scenario, wildfires would likely be larger and more intense because of greater horizontal and vertical fuel continuity. Increased development of multi- layered late seral stands would also foster unnatural population increases of insect and disease vectors further exacerbating the dead fuel buildup. The incidence of larger fires with consequently greater tree mortality would be more likely encountered when compared with historic regimes.

The percentage of stands representative of the understory re-initiation (UR) compare favorably with historic percentages.

Single storied, large diameter stands (SSLT) are not represented in the habitat type. Historically, these structures comprised 25 percent of the frequently disturbed landscape. As previously discussed, periodic, low intensity ground fires functioned to control species composition, maintain stocking levels, and favor the retention of the shade intolerant conifers (ponderosa pine, western larch, and Douglas-fir).

In the event of a large-scale disturbance event, large contiguous areas could potentially revert to additional stand initiation (SI) structures (already exceeding the historic range). This would further exacerbate the fragmentation of structural patterns on the landscape and possibly be detrimental to ecosystem function within the watershed.

WARM/DRY BIOPHYSICAL ENVIRONMENT (G7, G5)

The warm/dry biophysical environment is composed of two habitat types and comprises approximately 30 percent of the timbered acreage-14,810 acres). The Douglas-fir/snowberry (PSME/SYAL) plant association most commonly represents the G7 biophysical environment and the grand fir/spiraea (ABGR/SPBE) plant association the G5 bio-group within the watershed. The types generally occur on the more exposed sites, in transitional ecotones between forested communities and scablands, and in locations of shallower soil profiles.

The warm/dry type generally occupies the mid elevational plateaus averaging around 20 inches of precipitation. It occurs on the more exposed sites in transitional ecotones between more mesic grand fir dominated communities and scablands. Soil profiles are generally shallower than encountered in the grand fir series. Approximately 72 percent of the of the G5/7 warm/dry habitat type within the LJCW occurs on slopes less than 35 percent (10,626 acres).

Disturbance events in this environment were cyclic and generally consisted of low intensity surface fires with predictable return intervals of 10-25 years. Periodic, low severity fire regimes functioned to eliminate the development of a floor stratum of conifers and maintained open, park-like structures of ponderosa pine, Douglas fir and western larch (G5). However, even in low severity fire regimes, intense fires sometimes occurred in discrete areas of fuel buildup (possibly due to bark beetle mortality patterns, longer than normal fire-return intervals, or unusual fire weather events). Shade intolerant ponderosa pine regeneration was able to become established in these created gaps of ½ to 1 acre plus. The resultant stand structure appeared as a mosaic of younger ponderosa pine age classes nested within a matrix of ponderosa pine and Douglas fir overstory (photo III.1). Relatively uniform, open spacing was maintained within the clumps of advanced regeneration with the return of frequent, low-severity fire regimes.

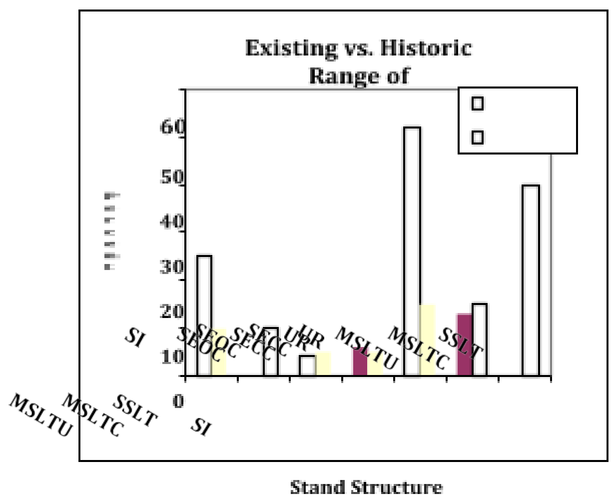
Figure IV-3. . Overstory ponderosa pine and Douglas-fir with a mosaic of younger pine age classes

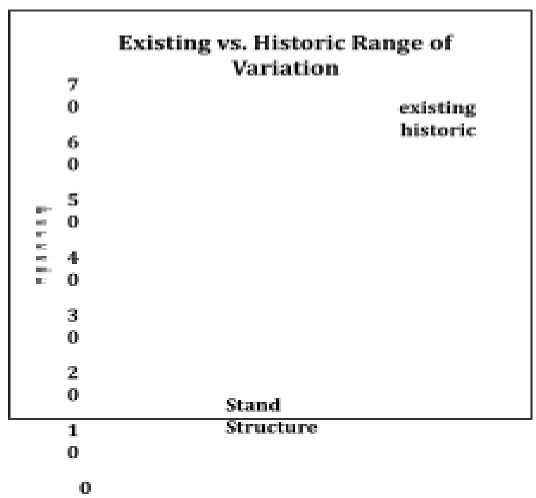
Late seral structures of layered ponderosa pine and Douglas fir were historically relegated to protected refugia. These layered structures did not constitute a significant percentage of the warm/dry landscapeThe disruption of natural disturbance regimes within the watershed has altered vegetation patterns on the landscape. The increase in large, more intense stand replacement fires over the last 20-25 years has been a direct result of the departure of stand structural development patterns from historic representation.

STRUCTURAL STAGE DISTRIBUTION

The percentage of stands within the G5/7 biophysical environment representative of the stand initiation stage of stand development (SI) epitomizes the departure from historic disturbance processes within the watershed. As previously stated, two large, stand replacement fire events have occurred in a habitat types that historically experienced low intensity surface fires with predictable short return intervals. The current percentage of SI structures exceeds historic by 15 percent in the G5 habitat type and is below historic within the G7 habitat type. The weighted average (by acres) exceeds historic by 4 percent. The bulk of the G5 stem initiation stands occur on Cold Springs Ridge and within Cottonwood Creek. The stands on Cold Spring Ridge were hand planted and should be entering the SECC stage within 7-10 years.

Figure IV-3. Warm/dry current vs. historic stand structure comparison





G5 **G7**

Grand fir/spiraea (ABGR/SPBE) (most common) Douglas-fir/snowberry (PSME/SYAL) (most common)

Late-old structures historically encountered within the warm/dry biophysical environment exhibited a mosaic pattern of “even-aged groups” depending upon the frequency and intensity of disturbance events (wind, fire, insects, and disease). Frequently disturbed sites were largely characterized by single storied/large diameter structures. Periodic, low severity intensity fire regimes functioned to eliminate the development of a floor stratum of conifers and maintained the open, park-like structure. Sites with variable fire regimes (i.e. combinations of frequent, low intensity fires as well as mixed-severity fire regimes) created a mosaic of fire effects. Structures appeared as a patchwork of even-aged groups when viewed on a landscape scale.

Historically, only 15 percent of the stands within the warm/dry environment exhibited MSLTU structures. Existing multi-layered structures would be difficult to sustain in an environment typified by frequent disturbance events without considerable protection measures.

Existing stand structures representative of the SECC, SEOC, UR, and MSLTC stages of development compare favorably with historic percentages within the habitat type.

In addition, the likelihood of these continuous, storied structures surviving another major disturbance event (insect infestations/fire) would be tenuous at best. In the event of a large-scale disturbance event, large contiguous areas could potentially revert to additional stand initiation (SI) structures (already exceeding the historic range). This would further exacerbate the fragmentation of structural patterns on the landscape and possibly be detrimental to ecosystem function within the watershed.

COOL/DRY BIOPHYSICAL ENVIRONMENT (G4)

The cool/dry biophysical environment comprises approximately 26 percent of the timbered acreage-13,167 acres). The grand fir/huckleberry (ABGR/VAME) plant association (Johnson) most commonly represents this biophysical environment within the watershed. Cool/dry grand fir plant associations dominate the gently rolling uplands where precipitation exceeds 25 inches per year. Sixty-five percent of the acreage within this habitat type occurs on slopes less than 35% (approximately 8,661 acres). Soils are considerably deeper with less fragmented rock content than on the warm dry-moist sites.

Natural disturbance events were cyclic, variable in severity and gave rise to the mosaic pattern of stand structures historically encountered on a landscape scale within this biophysical environment.

Fire was a frequent visitor to a large extent of this environment as evidenced by the existence of residual overstory ponderosa pine, western larch, and Douglas-fir. These early seral species, especially ponderosa pine and western larch, are extremely intolerant of shade and root competition. Consequently, frequent low intensity surface fires favored canopy dominance by these species to the exclusion of thin-barked late seral species such as grand fir and Englemann spruce. The probability of a stand replacing fire event within areas dominated by fire resistant species was rather low because of the light fuel loadings and lack of vertical fuel continuity.

Common cyclic disturbance events, such as group bark beetle morality, localized windthrow, and enlarging root rot centers provided sufficient fuel continuity to sustain isolated crown fire events. Locations of such past episodes were evidenced by the existence of even-aged groups of mixed conifers included within the timbered matrix.

The disruption of natural disturbance regimes within the watershed has altered vegetation patterns on the landscape when compared to historic conditions. The increase in large, more intense stand replacement fires over the last 20-25 years has been a direct result of the departure of stand structural development patterns from historic representation.

STRUCTURAL STAGE DISTRIBUTION

About 14 percent of the timbered acreage within the biophysical environment is representative of the stem initiation (SI) stage of stand development (1,898 acres). The regeneration harvested acres were the result of stand replacement disturbance events that occurred following the Joseph Creek fire of 1986, and the Douglas-fir tussock moth defoliation epidemic of 1972. The stand replacement event exceeded expected historic patterns (both temporally and spatially) given the pre-existing susceptible and vulnerable storied structures. Consequently, the existing percentage of stands within the SI stage exceeds historic by 9 percent within the cool/dry habitat type.

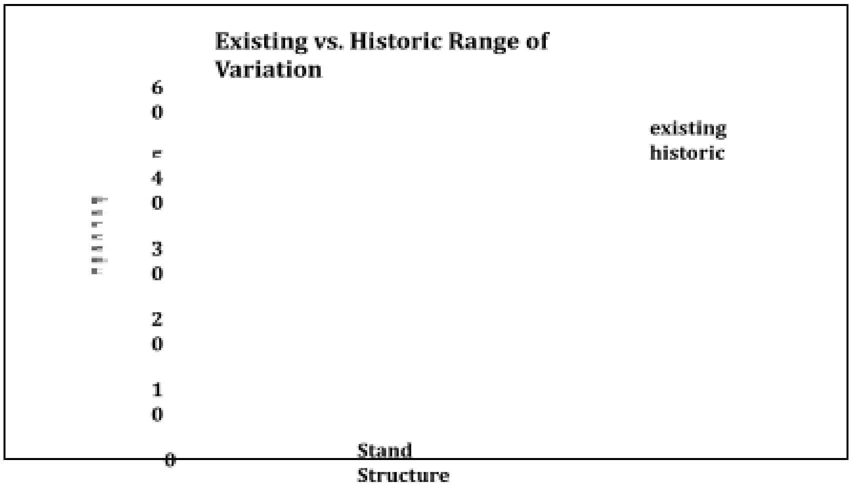
The percentage of stands representative of the SECC, SEOC and SSLT stages of development compare favorably with historic percentages within the biophysical environment.

The UR structural stage is under-represented when compared to historic within the watershed. Minor disturbances within the overstory create available growing space for the establishment of a tolerant advanced regeneration in this structural stage. The advanced regeneration consists primarily of grand fir and Englemann spruce. However, the character of stands in this stage of development is still dominated by the small to medium sized overwood.

Multi-storied without large tree representation (MSLTU) exceed historic numbers by 20 percent. However, existing species composition of these layered stands has been simplified over the decades. Past overstory removal harvest practices coupled with competition induced mortality of the remaining early seral, large diameter pioneers have allowed numerous age classes of tolerant grand fir and Englemann spruce understory to establish in the gaps. The stands are considered “late” (i.e. early seral species such as ponderosa pine, western larch, and lodgepole pine constitute less than 30 percent of the remaining species composition) in terms of seral development. Historically, low to moderate intensity fires functioned to maintain the retention of early seral species within the stand structure as a result of their fire resistance. Wildfires burning within the diverse landscape ranged from a non-lethal, slow-burning ground fires to isolated crown fires depending upon fuel and weather conditions. In contrast, however, the existing late seral, multi-layered structures are very susceptible and vulnerable to sustained, widespread damage due to insect, disease, and fire events.

Multi-storied with large tree (MSLTC) structures are lacking representation within the habitat type when compared with historic.

Figure IV-4. Cool/dry current vs. historic stand structure comparison



G4

Grand Fir/Huckleberry (ABGR/VAME) (most common)

In addition, the likelihood of these continuous, storied structures surviving another major disturbance event (insect infestations/fire) would be tenuous at best. In the event of a large-scale disturbance event, large contiguous areas could potentially revert to additional stand initiation (SI) structures (already exceeding the historic range). This would further exacerbate the fragmentation of structural patterns on the landscape and possibly be detrimental to ecosystem function within the watershed.

SUMMARY

Existing vegetation patterns were categorized by plant association groups, temperature/moisture groups, and structural stages then evaluated for historic and existing conditions. Results show that major plant association groupings within the LJCW include: mixed conifer (grand fir climax), Douglas-fir, and ponderosa pine.

Temperature classifications are described as: hot, warm, cool, and cold; indicating the relative temperature characteristics of a site. Moisture classifications range from dry to wet indicating the relative moisture of a given site.

Dry old single-story stands have been greatly reduced from pre-1900 levels. Some of the most significant changes in forested structural stages have occurred in the dry forest environment. A loss of large old trees and future large tree recruitments has occurred across the landscape, including large snags. The watershed timbered acres are dominated by stands of multi-storied trees lacking a large tree component (MSLTU). This overabundance of MSLTU is apparent in all biophysical groups. In comparison, the single storied large tree and under story re-initiation stand structures are severely lacking in warm/dry biophysical groups. The multi-storied large tree common is lacking in several of the biophysical groups as well, the highest deficit being in cool dry and warm moist. These changes have led to reductions in habitat for some species and increases for others.

The absence of density management and natural disturbance has created poor growth rate in these stands. The key forest resource management objective is to restore stand structural heterogeneity, both vertical and horizontal, and the size and arrangement of trees to meet historical range of variability goals (HRV).

Field surveys show the distribution of structural stages within the biophysical groups with an exceeding abundance, from historic, of multi-storied stands. A large percentage of the forested landscape is now dominated by dense, multi-layered conifer stands with tree species that are not well suited for the area. Fifty-eight percent of national forest lands are multi-storied without a large tree component and an additional 18 percent of the acres supporting multi-storied stands with a large tree component. The remaining 24 percent of the forested acres support the remaining 5 structural stage types.

Table IV-1. Structural stage distribution by biophysical environment

BE	ACRES	% OF FORESTED	STRUCTURAL STAGE													
			SI		SEOC		SECC		UR		MSLTU		MSLT		SSLT	
			%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	5	Acres	%	Acres
G2	56	0	0	0	0	0	0	0	100	56	0	0	0	0	0	0
G3	419	1	3	13	0	0	0	0	0	0	97	406	0	0	0	0
G4	13,167	26	14	1,898	0	0	2	279	5	707	51	6,703	28	3,580	0	0
G5	4,472	9	25	1112	0	0	4	161	6	263	52	2,303	13	633	0	0
G6	21,253	42	19	4070	0	0	4	872	5	1074	63	13,232	9	2,005	0	0
G7	10,338	21	4	428	0	0	6	595	6	605	58	6031	26	2679	0	0
G8	381	1	13	50	0	0	4	17	17	66	63	238	3	10	0	0
Forest	50,086			7,571		0		1,924		2,771		28,913		8907		0
NF	48,475															
Total	98,561	100														

ISSUES

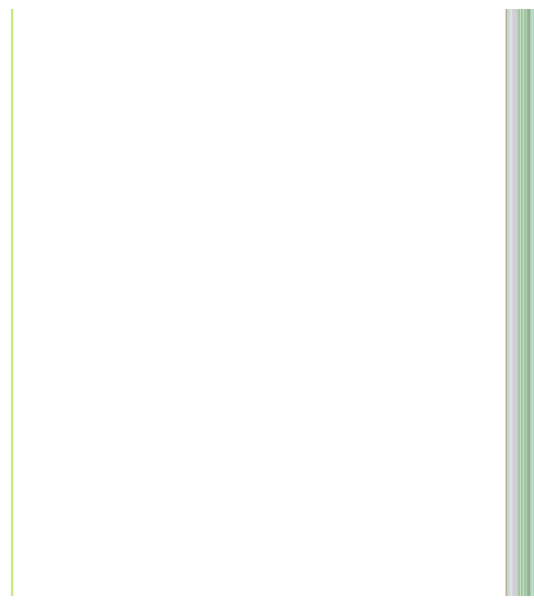
Landscape conditions provided the basis for development of watershed issues. The forestry resource through disclosure of findings, group discussions, and field trips developed common themes throughout the watershed that could be brought forward in integration with the other resources. Ecosystem health, stand density, and structure diversity were repeating elements regardless of biophysical group.

The two most shared structure types found to be exceeding historic representation are: stem initiation (SI) and (MSLTU) multi-story large tree uncommon. The stem initiation stage is a result of the 1986 Joseph Creek Fire left to natural regeneration on inherently poor sites. Canopy texture differences from high elevation show the stem initiation as the lighter green younger vegetation.

The high number of acres of MSLTU (Table IV-1) reflects a loss of large tree component in all biophysical groups and a reduction in late-old structure. Stand resiliency is threatened by the existing stand structure of multi-layered trees with little to no large tree element. Stands that once supported resilient fire tolerant, shade intolerant early seral species now consists of shade tolerant suppressed trees exceeding the needed stems per acre to be considered healthy. A high number of stems per acre, in all biophysical groups, have created high stand densities and basal area well over the HRV.

The warm/moist environment shows a significant deficit in multi-story large tree common (MSTLC), single story large tree (SSLT), and stem exclusion open canopy (SEOC). The landscape is spatially lacking the heterogeneity of these components. Because the primary contributors of large trees occurred from MSLTC and SSLT stand structures the result is current conditions lacking a big tree component.

Figure IV-6. Part of Joseph Creek Fire area displaying high amounts of stem initiation (light green) in timber stringers.



The warm/moist biophysical environment is most commonly represented by the Douglas-fir/ninebark (PSME/PHMA) plant association (Johnson). Forty- five percent of warm/moist was comprised of late-open structure and an additional 15- 20 percent represented by late closed. *(Current forest direction from Forest Fuels specialist (Steve Hawkins) and recent report by Franklin & Johnson list (PSME/PHMA) plant association (Johnson) as a Warm/Dry)*

Stands in the LJCW warm/dry biophysical groups are also deficient in large trees component as well, characterizing much of the single story large tree (SSLT) stands. Historically, only 15 percent of the stands within the warm/dry environment exhibited MSLTU structures. Existing multi-layered structures would be difficult to sustain in an environment typified by frequent disturbance events without considerable protection measures.

Twenty-six percent of the timbered acres are comprised of the cool/dry biophysical environment. The plant association within the watershed most commonly represented is the grand fir/huckleberry (ABGR/VAME) (Johnson). The existing forest structures exceeding historic are the multi-storied large tree uncommon (MSLTU) by 20%, and stem initiation (SI) by 9 percent.

The percentage of stands representative of the SECC, SEOC and SI stages of development compare favorably with HRV within the biophysical environment. The multi-storied with large tree (MSLTC), and understory re-initiation (UR) structural stages are under-represented. The loss of large tree component is a pattern across the biophysical environments.

<u>ISSUES:</u>

- Landscape size high severity wildfires, particularly in canyon areas, have created high levels of stem initiation (SI) type stands in certain areas. The landscape may benefit from a more balanced distribution of Stem Initiation (SI) stands across biophysical environments.
- The Lower Joseph Creek Watershed is deficit in multi-storied large tree common (MSLTC) and single storied large tree (SSLT). Stand densities and species composition are inconsistent with the historic ranges. Lack of shade intolerant species and historic densities leaves the stand susceptible to multiple disturbance factors with detrimental effects.
- Multi-storied large tree uncommon (MSLTU) structures exceed historic levels in all biophysical environments. Large tree component are lacking in a high number of the multi-storied stands much the result of past harvest practices. The basal areas and stocking density in these stands exceeds HRV. Average tree size is below HRV.
- The watershed is at greater risk to disturbances factors. An [redacted] conifers (ponderosa pine, western larch, and Douglas-fir), all resulting in an overall unhealthy ecosystem.
- Concern regarding the inability to treat all stands in need of management. A broader landscape approach is needed, however, elements exist that could potentially limit acres treated such as: Inaccessibility, steepness of slope, need vs. capabilities.

Figure IV-9. Results of Fir Engraver on Wallowa-Whitman National Forest.

The key forest resource management objective is to restore stand structural heterogeneity, both vertical and horizontal, and the size and arrangement of trees to meet historical range of variability (HRV) goals. A return to historic structural stages in the LJCW would create a more diverse, “patchy” landscape, with an increase of large diameter trees in single-storied stands. Wildlife is dependent on structural and landscape diversity.

Low-severity fires would occur more frequently, maintaining lower fuel loads and fire resilient stands, allowing trees to grow, thrive, and survive natural disturbances. Healthy ecosystems, with high integrity, have the ability to absorb and recover from disturbances without losing inherent function. Natural fire regimes and common (endemic) insect and disease activity play a significant role in the cultivation of vegetative integrity within the LJCW. However, effects of these disturbances currently are inconsistent with historic results.

As a result of the human and natural influences mentioned earlier, the landscape has become more homogenous, patch sizes have become larger, and patches are fewer. Forest stands have been simplified, and more heavily stocked. Changing vegetative conditions have made forests more susceptible to uncharacteristic disturbances, such as severe wildfires, insects and disease.

Figure IV-7. Geographic display of recommended priority treatment acres.

Vegetation and weather condition factors contributing to the uncharacteristic disturbances include: cumulative effects of a periodic and sometimes extended drought, climate change, increasing vegetative density, shifts in forest species composition, and modified landscape patterns.

RECOMMENDATIONS

Through the forestry assessment process it became evident that a high percentage of the forested acres were inconsistent with historic conditions and structure distribution. Stands were assessed against a reference point for stocking levels drawn from silviculturalist David Powell’s report, *Suggested Stocking Levels for Forest Stands in Northeastern Oregon and Southeastern Washington: An Implementation Guide for the Umatilla National Forest*. A basal area filter was developed and applied to identify those stands exceeding recommended stocking levels in each biophysical plant association group. Basal areas of greater than 80, 100,110 were used for warm moist Douglas-fir/ninebark (PSME/PHMA), warm dry Douglas-fir/snowberry (PSME/SYAL) and grand fir/spiraea (ABGR/SPBE), and cool dry Grand fir/huckleberry (ABGR/VAME) respectively. These basal areas filters were applied to field assessment results for Lower Joseph Creek Watershed. Stands with the highest deviation from the basal area filter fell into "priority" acres for treatment.

Given the excessive amount of acres inconsistent with historic conditions, it was apparent that treating all unhealthy stands was impracticable with the initial entry. The priority recommended stands that exhibited the highest deviation from historic were mapped with acknowledgement that non-priority stands are also in need of management.

Recommended priority treatment acres were identified based on existing stand conditions without regard to topographical location, slope, or management direction. Figure IV-7 exhibits the geographical distribution of priority stands for initial silvicultural treatment. Approximately 20,632 acres were identified and proposed as a priority for initial entry. Priority acres consist of 12,113 acres with slopes less than 35% and 8,519 acres over 35% slope.

Creative management and treatment options will likely be a precursor to moving stands to HRV. The overstocked understory has developed poor crown ratios and has been subjected to "climax site" maladies (i.e. high incidence of insects and disease), and wildfires (see Fire and Fuels Analysis). Douglas-fir dwarf mistletoe is of special concern since it can be expected to cause significant losses in infected stands that are incorrectly managed.

Management should accelerate the maintenance and development of resilient MSLTC and SSLT structures within these biophysical environments. Special consideration needs to be given to forests that meet late old structure characteristics. This may require active management to promote and sustain late old structure.

Consideration also needs to be given to silviculture prescriptions that reduce the risk of fire to existing multi-storied structures and designated old growth areas. Silviculture prescriptions designed to increase the representation of "Single Storied Large Tree" and "Multi Storied with Large Tree" structure within the warm/dry and warm/moist biophysical environments and the promotion of early seral shade intolerant species shifts stands closer to HRV goals. Conversion of these stands to fire tolerant species is consistent with historical conditions where low intensity fires interaction on the landscape provided natural thinning of competition. Such treatments should also improve resiliency to projected climatic change. Management of conifer species to reflect historic patterns will aid in reducing ladder fuels and heavy down woody eventually resulting in lower fire severity for the overstory stands.

A holistic landscape management approach is recommended with specific consideration of the habitat requirements for effective fish and wildlife conservation, and for activities that maintain and enhance water quality. Treatments for different biophysical groups should reference historic stand patterns that were full of gaps, patches and clumps of trees of different ages.

Development of large tree component, landscape diversity of species composition, and structural diversity both vertical and horizontal will address many facets identified for restoration during integration.

WARM/MOIST MANAGEMENT OPTIONS (G6)

DOUGLAS-FIR/NINEBARK (PSME/PHMA)

Approximately 5,233 acres (24%) of SI, SECC, MSLTC, and MSLTU stands within the G6 biophysical environment exhibit unsustainable stocking levels and have been identified as priority for management. Proactive management within the overstocked mid seral structural stages would provide the best opportunity to begin the process of meeting HRV structural stages within the warm/moist sites.

The following silvicultural treatment opportunities would be appropriate to meet objectives of increasing the representation of resilient MSLTC and SSLT structures:

- Intermediate thinning within single-storied, early to mid seral structures designed to reduce inter-tree competition and fire risk, maintain health and vigor of the residual stand, preserve future treatment options, and to accelerate the development of large diameter trees.
- Individual tree selection regimes designed to maintain and improve the health and vigor of existing multi-layered structures of diverse species composition, age and size classes. Stands would have a manageable existing component of early-mid seral species within all crown strata.
- The opportunity to include fiber utilization would be made available whenever possible.
- Silvicultural treatments should retain and protect large trees of early seral species and trees with old-growth physical characteristics consistent with our HRV goals. These trees will generally be the most fire-resistant trees on the landscape and they provide a valuable legacy. Treatments should enhance growing conditions for these trees and increase their likelihood for long-term survival.

In the absence of density management, these stands would continue to exhibit poor growth rates when compared to site potential. This delay would lengthen the period of time that would be necessary to achieve the “large tree” component of old-growth structure. In addition, the likelihood of these continuous, storied structures surviving another major disturbance event (insect infestations/fire) would be tenuous at best.

WARM/DRY G7, G5 MANAGEMENT OPTIONS

DOUGLAS-FIR/SNOWBERRY (PSME/SYAL), GRAND FIR/SPIRAEA (ABGR/SPBE)

Management should accelerate the maintenance and development of resilient MSLTC and SSLT structures within the biophysical environment. Maintain stand densities commensurate with site potential, manage for a diverse mix of conifer species reflecting historic patterns, and to restore fire resilient conditions commensurate with dominant fire regimes.

Around 7588 Acres (51%) of the SI, UR, SEC, MSLTU and MSLTC within the G5/7 biophysical exhibit unsustainable stocking levels and have been identified as priority for management.

Proactive management within the overstocked mid seral structural stages would provide the best opportunity to begin the process of increasing the representation of SSLT structures within the warm/dry sites. Previously un-logged sites need to be reviewed on a stand-by-stand basis.

The following silvicultural treatment opportunities would be appropriate to meet objectives of increasing the representation of resilient MSLTC and SSLT structures

- Intermediate thinning within single-storied, early to mid seral structures designed to reduce inter-tree competition and fire risk, maintain health and vigor of the residual stand, preserve future treatment options, and to accelerate the development of large diameter trees.
- Individual tree selection regimes designed to maintain and improve the health and vigor of existing multi-layered structures of diverse species composition, age and size classes. Stands would have a manageable existing component of early-mid seral species within all crown strata.
- The opportunity to include fiber utilization would be made available whenever possible.
- Silvicultural treatments should retain and protect large trees of early seral species and trees with old-growth physical characteristics consistent with our HRV goals. These trees will generally be the most fire-resistant trees on the landscape and they provide a valuable legacy. Treatments should enhance growing conditions for these trees and increase their likelihood for long-term survival into the future. Special consideration needs to be given to forest that meet late old structure characteristics. This may require active management to promote and sustain late old structure.

In the absence of density management, these stands would continue to exhibit poor growth rates when compared to site potential. This delay would lengthen the period of time that would be necessary to achieve the “large tree” component of old-growth structure.

COOL/DRY G4 MANAGEMENT OPTIONS

GRAND FIR/HUCKLEBERRY (ABGR/VAME)

Management priorities would be to maintain and improve the health and vigor of existing multi-layered structures of diverse specie composition, age and size classes. Stands targeted for treatment would have a manageable existing component of early –mid seral species within all crown strata (plates 2 and 3). Prescriptions would maintain stand densities commensurate with site potential, manage for a diverse mix of conifer species reflecting historic patterns, and restore fire resilient conditions commensurate with dominant fire regimes.

Around 7811 acres (59%) of the “Multi Storied Large Tree Uncommon” (MSLTU) and “Multi Storied with Large Tree” (MSLTC) stands within the G4 biophysical environment have been identified for management. Silviculture prescriptions designed to increase the representation of MSLTC stands would be desirable.   Proactive management within the overstocked mid seral structural stages (MSLTU) would provide the best opportunity to begin the process of increasing the representation of MSLTC structures within the cool/dry sites.

Small inclusions of cool/moist sites should be given special consideration as to their need for treatment or protection. Consideration should be given toward wildlife, riparian, and other resource needs to maintain landscape characteristics. Previously un-logged sites need to be reviewed on a stand-by-stand basis.

Silviculture treatments should retain and protect large trees of early seral species and trees with old-growth physical characteristics consistent with our HRV goals. These trees will generally be the most fire-resistant trees on the landscape and they provide a valuable legacy. Treatments should enhance growing conditions for these trees and increase their likelihood for long-term survival into the future.

The following silvicultural treatment opportunities would be appropriate to meet objectives within the G4 biophysical environment:

- Good opportunities for uneven-aged management as well as aspen clone enhancement/protection. Stand structures dominated by residual PIPO over a mixed conifer, multi-layered understory of seedling to medium size ABGR, PIPO, PSME, and LAOC in order of occurrence. Favor retention of vigorous PIPO, free LAOC, PSME, and ABGR in order of preference. Removal all competing conifers in areas where aspen is located.
- Thin from below may be best option in mixed conifer, second growth stand dominated by PSME/ABGR and where PIPO/LAOC may be well represented. Reserve basal area meeting HRV goals, favoring the early seral species. Mistletoe often occurs from light to heavy in PSME/LAOC.
- Designed to maintain and improve the health and vigor of existing multi-layered structures of diverse species composition, age and size classes.
- The opportunity to include fiber utilization would be made available whenever possible.
- Silvicultural treatments should retain and protect large trees of early seral species and trees with old-growth physical characteristics consistent with our HRV goals. These trees will generally be the most fire-resistant trees on the landscape and they provide a valuable legacy. Treatments should enhance growing conditions for these trees and increase their likelihood for long-term survival into the future.
- Special attention should be given to small inclusions of cool/moist sites, and approached with site-by-site need for treatment or protection. Consideration should be given toward wildlife, riparian, and other resource needs to maintain landscape characteristics.
- Previously un-logged sites need to be reviewed on a stand-by-stand basis.

In the absence of density management, these stands would continue to exhibit poor growth rates when compared to site potential. This delay would lengthen the period of time that would be necessary to achieve the “large tree” component of old-growth structure.

Today's forests are more susceptible to disturbances: uncharacteristic wildfires, insect and disease. Creating opportunities for fiber utilization and removal in conjunction with harvest operations and utilizing various methods for disposal will eliminate multiple back-to-back entries that could potentially contribute to negative impacts to other resources. By favoring the retention of shade intolerant conifers (ponderosa pine, western larch, and Douglas fir), forest resilience to disturbance will be greatly increased.

PRESCRIPTION DISCUSSION

Suggested prescription approaches were derived from The Case for Active Management of Dry Forest Types in Eastern Washington: Perpetuating and Creating Old Forest Structures and Functions, 2008 and Restoration of Federal Forests in the Pacific Northwest: Strategies and Management Implications 2009. These documents are highly supported for treatment in dry forest types in the interior west.

BACKGROUND

Most fundamentally, active management is necessary in all stands on dry forest sites that are to be managed with some level of emphasis on old forest attributes. This will be true whether goals are restoration to a near approximation of historical conditions or simply incorporation of a population of large, old trees in stands otherwise managed for economic and other goals. Active management will be required both to: 1) re-establish sustainable conditions—i.e., to restore stand structures and fuel loadings that have a low probability of fire intensities that will kill the large old trees, and 2) subsequently maintain them in a more fire and insect resistant condition.

Management activities may include either silvicultural (mechanical) manipulations of stands, prescribed fire, or both. Silvicultural activities typically will include:

- Reducing overall stand densities and fuel loadings, particularly of ground and ladder fuels
- Increasing the mean diameter of trees in stands
- Shifting composition toward the more drought- and fire-tolerant species, such as ponderosa pine and western larch.

Prescribed fire is potentially important as a part of fuel treatments as well as in achieving various other ecological objectives associated with fire, such as creation of seedbeds and restoring understory conditions.

Silvicultural activities that focus primarily on removing dominant trees from a partially cut stand will not reduce potential fire intensities and stand mortality (Stephens and Moghaddas 2005), nor will they contribute to creation of forest structure and composition characteristic of drier eastside older forest.

Forests on dry sites in eastern Oregon commonly consisted of a complex mosaic of patches, ranging from patches of dense reproduction to open groves of old trees. Management activities, such as fire suppression and logging, commonly have moved these stands toward homogeneous conditions consisting of higher density, smaller trees, and few old trees across large landscapes (Everett et al. 1994, Hann et al. 1997, Hessburg et al. 1999a, Hessburg et al. 2000). Restorative management activities should be designed to move stands back toward historical spatial patterns at both landscape and fine-scales.

Five stand restoration and fuel treatment principles seem applicable:

1. **Favor fire tolerant tree species during treatments, (ponderosa pine, western larch, and, sometimes, Douglas fir)**, thereby steadily improving the fire tolerance of stands, especially where fires are typically of low- or mixed- severity.
2. **Retain the large and very large fire tolerant trees.** These trees take 150 or more years to grow and are not easily replaced. They are key habitat features that can persist for centuries. Large trees of other species (e.g., grand fir and white fir (*Abies concolor*)) and younger, smaller trees of fire tolerant species could be removed, except as needed to meet other objectives, to reduce canopy fuels and provide economic benefits. Visual criteria including bark and canopy characteristics developed by Van Pelt (2008) can aid field recognition of old trees regardless of diameter.
3. **Apply treatments unevenly within stands**, creating fine-scale diversity within stands. Fuel and other stand-scale restoration treatments should produce a fine-scale mosaic of open patches of large trees, denser patches with mid-canopy trees, and regeneration within a landscape that generally meets *FireSafe* principles (above). Creating fine-scale diversity within stands provides for species and processes that operate at a smaller patch scale (ranging from less than 0.1 acre to 100 or more acres). Many plants, animals, and processes rely on a relatively fine scale pattern of patchiness that occurs at a tree, sub-patch, patch, patch-group, or neighborhood scale.
4. **Apply treatments unevenly among stands**, creating mid-scale mosaics within regional landscapes.
5. **Develop landscape-level silvicultural prescriptions** that integrate fuel reduction objectives with those for maintaining or improving habitat for wildlife species and restoration of dry forest ecological processes and functions.

Most restoration efforts begin not only with retention of the existing old tree population but with silvicultural treatments to reduce fuels and competing vegetation around these trees so as to improve their survival potential in case of wildfire or bark beetle attack. Additional elements of restoration prescriptions include:

1. Tree removals to:
    a. Move stand basal area toward a long-term sustainable level for the site (i.e., a basal area that approximates historic levels for the plant association),
    b. Shift species dominance toward more fire- and drought-tolerant species (e.g., ponderosa pine and western larch), and
    c. Increase the mean diameter of the stand;

2. Incorporate spatial variability in the intensity of the treatment, so as to enhance existing spatial heterogeneity (in addition to that associated with treatments around the old trees), such as that associated with existing natural canopy gaps and patches of regeneration; and
3. Treatment of fuels generated by the mechanical treatments.

In consideration of the 21" filter used for the last 15+ years in the Wallowa-Whitman NF, Franklin and Johnson have published[2]:

A Brief History of the 21" Rule: historically, the Forest Service in the Dry Forests of Oregon and Washington has used a partial cutting strategy that focused on harvest of the big, old ponderosa pine trees. As a result, their numbers were sharply depleted by the middle of the 1980s. It was clear that that approach was not sustainable but the FS plans of the mid 1980s did little to change things.

In response to the threat of litigation, the Regional Forester in the mid-1990s adopted interim direction for the national forests that included a requirement that these national forests limit harvest to trees less than 21" dbh (with some exceptions permitted). Also, these "eastside screens" called for a number of other conservation measures including more substantial stream buffers. The screens were put in place without an EA or EIS (an EA was written later) and were to last approximately 18 months. They still are in place today.

The "21-inch rule" has been fundamentally important in shifting management of eastside forests and conserving the remaining large, old trees. It helped midwife changes that redirected Forest Service management of these national forests.

<u>SHIFTING FROM DIAMETER TO AGE FOR IDENTIFYING OLD-GROWTH TREES IN DRY FORESTS</u>

When we began developing a plan for the former Klamath Reservation Forest (now a part of the Fremont-Winema National Forest) at the request of the Klamath Tribes, we utilized the 21" rule to limit the harvest of old growth trees and to identify areas of high concentrations of old growth trees (Johnson, et al. 2008). Our fundamental strategy for these forests (restore structural complexity as rapidly as possible) came from a previous assessment that had employed the 21" rule. Also, we used the old growth mapping results from the Audubon mapping project to make an initial spatial identification of "old growth stands." That project utilized a criterion of at least 10 trees/acre over 21".

As we developed the Plan, we used the 21" rule as the limit for harvesting most species. We made a partial exception for white fir, allowing it to be cut up to 24" because many young but large white fir were crowding old pines, providing fuel ladders and intense competition. We presented a draft of this approach to the Tribes and the Forest Service, defending our use of the 21" rule. As we further developed the Plan, though, doubts began to surface about the usefulness of the rule. First, we found areas where significant number of old growth ponderosa pine trees (older than 150-160 years) were less than 21" dbh. In some places most of the remaining old growth trees are less than 21" dbh. While this is a localized phenomenon, we have also found it on the Deschutes NF. (As an example, the pine forests along Highway 20 near Black Butte Ranch have significant numbers of old growth trees less than 21" dbh.) Because of their economic value, you can be sure they will be harvested in density treatments if allowed. Thus, the 21" rule would allow the harvest of old growth pine trees. Similarly, one of us (Franklin) has encountered a stand of very old western larch on trust lands in Washington State, in which most of the larches were less than 21 inches.

Second, we became convinced that harvest of large, young growth white fir was an essential part of restoring old growth ponderosa pine forests. This harvest is now permitted as an exception to the rule but the Forest Service is somewhat reluctant to push this harvest. As an example, the harvest analysis provided the Region 6 that we used in this paper excludes volume over 21". We became concerned that this crucial component of restoration would not occur in the magnitude that is needed. Third, we began to see the conservation effort more as one of maintaining all the old trees across the landscape than the identification of old growth groves per se that would be reserved. As such, we wanted to be sure that we used a rule that catches all the old growth trees that now exist.

Considering the density of treatment in the LJCW, projects in the areas need to be planned and implemented at the landscape level to be effective and to insure that spatial complexity is incorporated at larger spatial scales. Landscape level considerations include 1) what proportion of the landscape needs to be treated to achieve the goals, 2) what size of areas to treat at one time, and 3) the spatial heterogeneity desired within each size of landscape.

Considering actions over the first twenty years, Franklin and Johnson interpret prior research (2007) results as follows:

- Fuel treatments optimally placed to disrupt the growth of large fires require at least 20-40% of the landscape be treated and randomly placed treatments require at least 40-80% of the landscape be treated to achieve the same affect.
- Given the inevitable compromises over where treatments will occur, we average the two ranges to give an overall average of at least 45% of the landscape treated in the first 20 years.
- In addition, most units will be treated once or twice over the first fifty years as maintenance of previously treated units is balanced with treatment of new units.

Also, perhaps one-third of the landscape will be left untreated.

Johnson, et al. (2008) focused on ecological restoration of a 600,000-acre portion of the Fremont- Winema National Forest. They argued for comprehensively treating the forests, meadows, and glades at a rate of approximately 3% per year for the first 20 years.

Spatial heterogeneity is an essential element in restoring and sustaining Dry Forests and landscapes. Restoration activities need to build upon and enhance existing residual spatial heterogeneity. Ecological restoration will rarely involve extensive areas of uniform treatments. A complex pattern of open and dense forest, meadows, and glades should result with:

1. Small dense patches of seedlings and saplings. Johnson et al. (2008) proposed at least 10% of these "skips";

2. Medium-sized dense patches (300+ acres in size) scattered over the landscape to help provide habitat for wildlife species; and
3. Variability in landscape-level forest and non-forest patches.[2]

PRESCRIPTIONS

G7, G5 (WARM DRY PONDEROSA PINE / DOUGLAS-FIR STANDS)

The G7/G5 biophysical environments comprise 30% (14,810 acres) of the forested landscape within the LJCW. 7588 acres are considered high priority.

Recommended treatment:

- Thin approximately 25% of the high priority polygons per year for the first four years and an additional 25% from 4 to 8 years, 25% 8 to 12 years, and final 25% in 12 to 16 years.
- Retain old (>150 years), early seral, fire resistant species (ponderosa pine, western larch, Douglas fir) using the Van Pelt Old Tree Identification Guide to a minimum density averaging 60 square feet per acre.
- Fill in with younger, larger diameter co-dominant fire-resistant species where necessary to achieve minimum stocking. Utilize pockets of shade-tolerant species to create gaps (0.1-3 acres opening) over approximately 10% of the treated polygon.
- Create skips, feathering the outside perimeter for approximately 2 chains, over 10% of the area of the treated polygons, the skips could provide travel corridors opportunities or wildlife cover. Gaps and skips should be irregular in shape with varying widths.
- Retain as many snags over 12” dbh as safety of the harvesting operations will permit.
- Concentrate fuels at the landings through tree-length harvesting and supplement with mechanical treatments where necessary to reduce fuel loading to levels allowing under burning, repeating at approximate twenty year intervals of ground fire reintroduction.
- Permit no treatment in polygons not rated high priority during this entry period (approximately 50% of the G5/G7 biophysical environments), retaining large blocks as habitat for wildlife.
- Re-entry cycle timing on entered stands should be approximately 20 years or as needed with initial entry of lower priority stands utilizing the same prescription guidelines. Long range prescriptions can be modified with landscape level treatments being considered.

G6 (WARM DRY DOUGLAS-FIR/PONDEROSA PINE STANDS)

The G6 biophysical environments comprise 42% (21,253 acres) of the forested landscape within the LJCW. 5233 acres are considered high priority. Approximately 71% of this acreage is considered cable-logging ground.

Recommended treatment:

- Thin approximately 25% of the high priority polygons per year for the first four years and an additional 25% from 4 to 8 years, 25% 8 to 12 years, and final 25% in 12 to 16 years.
- Utilize the same general prescription as in the G7/G5 discussion, although the skips [redacted] areas generally present at the toe of the

Figure IV-8. Integration approved treatment acres.

[redacted] needed with initial entry of lower priority stands utilizing the same prescription guidelines. Long range prescriptions can be modified with landscape level treatments being considered.

G4 (COOL DRY DOUGLAS-FIR/GRAND FIR/WESTERN LARCH)

The G4 biophysical environments comprise 26% (13,167 acres) of the forested landscape within the LJCW. 7811 acres are considered high priority.

Recommended treatment:

- Treat 25% of the high priority polygons per year for the first four years and an additional 25% from 4 to 8 years, 25% 8 to 12 years, and final 25% in 12 to 16 years.
- Thin from below, retaining all old, early seral, fire resistant species using the Van Pelt Old Tree Identification Guide to a minimum average density of 80 square feet per acre.

- Fill in with younger, co-dominants trees where necessary to achieve minimum density.
- Vary spacing to create a heterogeneous mix of species and density. Utilize pockets of shade-tolerant species to create gaps (0.1-3 acres) over approximately 10% of the treated polygon.
- Create skips, feathering the outside perimeter for approximately 2 chains, over 10% of the area of the treated polygons, situating these skips could provide travel corridors and thermal cover for wildlife. Gaps and skips should be irregular in shape with varying widths.
- Retain as many snags over 12” dhb as safety of the harvesting operations will permit.
- Since tree-length harvesting may not be feasible with the higher density of the residual stand, mechanical fuels treatment should be utilized where ground fuels exceed recommended levels for keeping wildfire on the ground.
- Permit no treatment in polygons not rated high priority during this entry period (approximately 40% of the G4 biophysical environments), retaining large blocks as habitat for wildlife.
- Re-entry cycle timing on entered stands should be approximately 20 years or as needed with initial entry of lower priority stands utilizing the same prescription guidelines. Long-range prescriptions can be modified with landscape level treatments being considered.

INTEGRATION

Based on integration with other resource needs and opportunities, the number of priority silvicultural acres was reduced. The final agreed to priority acres brought forth from integration were approximately 16,000 acres (Figure IV-8) down approximately 4,500 acres from the proposed 20,632 acres.

The forestry group evaluated all the proposed priority acres with regard to management direction and discovered approximately 4,500 acres were either within Hells Canyon National Recreation Area designated road less or Management Area 13 designated old growth stands. Subsequently much discussion occurred regarding those 4,500 acres. All were in agreement that the identified stands were in need of treatment however, not all parties were in agreement that now is the time.

Meeting discussions occurred surrounding a need for action vs. a stall in development; it was agreed that priority acres overlapping designated road less and/or old growth would be tabled for future review to prevent any progress delays.

Several additional topics of watershed issues and recommendation were discussed during the integration process:

- There was concern of only focusing on the accessible stands and failing to treat all recommended forest stands. Opportunities addressing the broader landscape problems could potentially be overlooked if treatments are limited to accessibility. It was viewed as important to focus on landscape approaches to promote healthy ecosystems not on easy to reach areas.

- Utilization of existing roads was an important consideration for treatment access. Administrative access needs for implementation were of concern with a suggestion of deferring road work until recommended resource treatments were completed.
- Recognition that lack of fire disturbance has allowed for increased grand fir species on dry sites in both diameter size and numbers of trees per acre. It is important to manage for a diverse mix of conifer species to reflect historic patterns and restore fire resilient conditions commensurate with dominant fire regimes.
- The need for increased acres of SSLT and MSLTC was also important for a variety of wildlife species and stand resiliency during wildfire disturbances. Years of overstocked stands have contributed to lack of stand diversity much needed by wildlife species. Through treatment of the over abundant stand structures, progress toward increased large tree components can be accomplished. Integration agreement was reached that diameter limits (ie. 21” dbh) was not a factor when grand fir was located on dry sites in competition with over story shade intolerant species of ponderosa pine, western larch, and Douglas fir. As a result of this agreement it provided avenues to meet recommendations of late old structure and early seral species put forth from wildlife and forestry. Consensus of competitive grand fir on dry sites could also potentially offset some costs of long line operations for restoration treatment where ground based equipment is ineffective.

SUMMARY

Landscape issues exists in most all structural stages in all biophysical groups with the highest deviation from historic pertaining to large tree components. Large trees have limited presence within the LJCW a result of past harvest practices, successful fire suppression, and high levels of suppressed understory increasing stress levels in existing overstory. The single storied large tree is lacking significantly and in some cases non-existent within the warm dry biophysical groups with a substantial excess of multi-storied large tree uncommon in all biophysical groups.

Integration issues and desired conditions provided a base for prescriptions and final priority acres to carry forward to full integration. A need for development of large tree component became a common theme among not only the forestry group but other resource groups as well.

The integration process allowed other resource groups to identify the impacts of the recommendations in both a beneficial and adverse way. Several recommendations presented by the forestry group were complimentary in addressing other resource issues. The resource groups agreed regardless of the type of tool applied to the landscape aggressive first entry treatment is an important integrated approach during implementation.

V. Forest Condition -Fire and Fuels Analysis

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INTRODUCTION

DISTURBANCE HISTORY

Disturbance is an integral process in natural ecosystems, and management of forest ecosystems must take into account the chance of natural disturbance by a variety of agents. Fire is a ubiquitous disturbance factor in both space and time, and it cannot be ignored in long-term planning. Its effects can be integrated into land management planning through an understanding of how fire affects the site and the landscape (Agee, 1993).

Historical information indicates that fire was a common sight in the Blue Mountains of Oregon. Indigenous cultures often used fire for increasing their areas of food supply whether it were plants or wild game. Most extant evidence on fire use from this region is historical and suggests that burning followed an altitudinal gradient: low lying areas were "lately burnt," with new grass and clover (Trifolium) in May and June; open prairie land (from Walla Walla, the Palouse region, Wascopam, and Umatilla) during August; higher areas (in the Grande Ronde or the Blue Mountains) in late August (Indians, Fire and the Land, Robert Boyd).

Several accounts were recorded of Native burning in the Plains of the Columbia. It was common for travelers to comment in their notes and diaries of the amount of burning conducted by the Indians. The journals of Lewis and Clark revealed the complexity of Indian ecology, especially the importance of fire to the horse-mounted hunter-gatherers of the interior country. On their return trip up river in the spring of 1806, Meriwether Lewis reported that the plains of the Columbia were "covered with a rich verdure of grass and herbs for to nine inches high" (this would be bunchgrass, *Festuca Idahoensis*) (Indians, Fire and the Land, Robert Boyd).

A United States Army reconnaissance officer John C. Fremont stood looking toward the Columbia from the western slopes of the Blue Mountains and reported that "smokey and unfavorable" weather conditions obstructed "far views with the glass".

The ubiquitous and controversial Captain Benjamin Bonneville crisscrossed the Snake River-Blue Mountain country in 1834 and later made his notes available to Washington Irving, who wrote an account of those travels. According to Irvin's version, during the summer months the captain witnessed "the season of setting fires to the prairies" – fire and smoke virtually everywhere (Indians, Fire and the Land, Robert Boyd).

George E. Gruell from the Intermountain Forest and Range Experiment Station in Ogden, Utah researched historic documented records from 1776-1900. These records were accounts of early fires in the "interior West" – Montana, Wyoming, Idaho, Nevada, and eastern Oregon. One hundred and forty-five accounts of fires by 44 observers were found. Indians were identified as the primary ignition source over wide areas at lower and middle elevations. The 145 records were further broken out and 41 percent were attributed to Indians; 5 percent were attributed to non-Indians, and 54 percent made no mention of the ignition source. Very likely some lightning fires were inaccurately attributed to Indians, and the fires of unknown origin were caused by both Indians and lightning. Nevertheless, the available record does indicate that Indian set fires were common. Some journalists noted that fire enhanced grasses and inhibited growth of woody plants (Fire on the Early Western Landscape: An Annotated Record of Wildland Fires 1776-1900, Gruell). The majority of these reports were made along principal travel routes. Areas beyond the main travel routes are limited in the records except for an occasional explorer or trapper that may have journeyed into the area.

FUELS AND FIRE METHODOLOGY

STAND CONDITION FIRE HAZARDS – DOWN WOODY FUELS AND LADDER FUELS

Fuels and fire was umbrella under the forestry resource group and took a similar approach for forest condition assessment. Condition needs for fuels (fire hazard) were included on the assessment form found in the Appendix materials following this section.

The contractor, during the forest condition assessment, utilized a provided set of the most common photos series characteristics for this geographic area. These photo series provided an ocular comparison to quantifying natural forest residues (USDA Forest Service GTR PNW 105, 1980). The photos contained visual and written descriptions providing the contractor the ability visually identify the average down woody surface fuels and standing fuels (live vegetation including brush, all size trees, etc.). The contractor would assign a page number of the photo that corresponded to on site conditions and record it on the assessment sheet. This information combined with crown density and canopy layers, from the assessment sheet, provided in-depth information on fuels hazard conditions.

FIRE

Fire history of the area in terms of actual number of fire starts and size were identified from historic records of actual documented fires. Large fires were accessed from GIS and overlaid with Lower Joseph Watershed boundary displaying the temporal and spatial coverage. Fire starts were analyzed utilizing historic records of known fires documented and input in the corporate database. This data included many attributes such as cause, size, suppression costs, date of discovery, etc. Spatially, this data is analyzed for areas of high start densities and cause, and then displayed geographically.

Ecosystems frequented by fire usually contained species that adapted and took advantage of the disturbance. Adaptation occurs in many ways such as: thick bark, ability to sprout from rootstock or stem following a burn, serotinous cones, to name just a few. Climate also has a direct impact on vegetation and will influence the likelihood of that vegetation burning.

Fire regimes have been classified at various scales often encompassing specific mountain ranges or similar climatic areas. A fire regime for a particular land area is a function of the frequency of fire occurrence and fire intensity (F.Irving, 1971). It has also been described as a generalized description of the role fire plays in an ecosystem. These systems for describing fire regimes may be based on the characteristics of disturbance, the dominant or potential vegetation of the ecosystem in which ecological effects are being summarized, or fire severity based on the effects of fire on dominant vegetation (J.Agee, 1993). An important consideration is: a natural fire frequency of a half-century or a few hundred years does not mean that the whole area goes up in smoke every rotational period. There may be fires every year – someplace – in environments characterized as having long fire-free intervals. But the “someplace” is only in those parts of the environment where weather and fuel will support ignition and combustion (R.Thompson and A.Taylor, 1977).

In short, some small areas are micro regimes due to conditions of that specific site and may support fire more readily than that of the entire study area or may not due to weather patterns. That micro regime could be 10 acres or 10,000 acres when looking at a landscape perspective.

The fire regime indicates the frequency or fire return interval and the type of fire severity that is considered *typical*. Fire severity as referenced here pertains to the level of fire effects to the dominate vegetation and post burn conditions on site, ie: percent mortality of overstory/dominant species, re-sprouting potential after a fire, soil-erosion potential etc.

The most common fire regimes in Lower Joseph are I, II, and a smaller percentage of III. This indicates that the frequency (fire return interval) is thought to be between 0-35 years with a low fire severity for regime I. Regime I includes the lower and mid elevation forested plan associations, ponderosa pine, Douglas fir and warm fir groups (Wallowa-Whitman National Forest (W-W) Fire Management Plan). Fire Regime II is considered high severity due to heavy grass and shrub component. Most if not all vegetation in a Fire Regime II is consumed by fire. This fire regime includes low and mid elevation grass and shrubland plant associations dominated by; bunchgrasses, Idaho fescue, and sagebrush as identified in Appendix 3 of the W- W Fire Management Plan.

Table V-1. Fire Regimes as they pertain to post wildfire effects on dominate vegetation

FIRE REGIME GROUP	FREQUENCY (FIRE RETURN INTERVAL) FRI	FIRE SEVERITY (FIRE EFFECTS ON THE DOMINATE VEGETATION)	SEVERITY DESCRIPTION
I	0 – 35 year FRI	Low/mixed severity	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory
II	0 – 35 year FRI	Stand replacement severity	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35 – 200 + year FRI	Mixed/low severity	Generally mixed-severity, can also include low severity fires

CONDITION CLASS

Fire regime condition classes reflect the current conditions' degree of departure from modeled reference conditions. FRCC assessments measure departure in two main components of ecosystems: 1) fire regime (fire frequency and severity) and 2) associated vegetation. Managers can use the departure and condition class data to document possible changes to key ecosystem components (Schmidt and others 2002).

Examples include vegetation characteristics (species composition, structural stage, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances, such as insect and disease mortality, grazing, and drought. Common causes of departure include advanced succession, effective fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, and introduced insects and disease (Brown and Smith 2000; Schmidt and others 2002; Brown and others 2004; Hood and Miller 2007; Tausch and Hood 2007; Stambaugh and others 2008; Keane and others 2009).

Each fire regime has three condition classes that have been developed to categorize the current ecological condition as defined in terms of departure from the historic fire regime. As the condition class number increases a greater deviation is indicated with the associated greater risk of the loss of key biological elements found within the system (Wallowa-Whitman Fire Management Plan, 2002). When the condition class is combined with the regime it provides an indication of the current conditions across the watershed. Below is a brief overview of the condition class – fire regime relationship.

Table V-2. Condition Class departure from historic condition.

CONDITION CLASS	FIRE REGIME
FRCC 1	FRCC 1 Represents ecosystems with low (<33 percent) departure and that are still within an estimated historical range of variation as determined by modeling for the pre-EuroAmerican era (Hann and Bunnell 2001; Hardy and others 2001; Schmidt and others 2002); Fire regimes are within an historical range and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning with an historical range.
FRCC 2	FRCC 2 indicates ecosystems with moderate (33 to 66 percent) departure (Hann and Bunnell 2001; Hardy and others 2001; Schmidt and others 2002); Fire Regime have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Increases in invasive species (weeds and insects), large fire-tolerant trees are disappearing, small diameter fire-intolerant trees are increasing in numbers.
FRCC 3	FRCC 3 indicates ecosystems with high (>66 percent) departure from reference conditions (Hann and Bunnell 2001; Hardy and others 2001; Schmidt and others 2002); Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Uncharacteristic conditions include (but are not limited

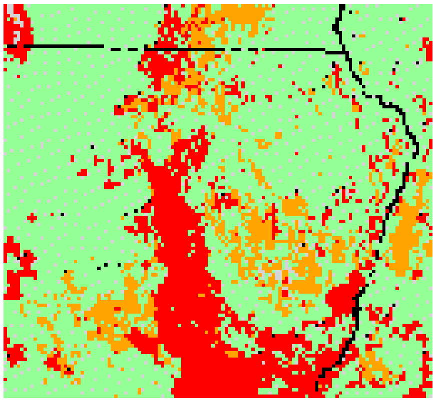
to): invasive species, diseases, "high graded" forest composition and structure (in which, for example, large fire-tolerant trees have been removed and small fire-intolerant trees have been left within a frequent surface fire regime), or overgrazing by domestic livestock that adversely impacts native grasslands or promotes unnatural levels of soil erosion

OVERVIEW OF FIRE DISTURBANCE

Fire return intervals are frequent in the northern Blue Mountains of Oregon, however, fire regimes today have been altered in respect to how fire interacts with the environment. Fire return intervals historically ranged from 0 – 35 years in the low severity regime I, 0 – 35 years in stand replacement severity grass types regime II, and 35 – 200 years in the moderate regime III. The fire regime III for this area is more represented by a closer frequency of 35 – 50 years. Fire frequency has not changed significantly to historical number of starts; the level of fire disturbance across the landscape has been reduced due to successful suppression efforts. The current fire regime for low and moderate regimes have missed between 2 to 5 fire cycles over the last 90 years. Possibly more since fire starts are random and do not occur on a schedule.

Historically when fires occurred in the Lower Joseph watershed a high percentage of the fires were considered low to moderate intensity (non-lethal). The current conditions have a significantly higher level of lethal and mixed fire regimes today. Figure V-1 maps below are based on research material taken out of the September 2002, issue 2 of Science Update, by the Pacific Northwest Research Station and the Interior Columbia Basin Ecosystem Management Project (ICBEMP). The current regime shows conditions have moved from a non-lethal/mixed regime to a mixed/lethal regime. In the event of a wildfire, it can be expected that existing watershed conditions would burn with results depicted in the current fire regime map shown in Figure V-1.

Changes from historic are described in severity classes by a wildfires effect on vegetation and how often these effects occur. The severity classes are non-lethal (does not kill the dominant layer of plants), mixed (mosaic severity patterns spatially, combination of fire effects), lethal (kills the dominate layer of plants; and rarely burns (2002, ICBEMP).



Historic Fire Regimes relating to fire impacts to the dominant

Current Fire Regime for Northeastern Oregon Historic Fire Regime for Northeastern Oregon
Lethal Mixed Non-Lethal Rarely State Boundaries

(Photos from ICBEMP, 2002)

Emily Heyerdahl completed a study through the University of Washington in 1996 on Historical Fire Regimes of Four Sites in the Blue Mountains, Oregon and Washington. The study was designed to reconstruct a multi-century history of fire regimes at a landscape scale, across a range of forest zones in the Blue Mountains using standard methods of dendrochronology.

The study investigated the influence of topography on fire intervals by correlating elevation, aspect class and slope with median fire interval from individual plots sorted by site, for the period 1687 to 1900. The study found no significant relationship for aspect or slope at any site, nor elevation except at Baker.

In the 40 dry forest plots at Imnaha, median fire intervals ranged from 15 to 88 years. For the same period, a sampling site from the previous study, located within our Imnaha sampling site, had a median fire interval of 12 years. Fire return intervals were obtained through interpretation of fire scars, and reconstruction of fire extent and intensities. Emily's study stated that their estimates of fire extent in both dry and mesic forests are conservative because most fires intersected the boundaries of the sampling sites. Also, fire extent for most years was large relative to modern classifications of fire size. At Tucannon and Imnaha, the mean number of fires from 1750 to 1900 was 1 in mesic forest but 3 to 5 in dry forests. Emily stated, "We have probably underestimated fire recurrence in dry forests at all sites for several reasons. First, very low severity fires may not scar any trees. Second, we may not have detected some small fires, especially in the low density sampling areas. Third, because we sampled only an average of 3 trees per plot, we may have missed some evidence of fire".

Heyerdahl's mesic forests sampling was less accurate than her dry forest testing. Because only four fires were reconstructed in mesic forest at the Tucannon and Imnaha sites, all of which intersected the boundary of the study area, we can only draw limited conclusions about the annual extent of fire in these forests. Each site experienced years of both large and small fire extent, relative to the sampling area. Most of these fires are in class E (300-999 ac) but some are in class F (1000-4999 ac), (Heyerdahl and Agee, 1996).

In the year 2000 Diana Olson completed her master thesis on *Fire in riparian zones: a comparison of historical fire occurrence in riparian and upslope forests in the Blue Mountains and southern Cascades of Oregon.* One of her study areas was on the Wallowa Whitman National Forest approximately 3 miles west of Baker City, Oregon. It is located on the northeast slope of the Elkhorn Mountains and it encompasses the lower portions of the Marble Creek watershed, extending northwest to the Mill Creek drainage and southeast to the Elk Creek drainage (Diana L. Olson, 2000). This study is currently the closest geographic study that has been done to compare upland and riparian.

Olson's study was separated into the following three different categories: stream size comparisons, forest type, and slope aspect comparison. The study showed that overall the riparian fire return intervals in Baker study area are longer than upslope fire return intervals. The time span distance depended on how they were categorized. When both large and small streams are combined, the fire return intervals showed 15 years for riparian and 11 year for upslope. When looking at a large stream only, the corresponding fire return intervals were 13-year within the riparian area and 10-years upslope. Smaller stream riparian results were 17-years for riparian and 10-years for upslope. This indicates that although riparian areas do not exhibit the same general fire return interval they did experience fires at upper end of each interval range.

The Wallowa Mountains Zone is a transitional district at the most northern portion of the Blue Mountains. North of the district lies the wheat field of Washington State and the Grande Ronde River basin with steep grassy side slopes. Forest types to the north range from a dry ponderosa pine to a mix conifer with some Engelmann spruce in moist areas. The Eagle Caps further transition from a ponderosa pine and mixed conifer at low elevation to mixed conifer, subalpine fir stands as the elevation increases. In the eastern Cascades and Blue Mountains, Pseudotsuga menziesii forests are found as a transitional type between non-forest areas or Pinus ponderosa forests at lower elevation and Abies grandis or Abies lasiocarpa forests at higher elevation (Agee, 1993). In the Blue Mountains, Hall (1976) found a 10 year fire-return interval using single stump samples.

FIRE REGIMES

On federal public lands there is a representation of fire regimes I, II, and III in Lower Joseph covering 43, 44, and 13 percent respectively. FRCC assessments use disturbance-adapted vegetation as a proxy to describe biophysical settings that represent the collective, integrated attributes of an environment. Inclusion of disturbance is critical for FRCC determination because the metric is based on an estimate of departure from vegetation seral stages and their interrelationships with fire frequency, fire severity, and other disturbances across landscapes historically (FRCC Guidebook version 3.0, September 2010).

A more detailed analysis was completed using known plant association groups in conjunction with the biophysical settings of the Lower Joseph area. The current stand classes were obtained from the forest vegetation layer and an on the ground field recon of the area. The obtained information was then compared to the historical data provided from the National Interagency Fire Regime Condition Class (FRCC) Guide Book. Developed in 2003, the Fire Regime Condition Class (FRCC) assessment system provides a vital connection between mangers' understanding of fire regimes, ecological departure, and efforts to maintain sustainable landscapes (USDA, USDI 10-Year Comprehensive Strategy and Implementation Plans 2001-2002. Coarse-scale definitions for natural fire regimes were initially developed by Hardy and others (2001) and Schmidt and others (2002) and subsequently re-interpreted by Hann and Bunnell (2001). The five natural fire regime groups are classified based on the average number of years between fires (fire frequency or mean fire interval [MFI]) combined with characteristic fire severity reflecting percent replacement of dominant over story vegetation (FRCC Guidebook version 3.0, September 2010).

Descriptions from the Interagency Fire Regime Condition Class (FRCC) Guidebook and the Wallowa-Whitman National Forest crosswalk of Blue Mountains fire regime potential natural vegetation group (PNVG) were used to identify the ecology classes that fall under each PNVG within the Lower Joseph watershed. Acres for the eco-classes in timbered areas were identified through on ground visits, contracted field surveys, and where data was missing the Wallowa-Whitman GIS vegetation layer. One PNVG fire disturbance regime may contain several eco-class vegetation groups due to fire frequency and fire severity.

Forested areas within the Lower Joseph Watershed fall into four types: Ponderosa Pine-Pacific Northwest/Great Basin (PPIN1) (Hot Dry), Ponderosa pine – Douglas-fir (Inland Northwest) (PPDF1)(Warm Dry), Douglas-fir Interior Pacific Northwest (DFIR1)(Warm Dry), and Douglas-fir Interior (DFIR2)(Cool Dry). Grasslands are represented by Mountain Grassland (without trees or shrubs) (MGRA1) and Mountain Grassland (with trees) (MGRA2).

The PPIN1 (Ponderosa Pine-Pacific Northwest/Great Basin) comprises approximately 3 % of the Lower Joseph area. The PPIN1 PNVG generally occurs on flat and gentle south-facing slopes on the east slope of the Cascades, in the northwest but locally in the Blue Mountains and Wallowa Mountains. The lower montane forest type is formed by heterogeneous mosaics of even-aged stands. This PNVG primarily transitions to mixed conifer, juniper, sagebrush, and grassland communities in the northwestern U.S. The fire regime for this PNVG is primarily short-interval of <20 years with ignitions spreading as surface fires. Historically, late-open stand structure comprised 55% of the landscape with widely spaced trees, diverse understory, and limited surface fuels due to frequent burning. Mid-open structure made up approximately 20% of the landscape with a diverse herbaceous understory and scattered woody shrubs maintained by frequent burning. Late closed made up 10%, mid-development closed 5%, and 10% in post replacement.

The PPDF1 (Inland Northwest) sites make up approximately 35 % of the Lower Joseph area. This PNVG generally supports co-dominant, fire-maintained mix of ponderosa pine and Douglas fir. Historically 40 percent of the landscape supported stands that were open, late-seral fire-maintained forest co-dominated by Douglas fir and ponderosa pine. Twenty-five percent was open pole to large sized forest, often with a mixed herbaceous understory (pine grass/elk sedge) and shrub layer. The remaining landscape of PPDF1 consisted of 15% grass and forbs with sprouting shrubs, 10% dense pole to large sized, multi-storied forest with a diverse shrub layer and 10% closed, multi-storied late-seral forest showing signs of insect or disease attack and mortality resulting from competition. Fires occurred relatively often in this forest type supporting a Fire Regime I with short intervals of less than 25 years. The fire frequency allowed for ground vegetation to be diverse in this forest type. (Interagency Fire Regime Condition Class Guidebook, May 2005)

The DFIR1 has a primarily short fire return interval of 10 – 20 years, is a fire regime 1 and comprises approximately 9 % of the watershed. There is currently an abundance of closed stands in mid-development and a deficit of late open stand structure. There is heavy encroachment of small diameter saplings increasing the level of ladder fuels and creating a closed canopy under the dominate overstory. Historically forty-five percent of the landscape was comprised of late-open structure and an additional 15 percent was represented by late closed. According to the newest fire regime condition class information, this meant very large Douglas-firs with some ponderosa pine and true firs with less than 50% cover with low shrub understory. Twenty percent of the landscape was comprise of mature to large Douglas-firs at <50% cover with low shrub understory. The remaining percentage of the landscape was distributed evenly with stand initiation, sapling to pole-sized Douglas fir and dense large Douglas fir with true firs or ponderosa pine at >50% cover. (Interagency Fire Regime Condition Class Guidebook, May 2005)

Douglas-fir Interior or DFIR2 is also considered a fire regime 1 with short to moderately long intervals with a 30-year mean fire return interval (MFI). The Lower Joseph area supports approximately 13 % of the DFIR2 and GFDF. This PNVG occurs on moderate to steep slopes on northerly aspects in mid to high elevation zones. It can occur in rocky, mesic sites with lodgepole pine, western larch, and some true firs. The Douglas-fir stands in the Lower Joseph area are currently very dense with a significant amount of seedling and sapling pole size trees due to fire exclusion. There is a high level of mid- development closed stands were historically these stands were late-open and late closed. DFIR2 historically was comprised of 25% of the landscape being mid-development closed where within that DFIR2 mid-development closed area > 50% sapling to pole-sized lodgepole pine and larch occurred with sapling-sized Douglas-fir. The mid-open historically supported 20 % of the landscape. These mid open areas were considered to have < 50% Douglas fir and lodgepole pine pole with open understory: true firs, aspen, and larch in patches. The late open historically supported large Douglas fir with open understory: patches of true firs, lodgepole pine, larch and aspen. (DFIR2 of Interagency Fire Regime Condition Class Guidebook, May 2005 and Interagency Fire Regime Condition Class Interagency Handbook Reference Condition, Potential Natural Vegetation Group, 2003.)

The GFDF PNVG is a mesic montane type east of the Cascades, occupying gentle to moderately steep slopes. Stand over stories range from relatively open to densely stocked, and usually dominated by early to mid seral species such as western larch, Douglas-fir, and western white pine; grand fir regeneration increases markedly during mid to late successional stages. Stand understories range from moderately open to dense, and are dominated by various mixes of shrubs and forbs such as queencup beadlilly, twinflower, wild ginger, ninebark, oceanspray, mountain maple, globe huckleberry, and beargrass (Interagency Fire Regime Condition Class Guidebook, May 2005 and Interagency Fire Regime Condition Class Interagency Handbook Reference Condition, Potential Natural Vegetation Group, 2003).

Throughout the Lower Joseph watershed particularly above 3500 on the more gentle to slightly steeper slopes there is an intermix of DFIR1, DFIR2, and GFDF across the landscape. There is no specific line separating the fire return intervals within these stands. Frequency can range from 0 to 50 years in this area depending on weather trends rainfall, snowpack, and summer drying. It is estimated that 70% of the stands in the GFDF experienced non-(stand) replacement fires primarily in the mid-open and late-open structures (GFDF of Interagency Fire Regime Condition Class Guidebook, May 2005 and Interagency Fire Regime Condition Class Interagency Handbook Reference Condition, Potential Natural Vegetation Group, 2003.)

These stands fit within the DFIR2 vegetation type and the (GFDF) grand fir – Douglas-fir with a slightly longer fire return interval of 35 to 50 years.

GRASSLANDS

Grasslands and large meadows are considered fire regime II. These areas experience fire every 0-35 years and are considered stand replacement. Disturbance in these areas (without fire suppression) are high and dependent on fire to maintain an open appearance. Grassland areas and meadows often burned in conjunction with the stands. Some meadows within the Lower Joseph Watershed are experiencing encroachment of trees due to the lack of disturbance. Shrublands and grasslands do experience all severities of burns.

The MGRA1 (Without Trees or Shrubs) comprises approximately 30 % of the area. It occurs on gentle (<30%) northerly aspects in the lower montane zone, gentle southerly aspects in the montane zone, and steep (>30%) southerly aspects in the upper montane zone. This mountain grassland has a fire regime of II with primarily short intervals of <20 years and is considered stand replacement resulting from complete consumption of the above ground vegetation leaving the stubble and root systems intact (Interagency Fire Regime Condition Class Interagency Handbook Reference Condition, Potential Natural Vegetation Group, 2003).

Mountain Grassland with Trees (MGRA2) makes up 15 percent of the area within Muddy Sled. MGRA2 are located on flat to gentle southerly aspects in the montane zone and steep (>30%) southerly aspects in the upper montane zone. Fire regimes I and II can be found within the MGRA2 with a primarily short fire return interval (e.g., <20 yr.) replacement and surface fires (Interagency Fire Regime Condition Class Interagency Handbook Reference Condition, Potential Natural Vegetation Group, 2003).

Landscape dynamics in the interior west are controlled by a combination of site conditions (soils, elevation, aspect and the timing and severity of disturbance. Fire was the dominant disturbance controlling the structure of forests of the interior west before the settlement era (Agee 1993, 1994; Smith 1983) and numerous studies have examined the effects of fire on stand composition and structure (reviewed by Keane et al. 1990).

The disturbance process for the vegetation within the Lower Joseph Watershed varies depending on the site conditions. Areas of mixed severity within the watershed were typically mosaic type fires that created small openings and larger areas where only a small percentage of the stand suffered mortality. These are often mid to higher elevation mixed conifer stands that support more fire resistant species such as ponderosa pine, Douglas-fir, and western larch. Fire often maintained these stands by periodically consuming the understory and ground fuels. Fire often burned on the ground until contacting pockets of heavy down fuels and torching out pockets of trees. These pockets can vary in size. When fire did pass through these stands a mosaic frequently occurred on the *landscape*. This type of regime displayed a combination of severities resulting in areas of stand replacement openings, canopies with residual live trees with some mortality, as well as areas of low intensity ground fires where the canopy would remain intact. Mixed severity fires typically contained the most diverse plant species consistent with the DFIR2 and GFDF potential natural vegetation group.

Areas that experienced low severity ground fires were often the open stands of ponderosa pine or ponderosa pine & associate type stands. The result of low severity burning in the pure ponderosa pine types was a more open park like stand with the least amount of understory due to the frequent fires and limited seedling establishment. When seedlings did occur it was often in small isolated clumps generally in locations where fire missed a cycle or a mosaic burn occurred.

Fire regimes conditions today are inconsistent with historic regimes. Historically, ponderosa pine is typically low severity regimes while mixed conifer will range from a low to mixed severity fire regime. Today however, many of the forest types are demonstrating higher levels of severity compared to those historically. For instance, ponderosa pine forests, once low severity fire effects, are now displaying a more mixed and sometimes high type fire severity. Fire intensities (heat generated while burning) within the ponderosa pine forests are significantly higher than historic resulting in a higher level of mortality (severity) and adverse fire effects overall. Two contributing factors are; the higher levels of downed fuel and increased layers of ladder fuels producing denser understory.

Fire regularly visited this area and kept the fire intolerant species in check promoting more tolerant fire species such as ponderosa pine, Douglas fir, western larch and aspen. Small micro-regimes exist in the watershed where fire can be expected to burn more mosaic until conditions were favorable to support a fire. When conditions were conducive fires would spread in all areas including the moister sites where isolated torching would occur.

Abies grandis forest has the most moderate environment of the forest zones of the eastern Cascades area. The Abies grandis zone occurs from 4,500 to 6,000 feet in the Ochoco and Blue Mountains (Hall 1967). This Abies grandis zone is a transitional forest zone with an intermediate fire regime between the lower elevation forests and the upper high elevation forests. In Abies grandis forests, associate species of grand fir may often be the primary dominants: western larch, lodgepole pine, Douglas fir, or ponderosa pine. The fire regime for this area resembles more of a moderate type fire regime often burning at various levels of severity. These areas typically experience light underburns in the grass and open stand types. A more moderate severity burn may occur in denser stands causing individual torching of trees or in some instances a higher severity burning in clumps of trees where patch sizes may vary with stand conditions.

Today, there are and have been a number of human influences affecting fire's role within the watershed. Some of these include:

Fire Suppression

- Limits the acres burned within the watershed
- Converts stands from fire tolerant to fire intolerant species
- Increases fuels within stands.
- Promotes abundance of suppressed understory that contributes to ladder fuels and higher intensity burning.
- Natural pruning of lower limbs is prevented creating full bole canopy

Harvest Activity

- Breaks up stand continuity throughout the landscape
- Changes stand structure and plant communities
- Trend toward fewer large trees and increased acreage of denser stands of smaller trees.

Road Systems

- To some degree provides natural barriers for fire spread
- Provides direct access to fire starts
- Access for public; increasing possibilities of human ignitions

CURRENT FIRE REGIME CONDITION CLASS

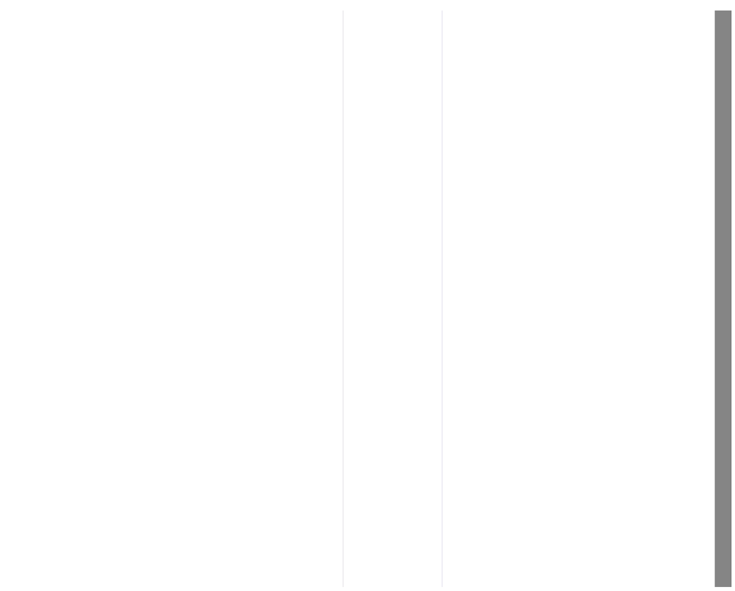
Condition class 3 is the most prominent stand condition within the watershed. The condition class or current ecological condition is considered to be outside of the historical range and the risk of losing key ecosystem components is high (Wallowa -Whitman Fire Management Plan, 2002).

Down woody fuels and stand condition on the landscape were compared to the representative descriptive data for each condition class listed in the Fire Management Plan for the Wallowa Whitman National Forest under section

FIRE FREQUENCY AND SEVERITY CONDITION CLASS.

During the contractor's forest condition assessment, they identified species, down woody fuel loadings (tons/acre), stand layers and crown density. This data was analyzed together to identify the number of stands that are currently outside their historical conditions pertaining to fire regime condition class. The following graph shows the number of stands supporting multiple layers. Based on field data surveys a high percentage of timbered areas are outside the historic condition class.

Figure V-2. Percent of Timbered area by stand structure layers



Seventy six percent of all stands surveyed contain three or greater structural layers. Forty six percent of the stands containing three or more structural layers support ponderosa pine. This is significant in that historically the PPIN1 and PPDF stands were predominately single or two layers. Figure V-2 shows the percentage spread of layered stands within the Lower Joseph Watershed.

Forest types in the Ponderosa pine – Douglas-fir (Inland Northwest), Douglas-fir Interior Pacific Northwest (DFIR1), Douglas-fir Interior (DFIR2) and the Mountain Grassland (without trees or shrubs) are currently in condition class three or two based on fire regime condition class (FRCC) protocol. Due to successful suppression efforts, these areas have missed 2 to 4 fire return intervals. Missed fire return intervals have resulted in uncharacteristic stand densities, fuel loadings and species composition from what existed on site historically.

Historically, the composition of the forest mosaic was largely determined by topography, especially elevation and aspect and closely related fire regimes. Ponderosa pine dominated southerly aspects, and a mixed coniferous cover including ponderosa pine, Douglas fir, and grand or white fir dominated the northerly aspects. Patches of shade-tolerant but fire-intolerant conifers displayed a much higher degree of spatial isolation than exists today. Today, regardless of aspect, dense patches of multi-layered shade-tolerant conifers are now most often found directly adjacent to patches of a similar kind (Hessburg and Agee, 2003).

Stand densities are well above what existed historically. Many of the ponderosa pine are succumbing to heavy competition or have been cut and removed from site resulting in non- [redacted] overstocking and stagnation (Agee 1994). In most dry mixed- conifer stands, effective fire suppression resulted in filling all of the growing space with trees by about 1960 (McNeil and Zobel, 1980), unless larger trees were subsequently harvested.

Figure V-3. Example of Ponderosa pine with heavy undergrowth and excess down woody material.

The architecture of mixed-conifer stands has changed both horizontally and vertically. The spatial patterns of a mosaic of several species with each containing a single clump species, has been replaced by the density of a single (Douglas fir, white fire, or grand fir) shade-tolerant species (Agee and Edmonds 1992, Thomas and Agee 1986). A human-induced shift from low-severity fires towards moderate-to high severity fire has occurred in drier portions of the Douglas fir and grand fir series. A related example is the Dooley Mountain fire along Highway 245 south of Baker City, Oregon that killed most trees. The large size of ponderosa pine and Douglas fir trees across the burned area suggests that the trees survived many fires in past centuries. Fire intensity has increased on both of these sites, apparently surpassing the past fire-intensity range, because of fuel buildup and “ladder” fuels enabling surface fires to move into the canopy (Agee 1994). Higher fire intensities have a direct correlation to the level of fire severity (post burn effects) a stand will experience.

Increased stand density had additional effects through the loss of grass and brush component as ground cover. Where stands are open and less shaded there is more abundant species diversity in the grasses and forbs. Studies completed on watersheds within the Grande Ronde found the following changes in ground cover. Substantial basin-wide shifts in the understory composition and stand structure from open to closed stands in

Figure V-4. Younger cohorts beneath Ponderosa pine and Douglas fir

stand structure as well as dead trees.

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shrublands resulted from the expansion of the dry forests and woodlands, and the development of croplands including both annual field corps and extensive hayland and pastures (Hessburg et al., 1999a).

Research completed in the (GTR-328) Historical and Current Forest Landscapes of Eastern Oregon and Washington discuss the increase in understory composition and

Figure V-5. Data derived from on the ground surveys of timbered stands.

the Grand Ronde and Pend Oreille basins. Open grass/forbs and shrub understories decreased from 90 to 100 percent from historical values in the Grande Ronde (Lehmkuhl et al, 1994). The loss of forest burning by all mechanisms during the last half of the 19th century set in motion dramatic changes in physiognomic conditions. Successful fire prevention and suppression programs of the 20th century further reinforced these changes. The loss of native pine understory increased by over 1000 percent from historical conditions (P≤0.10), while shade-tolerant Douglas-fir/grand fir increased 24-percent (P≤0.10) and subalpine fir increased 100-percent. Overstory canopy closure declined by 22-percent (P≤0.10) at the same time that total canopy closure did not change, indicating an increase in understory cover and density. Stand density also increased horizontally as shown by changes in tree distribution with stands, or stand clumpiness (GTR-328).

Site conditions today are denser in both the overstory and understory than historically existed. In a study of "Historical and current stand structures in Douglas-fir and ponderosa pine forests." conducted by Peter Ohlson and Richard Shcellhaas, a comparison was made in forest series on the eastern slopes of the Cascade Mountains. While there was considerable variability among plant association groups (PAGs), there was an overall increase in tree density, measured in terms of trees/acre and total basal area, between historical and current conditions. The plant association groups experienced the following increase in mean total trees/acre over the last 100 years:

- Warm Mesic Shrub Herb (WMSH) = + 43%
- Hot Dry Shrub Grass (HTSG) = + 100%
- Warm Dry Shrub Herb (WDSH) = + 209%
- Warm Dry Tall Shrub (WDTS) = + 12 %
- Cool Dry Grass (CDG) = + 92%

The increase in tree density has not been uniform over the last 100 years. Many stands reached their maximum density 40 to 50 years ago. McNeil and Zobel (1980) also noted that by 1960 effective fire suppression had resulted in young trees occupying all growing space in dry, mixed-conifer forests. The increase in density throughout the early 1900s represents an understory re-initiation phase of stand development following fire exclusion (Oliver and Larson 1990, O'Hara et al. 1996). Under the historical fire regime, recruitment of new cohorts likely occurred in pulses following fires; however, with the exception of a few individuals, these cohorts would have been destroyed during subsequent fires. In the absence of repeated fires since 1899, these post-fire cohorts have persisted. Many of these stands are now in a stem exclusion stage (Oliver and Larson 1990, O'Hara et al. 1996) where total tree density is declining because of competition for site resources. Arno et al. (1995) also report losses of live trees in recent decades on plots in similar forest types in western Montana. Losses from timber harvest were a minor factor in this analysis because the criteria for site selection eliminated stands where substantial past tree harvest occurred (Peter Ohlson and Richard Schellhaas).

Forest stand structures and species compositions have been dramatically altered since 1899. All sampled PAGs within the Douglas fir and ponderosa pine series have had increases in trees/acre with a shift toward stand domination by a more shade tolerant tree species. Peter Ohlson and Richard Schellhaas's conclusions agree with other research in the eastern Cascades indicating current stand density increases of 2 - 7 fold over historical conditions (Everett et al. 1996, Ohlson 1996, Camp 1999).

The increase is likely a result of decreased mortality of small trees in the absence of fire over the past century. A dense layer of Douglas fir now dominates what were once open stands of predominantly ponderosa pine. These younger cohorts have also breached the discontinuity between ground and crown fuels that existed under the historical disturbance regime, increasing the potential for stand replacement crown fires (Ohlson and Schellhaas). Where it occurs, western larch is being eliminated. Increased stand density has resulted in higher rates of mortality for the shade intolerant larch and natural regeneration of this species in these fully-stocked stands is very unlikely (Schmidt and Shearer 1995).

During the past few decades, stand density has increased in many stands while basal area has also continued to increase. This competition-induced mortality has also added to fuel loads in these stands. Douglas fir and ponderosa pine forest stands are no longer in synchrony with their inherent disturbance regimes. Increased stand density predisposes these sites to catastrophic wildfires or insect and disease outbreaks.

Stand densities based on actual stand surveys completed during the forest assessment within the Lower Joseph Watershed are consistent with the findings of the (GTR) General Technical Report – 328. The crown densities within stands on the watershed are extremely high. Approximately 19% of the timbered stands are less than 40% and more than half support greater than 60% crown density.

Crown density in combination with heavy fuels loadings and multiple layered stands will increase the probability of stand loss and likely stand replacement fires in timbered areas.

Since fire suppression, the fire potential has increased in three definable ways: surface fire intensity has increased due to increased fuels; torching potential, or the ability of a fire to move into the crowns, has increased due to vertical "fuel ladders" and low height to live crown; and the ability of fire to move through the crown has increase due to higher crown bulk densities (Graham et al. 1999, Agee et al. 2000, Edmonds et al. 2000).

FUEL MODELS

Fuel models present in the watershed today are primarily due to some harvest activity and successful fire suppression. Fuel model 1 (open grasslands) shows a decrease in upper elevation sites where suppression has allowed stands to encroach on upland meadows and grasslands.

Many areas that historically supported a fuel model 8 have either converted to a fuel model 9 or have taken on the characteristics of a fuel model 10 due to fire exclusion causing an accumulation of down woody fuels. Fuel model 8 was commonly found on sites where fires frequently occurred and where grass was present to carry fire under the canopies. The significance of this is:

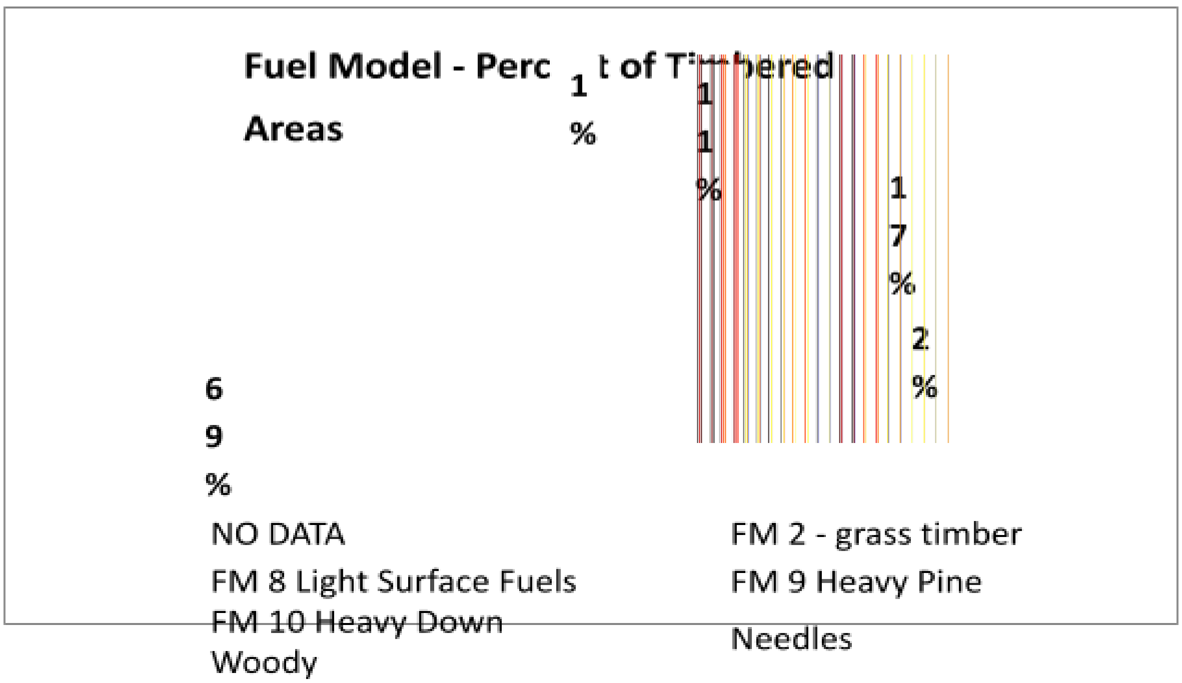
- Fuel model 8 is the primary supporter of the low intensity fires that existed in the reference condition.
- Plant and stand composition has been altered with this reduction.

- Plant and stand structure have a direct effect on wildlife behavior, intensities, and effects.

Fire suppression has allowed fuel model 10 to continually increase where historically a fuel model 8 existed.   The fuel model 10 stands have also changed geographically from the reference condition. Fuel model 10's today have been compounded by additional fuels in all size classes. Today's fuel model 10 exhibits widespread high intensity type fires because of the continuous fuel bed and dense stands, that was often broken in the past from small patches of fires on the landscape.

Fuel model 9 is present in primarily ponderosa pine stands with heavy needle case and support little to no grass or heavy down woody. Closed stands of long-needled pine like ponderosa, Jeffrey, and red pines, or southern pine plantations are grouped in this model. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning (Hal E. Anderson, 1982)

Figure V-6. The current fuel models identified in the Lower Joseph timbered areas.



Activities which lengthen the fire return interval (e.g. fire suppression) have allowed increased accumulation of coarse woody debris to occur. This phenomenon is particularly prevalent in many ponderosa pine and mixed-conifer forests (Parsons and DeBenedetti 1979) and wilderness areas (Barrett 1988).

The longest fire-free intervals of many low-elevation forests of the inland Pacific Northwest have occurred since the beginning of the era of active fire suppression (Hall 1977, Bork 1985). The most apparent changes in these forests include succession to fire-intolerant, shade-tolerant conifers (e.g. white fir, grand fir, incense-cedar) and the decrease of species such as ponderosa pine, sugar pine and western larch. This has resulted in changes in both the horizontal and vertical structure of the forest. Historically, this forest was open and park like (Walstad, John D., et. al 1990, Natural and Prescribed Fire in the Pacific Northwest). As a result of vegetation changes in low-elevation pine types, fuel loads have been drastically altered. Vertical separation between surface fuels and the conifer overstory has been eliminated by the formation of a mid-story conifer layer (Walstad, John D., et. al 1990, Natural and Prescribed Fire in the Pacific Northwest). Duff layers and woody debris have increase while the biomass of the herbaceous component has decreased. The overall increase in surface fuels and the laddering effect of the small to medium to tall trees had increased the threat and occurrence of crown fires where historically they were rear (Lotan et al. 1981).

The fire regimes and current condition classes have been altered within the Lower Joseph watershed as a result of fire suppression. Historically there were more acres of fuel models 2, and 8 due to frequent low-severity fires and less acres of fuel model and 10. Currently mixed conifer and ponderosa pine stands support a high stand density, heavy understory, are multi-layered and have had fire exclusion for more at least 3 – 4 return interval resulting in heavier fuel loadings converting many of these stands to a fuel model 10.

Sixty nine percent of the watersheds timbered stands support enough heavy down woody material classifying them as a fuel model 10. Thirty-eight percent of the Fuel Model 10 stands contain heavy down woody material, 3 or more layers of trees growth and over 60% stand density. These stands are extremely susceptible to crown damage during wildfires as well as stand replacement. These stands are outside their historic range qualifying them as a condition class 3. Figure V-7 photos provide a likely representation of fuel models described.

Figure V-7. Fuel Models

Fuel Model 2 – Timber/grass/some brush

Fuel Model 8 – Timber/very little surface

Fuel Model 9 – Pines stands heavy needles

Fuel Model 10 –moderate to abundant down fuels

FIRE OCCURRENCE

F igure V-8 demonstrates the frequency and distribution of starts throughout the watershed. Fire starts are dispersed throughout the watershed with certain areas of dense concentrations. However, all areas of the watershed have experienced fire starts at some time. The points identified are those recorded with the Wallowa Whitman National Forest. They do not include any starts that may have occurred on private or state lands or fires that went undetected and extinguished on their own.

Between the years of 1970 to 2008, fires are a common occurrence in the watershed and will continue to be in the future. Disturbance plays an important part in the ecological development of Lower Joseph Creek Watershed. Fires interaction with the watershed is primarily influenced by the elevation, slope, aspect, and seasonal weather conditions at the [redacted]

Figure V-8. Recorded fire starts

203 fires / 39 years = 5.2 fires per year

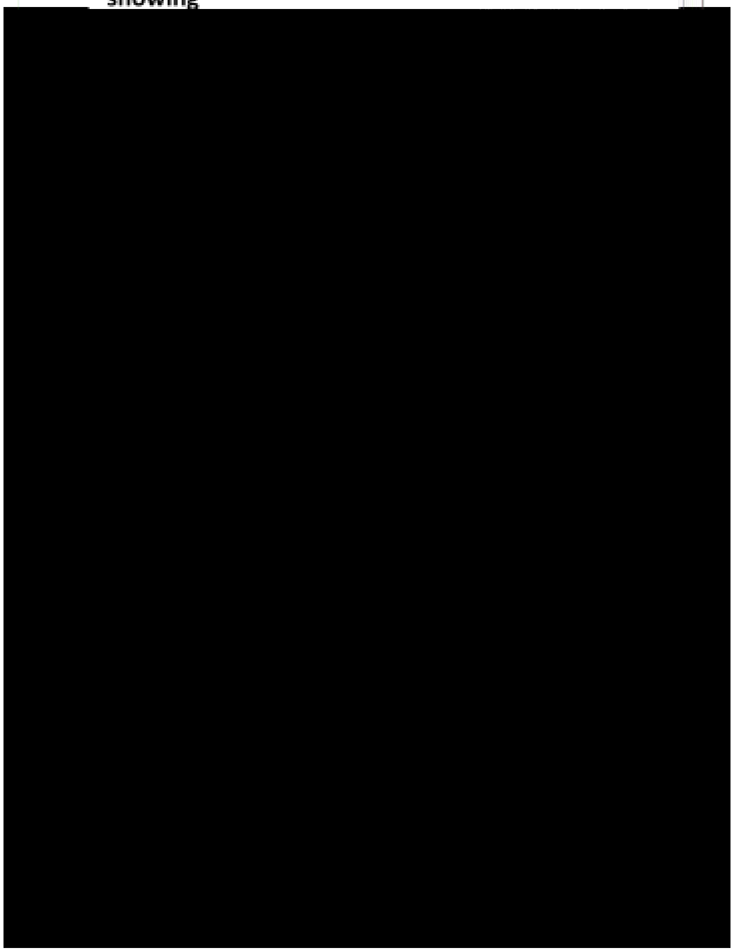
5.2 fires per year / 98 (000) acre area = .053 fires per 1000 acres per year

The Lower Joseph Watershed and the Wallowa Valley Ranger District lands, based on starts and land mass, shows the LJCW having slightly more fires per 1000 acres.

Fires for human starts were broke out by causation; 2 equipment, 20 campfires, 1debris burning, and 3 unknown. Nineteen of the 26 (73%) human fires occurred after September 1st and the remaining 15 of the human starts occurred after October 1st.

All but two of the fall fires were campfires, based on this time of year it is likely that the majority of the human caused fires occurred during hunting seasons. The human fires were not isolated to any specific area but spread throughout the public lands within the watershed. The largest human caused fire was approximately 4 acres.

Figure V-9. Concentrated areas of fire starts showing



The remaining 177 fires were lightning caused and 162 fires were less than 1 acre in size. Fires from 1 to 10 acres in size totaled 27 and there were 14 fires greater than 10 acres. The large fire of 1988 was Teepee Butte reaching a total acreage of 59, 860 with approximately 22,702 acres burning in the eastern portion of the Lower Joseph Watershed. In 1986 the Joseph Canyon fire burned from ridge top to river for a total of 40,163 acres, Figure V-9. All the above fires were full suppression fires.

Fire start density was analyzed and found to have areas of high concentrations. The most numerous collection of starts is located in three primary areas; 1) on the east side of the watershed off Forest Service road 4600 at the head of Cottonwood Creek, 2) at the head of West Fork Broady Creek in the vicinity of Coyote Campground, 3) north and east of Sled Springs between Highway 3 and the Joseph Canyon Rim. Fire starts in and near Coyote Campground concentration were all lightning cause except one fire. It is important to remember these small fire sizes are not typical for this area, fire suppression has impacted the natural actual size and severity of fires over past century.

There were a significant number of other large fires in and near the proximity of the watershed boundary throughout the decades. Seven large fires exceeding 650 acres occurred in the Lower Joseph Creek Watershed all started by lighting. Three of the seven ignition points originated within the watershed boundary with four having an origin outside of the watershed and burning into the area. Not mapped is the 70,000-acre 2012 Cache Creek Fire that burned inside and out of the entire northeastern boundary to the most northern point of the Lower Joseph Creek Watershed.

The smallest fire of 675 acres was Starvation Fire with the remaining large fires all exceeding 4,453 acres. Five of the large wildfires burned along significant portions of streams in the assessment area (Figure V-13). The 1910 Fire 2 (year of 1910) burned along 18.6 miles of streams including the headwaters of Cottonwood Creek. The Joseph Canyon Fire (1986) burned along 45.9 miles of streams including Davis, Swamp, and Joseph creeks. The Teepee Butte Fire (1988) burned along 45.9 miles of streams including the majority of Cottonwood Creek. The Jim Creek Fire (2000) along 7.7 miles of stream including Horse Creek. The Cottonwood Fire (2007) burned along about 4.6 miles of stream, mostly on private land north of the Forest Boundary, including Horse Creek and lower Cottonwood Creek.

Figure V-10. Historic large fires in and near the watershed.

A salvage sale followed the Joseph Canyon Fire that resulted in removal of burned trees along Davis, Swamp and Joseph creeks. A salvage sale also followed the Teepee Butte Fire; however, salvage cutting did not occur along streams.

About 75% of riparian area along Cottonwood Creek burned with moderate to high intensities resulting in high severity fire effects on the overstory. By the 1994 stream survey riparian hardwoods had recovered dramatically.

Table V-3. Large Fires, Year, Stream impacted, miles of stream burned.

FIRE NAME	YEAR ACRES	STREAM NAME	MILES BURNED
1910 Fire 2	1910 53,983	Cottonwood Creek	5.7
		Broady Creek	3.1
		E.F. Broady Creek	3.5
		Basin Creek	2.2
		Bear Creek	1.7
		Unnamed Streams	2.8
		Total	18.6
Joseph Canyon	1986 40,163	Joseph Creek	19.3
		Swamp Creek	8.4
		Davis Creek	5.7
		Rush Creek	4.7
		Peavine Creek	3.7
		Lupine Creek	4.2
		Total	45.9
Teepee Butte	1988 59,860	Cottonwood Creek	11.9
		Cold Spring Creek	2.1
		Cabin Creek	1.2
		Bear Creek	4.7
		Basin Creek	0.8
		Unnamed Streams	5.5
		Total	45.9
Jim Creek Fire(s)	2000 56,319 and 2006 12,946	Cold Spring Creek	3.8
		Cabin Creek	1.5
		Horse Creek	2.1
		Unnamed Streams	0.3
		Total	7.7
Cottonwood Fire	2007 4,453	Cottonwood Creek	1.1
		Horse creek	2.6
		Unnamed Streams	0.9
		Total	4.6

SUMMARY

Fire regimes I and II comprise a very large percentage of the watershed with a fire return interval from 0 – 35 years. Fire regime III is approximately 13 % of the watershed with a fire return interval range of 35 – 50 years. The watershed averages 5.2 fires annually based on historic records. This is a significant amount. Initial attack fire records show lightning fires occur with some localized geographic densities. Over a 39 year period three areas of high density ignitions stood out; two in the northeastern portion and one on the west side of the watershed.

Large fires are a common occurrence in the watershed and have been over time. The severity (effects of fire to overstory) and intensity (heat/energy released by the fire) of wildland fires today have increased substantially as compared to historic. Historic wildfires burned as a light surface fire through timbered stands consuming ground vegetation and debris, however, today's condition are supportive of fires that have and will continue to consume overstory vegetation if left unchecked.

Current stand structures are homogenous as compared to historic condition. What once was a heterogeneous landscape is now supporting a high level of multi-layered, dense contiguous stands. Crown density is creating a blanket of live fuels across the stand at all structural layers. An affect of current stand conditions is the contribution of surface fuels from continued mortality, due to competition, within the stand. This combination of conditions is conducive for large stand replacement fires.

ISSUES

Vegetation conditions are a contributing factor to large stand replacement fires resulting is overstory mortality. The abundance of multi-storied stands identified in the forestry section contributes significantly to fire hazard condition identified in this chapter.

Stand structures are contributing fuel through live tree component in terms of ladder fuels from vertical layering and stand densities in number of trees per acre. Outside of down woody fuels layering and crown closure are two prominent stand conditions that increase potential for stand replacement fires. First, stands containing 3 or more structure layers (vertical fuels) contain a canopy base height close to ground level providing avenues for fire spread into the canopy with increase probability for high overstory mortality. Second, high crown densities (horizontal fuels) in all stand layers provide a contiguous path of aerial fuels for sustained and extreme crown fire spread. In addition to increased fire behavior and adverse fire effects, abnormal stand densities continually contribute to stress on stands causing increase levels of mortality from competition, insects, and disease resulting in a buildup of down material underneath already dense stands.

The current fuel condition exceeds historic levels in terms of live fuels as well as dead down material. Sixty nine percent of timbered stands, riparian and upland, have a heavy down woody component providing a fuel source for fire ignitions and avenues for fire spread. The overall condition and percentage of timbered stands are significantly altered from their historical range. Heavy down fuel loadings are not limited to upland timbered stands but also threatened riparian areas with potential for higher than historic fire effects to overstory vegetation.

Additionally, dry forests are depleted of open stands with large tree components that can tolerate landscape fires. Two factors that contribute to the lack of large diameter fire tolerant, early seral species such as ponderosa pine, western larch, and Douglas fir is: past management practices and recent large scale severe stand replacing fires. Successful fire suppression has also prevented natural thinning processes to occur allowing for encroachment of shade tolerant species in temperature and moisture zones that historically supported fewer trees per acre.

Issues:

1. Lack of fire disturbance on the landscape have changed watershed conditions when compared to historic condition stand structures and species diversity, There is need for re-introducing landscape burning under controlled weather and seasonal timing conditions to minimize impacts to the existing stands.
2. The extensiveness of acreage inconsistent with historic conditions is a concern in terms of ability to treat all acres. Limited access in some watershed areas reduces treatment options and increases management costs. Strategically locating treatment areas on the landscape to break up the continuity will increase stand mosaic and landscape resilience to disturbance.
3. Fuels reduction both in and outside of riparian areas are needed to decrease mortality and increase probabilities of stand preservation. The risk of losing key ecosystem components from uncharacteristic wildfire behavior is high due to excessive down woody fuel, stand density and structural layering.
4. Stands are exhibiting high levels of stems per acre contributing to stand stress resulting in buildup of down woody fuels through mortality and limb wood castings as forest floor litter and creating a conduit for fire spread between the ground and overstory canopy.
5. Crown densities are exceeding historic condition in all biophysical plant associations creating avenues for sustained crown fires. Live crowns are limiting and in some cases prohibiting sunlight to the forest floor preventing surface vegetation to survive. More than half of the forested stands support crown densities of 60 or higher.

RECOMMENDATIONS

Fire behavior and severity depend on the properties of the various fuels (live and dead vegetation and detritus) strata and the continuity of those fuel strata horizontally and vertically (Graham et al, 2004). Fire behavior in stands of high tree density, closed canopy, and heavy down fuels have resulted in increased burning intensities with severity of fire effects eliminating most if not all overstory vegetation. Recommendations designed to meet this concern can be accomplished through one or more various approaches. Stand conditions will dictate the need for combined treatment types particularly where heavy fuel loads and high density with structural layering has occurred.

Both commercial and non-commercial thinning provides opportunities to meet desired stand conditions. Management recommendations outlined in the Forestry chapter will aid in moving the landscape to its historic range of variability. During commercial treatments fiber utilization of small material is preferred by taking advantage of single entry treatment with equipment. It was proposed to prioritize utilization of material over on site disposal in an effort to increase product use with potential decrease of overall smoke emission. Applications of various removal methods in conjunction with harvest operations is suggested for efficiency of processes, single entry approach, emission reduction, and increased opportunities for material use particularly where cost of post-harvest treatments is equal to or exceeds removal costs during commercial treatments. This approach is consistent with the Forest Service 5100 Manual where sub-section 5151.1 - Methods of Fuel Treatment, bullet 1. states the following: "1. Utilization. Use methods that reduce unwanted fuel through improved harvest techniques or through higher utilization standards. Favor utilization when the cost of onsite treatment equals the cost of removal for utilization." and Wallowa-Whitman Land and Resource Management plan states under Chapter 4 Timber Management section 3. i. and j. and section 5.

Figure V-11. The greater the distance between surface fuels (A) and the base of tree crowns (B) the more difficult it is for surface crown fires. Photo and caption (Graham et al, 2004)

Recommendations for standing live tree treatments involve stand density reduction of understory ladder fuels, opening of crowns through density reduction, raising the canopy base height on tree boles and understory removal while favoring fire tolerant early seral species. The canopy base height for an individual tree is the height at which sufficient fuel density exists for sustained canopy ignition. For a stand of trees, canopy base height considers both the main canopy layer and ladder fuels in the understory (Andrews, 2008).

Live tree crown in many stands are near the forest floor merging down woody and canopy together. This arrangement can and has caused complete stand loss during wildfires.

The recommendation for removal of suppressed understory trees will elevate the lower tree bole limbs helping to reduce opportunities for fire spread into the crowns and reducing overstory mortality. Treatment at stand levels of thinning and fuels reduction can effectively raise the average canopy-base height reducing potential for sustained canopy ignition.

There are additional opportunities for standalone fiber removal projects such as: post and pole, green tree fire wood and thinning projects. Biomass utilization allows for offsite removal of material under multiple type projects. Whip felling and hand piling of material outside of commercial areas can be accomplished for stand preservation and in advance of prescribed burning where large old tree crowns are in contact with suppressed small diameter saplings in the understory. Removal of these small diameter trees will provide protection of the large old trees prior to re-introduction of fire of that site. Whip felling also provides selective retention of healthy residual tree stock.

Reduction of down woody, both during and separate from commercial treatment, can be accomplished through mechanical and hand treatments. Opportunities to re-direct fuels in riparian areas depleted of large woody could allow for onsite utilization of some material. This accomplishes some removal of material and increased riparian health.

Utilization for fiber or pulp in areas of excessively high amounts would be optimal.

Hand piling of existing material on site will change fuels arrangement, however it must be followed up by pile burning for effective reduction of tons per acre in moving toward historic levels. Usage is preferred over on site disposal.

Low to moderate intensity prescribed fire is a recommended follow up tool after mechanical treatments and as a primary tool for areas outside of mechanical treatment locations. Reintroduction of fire to the landscape is recommended at times when environmental condition can be managed for successfully minimizing fire effects to overstory vegetation. Lower Joseph Watershed contains a vast area of dissected ridgelines and canyons of grass and timber stringers conducive for prescribe fire opportunities.

INTEGRATION

Fire has played a significant role in molding the landscape ecological structure throughout documented history of the area. Historic wildfires were frequent and of low to moderate severity maintaining high quantities of overstory post burning. Open stands of fire tolerant (shade intolerant) species provided a valuable contribution to large tree component and increased probability of stand survivability.

Changes to historic fire regimes and the national FRCC PNVG's were consistent with silvicultural deviations. Historical range of variability provided guidance for landscape treatment approaches. Proposed retention of shade intolerant species would move the landscape to a more fire resilient environment by favoring early seral species of ponderosa pine, western larch, and Douglas fir in order of preference. Promotion and retention of large trees would be one-step in moving toward a resilient landscape.

Although fire suppression is successful under most situations there is acknowledgement that those fires that do escapes during initial attack often result in large landscape scale fires. Concern of inability to treat all stands is realistic and undesirable for most resource groups. It has potential to fail to address opportunities for forage improvement and increased potential for entire stand loss due to wildfire, further shifting stand structures away from their historic percentages across the watershed. Large homogenous areas were supported for treatment in an effort to develop heterogeneity in all vegetation types. A combination of needs can be met by strategically locating stands on the landscape:

- Mosaic landscape will provide much depleted diversity and a mimic of historic condition.
- Strategically locating the stands can provide the highest level of landscape protection for wildlife and from wildfire.
- Achieve a level of treatment for long-term management in terms of landscape investments.
- Opportunities for re-introducing fire on the landscape through utilization of prescribed burning as an entry treatment.

It is important to give consideration to silviculture prescriptions that reduce the risk of fire to existing multi-storied structures and provide protection to surrounding designated old growth areas. Silviculture prescriptions designed to increase the representation of “Single Storied Large Tree” and “Multi Storied with Large Tree” structure within the biophysical environments and the promotion of early seral shade intolerant species will compliment other resource’s desired condition while shifting stands closer to landscape HRV goals. Conversion of these stands to fire tolerant species is consistent with historical conditions where low intensity fires interaction on the landscape provided natural thinning.

Deficient wildlife habitat is one consequence of this departure from historic conditions. Management approaches to stand improvements will supplement the needs of many resources. A variety of species was shown to be in need of functional late old structure, large tree components, and diverse riparian habitat. Proposed landscape diversity of stand structures will contribute to a wider distribution of wildlife and flora species habitat while promoting healthy ecosystems. This would aid the US Forest Service’s mandates to meet a number of standards on behalf of wildlife, wildlife habitat, access and usability.

Proposed fuels treatments in riparian areas can be applied to promote properly functioning conditions through increased vegetation and redirecting large woody debris into streams. Large woody debris can aid in dissipating stream energy associated with normal high flow events without channel degradation.

Creation of shaded timbered fuel breaks along ridges and roads assist suppression resources in fire control. Location and size of treatment areas have been shown to interrupt wildfire spread creating safer defensible areas for wildland firefighting and improved resource effectiveness. Roadside thinning of stands would need to consider wildlife security and should be coordinated with local wildlife biologist.

The use of low intensity prescribed burning fires will begin the process of re-introducing fire on the landscape. Prescribed burning under appropriate environmental and weather conditions can be a useful tool in accomplishing landscape needs for habitat and plant diversity, riparian health, and forage production. Additionally, lower bole limbs, saplings, and down woody fuel can be removed, using prescribed fire, raising the canopy base height of the stand creating higher wildfire resiliency.

Commercial utilization of small diameter material over on site disposal has the potential to create new revenue opportunities. Suggested methods supported to meet desired condition were standalone fiber opportunities such as: post and pole, commercial and personal use firewood, green tree small diameter firewood sales. These options allow for meeting local community demands while achieving management recommendations.

SUMMARY

Multiple management options are available to move the landscape toward its historic range of variability. The applications of both commercial and non-commercial activities as well as prescribed burning are a few tools supported by the resource groups to encourage healthy ecosystems.

Through the promotion of resilient, healthy stands numerous resource needs can be addressed such as: ecosystem diversity, increased forage, healthy riparian, fire tolerant landscapes, and innovative utilization opportunities. Resource group coordination when applied to the landscape can achieve multiple ecosystem benefits.

The resource groups agreed regardless of the type of tool applied to the landscape aggressive first entry treatment is an important integrated approach during implementation.

VI. Rangeland Condition Assessment

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INTRODUCTION

RANGELAND HISTORY

Historic activities in the Lower Joseph Creek Watershed (LJCW) forms the foundation of the soil, vegetation, and upland hydrology conditions on the LJCW landscape today. Ownership patterns and historic use factor into these landscape and resource conditions. Forest Service and private land forms a mosaic pattern throughout the LJCW. Current private land uses include homesteading, ranching operations, farming, roads, irrigation ditches, livestock pastures and winter-feeding operations, timber harvest, and recreational use.

The use of National Forest System lands for grazing predates the actual establishment of the Wallowa-Whitman National Forest in the LJCW. The first known use of the area for grazing livestock was by the Nez Perce Indians who grazed their horses in the vicinity as early as the 1730s. In the late 1800s, Euro-American settlers began grazing livestock, including sheep, horses and cattle. Because the area was homesteaded, many landowners wintered livestock in the LJCW and continued grazing for as long as weather, water, and forage conditions permitted.

Little is known about stocking numbers or season of grazing in the LJCW prior to 1940. The 1940s saw the beginning of permitted grazing on National Forest System lands. Stocking numbers were high compared to today (Wallowa-Whitman Forest Service Records). By the mid to late 1900s, the Forest Service had implemented a variety of intensive grazing strategies, such as regulated livestock numbers, limited season of use, and restriction of animals to specific areas, (Wallowa-Whitman Forest Service Records). These strategies were designed to protect native bunchgrass and other forage plants, and soils during critical periods of vegetation growth and nutrient storage and soil stability. The net effect of these management changes has been an improvement in grassland and stream condition and function over conditions found in the early 1900s. Historic land use practices, modified soil conditions, and vegetation community changes have resulted in the site conditions observed today.

TOPOGRAPHIC INFLUENCE

There is a vast change in topographic features within the Lower Joseph Creek Watershed (LJCW). These features have caused climatic variation and furthermore the development of several plant associations within a relatively small landscape setting. Looking north from the grand fir-dominated headlands and headwaters of Lower Joseph Creek, meadows of prairie junegrass are the watershed's first grasslands. This association is dominated by Idaho fescue and prairie junegrass, but is interspersed with species like slender cinquefoil, yarrow, and owl-clover (Johnson & Simon 1987).

In the headland valleys of Swamp and Davis creeks, gentle slopes covered in grand fir communities give way to open valley bottoms of prairie junegrass association and riparian communities. These upper riparian communities, located in the cold air drainage meadows above 4800 feet, support species like mountain alder, mountain aspen, and aquatic sedges (USFS 2001).

As Davis and Swamp Creek carve deeper paths northward through the thick basaltic rock flows, the east and west-facing slopes are dissected by small streams which run perpendicular to the main branches of the creeks. This creates north and south-facing side slopes, which alternate between bluebunch wheatgrass communities on the south-facing slopes and Douglas fir climax associations on the north-facing slopes. These bluebunch wheatgrass communities are typically comprised of isolated plants of bluebunch wheatgrass, Sandberg's bluegrass, and interspersed with species like narrow-leaved skullcap and arrowleaf balsamroot (Johnson and Simon 1987). The conifer-covered canyons above 4200 feet give way to slopes dominated solely by bluebunch wheatgrass communities (USFS 2001).

In the northern portions of Lower Joseph Creek, Idaho fescue and prairie junegrass association occur on plateau tops, biscuit mounds, and ridge tops above the deep canyons. These associations grow on loess-influenced basalt-based soils with Mazama ash influence and receive precipitation as high as 26 inches annually (USFS 2001). Scabland communities of stiff sagebrush and sandberg bluegrass can also be found on these plateaus.

Moving from the plateaus and down into the canyons, slopes grow steep quickly. Slopes are covered in bluebunch wheatgrass and Sandberg bluegrass plant associations. These associations are found on slopes up to 90%, and on benches and fingers that jut across and into the canyon. Topograpic features in this area also include basalt cliffs, talus slopes, and colluvial build-up of rocks, where little to no grass grows.

Going deeper, in valley riparian areas below 4800 feet, the bluebunch wheatgrass communities give way to prairie junegrass communities in the flood plain, with riparian communities along the main stem of Lower Joseph Creek. Though precipitation can be as low as 10 inches in the canyons, riparian communities are sustained by the waters of Lower Joseph Creek (USFS 2001).

These riparian communities occur within the floodplain and in seasonal swales, where sedges, bluejoint reedgrass, and Baltic rush all grow. The riparian communities along streambanks are often composed of species like mountain alder, tall mannagrass, and willow. Riparian communities continue all the way to the confluence with the Grande Ronde River, where the Lower Joseph Creek Watershed becomes part of the Grande Ronde Watershed.

ECOLOGY

The ecology of rangelands includes the functionality of hydrologic function, vegetation characteristics, and soil stability processes occurring above and below ground. Vegetation characteristics and hydrologic function are ecological processes that occur both above and below ground. Both processes are influenced heavily by soil processes throughout the soil profile. Often times, sites with alterations in vegetation characteristics from past management are coupled with altered conditions within the soil profile (see discussion in C&T plot summary). The health of soils on a site tells the history of past management.

INTERPRETING INDICATORS OF RANGELAND HEALTH (IIRH)

In order to facilitate a summary of rangeland ecological conditions relative to the overall conditions of the LJCW, Interpreting Indicators of Rangeland Health (IIRH) assessments were conducted across the watershed. The IIRH assessment has been developed to assess the current condition of a site and determine what processes have been altered, and what is expected from a site with those alterations. Interpreting Indicators of Rangeland Health (IIRH) is a method to assess upland rangeland health defined in Technical Reference 1764-6 as: "The degree to which the integrity of the soil, vegetation, water, and air, as well as the ecological processes of the rangeland ecosystem is balanced and sustained" (Pellant et al. 2005). IIRH is an attempt to look at how well ecological processes in an evaluation area are functioning within a normal rate of variability relative to an ecological site (NRCS 2010).

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for thirty-six sites within ten different subwatersheds throughout the LJCW. Thirty of the thirty-six sites were located on Forest Service land. The remaining six sites were located on private land. The subwatersheds include: 1) Upper Swamp Creek, 2) Lower Swamp Creek, 3) Joseph Creek/Sumac Creek, 4) Joseph Creek/Cougar Creek, 5) Joseph Creek/Peavine Creek, 6) Joseph Creek/Green Gulch 7) Joseph Creek/Rush Creek, 8) Broady Creek, 9) Horse Creek, and 10) Upper Cottonwood Creek.

VEGETATIVE CHARACTERISTICS

To assess the condition of the vegetation characteristics or biotic integrity of IIRH sites in the Lower Joseph Creek Watershed Assessment, two main reference tools were used. These references included the Natural Resources Conservation Service (NRCS) Ecological Site Descriptions (NRCS 2010), and a reference for local plant associations (Johnson and Simon 1987). The Ecological Site Descriptions gave a general idea of the soils and vegetation that should be present on any one site. As a result of the generality of the Ecological Site Descriptions, the reference with a more thorough development of vegetation dynamics was used; The Plant Associations of the Wallowa-Snake Province (Johnson and Simon 1987). Johnson and Simon (1987) provided information on current predominant vegetation, prehistoric plant associations, and gave insight into management that may have caused the shift in vegetation within each IIRH site.

Current condition of the vegetation dynamics, was based on the functional condition of each IIRH site. To determine the functional condition, several steps occurred. After a site was determined to exist within a particular Ecological Site Description, (by comparing soil and vegetation components of the Ecological Site Description to what was found at the IIRH site), the plant association (Johnson and Simon 1987) was determined and insight into the seral state of the plant association of each IIRH site. The overall changes found within an IIRH site could then be compared to changes as Johnson and Simon (1987), and later work by Swanson and Johnson (2008) found within the same plant communities. During each IIRH assessment, the amount of change at the IIRH site was compared to what was prehistorically expected for the site, called the reference condition (NRCS 2010). This gave the current seral state of the site; with a late seral state being sites that are in or close to prehistoric condition, and early to very early being sites that have greatly departed from prehistoric condition.

GEOLOGY, SOILS AND UPLAND HYDROLOGY

Soils are related to landform, vegetation, weathering, and climate. Soils vary across the landscape with deep soils on flatter, valley bottoms and shallow skeletal soils on the shoulders of plateaus, ridges and steep slopes. There are two principal types of soils found within the LJCW, "residual soils" which are soils formed from local bedrock in place, and "ash soils" or "mixed soils" which are derived from volcanic ash, or a mixture of volcanic ash, fine-textured windblown loess and colluvial surface deposits. Soil textures are medium to fine tending towards clay loam to silt loam (NRCS 2010).

Soil factors which influence productivity, such as total depth, effective rooting depth, soil texture, ash and/or loess depth, and coarse rock fragment by content, vary across the landscape by topographic position. In general, the deeper, more productive ash and/or loess influenced soils are found on north and east aspects, toe slopes, and in swales (NRCS 2010).

The depth of the surface soil is dependent on the soil type. The surface soil is the most productive portion of the soil profile. It contains the greatest concentration of soil organic matter, plant available nutrients, and fine roots. Soil textures that have descriptions of rock content such as gravelly or cobbly to very or extremely gravelly or cobbly indicates greater than 15 to 90 percent rock by content in the soil profile (NRCS 2010),

Eleven of the seventeen soil types associated with the IIRH sites are predominately very rocky or cobbly and very shallow to shallow. Three of the nineteen soil types are predominately cobbly to very cobbly shallow to moderately deep. Only three of the soil types are moderately deep - to deep soils with a volcanic ash influence.

Shallower, less productive, residual basalt soils with the minimal ash depth and content, influenced by rock and clayey soils are generally found on south and west aspects, steeper slopes, and on the noses of ridges and plateau tops (NRCS 2010). These sites are generally associated with open meadow plant communities (these open meadow sites refer to several land forms including grasslands, scablands, and meadow areas), scattered throughout the LJCW area (Johnson and Simon 1987). Open meadows and dry scabland plant communities are defined as having thin, rocky residual soils with clay influence and vegetated with drought tolerant plants (Johnson and Simon 1987).

SOIL PROPERTIES ASSESSMENT METHODOLOGY

INTERPRETING INDICATORS OF RANGELAND HEALTH (IIRH)

Soil information for the indicators of rangeland health (IIRH) analysis within the LJCW was obtained by on-site data collection and interpretation, and through data collected by the NRCS Web soil Survey interactive internet site (NRCS 2010).

Soil Map Unit Name, slope and Plant association were taken from NRCS Map Unit Description printouts from website (NRCS 2010). Please refer to Appendix C for a listing of plant codes and plant names.

This assessment is accomplished with an interdisciplinary range team, and is an attempt to look at how well ecological processes in a site are functioning within a normal rate of variability relative to an ecological site (NCRS 2010). This protocol will produce three ratings one for each of three attributes as follows.

1. Soil and Site Stability is defined as "the capability of an area to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water" (Pellant et al. 2005).
2. Hydrologic Function is defined as "the capability of an areas to capture, store , and safely release water from rainfall, run-on, and snowmelt (where relevant), to resist a reduction in this capacity, and to recover this capacity when a reduction does occur" (Pellant et al. 2005).
3. Biotic Integrity is the "capability of the biotic community to support ecological processes within the normal range of variability expected for the site, to resist a loss of capacity to support these processes, and to recover this capacity when losses do occur. The biotic community includes plants, animals, and microorganisms occurring both above and below ground" (Pellant et al. 2005).

Attribute ratings reflect the degree of departure from expected levels for each indicator per the reference sheets and are rated as follows:

Table VI-1, Degree of departure with corresponding rating attribute reflecting departure

DEGREE OF DEPARTURE	RATING
Extreme to Total	5
Moderate to Extreme	4
Moderate	3
Slight to Moderate	2
None to Slight	1

For this assessment, 17 qualitative indicators are observed and rated in one of the above five categories. Ten of the indicators relate to soil characteristics and include rating degrees of rills, water flow patterns, pedestals/terraces, bare ground, gullies, wind scours/deposition, litter movement, surface resistant to erosion, surface loss or degradation, and compaction. Ten of the indicators relate to hydrologic function and include rating degrees of rills, water flow patterns, pedestals/terraces, bare ground, gullies, surface resistant to erosion, surface loss or degradation, plant composition relative to infiltration, and compaction. Nine indicators relate to the biotic community and include surface resistant to erosion, surface loss or degradation, compaction, functional/structural groups, plant mortality/decadence, litter amount, annual production, invasive plants, and reproductive capability of perennial plants.

This protocol is designed to provide a preliminary evaluation of ecological site conditions and to provide early warnings of potential problems. The protocol also provides opportunities by helping land managers identify areas that are at potential risk of degradation or where resource problems currently exist. This technique, in association with quantitative monitoring and inventory information, can be used to provide early warnings of resource problems on upland rangelands. The results can be used to communicate fundamental ecological concepts and improve communication among interest groups.

The results of IIRH assessments are not meant to identify the cause(s) of resource problems, be used independently to make management changes, or used to determine trend. For more information as to the ecological conditions of the LJWA Area, please refer to the Wallowa-Whitman National Forest Lower Joseph Creek Interpreting Indicators of Rangeland Health project file.

SOIL STABILITY TEST PROTOCOL

Soil stability tests completed during the IIRH assessments followed the protocol developed by Herrick et al. (2001). For this test, sample points are randomly selected; and within each sample point, soil fragments of 2 to 3 mm in diameter are collected. These soil fragments or peds are then tested using a series of timed dips into water. The following is the classification for the soil stability with 1 being the least stable and 6 being the most stable.

1 – 50 percent of the structure integrity lost within 5 seconds after insertion

2 – 50 percent of structure integrity lost 5-30 seconds after insertion.

3 – 50 percent of structure integrity lost 30-300 seconds after insertion.

4 – 10 to 25 percent of soil remains after 300 seconds and five dipping cycles.

5 – 25 to 75 percent of soil remains after 300 seconds and five dipping cycles.

6 – 75 to 100 percent of soil remains after 300 seconds and five dipping cycles.

According to the ecological site descriptions developed by the NRCS for the ecosystems present within the LJWA, (NRCS 2010), soil stability ratings should predominantly fall between 3 and 5.

INTERPRETING INDICATORS OF RANGELAND HEALTH SITE SELECTION

The Lower Joseph Creek Watershed Range Sub-group identified Protocols to use for identification of the locations of the Interpreting Indicators of Rangeland Health sites. To best represent the larger watershed and understand the various management from private to public land, both ecological and social attributes were used in developing the appropriate sites. Consultation with Pat Shaver, NRCS aided in the stratification criteria.

The attributes included were:

Broad Based Criteria

- Non-forested areas (less than 40%)
- Areas of Use by Cattle
- Some crossover of locations of Condition and Trend Plots
- Random locations based on stratification accounted for the diversity of the watershed
- Sites must be more than 1/8th mile from roads, water, salting areas and other known disturbance sites.

Ecological Criteria

- Slope
- Aspect
- Vegetation

category Social Criteria

- Landownership (public/private)
- 1 site per allotment (If additional sites available allocate 1 additional site per 85 head)
- Areas of concern or question in previous assessments or management actions
- Areas identified as special (RNA's, Listed Plant Species locations)

DESCRIPTION AND DETAIL OF SITE SELECTION

All sites were located in non-forested areas or areas of less than 40% cover. They were also more than 1/8th mile from significant roads, water, salting areas and other known disturbance sites unless landform required less. If this occurred the team made sure the assessment area was not being directly affected by that attribute. All of the sites were located where cattle have access. In addition, some of the locations were placed in relative proximity with the Condition and Trend plots to allow for crossover between these two methodologies.

A list of the all the combinations of Aspect, Slope and major vegetation categories was developed allowing for coverage of basic land form and vegetation sites. All of these attributes were limited to minimal options to keep the combinations within usable numbers. Aspect was divided into north and south. Slope was broken into 0 to 5% slope, 5 to 15% slope and over 15% slope. Vegetation categories were taken from the previous experience of mapping the vegetation in the Upper Joseph Creek Watershed Assessment. Therefore we used Idaho Fescue, Bluebunch Wheatgrass or Scabland.

Land ownership of the open grassland was estimated to be ¾ public and ¼ private. Therefore, the same ratio of public and private sites per ownership was used as criteria for site selection. A request to participate was sent out to the qualifying landowners in the watershed. To qualify, only landowners with 240 acres or more were considered for site selection. This was to attempt to keep the private representation in lands that are less likely be converted into small ranchettes and to have enough land in one ownership to offer a viable unit of grazing. These lands must also be currently grazed or has had past grazing and are proposed to be grazed in the future. Those who signed up to participate were then assessed for the ecological site and to represent the various areas of the watershed. The private land sites in the end represented approximately 15%.

To prepare to select the sites an slope/aspect map was generated, a random number list was created and compared to our slope/aspect/vegetation combinations. A potential list of the various sites was generated. Using the potential list the sites that represent necessary sites were selected. This included a site in a Research Natural Area and sites representing the listed species, Spalding catchfly. Then one site per allotment was identified working down the random list generated. Finally, additional sites were allocated to locations in the larger allotments. The allocation used 85 head of allowed livestock per site. They were placed in separate pastures or areas to fill out the best representation of the watershed.

Once the sites were selected on the map it was understood that the evaluation team would have to interpret the map site and make appropriate on the ground decisions once at the location. The following was given as a guideline.

Criteria for selecting Ecological sites when on the ground: Choose an ecological site description within 250 feet from the center of the designated site location. The team will then use appropriate area from that whole site description area, not just those within the radius. If appropriate conditions were not present on the ground the team had the latitude to adjust the site to get an appropriate area to represent the actual area.

OVERVIEW OF CONDITIONS

The surface soil is considered to be the top A or A/B horizon of a soil. The depth of the surface soil is dependent on the soil type. The surface soil is the most productive portion of the soil profile. It contains the greatest concentration of soil organic matter, plant available nutrients, and fine roots. Soil textures that have descriptions of rock content such as gravelly or cobbly to very or extremely gravelly or cobbly indicates greater than 15 to 90 percent rock by content in the soil profile (NRCS 2010), (please see Interpreting soils data in Appendix C. It is important to note that physical properties of soils can be very different with the presence or absence of volcanic ash.

Eleven of the seventeen soil types associated with the IIRH sites are predominately very rocky or cobbly and very shallow to shallow. Three of the nineteen soil types are predominately cobbly to very cobbly shallow to moderately deep. Only three of the soil types are moderately deep - to deep soils with a volcanic ash influence. The surface soil depth of soils surveyed within the LJCW ranges from 2 to 14 inches deep, with the depth to bedrock or a restrictive layer ranging from 4 inches in the Bocker soil series to greater than 40 inches in the Syrup Creek soil series (NRCS 2010). Detail descriptions of the landtype associations (LTA) and their soil types within the watershed can be found in the Introduction Chapter I of this assessment.

Table VI-2 lists IIRH sites and the associated plant associations, Soil Map Unit (SMU), slope range, and erosion hazard for each site. An individual SMU may be composed of one, two or three different soil types or soil series names. A Soil Map Unit name with more than one soil type is called a "complex". As indicated, there were nineteen SMU's identified during the 2008 IIRH analysis. Multiple IIRH sites have the same SMU. Note in Table VI-2 that several of the SMU's have the same soil types, and differ only in slope class and erosion hazard risk.

Table VI-2. IIRH sites within the Lower Joseph Creek Watershed Analysis Area and Associated Plant Association, Soil Map Unit (SMU), Slope Class, and Erosion Hazard Risk Rating.

IIRH SITE #S	PREDOMINANT PLANT ASSOCIATION	SOIL MAP'S UNIT (SMU) NAME & SLOPE	EROSION HAZARD (OFF-ROAD / OFF-TRAIL)
32, 33	FEID/PSSP6	Albee-Bocker complex, 2 to 15 percent slopes	Slight
17, 27, 28, 31	FEID/PSSP6	Anatone-Bocker-Fivebeaver complex, 0 to 15 percent slopes	Slight
8, 10	FEID/PSSP6	Anatone-Bocker-Fivebeaver complex, 15 to 30 percent slopes	Moderate
11	FEID/PSSP6	Anatone- Bocker-Rock outcrop complex, 15 to 30 percent slopes	Moderate
Pvt. 6	FEID/PSSP6 /POSA12	Anatone-Cherry Creek-Imnaha complex, 30 to 60 percent north slopes	Moderate to Severe
7, 13, 19,	PSSP6 /POSA12	Bocker-Anatone complex, 15 to 30 percent slopes	Slight to Moderate
16, 26, 35	PSSP6 /POSA12	Bocker Anatone--Rock outcrop complex, 15 to 30 percent slopes	Slight to Moderate
29	PSSP6/ FEID	Bocker-Clearline-Rock outcrop complex, 60 to 90 percent slopes	Severe
12, 22	PSSP6/ FEID	Bocker-Imnaha-Rock outcrop, 30 to 60 percent north slopes	Severe
Pvt. 4, Pvt. 5	PSSP6/ FEID	Gwinly-Kettenbach-Rock outcrop complex, 60 to 90 percent slopes	Very Severe
15, 20	PSSP6/ FEID	Gwinly-Mallory-Kettenbach complex, 15 to 30 percent slopes	Moderate
Pvt. 2	FEID/PSSP6	Harlow- Bocker complex, 2 to 15 percent slopes	Slight
Pvt. 3	PSSP6/ FEID	Harlow- Snell-Imnaha complex, 15 to 30 percent slopes	Moderate
4, 5	FEID/PSSP6	Parsnip-Bocker complex, 0 to 15 percent slopes	Slight
Pvt. 1	FEID/PSSP6 /POSA12	Wallowa-Bocker complex, 0 to 15 percent slopes	Slight
25, 34	ABGR/LIBO2	Limberjim-Syrup Creek complex, 0 to 15 percent slopes	Slight
30	PSSP6/ FEID and PHMA/SYAL	Rock outcrop-Imnaha-Cherry Creek complex, 60-90 percent north slopes	Severe
9	ABGR/LIBO2	Syrup Creek-Lowerbluff complex, 2 to 15 percent slopes	Slight to Moderate
18	ABGR/LIBO2	Syrup Creek ashy silt loam, 0 to 15 percent slopes	Slight

SOIL EROSION

Soil erosion is a natural process and is dependent on the soil properties (such as parent material, depth, texture and rock content), site vegetation characteristic (type, density and composition) and the slope of the site. Ecological properties are intricately interrelated with soil erosion hazard. For example, vegetation, including biological crust, protects the soil surface from raindrop splash impact, dissipates the energy of overland flow, and binds soil particles together. In general, the greater the amount of effective soil cover (litter, live vegetation, surface rock), and the lower the slope angle of a site, the lower the erosion potential and rate of erosion (NRCS 2010).

Soil erosion can be accelerated by natural events such as wildfire and land management activities. The soil erosion hazard of a soil (column four in Figure VI-2) applies to the potential risk of detachment and movement of soil particles down slope under conditions where the expected amount of live vegetation, effective ground cover and/or other soil stability factors, (for example; soil microbiological activity), has been removed or severely compromised.

As indicated in Table VI-2, soil slope tends to be the main factor in determining the soil erosion hazard rating for most soil types surveyed within the LJCW. Table VI-3 lists the general soil erosion hazard rating by slope class. As indicated in the table, as slope angle increases so does the erosion hazard.

The erosion hazard ratings in Table VI-3 relate the SMU or soil “complex” to landform slope. In general, soil complexes with slopes between 0 and 15 percent have a slight erosion hazard rating. The exception is Syrup Creek-Lowerbluff complex with slopes of 2 to 15 percent, it's erosion hazard rating is slight to moderate due to its silt loam texture. In general, soil complexes with slopes between 15 and 30 percent have slight to moderate or moderate erosion hazard rating. Soil complexes with slopes between 30 to 60 percent generally have severe erosion hazard ratings. The exception being the Anatone-Cherry Creek-Imnaha complex, 30 to 60 percent north slopes with a moderate to severe erosion hazard rating due to the higher permeability rate and shrub vegetative component. The soils and geology within the LJCW are not prone to mass movement (NRCS 2010).

Table VI-3. Soil Slope Class and Associated Typical Soil Erosion Hazard

SLOPE CLASS (PERCENT)	TYPICAL SOIL EROSION HAZARD
0-15	Slight
15-30	Moderate
30-60	Severe
60-90	Very Severe

Soil erosion hazard is not the same as the rate of soil erosion. The rate of erosion is the actual amount of soil loss by erosion over time and is calculated by using a soil erodibility factor (“Kw factor”). The Kw factor (see Table VI-4) is a measure of overall erodibility of the surface soil for individual soil types and can be related to actual soil loss over time (i.e. tons of soil loss per acre). The Kw factor is calculated in a laboratory in the absence of live vegetation or ground cover. It is based on the soil texture, (amount of sand, silt and clay), and includes coarse rock fragments. A Kw factor value of 0.2 or less indicates stable soils even in the absence of live vegetation. Soils with Kw factors ranging from greater than 0.2 to less than 0.4 are moderately erodible. The soil erodibility (Kw) factors greater than 0.4 indicate highly erodible soils. The “Erosion Hazard” relates soil erodibility, (Kw soil factor) to landform slope.

Soils with high volcanic ash and/or loess content or influence, tend have a higher soil erosion hazard ratings compared to residual soils because of their low bulk density, (see discussion below), and high detachability (Kw factor). However, in an undisturbed state, the actual surface erosion, (sheet and rill erosion), of ash soils on gentle slopes is generally low. As slope increases and vegetation or effective ground cover decreases, the susceptibility of detachment and transport is increased and soil erosion is common (NRCS 2010).

Residual soils commonly associated with dry meadows and scablands, generally have a low erosion hazard rating due to the lower detachability (Kw) associated with loam and clay loam soil texture. When fines are washed away from surface soils by sheet erosion on scabland soils, erosion pavement can form on the soil surface (NRCS 2010)

Table VI-4 lists each of the seventeen different soil series associated with the SMUs listed in Table VI-2. Key soil properties, characteristics, soil erodibility factors, and soil compaction potentials are listed in the table to provide information on inherent site stability and soil productivity. The Kw factors (discussed above) and Bulk Densities for soils are displayed to indicate the sensitivity of soils to erosion (Kw-Factor) and compaction (Bulk Density) as a function of ground disturbance associated with human activities.

Table VI-4. Predominant Soil Series with some Key Soil Properties Associated with Soil Map Units surveyed within the LJCW.

IIRH SITES[1]	SOILS NAME[2]	DEPTH TO RESTRICTIVE LAYER (IN)	SOIL DEPTH OF "A" HORIZON (IN)	SURFACE TEXTURE	KW FACTOR (INCLUDES COARSE FRAGMENTS)	BULK DENSITY (G/CC) (ROCK EXCLUDED)	COMPACTION POTENTIAL (BASED ON BD)
33	Albee	0-40	0-14	Ashy silt loam	0.37	1.35-1.5	Low
7, 8, 10, 13, 19, 26, 31, 35, P6	Anatone	10-20	0-4	Very stony silt loam	0.15	1.20-1.70	Low
4, 11, 12, 16, 17, 22, 27, 28,	Bocker	4-10	0-2	very cobbly silt loam	0.1	1.35-1.50	Low

IIRH SITES[1]	SOILS NAME[2]	DEPTH TO RESTRICTIVE LAYER (IN)	SOIL DEPTH OF "A" HORIZON (IN)	SURFACE TEXTURE	KW FACTOR (INCLUDES COARSE FRAGMENTS)	BULK DENSITY (G/CC) (ROCK EXCLUDED)	COMPACTION POTENTIAL (BASED ON BD)
29, 31, 32, P2							
30	Cherry-creek	40- 60	0-9	Very cobbly to extremely cobbly silt loam	0.2	0.85 – 1.0	Moderate
	Clearline	40-60	0-4	Very gravely silt loam to very gravely fine sandy loam.	0.15 – 0.2	0.85 – 1.0	Moderate
	Fivebeaver	7-10	0-7	Gravelly ashy silt loam to extremely cobbly ashy silt loam	0.2	0.85 – 1.0	Moderate
20, P4, P5	Gwinly	10-20	0-4	Very cobbly ashy silt loam to very cobbly silty clay loam	0.17	1.1 – 1.3	Low
	Harlow	10 – 20	0 - 4	Very stoney loam	0.15 – 0.1	1.15 – 1.3	Low
30, P3	Imnaha	20-40	0-5	Gravely silt loam	0.17 – 0.20	1.0 – 1.2	Low
15	Kettenbach	20-40	0-8	Very cobbly ashy loam to very cobbly loam	0.2	1.45 – 1.45	Low
	Limberjim	40-50	2-8	Ashy silt loam	0.24	0.65-0.85	High
9	Lowerbluff	10-20	1-7	Silt loam	0.28	0.75 – 0.95	High to Moderate

IIRH SITES[1]	SOILS NAME[2]	DEPTH TO RESTRICTIVE LAYER (IN)	SOIL DEPTH OF "A" HORIZON (IN)	SURFACE TEXTURE	KW FACTOR (INCLUDES COARSE FRAGMENTS)	BULK DENSITY (G/CC) (ROCK EXCLUDED)	COMPACTION POTENTIAL (BASED ON BD)
	Mallory	20-40	0-3	Very stony silt loam to very cobbly clay loam	0.15	1.15 – 1.3	Low
4	Parsnip	10 - 20	0 - 6	Gravely silt loam	0.32	1.2 – 1.35	Low
	Snell	20 – 40	0 - 4	Very stoney loam	0.24	1.25 – 1.35	Low
18, 25, 34	Syrupcreek	20-40	2-6	Ashy silt loam	0.32	0.65-0.85	High
P1	Wallowa	20-40	0-11	Silt loam	0.28	0.75 – 0.95	High to Moderate

[1] Soils with IIRH site names are the predominant soil on the site. Soils without site names are the subdominant soils within the SMU complexes listed in Table VI-2.
[2] Soil descriptions were taken from NRCS Map Unit Description printouts from website (NRCS 2010).

BULK DENSITIES AND SOIL COMPACTION

Inherent bulk densities and compaction potentials of the soils surveyed throughout the LJCW area during the IIRH analysis are located in Table VI-5. The inherent bulk density of a soil is equal to grams of soil per cubic centimeter volume of soil. The measurement does not include rock fragments, but fine soil particles less than 2 mm in diameter.

Soil compaction (increase in soil bulk density with a decrease in soil porosity), can have negative impacts on site productivity and can also alter the hydrologic function of a site. Reductions in infiltration rates caused by soil compaction can lead to increased runoff, increased surface erosion, and increased sedimentation of creeks. Factors affecting compaction include; soil texture, degree or duration of pressure exerted on the soil, and soil moisture content.

Soil compaction potential is inversely related to inherent soil bulk density. In general, the lower the bulk density, the greater the soil compaction potential from ground based activities such as vehicular traffic, livestock congregation, farming practices, and timber harvesting activities. Figure VI-5 shows the range of soil bulk density values and its relation to soil compaction potential (NRCS 2010).

Table VI-5. Range of soil bulk density values and the relation to soil compaction potential.

BULK DENSITY VALUE(G/CC)	QUALITATIVE BD DESCRIPTION	COMPACTION POTENTIAL
0.65 to 0.85	Low	High
0.85 to 1.1	Moderate	Moderate
1.1 to 1.7	High	Low

Soils with low bulk densities (less than 0.85 g/cc) indicate higher compaction potential and tend to contain a high proportion of volcanic ash. Soils with higher bulk densities (greater than 1.30 g/cc) indicate a high percent of clay content and a low compaction potential. Although rock fragments are not taken into account in the laboratory analysis of soil bulk density and estimate of soil compaction potential, in reality, rock fragment in a soil profile may decrease soil compaction potential. In particular soil compaction potential is decreased in soils that are very or extremely cobbly or stoney. This holds true even for ash soils which have a low inherent bulk density and a high compaction potential (NRCS 2010).

As indicated in Table VI-4, IIRH sites analyzed within the LJCW were predominately on inherently stable soils with low **erodibility** potential, and high or moderately high bulk densities with low to moderately low compaction potentials. Eleven of the seventeen soil types identified during the LJCW IIRH analysis are considered to be stable soils. Six of the seventeen soil types are moderately erodible (Kw factors greater than 0.2). There were no highly erodible soils, (Kw factors greater than 0.4), identified during the IIRH analysis (NRCS 2010).

INTERPRETING INDICATORS OF RANGELAND HEALTH (IIRH) RESULTS

In order to facilitate a summary of rangeland ecological conditions relative to the overall conditions of the LJWA, the IIRH data has been grouped, summarized and discussed for each individual subwatershed for which an IIRH analysis was conducted.

Each analysis area is identified by a site number and the Range Allotment/Pasture name in which the IIRH analysis area is located. Site characteristics and IIRH ratings, and the justifications for the ratings are briefly described by site, and by subwatershed. A brief discussion of soil stability ratings are embedded within the discussion of soil and site stability ratings.

As stated in the ecology section of this document, the indicators of soil and site stability, hydrologic function and biotic integrity are intertwined. Soil provides a foundation for vegetation establishment and growth as well as provides for the processes of air, gas, water, and nutrient movement into and through the soil profile. These soil processes are dependent on soil porosity, the capture, storage, and safe release of water (hydrologic function) and erosional material, and a consistent supply of organic matter. Depending on inherent ecological site characteristics, changes in IIRH indicators from expected conditions may be reflected by one or all of the IIRH attributes. Data that indicates a departure of soil and site stability is generally reflected by the same degree of departure in hydrologic function, and reflected by a similar degree of departure in biotic integrity.

All of the information presented and discussed within this results section is based on data collected at the time of the IIRH analysis. Results of the IIRH analysis represent the resource conditions that were current at the time of the assessments. The results are not meant to identify the cause(s) of resource problems, determine trend, or to be used independently to make management changes. The results will however, allow for an interpretation of how past and current management are affecting the ecological processes of the evaluation areas within the LJWA Area.

For a greater comprehension of inherent ecological and soil conditions, and vegetation communities of IIRH sites summarized under each subwatershed subtitle please refer to Table 1, (Soil Map Units and erosion hazard for Each IIRH site) and Table 3, (dominant soil type, key soil properties, characteristics, soil erodibility factors, and soil compaction potentials).

OVERALL SUMMARY IIRH ASSESSMENT

Ecological site characteristics of the IIRH assessment sites ranged from open meadows and dry scabland areas to open forested sites. Topographically, these sites were located on mid to upper slopes, tops of ridges, and plateaus. The exception being IIRH site 34, which was located on a densely forested early seral grand fir/twin flower plant association on a plateau top in the Upper Cottonwood Creek subwatershed. Slopes ranged from less than 5 to greater than 60 percent. Using the IIRH site selection protocol (Williams 2010) an equal number of south and north facing slopes were selected to represent the LJCW. However, south and north facing slopes may not be equally represented within each subwatershed.

Condition trend is not determined with the IIRH analysis. However, data suggest that on the south facing plateau and ridge side slopes, north facing foot slopes and in the concave swales, current management appears to be maintaining ecological conditions. Soil erosion in the dry open meadows, scablands and the steep interslopes within the LJCW appears to be consistent with the hillslope hydrology, summer thunderstorms, and infiltration limitations of these shallow, rocky sites. Erosion on the north ridge and plateau slopes and in the concave swales also appear consistent with inherent hillslope hydrology. Soil stability is provided with clays and organic cementing agents such as root exudates, soil organism secretions, and biological crust organisms (Tisdall and Oades 1982; Bowker et al. 2008). Throughout the LJCW, the soils are generally finely aggregated, stable, and on porous sites with well vegetated mid to late seral perennial bunchgrass, annual grass and forb plant communities and where biological soil crusts are common. The soil pores retain water for plant growth, and allow for adequate infiltration, and percolation (Tisdall and Oades 1982).

Risks to all IIRH site conditions include the encroachment of annual cheatgrass and other invasive species. A decline in native bunchgrasses and an increase in annual vegetation were noted in some areas within the LJCW area. Current rangeland management focuses on site stability by maintaining the mid to late seral vegetation communities and maintaining enough surface protection to prevent accelerated erosion.

SUMMARY OF IIRH RESULTS BY SUBWATERSHED

UPPER SWAMP CREEK:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed on private land for one analysis area, (P1), within the Upper Swamp Creek subwatershed. The attribute ratings, Ecological site name and plant association are listed in Table VI-6 for the IIRH site. P1 was located on a moderately deep ashy silt to silt loam soils over basalt bedrock. The site was located on a 15-20 percent east to northeast facing slope at 4631 feet elevation.

Soil and Site Stability Attribute

Soil and site stability rating for the open meadow private land site P1 indicated none to slight departure from expected conditions for the site. The amount of bare soil, surface soil structure and surface organic litter, rills, pedestals, water flow patterns and soil surface resistance to erosion match what is expected for the deeper *Wallowa* soils. The amount of bare soil, litter cover and terracettes are slightly higher than expected for the shallower, *Bocker* soils. Terrecettes showed only minor evidence of active erosion, predominately from freeze thaw activity. Soil stability ratings were high, with no departure from expected conditions. The surface soil stability test conducted on the *Wallowa* soil indicated stable aggregation and showed little evidence of detrimental effects from historic or past land management practices.

Hydrologic Function Attribute

The rating and justification for hydrologic function for the open meadow private land site (P1) reflect those for soil and site stability. The hydrologic function rating for site P1 indicated none to slight departure from expected conditions. The qualitative indicators matched those expected for the site with the exception of the increased amount of bare soil associated with the *Bocker* soils. Bare soil was generally associated with gophers, ground squirrels and terracettes. There was no evidence of accelerated surface soil erosion, rilling or gullies. Water flow patterns were limited to areas associated with terracettes on the shallower *Bocker* soils.

Table VI-6. Summary of IIRH Ratings, Predominant Soil Type and Ecological Site for IIRH Site Surveyed within the Upper Swamp Creek Subwatershed.

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
P1	Private 1	Mountain Loamy –silt loam without rock fragments (18) FEID-KOMA (High Elevation)	*Wallowa*	Open plateau shoulder to midslope at 4631ft, 15-20% northeast facing slope.	No departure (5.0).	None to slight departure (5.0)	None to slight departure (5.0)	None to Slight departure from that expected for bare surface soils (6.0).

[1] The Plant Association is based on Johnson and Simon (1987)
[2] Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.
[3] Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.

Biotic Integrity Attribute

The rating and justification for biotic integrity of the open meadow private land site (P1) reflect those for both soil and site stability and hydrologic function. The biotic integrity rating for site P1 indicated none to slight departure from conditions expected for the site. The plant association for this site is Idaho fescue-prairie junegrass (high elevation) in a late seral state (Johnson and Simon 1987). The number and composition of structural and functional groups plant mortality, vigor, decadence and reproductive capability match that expected for the site. Amount and composition of invasive species match that expected for the site and are primarily located in disturbed areas.

LOWER SWAMP CREEK:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for seven analysis areas within the Lower Swamp Creek subwatershed. Six of the sites were located on Forest Service land and one site (P2) was located on private land. The IIRH site numbers, and Grazing Allotment and Pasture names in which each of the IIRH sites are listed in Table VI-7.

Five of the seven IIRH sites in the Lower Swamp Creek subwatershed were located on open meadows with very shallow to moderately deep, silt loam to silty clay loam rocky soils, on south facing slopes ranging from 6 to 30 percent. Elevations of these open meadow sites range from 4099 feet to 4793 feet. The remaining two of the seven IIRH sites (numbers 9 and 18) were located on open forested, dry pine sites with moderately deep - to deep slit loam to ashy silt loam soils. Slopes of the open forested sites ranged from 5 to 8 percent southwest and north/northwest facing slopes, respectively. Elevations ranged from 4466 feet to 5036 feet.

Table VI-7. Summary of IIRH Ratings, Predominant Soil Types and Ecological Sites for Each IIRH Site Surveyed within the Lower Swamp Creek Subwatershed.

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
4	Cow Creek – Special Use	Mountain Loamy (18) FEID-KOMA (Mounds)	*Parsnip* (mound) *Bocker* (intermnd)	Open meadow on ridge top at 4099ft, 6-7% south slope.	Slight to moderate departure (4.3).	Slight to moderate departure (4.2).	Moderate to extreme departure (3.5).	Slight to moderate departure from expected (3.9).
7	Davis Creek/ Davis South	Mountain Shallow (22) FEID-PSSP6/ BASA	*Anatone*	Open meadow on upper shoulder of plateau at 4430ft, 18% southeast slope.	Moderate departure (3.7).	Moderate departure (3.5).	Moderate departure (4.2).	Slight to moderate departure for soils under litter (3.6).
8	Davis/ Davis West	Mountain Shallow South (36) FEID-KOMA (Ridgetop)	*Anatone*	Open meadow on upper shoulder of plateau at 4793ft, 16% southeast slope	None to slight departure (4.9).	None to slight departure (4.9).	None to slight departure (4.6).	None to slight departure from expected (5.7).
9	Swamp Creek/ Little Elk	MLRA009 – Loamy Dry pine PIPO/SYAL	*Lowerbluff*	Open forested mid slope of plateau, at 4466ft, 5-8% southwest slope.	No departure (5.0)	None to Slight Departure (5.0).	None to Slight Departure (5.0).	None to Slight Departure (6.0).
11	Swamp Creek/ Starvation Ridge	Mountain Shallow South (36) FEID-PSSP6/ BASA	*Bocker*	Open meadow on ridge shoulder and ridge mid slope at 4380ft, 20-30% south west slope.	None to slight departure (5.0).	None to slight departure (5.0).	None to slight departure (5.0).	No departure (6.0)
18	Cougar Creek/ Peavine	Loamy Skeletal Dry Pine PSME/ CARU	*Syrup- creek*	Open forested on upper to middle plateau slope at 5036ft elevation, 5% north/ northwest slope.	None to slight departure (5.0)	None to slight departure (5.0)	None to slight departure (5.0).	None to slight departure (5.6).
P2	Private 2	FIED-PSSP6/ BASA	*Bocker*	Open meadow/scab land on plateau top to shoulder	Slight to moderate/ moderate	Slight to moderate/ moderate	Slight to moderate departure (4.3).	Slight to moderate departure (3.0).

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
				at 4268ft elevation, 5-10 % north to northwest facing slope.	departure (4.0).	departure (4.0).		

[1] The Plant Association is based on Johnson and Simon (1987)

[2] Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.

[3] Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.

As noted above, IIRH analysis results for all the sites indicated a broad range in departure from expected conditions. Results ranged from none to slight for soil and site stability, none to moderate for hydrologic function and none to extreme for biotic integrity. Ratings for soil stability tests ranged from slight to moderate.

Soil and Site Stability Attribute:

Soil and site stability ratings for the open meadow sites 8 and 11 indicated none to slight departure from expected conditions for the sites. The amount of bare soil was higher than expected on site 8. This appeared to be primarily due to higher than expected gopher activity. Both sites 8 and 11 exhibited little ground disturbance, and had adequate amounts of litter. There was little to no evidence of accelerated surface soil erosion; sheet, rilling or gullies. Soil stability ratings were good, with none to slight departure from expected conditions. The *surface soil stability* test indicated stable aggregation and showed little evidence of detrimental effects from historic or past land management practices.

Soil and site stability ratings for the open meadow sites 4 and 7 indicated a slight to moderate and moderate departure from expected conditions, respectively. Soil and site stability rating for the open meadow private land site (P2) indicated a slight to moderate/moderate departure from expected conditions. On all three sites, the amount of bare soil was greater than expected. Some historic surface soil loss and movement was evident by presence of pedestalling, and rills and water flow patterns. These indicators were rated as slightly to moderately more numerous, active and connected than expected. Soil erosion appears to be associated with greater than expected amount of bare soil, annual vegetation, and gopher activity, and less biological soil crusts than expected. Soil biotic crusts were found only in protected sites such as among surface rocks or under and adjacent to isolated perennial grasses. Soil stability tests indicated a slight to moderate departure from that expected for each of the three the sites and appeared to be associated with greater amounts of bare soil and less amounts of soil biotic crusts than expected for the sites. Soil stability has been shown to be affected by a reduced level of soil biotic secretions needed for aggregate stability (Finch et al. 2004). Soil physical characteristics are similar between the five open meadow sites. They ranged from very shallow - to shallow, very cobbly, and very stoney silt loam soils.

Soil and site stability ratings for the open forested sites 9 and 18 indicated none to slight departure from expected conditions, respectively. The amount of bare soil and vegetative ground cover was within the expected range for the sites. Surface soil resistance to erosion was high, and indicated no departure from expected conditions. Site 18 had evidence of detrimental soil compaction associated with skid trails only. The soils associated with skid trails appeared to be stable, with no active erosion. Soil compaction appeared to be recovering naturally through root penetration and freeze thaw activity. The aerial extent of skid trails was estimated at less than 20 percent of the analysis area.

HYDROLOGIC FUNCTION ATTRIBUTE:

The ratings and justifications for hydrologic function for both open meadow and open forested sites reflect those for soil and site stability.

The hydrologic function ratings for sites 8 and 11 indicated none to slight departure from expected conditions. The qualitative indicators matched those expected for the sites with the exception of the slight increased amount of bare soil for site 8. There was no evidence of accelerated surface soil erosion, rilling or gullies.

The hydrologic function ratings for open meadow sites 4 and 7 indicated a slight to moderate, and moderate departure from expected conditions, respectively. The hydrologic function rating for open meadow private land site, P2, indicated a slight to moderate/moderate departure from expected conditions. For each of the three sites the amount of bare soil, pedestalling, rills and water flow patterns were slightly to moderately greater than expected for the sites. Soil erosion appears to be associated with greater than expected amount of bare soil, annual vegetation and gopher activity, and less than expected cover of biological soil crusts. Where sheet and rill erosion activity was found there were no gullies. Upland water flow patterns are short and unconnected to drainage systems.

Hydrologic function ratings for the open forested sites 9 and 18 indicated none to slight departure from expected conditions, respectively. The amount of bare soil and vegetative ground cover was within the expected range for the sites. Similar to the soil and site stability indicator, only the amount of soil compaction associated with skid trails on site 18 was greater than expected for the site. The soils associated with skid trails appeared to be stable, with no active erosion. The aerial extent of skid trails was estimated at less than 20 percent of the analysis area.

Biotic Integrity Attribute:

The ratings and justifications for biotic integrity of the open meadow and open forested sites reflect those for both soil and site stability, and hydrologic function.

The biotic integrity rating for the open meadow site 8 indicated none to slight departure from conditions expected for the site. The plant association for this site is Idaho fescue-junegrass (ridgetop) in an early seral state. Functional groups appear to have been slightly compromised due to invasion of annuals, a decline in Idaho fescue, and an increase in onespike oatgrass and sandberg bluegrass. The amount and distribution of invasive annuals, (primarily bromes and gumweed), were slightly greater than expected for the site and present primarily on disturbed and bare soils. The current disturbed and bare soils are mostly a result of gopher activity.

The biotic integrity rating for the open meadow site 11 indicated none to slight departure from conditions expected for the site. The plant association for this site is an Idaho fescue – bluebunch wheatgrass/arrowleaf balsamroot in a late seral state. The amount, distribution and composition of structural and functional groups on site 11 closely match that expected for the site. Amount and distribution of annual grasses matched that expected for the site, and did not appear to be at risk of increasing.

The biotic integrity rating for the open meadow site 4 indicated a moderate to extreme departure from conditions expected for the site. The plant association for this site is an early seral state Idaho fescue/prairie junegrass (mounds). Historically, this site was heavily grazed as it was adjacent to a homestead. The structural groups were dramatically compromised with the seeding of intermediate wheatgrass on the mounds. The functional and structural groups were altered with the invasion of annual grasses on the site. The overuse, seeding, and invasion have lead to the conditions today; in which there is a severe decline in population of native perennial vegetation. Native plants account for only 20 percent of the current vegetation. These site conditions have reduced site productivity accordingly.

The biotic integrity rating for the open meadow site 7 indicated a moderate departure from conditions expected for the site. The plant association for this site is Idaho fescue-bluebunch wheatgrass/arrowleaf balsamroot and is in a mid seral state. Although all species expected to be on site are present, the proportion of the species has been altered with an increase in bluebunch wheatgrass, and a decrease in Idaho fescue. Snowberry and rose are also increasing on this site, probably as a result of disturbance. The departure from expected conditions appears to also be associated with increased bare ground and the presence of invasive annual grasses scattered throughout the site.

The biotic integrity rating for the open meadow private land site P2 indicated a slight to moderate departure from conditions expected for the site. The plant association for this site is Idaho fescue-bluebunch wheatgrass/arrowleaf balsamroot in an early to mid seral state. Although all species expected to be on site are present, the species composition has been altered with a decrease in both bluebunch wheatgrass and Idaho fescue populations, and the presence of invasive annual grasses both scattered throughout the site and present in disturbed areas. The departure from expected conditions appears to also be associated with historic soil loss and degradation and loss of soil biotic crusts. The site is scabby with some formation of desert pavement. Therefore, the site potential is not as great as historically would have been expected for the site. Patches of medusahead and wildrye were noted on south slopes adjacent to the site.

The biotic integrity ratings for the open forested sites 9 and 18 indicated none to slight departure from expected conditions. The plant association of these sites are ponderosa pine/snowberry in a mid to late seral state, and Douglas fir/pinegrass in a mid to early seral state for sites 9 and 18, respectively. In site 9, species expected are present at expected levels. Soil compaction associated with skid trails from past timber harvests may be limiting some growth. Although there is good vegetation cover in site 18, the plant seral state has shifted to a more early seral state as a result of past logging activity. An increase in lupine species was noted. Invasive annual grasses are few in both sites, and are located primarily on skid trails.

JOSEPH CREEK/GREEN GULCH:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for two private land analysis areas (sites P3 and P4) within the Joseph Creek/Green Gulch subwatershed. The IIRH site numbers and attribute ratings are located in Table VI-8.

The private land IIRH sites, (P3 and P4), located in the Joseph Creek/Green Gulch subwatershed were located on open meadows. Site P3 was located on a shallow, gravelly silt loam soil with a 20 percent north facing slope. P4 was located on moderately deep stony silt loam soil on a 70 percent southeast facing slope. Both were located at approximately 4100 feet elevation.

As noted in Table VI-8, IIRH analysis results indicated a departure from expected conditions range from none to slight and moderate for soil and site stability and hydrologic function, and none to slight for biotic integrity. Ratings for soil stability tests ranged from none to slight.

Soil and Site Stability Attribute

Soil and site stability rating for site P3 indicated none to slight departure from expected conditions. This rating was primarily attributed to the amount of bare soil being slightly greater than expected for the site due to a decrease in native annuals in perennial plant interspaces. Rill formation and connectivity is infrequent and match what is expected for the site. The soil stability test conducted on site soil indicated relatively stable aggregation and soil stability to erosion (Herrick et al. 2004).

Soil and site stability rating for site P4 indicated a moderate departure from expected conditions. This rating was primarily due to the amount of bare soil and water flow patterns being more evident, connected, and active than expected for the sites. Pedestals and terracettes were found to be strongly associated with flow patterns, animal trailing, bare soil, and plant inter-spaces. The amount of bare soil was more common, connected and larger than expected for the site. There was little vegetation cover in perennial plant interspaces and little to no soil biotic crusts. Evidence of rain splash impact and surface soil sealing is greater than expected for the site. The soil stability test conducted on bare and exposed soil indicated relatively stable aggregation, with none to slight departure from expected conditions.

Table VI-8. Summary of IIRH Ratings, Predominant Soil Type and Ecological Site for IIRH Sites Surveyed within the Joseph Creek/Green Gulch Subwatershed.

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
P3	Private 3	Mountain Loamy (18) and Mountain Shallow (22) FEID-PSSP6 (Ridgetop)	*Imnaha*	Open upper plateau slope at 4100ft elevation, 20% north facing slope.	None to slight/ Slight departure (4.7).	None to slight/ Slight departure (4.7).	None to slight departure (4.9)	None to Slight departure from that expected for bare surface soils (5.2).
P4	Private 4	Shallow South (30) PSSP6-POSA12 (Basalt)	*Gwinly*	Open plateau mid slope at 4089ft elevation, 70% Southeast facing slope.	Moderate departure (4.0).	Slight to moderate departure (4.0).	None to slight departure (4.8).	None to Slight departure from that expected for bare surface soils (4.6).

[1] *The Plant Association is based on Johnson and Simon (1987)*
[2] *Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.*
[3] *Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.*

Hydrologic Function Attribute

The ratings and justifications for hydrologic function for both private land sites reflect those for soil and site stability.

The hydrologic function-rating site P3 indicated none to slight departure from expected conditions. The qualitative indicators deviated slightly from those expected for the sites with the exception of evidence of minor erosion and deposition on site. Water flow patterns and pedestals closely match that expected for the site but show evidence of minor erosion and deposition on exposed soils, and some rain splash impact and minor sheet erosion. Soil does not appear to be moving off-site, but it appeared to be deposited in micro topographic positions and vegetation. The *surface soil stability* test conducted on the site indicated that surface soil resistance to erosion matched what is expected for the site.

The hydrologic function rating for site P4 indicated a slight to moderate/moderate departure from expected conditions. The rating is primarily due to the number, length and connectivity of pedestals, terracettes, rills, and water flow patterns being more common and slightly greater than that expected for the site. Rills, pedestals, and terracettes showed evidence of minor erosion, instability and deposition. Active pedestalling and terracettes were strongly associated with flow patterns, bare soil and plant interspaces. The amount of bare area is more common, more connected, larger and show signs of active sheet erosion. Evidence of soil erosion appeared to be associated with a greater than expected amount of bare soil, and less than expected biological soil crusts. The soil stability test indicated adequate to good soil stability. However, site conditions verify the high erosion hazard of bare soils due to the site's high slope angle and resultant water runoff/flow. Where sheet and rill erosion activity was found there were no gullies observed. Upland water flow patterns are short and unconnected to drainage systems.

Biotic Integrity Attribute

The biotic integrity rating for both private land sites P3 and P4 indicated none to slight departure from expected conditions for sites. The plant association for site P3 is an Idaho fescue/bluebunch wheatgrass (ridgetop) in mid to late seral state. The number and composition of structural and functional groups, plant mortality, plant vigor, decadence and reproductive capability closely match those expected for the site. The site is dominated by perennial bunchgrasses. The survey indicated a slight decrease in native annuals, and soil biotic crusts and mosses. Invasive annual grasses are predominately located in small patches associated with bare soil and disturbed areas.

The plant association for site P4 is a bluebunch wheatgrass/Sanberg bluegrass (basalt) in mid to late seral state with expected species. The composition of structural and functional groups plant mortality, plant vigor, decadence and reproductive capability closely match that expected for the site. In general, the site vegetation is dominated by perennial bunch grasses. Other expected and late seral plant species are generally found at expected ratios. There has been a slight to moderate decrease in overall vegetation cover and loss of soil biotic crusts and mosses in perennial plant interspaces and terracettes. These vegetation changes appear to be associated with the greater than expected amount of bare soil. Terracettes are more numerous than expected and show signs of active erosion/sloughing down slope due to animal trailing, freeze thaw action and the slope steeness. However, soil stability test indicated soil stability levels to match that expected for the site. Due to active erosion on terrace walls, perennial plants have exposed roots and are at risk of early drying. Invasive annual grasses are located primarily in disturbed areas.

JOSEPH CREEK/SUMAC CREEK:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for five analysis areas within the Joseph Creek/Sumac Creek subwatershed. The IIRH site numbers, and Grazing Allotment and Pasture names in which each of the IIRH sites are located are listed in Table VI-9.

Three of the five IIRH sites (sites 10, 12 and 13) in the Joseph Creek/Sumac Creek subwatershed were located on open meadows with very shallow - to shallow silt loam to silty clay loam, rocky. Each of the open meadow sites are associated with Idaho fescue plant communities and located on south facing slopes ranging from 5 to 60 percent. Elevations of the open meadow sites range from 4078 feet to 4531 feet.

IIRH Site 15 was located on a mosaic patterned shallow to moderately deep, rocky silt loam soil. Site 17 was located on a site with a mosaic pattern of open meadow with Idaho fescue and open dry ponderosa pine plant communities. The site was located on a 5 percent north facing slope at 4861 feet elevation. The soils on this site exhibit a similar mosaic pattern as the vegetation; a very shallow to moderately deep, rocky, loam to silty clay loam soil associated with the Idaho fescue plant community, and a shallow very cobbly ashy silt loam soil, with a one-inch deep surface layer of decomposed pine needles associated with the open ponderosa pine community.

As noted in Table 8, IIRH analysis results indicated a departure from expected conditions that range from slight to moderate, slight to moderate, and none to extreme for soil and site stability, hydrologic function, and biotic integrity attributes, respectively. Ratings for soil stability tests ranged from none, and slight to moderate.

Soil and Site Stability Attribute

Soil and site stability rating for site 12 indicated a slight departure from expected conditions for the site. The amount of bare ground on the site was only slightly greater than expected, with good soil biotic crust cover and a high soil stability rating. The surface soil indicated stable aggregation and showed little evidence of detrimental effects from historic or past land management practices. Soil and site stability rating for site 15 indicated a slight to moderate departure from expected conditions. The rating was primarily due to a greater amount of bare soil and annual grasses, active pedestalling and rill erosion, and slightly lower soil stability rating than expected for the site.

Soil and site stability rating for sites 10 and 13 indicated a moderate departure from conditions expected for the sites. Historical evidence suggests that these ratings were primarily due to surface soil loss and degradation. Active pedestalling, water flow patterns and soil compaction were more evident and connected than expected for the sites. Pedestals appeared to be associated with flow patterns. Soil compaction was restricted to the surface 1 to 2 inches of soil depth, but moderately widespread. Signs of surface soil sealing and compaction appeared to be moderately restricting infiltration rates. The amount and cover of soil biotic crust was less than expected, primarily and was anchored to plant bases and rocks

Soil and site stability ratings for the open forested site 17 indicated none to slight departure from expected conditions. The amount of bare soil and vegetative ground cover was within the expected range for the sites. *Surface soil stability* test indicated that soil resistance to erosion was high, and indicated no departure from expected conditions. Site 17 had evidence of detrimental soil compaction associated with skid trails. The soils associated with historic skid trails appeared to be stable, with no active erosion. Soil compaction appeared to be recovering naturally through root penetration and freeze thaw activity. The aerial extent of skid trails was estimated at less than 20 percent of the analysis area.

Table VI-9. Summary of IIRH Ratings, Predominant Soil Types and Ecological Sites for Each IIRH Site Surveyed within the Joseph Creek/Sumac Creek Subwatershed.

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association [1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
10	Swamp Creek/ Miller	Mountain Shallow South (36) FEID-PSSP6 / LUSE	*Anatone*	Open meadow on a ridge shoulder top at 4531ft, 17% south/southeast slope.	Moderate Departure (3.7).	Sight to moderate departure (4.5).	Slight to moderate departure (4.4).	Slight to moderate departure (4.1).
12	Swamp Creek/ Miller Unit	Mountain Shallow South (36) FEID-PSSP6 / BASA	*Bocker*	Open meadow on a ridge shoulder at 4468ft, 60% southeast slope.	Slight departure (4.7)	Slight departure (4.7)	Slight departure (4.2)	Slight to moderate departure (3.9).
13	Al Cunningham/ Shoot Canyon	Mountain Shallow South (36) and Mountain Loamy (18) ERST2/ POSA12	*Anatone*	Open meadow on the upper shoulder of plateau top at 4322ft elevation, 5-10% south slope.	Moderate Departure (4.1).	Moderate Departure (3.8).	Moderate to extreme departure (3.2).	Slight to moderate departure (3.4).

15	Chico Administrative Use Site #1/ Horse Pasture	Shallow South (31) and South (30) PSSP6/ POSA12 (Basalt)	*Ketten-back*	Open meadow on mid slope of plateau at 4078ft, 25-30% south slopes.	Slight to moderate departure (4.6).	Slight to moderate departure (4.3).	Moderate departure (3.9).	No departure under litter(6.0) Moderate departure no cover (2.3).

17	Cougar Creek/ Muddy Creek	Mountain Shallow (27) PSME/ SPBE	*Bocker*	Open meadow and open dry pine forest on ridgetop at 4861ft, 5% north slope.	None to slight departure (4.7).	None to slight departure (4.7).	None to slight departure (4.7).	No departure (6.0).

[1] The Plant Association is based on Johnson and Simon (1987)

[2] Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.

[3] Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.

Hydrologic Function Attribute

The hydrologic function rating for site 12 indicated a slight departure from expected conditions for site. The justifications for hydrologic function reflect those stated for soil and site stability above. The hydrologic function rating for site 15 indicated a slight to moderate departure from expected conditions. The justifications for hydrologic function reflect those stated for soil and site stability above. In addition, the shallow soils displayed a greater number, length and connectivity of water flow patterns than expected for the site. There was evidence of some instability and deposition.

The hydrologic function rating for sites 10 and 13 indicated a moderate departure from conditions expected for the sites. The justifications for hydrologic function reflect those stated for soil and site stability above. These ratings were primarily due to evidence of historic surface soil loss and degradation. Specific justifications include water flow patterns, pedestalling, and evidence of minor active erosion. Infiltration appeared to be reduced due to a lack of deep-rooted perennial plants, lack of surface litter, and surface soil sealing. On site 13, the amount and distribution of invasive annual grass was higher and litter cover lower than expected for the site.

The hydrologic function rating for the open forested site 17 indicated none to slight departure from expected conditions. The justifications for hydrologic function reflect those stated for soil and site stability above. The amount of bare soil and vegetative ground cover was within the expected range for the sites. Surface soil resistance to erosion was high, and indicated no departure from expected conditions. There was evidence of detrimental soil compaction associated with skid trails. The aerial extent of skid trails was estimated at less than 20 percent of the analysis area.

Biotic Integrity Attribute

The biotic integrity rating for site 12 indicated a slight departure from expected conditions for the site. The plant association for this site is Idaho fescue/bluebunch wheat grass-arrowleaf balsamroot in a mid to late seral state. The number and composition of structural and functional groups were slightly less than expected for the site. Soil movement was observed and may lead to a decrease in the ability of native vegetation to establish. Invasive annual grasses were found primarily in disturbed areas within the site.

The biotic integrity rating for site 15 indicated a slight to moderate departure from expected conditions. The plant association for this site is a bluebunch wheatgrass-Sandberg bluegrass (basalt) in an early seral state. The number and composition of structural and functional groups were slightly to moderately less than expected for the site as there was a decrease in bluebunch wheatgrass, and an increase in annul forbs and invasive annual grasses. The presence of annual species in areas with moderately deep soils appeared to be associated with past disturbance. Annual grasses were common throughout in large patches, and primarily associated with the deeper soils.

The biotic integrity rating for site 10 indicated a slight to moderate departure from conditions expected for the site. The plant association for this site is Idaho fescue/ bluebunch wheatgrass – silky lupine in an early seral state. Currently, the site contains more Sandberg blue grass relative to Idaho fescue and to conditions expected. This departure from expected conditions is primarily due to a reduction in the number of native perennials, increase in annual grasses, and corresponding reduction in native annuals. Annual grasses were common throughout the site, found primarily in a mosaic pattern, and associated with shallow, bare soils. The early seral state of this site is most likely the result of past livestock management and spring long grazing.

The biotic integrity rating for sites 13 indicated a moderate to extreme departure from conditions expected for the site. The plant association for this site is a strict buckwheat/ Sandberg bluegrass in an early seral state. The functional and structural groups have been moderately to severely compromised, as only a few Sandberg bluegrass or bluebunch wheatgrass plants were observed. This departure from expected conditions is associated with increased bare ground and the presence of annual weeds that dominate the site. Site productivity has been reduced accordingly, and is only 20 to 40 percent of that expected for the site. The seral state condition is primarily a result of annual early spring grazing.

The biotic integrity rating for the open forested site 17 indicated none to slight departure from expected conditions for the site. The plant association for this site is a Douglas fir/birchleaf spirea in a mid to early seral state. The site is more open than expected, most likely a result of past timber harvests. Therefore, the site forms almost a mosaic pattern of grass-dominated areas and forest dominated areas. The open areas are dominated with Idaho fescue and bluebunch wheatgrass, and these areas appear to be in a mid to late seral state. The number and composition of structural and functional groups closely match that expected for the site. Plant mortality, decadence and reproductive capability match that expected for the site. Very few invasive annual grasses were present. Annual bromes were present only under pine trees that appear to be habitually used for bedding by livestock.

JOSEPH CREEK/COUGAR CREEK

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for three analysis areas within the Joseph Creek/Cougar Creek subwatershed. The IIRH site numbers, and Grazing Allotment and Pasture names in which each of the IIRH sites are listed in Table IV-10.

Each of the three IIRH sites (sites 19, 20 and 22) in the Joseph Creek/Cougar Creek subwatershed were located on open meadows with very shallow to moderately deep, rocky silt loam to silty clay loam on south facing slopes ranging from 15 to 60 percent. Elevations ranged from 4262 feet to 4865 feet.

As noted in Table IV-10, the IIRH analysis results indicated a departure from expected conditions that ranged from none to moderate for each of the three attributes discussed below. Ratings for soil stability tests ranged from none and slight to moderate.

Table VI-10. Summary of IIRH Ratings, Predominant Soil Types and Ecological Sites for Each IIRH Site Surveyed within the Joseph Creek/Cougar Creek Subwatershed.

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
19	Cougar Creek/ Courgar	Mountain Very Shallow (27) PSSP6-POSA12 (Scabland)	*Anatone*	Open meadow on upper to mid slope of ridge at 4865ft, 15-20% south slope.	Slight to moderate departure (4.4).	Slight to moderate Departure (4.4).	Slight to moderate departure (4.2).	None to slight departure under cover (5.6). Moderate no cover (2.6)
20	Swamp Creek/ Lower Swamp	Shallow South (31) and South (30) FEID-PSSP6/ BASA	*Gwinly*	Open meadow on ridge shoulder, upper slope at 4262ft, 30% north slope.	None to Slight departure (4.8).	None to slight departure (4.8).	No departure (5.0).	None to slight departure (5.3).
22	Table Mountain / Thorn Hollow	Mountain Shallow South (36) FEID-PSSP6/ BASA	*Bocker*	Open meadow on ridge shoulder at 3433ft, 60% south slope.	Slight to moderate / moderate departure (4.1)	Slight to moderate / moderate departure (4.1).	Slight to moderate / moderate departure (4.3).	None to slight departure under cover (5.0). None to slight departure no cover (5.4).

[1] *The Plant Association is based on Johnson and Simon (1987)*
[2] *Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.*
[3] *Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the sit. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.*

Soil and Site Stability Attribute:

Soil and site stability rating for sites 19 and 22 indicated a slight to moderate departure from expected conditions. These ratings were primarily due to historic surface soil loss and degradation. The amount of bare soil and water flow patterns were more evident, connected, and active than expected for the sites. Pedestals were slightly more common in water flow patterns and displayed minor active erosion. Bare ground and surface soil loss was generally associated with terracettes, perennial plant interspaces, loss of soil biotic crusts, and areas with very shallow soil. Site 22 had more active rills than expected for the site in addition to evidence of older inactive rills. Soil stability tests for soils with organic litter or vegetative cover on both sites 19 and 22 had good soil resistance to erosion. Soil stability test for bare and exposed soil on site 19 was less than expected. Soil stability test for bare and exposed soils on site 22 was good and met expected conditions for the site. This is likely due to the abundance of fine roots from 0 to 2 inches deep in the soil profile.

Soil and site stability rating for site 20 indicated none to slight departure from conditions expected for the site. Soil and site stability indicators matched closely to those expected for the site. The primary departure was a slight increase in evidence of active pedestalling, water flow patterns and the amount of bare soil expected for the site. The soil stability test indicated good soil stability and aggregate formation.

Hydrologic Function Attribute:

The hydrologic function rating for sites 19 and 22 indicated a slight to moderate departure from conditions expected for the sites. The justifications for hydrologic function reflect those stated for soil and site stability above. Water flow patterns and pedestalling are slightly more common than expected for sites, with some evidence of active erosion – predominantly in the form of sheet erosion. Flow patterns and soil movement ceased with a decrease in slope, change in micro-topography, and an increase in vegetation or soil cover. Infiltration appeared to be reduced due to lack of deep-rooted perennial plants, lack of surface litter, and surface soil sealing. The amount and distribution of invasive annual grass was higher, and litter cover lower than expected for the sites.

The hydrologic function rating for site 20 indicated none to slight departure from expected conditions. The justifications for hydrologic function reflect those stated for soil and site stability above. The amount of bare soil and vegetative ground cover was within the expected range for the site with the exception of areas associated with terracettes. Surface soil resistance to erosion was high, and indicated no departure from expected conditions.

BIOTIC INTEGRITY ATTRIBUTE:

The biotic integrity rating for sites 19 and 22 indicated a slight to moderate departure from expected conditions for sites. The plant association for site 19 is a bluebunch wheatgrass/Sandberg bluegrass (scabland), and is in an early seral state. The number and composition of structural and functional groups were slightly less than expected for the site. This appears to be predominately associated with large patches of annual grasses found scattered throughout the site, and the reduction of annual production expected for the site. Annual production from native species for site 19 was estimated to range from 40 to 60 percent of the potential based on recent weather.

For site 22 the number and composition of structural and functional groups was slightly to moderately less than expected for the site. This is an Idaho fescue-bluebunch wheatgrass/arrowleaf balsamroot in a mid seral state. This site exists on a very steep slope and experiences soil movement frequently. Plant species are found at an expected rate with the exception of a decrease in Idaho fescue. The departure from expected conditions appears to be associated with the presence of annual forbs scattered throughout the site and associated with concave, moist areas. Annual production for the site was estimated to exceed 80 percent of the potential for the site.

The biotic integrity rating for site 20 indicated no departure from conditions expected for the site. The plant association for this site is Idaho fescue-bluebunch wheatgrass/ arrowleaf balsamroot in a late seral state. The number and composition of the structural and functional groups match conditions expected for the site. Plant mortality, vigor, decadence and reproductive capability match that expected for the site. Annual grasses and other invasives were few, and match that expected for the site.

JOSEPH CREEK/PEAVINE CREEK:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for two analysis areas (site 16 and site 25) within the Joseph Creek/Peavine Creek subwatershed. The IIRH site numbers, and Grazing Allotment and Pasture names in which each of the IIRH sites are located are listed in Table VI-11.

IIRH site 16 was located in an open meadow with a very shallow - to shallow rocky silt loam to silty clay loam soil on a 5 percent south facing slope at 4420 feet elevation. IIRH site 25 was located on a forested draw-head on a plateau top, with moderately deep - to deep silt loam to ashy silt loam soil. Site 25 was on a 5 percent northwest facing slope at 4999 feet elevation.

As noted in Table VI-11, the IIRH analysis results indicate slight to moderate departures from expected conditions for IIRH site 16, and a slight departure from expected conditions for IIRH site 25. Ratings for soil stability tests for both IIRH sites 16 and 25 indicated good soil stability, and showed none to slight departure from expected conditions.

Soil and Site Stability Attribute:

Soil and site stability rating for site 16 indicated a slight to moderate departure from expected conditions for the site. This rating is primarily due to historic surface soil loss and degradation. Bare soil was greater than expected and in larger, more continuous patches than expected. Soil compaction was observed in the surface 1.5 inches of the soil, and was moderately widespread. Signs of surface soil sealing on bare soils and compaction appears to be moderately restricting infiltration. Moss and soil microbiotic cover, observed in protected areas and areas with high surface rock content, met conditions expected for the site.

Soil and site stability ratings for the forested site (25) indicated a slight departure from expected conditions. This rating is primarily due to an increase in bare ground, surface soil loss and surface soil degradation over conditions expected for the site. The amount of bare soil was greater than expected for the site. The amount of bare soil and vegetative ground cover was within the expected range for the site in areas not associated with skid trails. Bare soil was generally associated with gopher activity and past logging activities (compacted skid trails and landings, and burned areas). Gopher activity tended to be concentrated on skid trails and accounted for a large portion of the bare ground. Site 25 had evidence of detrimental soil compaction associated with skid trails. The soils associated with historic skid trails appeared to be stable, with no active erosion. Soil compaction appeared to be recovering naturally through root penetration and freeze thaw activity. The aerial extent of skid trails was estimated at les than 20 percent of the analysis area.

Table VI-11. Summary of IIRH Ratings, Predominant Soil Types and Ecological Sites for Each IIRH Site Surveyed within the Joseph Creek/Peavine Creek Subwatershed.

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
16	Fine/ Peavine #4	Mountain Very Shallow (27) PSSP6-POSA12 (Scabland)	*Bocker*	Open meadow on ridge top at 4402ft, 5% south slope	Moderate Departure (4.1).	Moderate Departure (4.1).	Slight to moderate departure (4.1).	None to slight departure (4.1).
25	Table Mountain / Kirkland	Warm-dry forest, loamy soil. PICO (ABLA2)/ VASC/ POPU	*Syrup-creek*	Forested on top of draw on plateau top 4999ft, 0-5% northwest slope.	Slight departure (4.7)	Slight departure (4.7)	Slight departure (4.1)	None to slight departure under cover (5.6).

[1] The Plant Association is based on Johnson and Simon (1987)
[2] Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.
[3] Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.

HYDROLOGIC FUNCTION ATTRIBUTE:

The hydrologic function rating for site 16 indicated a moderate departure from expected conditions for the site. The justifications for hydrologic function reflect those stated for soil and site stability above. The amount of water flow patterns match what is expected for the site, but show evidence of minor, active erosion. The justifications for hydrologic function are due to the presence of pedestal formation up to 1 to 2 inches in height and present in patches up to 4 inches in diameter. Pedestals were primarily concentrated in flow paths. The predominant type of soil erosion is rain-splash and sheet erosion. Soil did not appear to be moving off site. Due to the low slope angle of the site sediment appears to be caught in litter, change in micro-topography, rocks and plant bases.

The hydrologic function rating for forested site 25 indicated a slight departure from expected conditions. The justifications for hydrologic function reflect those stated for soil and site stability above. The justifications for hydrologic function are due primarily to the slightly increased amount of bare ground and surface soil degradation in the form of soil compaction associated with skid trails. Current and past rill formation, water flow patterns, and pedestals match that expected for the site. Infiltration and runoff are not affected by changes in the native plant community composition and distribution. Some surface soil sealing and sheet erosion was noted on bare soils on skid trails. However, observations did not indicate surface soil being transported off site.

BIOTIC INTEGRITY ATTRIBUTE:

The biotic integrity rating for site 16 indicated a slight to moderate departure from expected conditions for the site. The plant association for this site is a bluebunch wheatgrass – Sandberg bluegrass (Scabland) with weak Idaho fescue/prairie junegrass (Mounds). The scabland site is in a mid seral state, with some invasive annual grasses present and a loss of surface soil. The mounds are low in stature and percentage within the site and represent only a small area of the site. The mounds are in a very early seral state with a loss of surface soil, native plant communities, and an increase in invasive annual grasses. There was noted a slightly greater plant decadence and reduced annual production than expected for the site.

The biotic integrity rating for the forested site 25 indicated a slight departure from expected conditions for the site. The plant association for this site is a lodgepole (subalpine fir)/grouse huckleberry/Jacob's ladder in an early seral state. This departure from expected conditions is due to the number and composition of structural and functional groups being slightly less than expected for the site, mostly as a result of past timber harvest and grazing practices. Some non-native species (example; clover, timothy orchardgrass) have been introduced or planted during post timber harvest activities. Yarrow appears to have increased due to ground disturbance. Annual production is slightly reduced from expected production rates due to increase in bare soils and change in plant composition. The site appears to be healing from past practices.

JOSEPH CREEK/RUSHCREEK:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for three analysis areas within the Joseph Creek/Rush Creek subwatershed. One site was located on Forest Service land (site 26). Two sites, (sites P5 and P6), were located on private land. The IIRH site number and attribute ratings are listed in Table VI-12.

Each of the three sites were located on open meadows. IIRH site 26 was located on a plateau top, with a shallow and rocky silt loam to silty clay loam soil on a 5 to 10 percent south facing slope at 4596 feet elevation. The two private land sites (P5 and P6) were located on plateau shoulders with shallow gravelly silt loam surface soils, on steep slopes ranging from 55 to 70 percent. Site P5 was located on a south facing slope at 4259 feet elevation. Site P6 was located on a northeast facing slope at 4029 feet elevation.

As noted in Table VI-12, the IIRH analysis results indicate none to slight departures from expected ecological conditions for IIRH site 26 and private land site P6. IIRH analysis results indicate slight to moderate departures from expected ecological conditions for private land site P5. Ratings for soil stability tests for all three sites indicated good soil stability, and showed none to slight departure from expected conditions.

Table VI-12. Summary of IIRH Ratings, Predominant Soil Types and Ecological Sites for Each IIRH Site Surveyed within the Joseph Creek/ Rush Creek Subwatershed.

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
26	Hunting Camp/ Tamarack	Mountain Shallow South (36) FEID-PSSP6 / LUSE	*Anatone*	Open meadow on plateau top at 4596ft, 5-10% southwest slope.	None to Slight departure (5.0).	None to Slight departure (5.0).	None to slight departure (5.0).	None to slight departure (5.6)
P5	Private 5	Mountain Shallow (22) FEID-PSSP6 / BASA	*Gwinly*	Open plateau shoulder at 4259ft elevation, 55-70% South facing slope.	Slight to moderate / moderate departure (4.1)	Slight to moderate/ moderate departure (4.0)	Slight to moderate/ moderate departure (4.4)	None to slight departure (4.6)

Site #	Allotment/ Pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
P6	Private 6	Shrubby North (60) FEID-PSSP6 / BASA	*Anatone*	Open plateau shoulder at 4029ft elevation, 60-70% Northeast facing slope.	Slight departure (4.6)	Slight departure (4.6)	Slight departure (4.9)	None to slight departure (5.7)

[1] The Plant Association is based on Johnson and Simon (1987)

[2] Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.

[3] Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.

Soil and Site Stability Attribute:

Soil and site stability rating for site 26 indicated none to slight departure from expected conditions for the site. Soil and site stability indicators matched those expected for the site. Bare soil, surface soil structure and organic matter content, rills, pedestals, water flow patterns and soil surface resistance to erosion did not deviate from expected conditions. The soil stability test indicated good soil aggregate formation and good soil stability.

Soil and site stability rating for private land site P5 indicated a slight to moderate tending toward moderate departure from expected conditions for the site. Historical evidence suggests this rating is due to historic surface soil loss, degradation, and soil cover loss. The amount of bare ground was more than expected due to loss of native annuals, biotic crusts and mosses in perennial plant interspaces. Evidence of old rills, water flow patterns and pedestals with blunted or muted erosion features were common. The current number and patterns of rills, water flow patterns and pedestals match that expected for the site, but show signs of minor active erosion. The soil stability tests indicated good soil stability, and showed none to slight departure from expected conditions. Soil degradation appears to be slowly recovering in the form of increased litter cover and associated increase in soil organic matter content.

Soil and site stability rating for private land site P6 indicated a slight departure from expected conditions for the site. This rating is due primarily to a slight increase in the amount of bare soil over conditions expected for the site. The analysis showed slight evidence of minor erosion associated with rills and pedestals within flow patterns. These appear to be associated with historic soil loss and bare ground related to past management. The litter amount matched what is expected for the site. Soil biotic crust and moss cover was less than expected for the site, but appears to be recovering from historic loss. The soil stability tests indicated good soil stability, and showed none to slight departure from expected conditions.

HYDROLOGIC FUNCTION ATTRIBUTE:

The hydrologic function rating for site 26 indicated none to slight departure from expected conditions for the site. The justifications for hydrologic function reflect those stated for soil and site stability above. Site conditions indicated good infiltration. There was no evidence of increased water flow patterns over expected conditions. There was good ground and litter cover. Soil stability test indicated good soil resistance to erosion.

The hydrologic function rating for private land site P5 indicated slight to moderate with a tend toward moderate departure from expected conditions for the site. The justifications for hydrologic function reflect those stated for soil and site stability above. The departure is primarily due to historic surface soil degradation, soil loss and loss of soil cover. The current number and patterns of rills, water flow patterns and pedestals match that expected for the site, but show signs of minor, active erosion. The soil type is generally stable to moderately erodible. However, due to the high slope angle, the site has a very severe soil erosion hazard rating. If these soil types are denuded or heavily disturbed the soils are easily eroded with a high risk of sediment transport off slope. Surface rock cover on site P5 is very high and helps to reduce effects of water runoff and erosion, and sediment transport off site. The soil stability test indicated good soil resistance to erosion.

The hydrologic function rating for private land site P6 indicated a slight departure from expected conditions for the site. The justifications for hydrologic function reflect those stated for soil and site stability above. Hydrologic indicators closely match that expected for the site. Litter amount is what is expected for the site. There was slight evidence of minor erosion associated with rills and pedestals within flow patterns. However, infiltration and runoff appears to not be affected by changes in plant community. Soil does not appear to be moving off site but is accumulating in micro depressions and vegetation. The soil type on site P6 is stable (Table VI-1). However, due to the high slope angle, the site has a moderate to severe soil erosion hazard rating (refer to Table VI-1). Therefore, if denuded or heavily disturbed the soils on site P6 are erodible, with a high risk of sediment transport off slope. Surface rock cover on site P6 is high and helps to reduce effects of water runoff and erosion, and sediment transport off site. The soil stability test indicated good soil resistance to erosion.

BIOTIC INTEGRITY ATTRIBUTE:

The biotic integrity rating for site 26 indicated none to slight departure from expected conditions for the site. The plant association for this site is Idaho fescue-bluebunch wheat grass/silky lupine in a mid to early seral state as there is an increase in Sandberg bluegrass, and a decrease in prairie junegrass. Plant mortality, vigor, decadence and reproductive capability match that expected for the site. Presence of invasive annual grasses was only slightly greater than that expected for the site. Litter amount was slightly more than expected due to the small patches of annual grasses.

The biotic integrity rating for site P5 indicated a slight to moderate tending toward moderate departure from expected conditions for the site. The plant association for this site is Idaho fescue/bluebunch wheatgrass-arrowleaf balsamroot in a mid to early seral state as there is a decrease in Idaho fescue, and high populations of non-native perennials and invasive annuals throughout the site. The biotic integrity rating is primarily a related to historic soil degradation, surface soil loss and loss of soil biotic crusts. The site has experienced a moderate change in functional structural groups with reduce cover of Idaho fescue and native annuals in perennial plant interspaces. Invasive annuals are primarily composed of bachelor's button and are scattered to common throughout the site. Invasive annual grasses form a mosaic across the landscape and are concentrated in disturbed areas within the site.

The biotic integrity rating for private land site P6 indicated slight departure from expected conditions for the site. The plant association for this site is Idaho fescue/bluebunch wheatgrass-arrowleaf balsamroot in a mid seral state. The biotic integrity rating is primarily due to historic soil surface loss and degradation. The composition of structural and functional groups plant mortality, plant vigor, decadence and reproductive capability closely match that expected for the site. There has been a slight decrease in the Idaho fescue component and loss of soil biotic crusts and mosses in perennial plant interspaces, and an increase in annual grasses on the site.

BROADY CREEK:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for three sites within Broady Creek subwatershed. The IIRH site numbers, and Grazing Allotment and Pasture names in which each of the IIRH sites are located are listed in Table VI-13.

Each of the three IIRH sites (sites 27, 28 and 29) in the Broady Creek subwatershed were located on open meadows with very shallow to shallow silt loam to silty clay loam soils on south facing slopes ranging from 5 to 60 percent. Elevations ranged from 3696 feet to 5100 feet. All of the sites are bluebunch wheatgrass/Idaho fescue mound/intermounds ecological plant communities.

Table VI-13. Summary of IIRH Ratings, Predominant Soil Types and Ecological Sites for Each IIRH Site Surveyed within the Broady Creek Subwatershed.

Site #	Allotment/ pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
27	Teepee Elk/ Elk	Mountain Shallow (27)	*Bocker*	Open meadow on plateau top at 4922ft, 0 - 5% northwest	No departure (5.0).	None to slight departure (5.0).	Slight departure (4.6).	None to slight departure (5.2)

Site #	Allotment/ pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
		ARRI/ POSA12 and FEID-KOMA (Mounds)		to southwest slope.				
28	Cougar Creek/ Baldwin	Mountain Shallow (27) FEID-KOMA (Ridgetop)	*Bocker*	Open meadow on ridge top at 5100ft elevation, 0 - 5% southwest slope.	None to slight departure (4.6).	None to slight departure (4.6).	Slight to moderate departure (4.3).	Slight departure (4.5)
29	Teepee Elk/ Rock Creek	Mountain Shallow South (36) FEID-PSSP6 /LUSE	*Bocker*	Open meadow on steep side slope of plateau at 3696ft, 60% southwest slope.	Slight to moderate departure (4.4).	Slight to moderate departure (4.4).	Slight departure (4.7).	None to slight departure (4.7) under litter. Moderate no litter (4.0).

[1] The Plant Association is based on Johnson and Simon (1987)
[2] Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.
[3] Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.

As noted in Table VI-13, IIRH analysis results indicated a range of none to moderate departure from expected conditions for each of the three attributes discussed below. Ratings for soil stability tests indicated none and slight departure from expected conditions.

Soil and Site Stability Attribute:

Soil and site stability rating for sites 27 and 28 indicated none to slight departure from expected conditions for both the mound and intermound areas. Site soil and stability indicators for site 27 match what is expected for the site. The amount of bare soil, soil micro-biotic crusts, surface soil organic matter, and vegetative ground cover was within the expected range for the sites. Surface soil stability test indicated that soil resistance to erosion was high, and indicated no departure from expected conditions. IIRH site 28 indicated a slight departure primarily due to a slight increase in the amount of bare soil, and the presence of a shallow compaction layer, most likely as a result of ungulates. Soil stability tests indicated a slight decrease in soil stability to erosion than what was expected for the site.

Soil and site stability rating for site 29 indicated slight to moderate departure from conditions expected for the site. This departure from expected conditions is due primarily to historic surface soil degradation and loss. The amount of bare ground was slightly to moderately greater than expected for the site and generally associated water flow patterns. Where fines have been washed away, rock cover is acting as surface cover and protecting the surface soil from rainsplash impact and erosion. *Soil stability test* results indicated good soil stability and closely matched that expected for the site.

HYDROLOGIC FUNCTION ATTRIBUTE:

The hydrologic function rating for site 27 and 28 indicated none to slight departure from conditions expected for the sites. The justifications for hydrologic function reflect those stated for soil and site stability above. The primary reason for a slight departure is due to the change the distribution and composition of deep-rooted perennial plants to shallow rooted annual plants on the mound areas (see more in depth discussion of plant communities in the biotic integrity section below). Ground cover was within the expected levels. On site 27, infiltration appeared to be good, and not affected by plant composition. No active water flow patterns, rilling or pedestalling were observed, most likely as a result of good infiltration rates and low slope angle of the sites. On site 28, a slight departure is due to evidence of minor erosion in water flow patterns and slightly more bare ground than expected for the site. A shallow compaction layer was found at 1.5 inches deep. Infiltration and runoff appear to be slightly affected by a change in plant composition from perennial grasses to annual grasses on the mounds. There was no evidence that surface soils or sediment are moving off site. Soil resistance to erosion tests for both sites 28 and 29, indicated good soil resistance to erosion for both mound and intermounds areas.

The hydrologic function rating site 29 indicated slight to moderate departure from expected conditions. The justifications for hydrologic function reflect those stated for soil and site stability above. The number and length of water flow patterns were slightly greater and more active than expected for the site. The amount of bare ground closely matches that expected for the site, except in small patches of bare soil associated with perennial plant interspaces. In areas with bare soil, water flow is contributing to slightly elevated pedestal formation, erosion, and litter movement. Pedestals are approximately 2 to 4 inches in height and generally associated with water flow patterns. There was some evidence of soil slumping off terracette walls, apparently due to animal trailing. Soil stability tests indicated soil stability to erosion, and closely matched that expected for the site.

BIOTIC INTEGRITY ATTRIBUTE:

The biotic integrity rating for sites 27 and 29 indicated a slight departure from expected conditions for sites. The plant association of site 27 is a stiff sage/Sandberg bluegrass and Idaho fescue-prairie junegrass (Mounds). The stiff sage areas are in a mid to early seral state, with a decrease in stiff sage and Sandberg bluegrass, and an increase in invasive annual grasses. Mounds have changed to a Kentucky bluegrass community, most likely as a result of past grazing practices. For site 27, the number and composition of structural and functional groups is slightly less than expected for the site predominately due to the invasion of annual grasses primarily found scattered throughout the mounds, and the subsequent reduction of annual production expected for the site, and the shift from Idaho fescue/prairie junegrass to a Kentucky bluegrass.

The plant association for site 29 is an Idaho fescue-bluebunch wheatgrass/silky lupine in a late seral state. The departure noted in the biotic integrity is primarily due to a slight, historic surface soil degradation and loss, and the presence of annual grasses and forbs in disturbed areas – particularly associated with soil slumping of terracettes. Intermediate wheatgrass was also found on site and is a result of plantings within an adjacent timber harvest areas. Plant mortality, vigor, decadence and reproductive capability match that expected for the site.

The biotic integrity rating for site 28 indicated slight to moderate departure from conditions expected for the site. The plant association of this site is an Idaho fescue-prairie junegrass (Ridgetop) in mid seral state. The departure is due to a slight to moderate change in functional and structural groups expected for the site as there is an increase in Kentucky bluegrass, and a decrease in bluebunch wheatgrass, Idaho fescue, and praire junegrass. The moderate invasion of annual grasses was found primarily on the mounds. Annual production was slightly reduced from expected rates due to an increase in the size of plant interspaces, the increased amount of bare soil, and presence of invasive annual grasses in the mound and disturbed areas.

HORSE CREEK:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for two sites within the Horse Creek subwatershed. The IIRH site numbers, and Grazing Allotment and Pasture names in which each of the IIRH sites are located are listed in Table VI-14.

The two IIRH sites (sites 30 and 33) in the Horse Creek subwatershed were located on open meadows. However, site 30 was located on a very shallow - to shallow rocky silt loam to silty clay loam soil on a 60 percent northwest facing slope at 2907 feet elevation. Site 33 was located on a moderately deep - to deep silt loam soil on a 0 to 5 percent north/northwest facing slope at 5050 feet elevation.

As noted in Table IV-14, the IIRH analysis results indicated none to moderate departures from expected conditions for the soil and site stability, and hydrologic function attributes. Results indicated a slight departure from expected conditions for biotic integrity. Ratings for soil stability tests for both IIRH sites 30 and 33 indicated good soil stability, and showed none to slight departure from expected conditions.

SOIL AND SITE STABILITY ATTRIBUTE:

The soil and site stability rating for site 30 indicated none to slight departure from expected conditions for the site. Site soil and stability indicators; amount of bare soil, surface soil structure, surface soil organic, rills, pedestals and waterflow patterns, closely matched what was expected for the site. The soil stability test and showed none to slight departure from expected conditions.

Table VI-14. Summary of IIRH Ratings, Predominant Soil Types and Ecological Sites for Each IIRH Site Surveyed within the Horse Creek Subwatershed.

Site #	Allotment/ pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
30	Cold Springs/ Lost Cow	Shrubby North (60) and North (40) SYAL-ROSA	*Imnaha Cherry-creek*	Steep side slope of plateau at 2907ft, 60% northwest slope	None to slight departure (5.0).	None to slight departure (5.0).	Slight departure (4.7).	None to slight departure (5.5)
33	Cold Springs/ North Cold Springs	Mountain Loamy (18) *Albee* soils Very Shallow (27) *Bocker* FEID-PSSP6 (Ridgetop)	*Albee and Bocker*	Plateau top at 5050ft, 0-5% north to northwest slope.	Slight to moderate departure (4.6).	Slight to moderate departure (4.6).	Slight departure (4.7).	None to slight departure (5.6)

[1] The Plant Association is based on Johnson and Simon (1987)
[2] Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.
[3] Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.

The soil and site stability rating for site 33 indicated a slight to moderate departure from conditions expected for the site. This rating was primarily due to the moderate increase in the amount of bare soil and moderate decrease in the amount of soil biotic crust expected for the site. The amount and connectivity of water flow patterns, rills and pedestals matched that expected for the site. The soil stability test indicated that the soils on mounds had good soil structure and associated good resistance to erosion. Soil stability tests indicated slight to moderate reduction in soil stability on intermounds sites due to soil degradation in the form of surface soil loss, and surface soil sealing. Soil stability test indicated no departure from expected conditions for the mound areas.

HYDROLOGIC FUNCTION ATTRIBUTE:

The hydrologic function rating for site 30 indicated a slight departure from expected conditions for the site. The justifications for hydrologic function reflect those stated for soil and site stability above. Water flow patterns matched that expected for the site. Litter cover and amount was slightly greater than what is expected for the site due to presence of invasive annual grasses in perennial plant interspaces. Lack of active rills or sheet erosion indicated good infiltration. Soil stability tests indicated good soil resistance to erosion, with a no departure from expected conditions.

The hydrologic function rating for site 33 indicated a slight to moderate departure from conditions expected for the site. The justifications for hydrologic function reflect those stated for soil and site stability above. These ratings were primarily due to less litter cover on mounds, and greater amount of bare soil on intermound areas than expected for the site. Water flow patterns showed little evidence of active erosion. However, pedestals within intermounds areas were greater in number than expected and ranged from 1 to 2 inches in height. The soil stability test indicated a slight to moderate departure from expected conditions for the intermounds areas, and no departure from expected conditions for the mound areas. Sediment did not appear to be moving off site due to low slope angle and adequate infiltration.

BIOTIC INTEGRITY ATTRIBUTE:

The biotic integrity rating for sites 30 and 33 indicated none to slight departure from expected conditions for site. The plant association for site 30 is snowberry-rose in a transitioning state. This site appeared to be shifting from one dominated by bluebunch wheatgrass and Idaho fescue to one dominated by snowberry and rose species. As a result of this shift, a seral state was not identified. This shift is most likely the result of past grazing practices and fire history. Plant mortality, vigor, decadence and reproductive capability match that expected for the site.

The plant association of site 33 is an Idaho fescue/bluebunch wheatgrass (Ridgetop) in a late seral state. The number and composition of the structural and functional groups match conditions expected for the site. Plant mortality, vigor, decadence and reproductive capability match that expected for the site. Invasive annual grasses were few, and match that expected for the site.

UPPER COTTONWOOD CREEK:

Interpreting Indicators of Rangeland Health, (Pellant et al. 2005), was completed for four sites within Upper Cottonwood Creek subwatershed. The IIRH site numbers, and Grazing Allotment and Pasture names in which each of the IIRH sites are located are listed in Table VI-15.

Of all the subwatersheds with IIRH survey sites, Upper Cottonwood Creek subwatershed IIRH sites had the most varied landform and topographic characteristics. Three of the four IIRH sites (sites 31, 32 and 35) in the Broady Creek subwatershed were located on open meadows with very shallow to moderately deep, rocky silt loam to silty clay loam soils on slopes ranging from 0 to 60 percent, and elevations ranging from 5152 to 5450 feet. Aspects ranged from northwest, southwest and northeast for sites 31, 32 and 35, respectively.

Table VI-15. Summary of IIRH Ratings, Predominant Soil Types and Ecological Sites for Each IIRH Site Surveyed within the Cottonwood Creek Subwatershed.

Site #	Allotment/ pasture	Ecological Site Name and Plant Association[1]	Dominant Soil Name	Landform, Topographic Position, Aspect and Slope	Soil & Site Stability (1-5)[2]	Hydrologic Function (1-5)[2]	Biotic Integrity (1-5)[2]	Soil Stability Class (1-6)[3]
31	Cold Springs/ North Wildhorse	Mountain Very Shallow (27) and Mountain Shallow (22) mound intermounds complex. FEID-KOMA (Mounds)	*Bocker and Anatone*	Open meadow on top of Wildhorse Ridge at 5222ft, 10-15% Northwest slope.	Moderate departure (4.1).	Moderate departure (3.9).	Moderate departure (4.3).	Slight to moderate departure bare soils in inter-mound sites (4.0).
32	Cold Springs / Cotton-wood	Mountain Shallow South (36) FEID-PSSP6 (Ridgetops)	*Bocker*	Open meadow on plateau top at 5152 ft, 2-10% southwest slope.	Slight departure (4.8).	Slight departure (4.6).	Slight departure (4.6).	Slight departure (4.4)
34	Cold Springs/ South Cold Springs	Warm-dry forest, loamy soil. ABGR/ LIBO2	*Syrup-creek*	Forested site on plateau top at 5294ft, 0-5% north slope.	Slight to moderate departure (4.5).	Slight to moderate departure (4.5).	Slight to moderate departure (4.2).	None to Slight departure (6.0)
35	Cold Springs/ South Cold Springs	Mountain Very Shallow (27) and Mountain Shallow (22) PSSP6-POSA12	*Anatone*	Open meadow on steep plateau side slope at 5450ft, 60 – 70% east to southeast slope.	Slight to moderate departure (4.5).	Slight to moderate departure (4.4).	Slight to moderate departure (4.6).	Slight departure (4.0)

[1] *The Plant Association is based on Johnson and Simon (1987)*

[2] Attribute ratings reflect the degree of departure from qualitative indicators specified for each attribute per the Ecological Site reference Sheets (USDA 1997). A value of 5 is the highest attribute rating, a value of 1 is the lowest.
[3] Soil Stability class is tested using the protocol described above (Pellant et al. (2005). The soil stability class reflects the degree soil stability relative to test standards, and the degree of departure from conditions expected for the site. A value of 6 indicates the highest soil stability and the least departure from expected conditions, a value of 1 indicates the lowest soil stability, and the greatest departure from expected conditions.

Site 33 was located on an open meadow with moderately deep - to deep, silt loam soil on a 0 to 5 percent north/northwest facing slope at 5050 feet elevation. Site 34 was a forested site located on a moderately-deep ashy silt loam soil on a 0 to 5 percent north slope at 5294 feet elevation.

Soil and Site Stability Attribute

The soil and site stability rating for site 31 indicated a moderate departure from expected conditions for the site. The departure from expected conditions is primarily due to historic surface soil degradation and loss in the intermound areas. The amount of bare ground was slightly greater than expected for the site. Bare ground was associated with the loss of a soil biotic crust component, reduced litter, and increase in water flow activity in perennial plant interspaces within the intermound areas. Surface soil loss is evident with pedestal formation up to 1 inch high. The soil stability test indicated that surface soil resistance to erosion has been slightly to moderately reduced from expected conditions within intermounds sites.

Soil and site stability rating for site 32 indicated a slight departure from expected conditions for the site. The departure from expected conditions is primarily due to the slight to moderate increase in the amount of bare soil, and slight to moderately decrease in soil biotic crust component than expected for the site. Soil stability test and showed none to slight departure from expected conditions.

Soil and site stability rating for sites 34 and 35 indicated a slight to moderate departure from conditions expected for the sites. The departure from expected conditions on forested IIRH site 34 was due primarily to soil degradation due to past logging activities. The amount of bare ground associated with past burning and skid trails was higher than expected. Detrimental soil compaction was evident on skid trails and landings. The aerial extent of skid trails was estimated at less than 20 percent of the analysis area. Use on this site by ungulates appears to be low to moderate. Impacts consist of trailing on skid trails, and light use of grass, forbs and shrubs. Soil resistance to erosion tests indicated no departure from expected conditions.

The slight to moderate departure from expected conditions for site 35 was due primarily to historic surface soil degradation and loss of soil cover. The amount of bare ground was slightly more than expected due to loss of perennial plants, biotic crusts and presence of slightly active terracettes. The soil stability test indicated a slight departure from expected conditions. Effects to soil and site stability do not appear to be related to current management, but a function of historic use.

Hydrologic Function Attribute

The hydrologic function rating for site 31 indicated a moderate departure from expected conditions for the site. The justifications for hydrologic function reflect those stated for soil and site stability above. The amount of bare ground was greater and more connected than that expected for the site. Bare areas appear to be strongly associated with gopher activity and not current management. The number and length of water flow patterns were slightly greater than expected for the site with evidence of minor erosion, instability and deposition – specifically in the intermounds areas. Mound areas do not have water flow patterns above that expected for the site. In intermound areas with bare soil, water flow is contributing to pedestal formation and litter movement. Pedestals are approximately 0.5 to 1 inches in height, associated with water flow patterns and show minor evidence of erosion, primarily in the form of sheet erosion.

The hydrologic function rating for site 32 indicated a slight departure from expected conditions for the site. The justifications for hydrologic function reflect those stated for soil and site stability above. The results indicated a moderate increase in the amount of bare soil and moderately less soil biotic crust cover than expected for the site. A slight change in structural and functional groups has decreased canopy cover and ground cover, but does not appear to be affecting water infiltration rates (see discussion on biotic integrity below). Rills, water flow patterns and pedestals match that expected for the site. Terracettes are slightly greater than expected for the site, and appear to mostly be caused by wildlife trailing.

The hydrologic function rating for sites 34 and 35 indicated a slight to moderate departure from conditions expected for the sites. The justifications for hydrologic function reflect those stated for soil and site stability above. The departure from expected conditions on forested site 34 was due primarily to the reduction in vegetation cover, ground cover and detrimental soil compaction associated with skid trails from past logging activities. Infiltration rates and runoff effects were not evident. Due to the low slope angle of the site, and adequate canopy and understory cover, the amount of rills, water flow patterns and pedestals match that expected for the site.

The slight to moderate hydrologic function rating for site 35 was due primarily to historic soil degradation as reflected by a slight to moderate departure from expected conditions for 6 of the 10 hydrologic indicators. Terracettes, primarily associated with flow patterns were more numerous than expected with signs of minor erosion and deposition. Terracettes appeared to be associated with animal trailing, freeze thaw activity and soil sloughing/movement downhill from erosion.

Biotic Integrity Attribute

The biotic integrity rating for site 31 indicated a slight to moderate departure from expected conditions for the site. The plant association for this site is an Idaho fescue-prairie junegrass (Mounds) in late seral state on the mounds, and a disclimax state in the intermounds. On the mounds, the number and composition of the structural and functional groups match conditions expected for the site. Within the intermound areas, Kentucky bluegrass is filling in the functional role of Sandberg bluegrass, moving the intermounds toward a Kentucky bluegrass disclimax. Within the intermounds, there was also slightly less vegetation than expected. Plant mortality, vigor, decadence and reproductive capability match that expected for the site. Annual grasses and invasives were few, and match that expected for the site.

The biotic integrity rating for site 32 indicated slight departure from expected conditions for site. The plant association for this site is an Idaho fescue-bluebunch wheatgrass (Ridgetop) in mid seral state. The number and composition of the structural and functional groups on this site have been compromised as there is a decrease in Idaho fescue and prairie junegrass, and an increase in bluebunch wheatgrass and Sandberg bluegrass. Plant mortality, vigor, decadence and reproductive capability match that expected for the site. Annual grasses and invasives were few, and match that expected for the site.

The biotic integrity rating for site 34 indicated a slight to moderate departure from expected conditions for site. The plant association for this site is a grand fir/twinflower and is in an early state. Most likely as a result of past timber harvest practices, this site has changed in composition of plant species and therefore structural and functional groups. This site should consist of a cool moist grand fir ecosystem, but currently has an increase in ponderosa pine, scouler willow, rose, and twinflower. Plant mortality, vigor, decadence and reproductive capability match that expected for the plant species present.

The biotic integrity rating for site 35 indicated a slight to moderate departure from expected conditions for site. The plant association for this site is a bluebunch wheatgrass-Sandberg bluegrass and is in a late seral state. This site is unique in that it does not match any one Johnson and Simon (1987) plant association. The bluebunch wheatgrass-Sandberg bluegrass plant association matches best, however this site is more steep, at a higher elevation and contains less vegetation as a result of the soil type than expected. There are very few invasive annual grasses present on the site. Site potential appears to be at expected structural and functional group levels. Plant mortality, vigor, decadence and reproductive capability match that expected for the site.

C&T AND ECOPLOT ANALYSIS FOR THE LJCW ASSESSMENT

ANALYSIS INFORMATION

It is very important to note that the data from C&T readings cannot be compared to the data from EcoPlot readings. For this analysis, C&T data was used as a trigger to identify when vegetation or other attributes had a significant change, using a paired t-test (t = 0.05). As this method includes data over time on several soil and vegetation attributes and can easily be summarized and reinterpreted to help evaluate trend and current condition (Ruyle and Dyess 2010) EcoPlot data was then assessed and/or statistically paired with other year's EcoPlot data (actual amount of basal cover or canopy cover), for a more accurate account of cover change. T-tests were also used within the EcoPlot data, and significant changes are noted and described.

Direct hits are C&T data's method of identifying the frequency of perennial vegetation. Direct hits are a measure of when the Parker 3-Step loop lands directly on a perennial plant. For this analysis, the direct hits are given for each site and statistically compared using a paired t-test where t=0.05 to determine significant change.

It is important to note that reinterpreting range condition assessments from Parker data should be based on current understandings of plant community dynamics (Ecological Site Description and localized Plant Association information) and associated with state and transitions models and site stability ratings (SRM Task Group on Unity in Concepts and Terminology 1995). Finally, as stated in Ruyle and Dyess (2010):

> Each monitoring location is unique and soil-vegetation classifications such as TEUI or Ecological Site Inventory are constructs of human interpretation, potential of desired conditions require a great deal of professional judgment and should be used for general guidance only. Monitoring data acquired at site-specific locations, regardless of the data collection method, should be interpreted using current ecological concepts.

The statistics used for the C&T and EcoPlot data of the LJCW this analysis is a simple t-test. Other forms of statistics can be applied to this data for interpretation purposes such as Chi-Squares, histograms interpretations, and by using paired t-tests with the data presented in a different manor (Mellman-Brown 2011).

PROTOCOLS AND ASSESSMENT METHODOLOGY

To quantitatively measure long-term trend in the Lower Joseph Creek Watershed Assessment, four methods were used:

1. condition and trend (C&T)
2. cover/frequency (EcoPlot)
3. soil stability test
4. photo monitoring

Listed below are the protocols for these assessments.

C&T Plots

C&T or Condition and Trend plots, (US Forest Service 1984), have been established and read periodically over the last 60 years within the LJCW area. Data for each plot is collected by dropping a Parker 3-step loop once every foot along a 100 foot transect. With each drop of the ring, the components within the ring are recorded including; bare ground, rock, moss, lichen, litter, and vegetation. Vegetation includes the perennial species found within the ring or the closest perennial species to the ring. Every plot has a record of a perennial plant. Three transects are measured for each C&T location. At each site, an assessment of plant vigor and soil stability is also assessed and used for a qualitative assessment of the site. For more information on the protocol of C&T plots, please refer to the Range Analysis and Management Handbook (US Forest Service (1984)).

During the Lower Joseph Creek Watershed Assessment, the C&T data was assessed using a paired t-test where specific plant species or components were paired to that same attribute from the same site during prior year's readings. The t-test compared the historical percentage for a particular vegetation species or component to the current percentage, thus creating a trend. For the LJCW, prairie junegrass (*Koeleria macrantha*), Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Psuedoragneria spicata*), Idaho fescue (*Festuca idahoensis*), and annual invasive grasses including bromes (*Bromus* spp.), and ventenata (*Ventenata dubia*), were the main vegetation compared. If other species had a strong presence at a site, then they were also considered for the analysis. Additional attributes compared were bare ground, moss/lichen cover, litter cover, and direct hits on perennial plant species (when the loop landed directly on a perennial plant).

EcoPlot

The type of EcoPlot method used is Cover-Frequency, which is a long-term trend data collection of vegetation and ground cover components that the Forest Service is currently shifting trend monitoring towards. In many areas around the Blue Mountain Province of Oregon, this data collection is taking the place of the C&T plots that have traditionally been collected. Data for EcoPlots is collected using the protocol as detailed in the Cover-Frequency Transect Protocol Desk Guide (2005), provided by the Forest Service. For data collection, a 20 x 50 cm frame is placed at five foot increments along each established C&T transect, as it is preferable to collected data on top of prior monitoring data (Ruyle and Dyess 2010). Within each frame placement, percent canopy cover data is collected for all species. Basal or ground level measurements are also collected such as: bare ground, rock (pavement, gravel, and rock), moss, lichen, and litter (any plant material live or dead). A percent of each of these components is then recorded. The basal cover measurement must equal 100 percent. The total percent of canopy cover can vary based on the amount and degree of overlapping vegetation present within the plot and can exceed or be less than 100 percent.

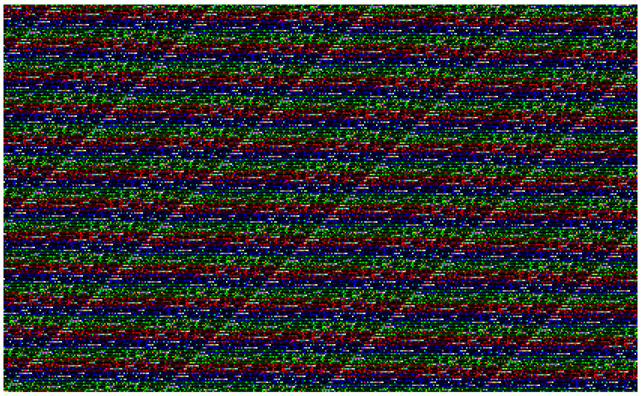
Like C&T data, EcoPlots can only be statistically analyzed when there is more than one year of data collection. For most of the sites within the LJCW area, this was the first data collected for EcoPlots. For this reason, C&T plot data was also collected, as a transition process is recommended to move from Parker 3-step data to other protocols (Ruyle and Dyess 2010). At plot locations where EcoPlot data has been collected prior to this reading of the plots, EcoPlot data will be analyzed using t-tests, using the same abiotic and biotic components as described within the C&T site description above.

Soil Stability Test

Soil Stability tests were completed during the C&T site data collection following the protocol developed by Herrick et al., 2004. For this test, sample points are randomly selected, and within each sample point, soil fragments, “peds”, of 2 to 3 mm in diameter are collected.

Figure VI – 6. Simplified diagram of soil fragment "peds". (Source: www.nzsoils.org., 2011)

These soil fragments or peds are then tested using a series of timed dips into a water bath.



The following are the classification for rating soil stability with 1 being the least stable and 6 being the most stable.

According to the ecological site descriptions developed by the NRCS for the ecosystems present within the Lower Joseph Creek Watershed Assessment, soil stability ratings should predominantly fall between 3 and 5 in the classification for soil stability.

Table VI-16. Soil stability test ratings. (Herrick et al., 2004)

STABILITY	WATER BATH SOIL STABILITY TEST
1	50 percent of the structure integrity lost within 5 seconds after insertion
2	50 percent of structure integrity lost 5-30 seconds after insertion.
3	50 percent of structure integrity lost 30-300 seconds after insertion.
4	10 to 25 percent of soil remains after 300 seconds and five dipping cycles.
5	25 to 75 percent of soil remains after 300 seconds and five dipping cycles.
6	75 to 100 percent of soil remains after 300 seconds and five dipping cycles.

Photographs

Photographs were also taken at the C&T site. At each of the three transect, photographs were taken at the 0 foot mark looking down the transect line, then of the horizon at 90, 180 and 270 degrees of the transect line. Photographs were also taken of the 5, 30, 55, 80, and 95 foot marks of the transect line. Finally, at each transect, a photograph was taken from the 100 foot mark looking back up the transect line. The data for the photographs are not captured below in the written description of each C&T site, but rather were used to help identify landscape location, vegetation and abiotic attributes, and used as a means to assess trend from prior readings of the site.

SITE SELECTION

The site selection for C&T and EcoPlots locations for the Lower Joseph Creek Watershed Assessment followed a criterion, decided upon by the Rangeland Sub-Committee and as outlined below:

For Established Site Locations

1. Past recommendations - The Wallowa-Whitman National Forest has been establishing and recording information on C&T sites since the mid 1950's. As a result, several sites had been established and read numerous times within the LJCW area. For this first criterion, any site which was recommended to re-visit from past readings was selected as a possible site.
2. Most recently read sites – These sites were read within the last 10 years. Once identified these sites were were brought to the top of the list. The most recent readings were in 2003. This was a criterion as the data would have the most up-to date and accurate account of data collection within the sites. Also, many of the sites read within the last 10 years had EcoPlot data, allowing for a statistical comparison.
3. Representative of livestock use – sites which currently include livestock use were also selected as part of the criterion.
4. At least one site per allotment – once the first three criteria had been assessed, the final previously read plots were chosen based on one site per allotment. This criterion allowed for an even distribution of C&T sites.

For Establishment of New Sites

If the above criteria failed to produce a site within an allotment, the following criteria was used to select and establish site locations.

1. Previously read EcoPlots– if an allotment failed to have a C&T site within it, previously established EcoPlot sites were used, and re-established as C&T sites for future readings (three transects instead of two).
2. **Threatened and Endangered Species** (T&E) locations – the next criterion was to consider locations with known or potential habitat of T&E species, specifically Spalding's catchfly (*Silene spaldingii*). A site was then established within the general area of the T&E species or potential habitat.
3. Research Natural Area (RNA) locations – during the Joseph Creek Rangeland Analysis (2005), two proposed RNA sites were created. These sites area also within the LJCW area. The range subgroup decided that each of these RNA's should have a C&T site.
4. Site Uniformity and livestock representation - once in the general location of an area for site establishment, the actual location of the site was determined based size and uniformity of an area supporting the same plant association throughout the site. Also, the site had to be representative of livestock use, but not be located in an area

with extensive livestock or other disturbance such as adjacent to watering areas, main roads, fences or other areas that attract congregation of livestock, wildlife, or humans.

Once all of past C&T sites and establishment of new sites were decided upon, the team then considered whether or not other additional sites were needed; i.e., more than one site per allotment, or other sites with TS&E species. Following the criteria listed above, these sites were then identified and either located or established.

SITE ANALYSIS FINDINGS

The following pages contain the analysis of each site within the LJCW area. Each site is described using a specific format:

1. The location of the site is identified and features pertinent to deciphering why the site was chosen are identified and include; topography, past readings, plant communities, and seral state of the plant community.
2. The second paragraph and table describes the data, both through statistics and actual data numbers, and includes pertinent information about past readings.
3. The third paragraph describes the soil stability ratings from the Soil Stability Test (Herrick et al. 2004.
4. The fourth paragraph describes any history, the current grazing use, or any other information which may pertain to the condition and/or trend found at the site.
5. The fifth paragraph is the management considerations as explained by Johnson and Simon (1987), Crowe and Clausnitzer (1997) or Wells (2006).
6. The final paragraph gives an interpretation of the trends found, and possible changes in management to consider.

AL CUNNINGHAM 2

This site is located in the South Alford Pasture of the Al Cunningham Allotment on a south side shoulder of a ridgetop. The condition of this site exhibits a very early seral bluebunch wheatgrass/Sandberg bluegrass (basalt) site (Johnson and Simon 1987). This is a previously established site. However, it was misplaced in 2010 and was actually placed and read approximately 300 yards away from the original site. Though the sites are similar, the old plot data will not be compared to the new plot data for the analysis.

Table VI-17. Site results for Al Cunningham 2

AL CUNNINGHAM 2			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	2010 Relative Cover	
Bluebunch Wheatgrass	0	0	20 - 65
Sandberg Bluegrass	1.20	73.30	1 - 20
Arrowleaf Balsamroot	0.00	1.00	0 - 15
Idaho Fescue	0.00	0.33	--
Lupine	1.33	13.00	0 - 5
Invasive Annuals	10.30	10.33	--
	Basal Cover	Coverage	
Bare Ground	56.00	51.67	1 - 40
Moss/Lichen	0.67	0.33	0 - 20
Litter	32.00	40.67	0 - 40

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[3] According to Johnson and Simon (1987)

At this site, two percent of the C&T direct hits were recorded on perennial plants. Over 50 percent of the site is bare ground, higher than expected for this plant association in a mid to late seral state. Moss and lichen cover was less than one percent basal cover and coverage, which is on the low range of amount expected for mid to late seral conditions. The predominant perennial species on this site are Sandberg bluegrass, lupine and arrowleaf balsamroot. Bluebunch wheatgrass was not found within the site, and in a mid to late seral state, would be the dominant species. Invasive annual grasses including bromes and vententata had canopy and relative cover of over 10 percent of the ground. By analyzing the photographs, this site appears to have high annual livestock impacts, in part because it is located on the shoulder of a ridgetop, is in close proximity to an old logging road, within approximately ½ mile from a spring, and with the current grazing schedule.

Only one of the randomly selected peds was under vegetative cover, and was recorded at a 1 for soil stability. The rest of the peds (n=17) averaged a soil stability rating of 3, which is within the expected 3 to 5 range of soil stability; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

History

The grazing schedule of this allotment has livestock grazing annually in the spring for at least the last 10 years.

CHICO

The Chico site is located within the Chico Administrative Horse Allotment on a south facing steep hillside. The condition of this site exhibits a mid seral Idaho fescue/bluebunch wheatgrass – arrowleaf balsamroot site (Johnson and Simon 1987). This site has been read in 1978 using EcoPlot techniques, however, this reading does not follow the same protocol as the 2010 reading and therefore could not be statistically compared.

Table VI-18. Site results for Chico

CHICO			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	2010 Relative Cover	
Idaho Fescue	0.43	2.67	3 - 40
Bluebunch Wheatgrass	17.17	82.33	10 - 65
Arrowleaf Balsamroot	0.43	3.00	0 - 20
Sandberg Bluegrass	0.17	0.00	0 - 20
Invasive Annuals	8.28	5.00	--
	Basal Cover	Coverage	
Bare Ground	17.33	14.33	1 - 40
Rock/Gravel	37.00	36.00	2 - 60
Moss/Lichen	6.33	4.67	0 - 20
Litter	39.67	36.67	3 - 70

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[3] According to Johnson and Simon (1987)

Bluebunch wheatgrass had the highest canopy and relative cover, however there was a considerable difference of values. This difference is most likely the result of indirect hits locating bluebunch wheatgrass as the closest perennial. The amount of bluebunch wheatgrass is within or above expected mid-late seral levels within the Idaho fescue/bluebunch wheatgrass – arrowleaf balsamroot plant association (Johnson and Simon 1987). Direct hits on perennial plant species averaged 10 percent, this low number of direct hits can partially be attributed to the high amount of rock and gravel at this site. Litter averaged around 38 percent and hits; most of which appears to be litter from perennial grass species. Litter and bare ground amounts were within the mid to late seral range (Johnson and Simon 1987). Invasive annual grasses occupied 8 and 5 percent canopy and relative cover, respectively.

The soil stability reading on this site for under vegetative cover averaged 2.8. The soil stability rating for areas not under vegetative cover averaged 3.1. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

For at least the last 20 years, the Chico Administrative Horse Allotment has been grazed in the spring (April – June), and again in the fall (Sept – Nov). Generally, the time on the Allotment does not exceed 2.5 to 3 months. However, this schedule has been varied during certain times, for example, after the Jim Creek fire (2006), the horses that normally reside in the Jim Creek Allotment were moved to the Chico Allotment for the duration of the summer. To compensate for use change, the Chico Allotment was then rested for the next two years (Hollenbeak 2010). A new fence was built in the fall of 2009, which divides the biggest pasture of this allotment into two smaller pastures.

COLD SPRINGS 1-77

This site is located in the South Wildhorse Pasture of the Cold Springs Allotment on the plateau by Billy Meadows. This site is also approximately 100 feet from to the 4600 road and 4600-520 road. The condition of this site exhibits an early to very early Idaho fescue-prairie junegrass (mounds), plant association (Johnson and Simon 1987). This site has been read as an EcoPlot in 1977 and 1981. Unfortunately, the EcoPlot methods used to read this site prior to 2002 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past. This site was also read in 2002 and 2008 as an EcoPlot and C&T).

Table VI-19. Site results for Cold Springs 1-77

COLD SPRINGS 1-77							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)[2]**	**SIGNIFICANT CHANGE[3]**	**C&T (HITS)[4]**	**C&T (HITS)**	**SIGNIFICANT CHANGE**	**MID-LATE SERAL RANGE[5]**
	2002 Canopy Cover	2008 Canopy Cover		2002 Relative Cover	2008 Relative Cover		
Prairie Junegrass	1	2.42	None	4.67	15	Increase	0 – 15
Sandberg Bluegrass	2.67	4.87	None	12.67	26.33	None	0 – 20
Bluebunch Wheatgrass	3.10	0.67	None	4.00	4.00	None	0 – 25
Idaho Fescue	0.00	0.00	None	0.00	0.00	None	15 – 85
Intermediate Wheatgrass	6.90	2.67	None	3.00	5.33	None	--
Wyeth's Buckwheat	12.4	8.58	None	18.00	13.33	None	0 - 35
Invasive Annuals	N/R[6]	N/R		N/R	N/R		0 - 25
	Basal Cover	Basal Cover		Coverage	Coverage		
Bare Ground	19.43	41.33	Increase	30.00	28.00	None	1 - 30
Moss/Lichen	0.00	1.33	None	0.00	0.00	None	0 - 20
Litter	18.00	57.00	Increase	51.33	62.67	None	0 - 90

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] Only the last two years of the readings are shown

[3] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[4] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[5] According to Johnson and Simon (1987)

[6] N/R is not recorded

Since the site reading in 2002, the site appears to have a significant increase in relative cover of prairie junegrass and an increase in Sandberg bluegrass. Bluebunch wheatgrass and intermediate wheatgrass have remained fairly static while Wyeth's buckwheat has decreased. This site also contains several forb species including: onion, tarweed, red avens, and camas. According to the Ecoplot readings, both bare ground and litter have significantly increased at this site. When comparing the canopy and basal cover to what is expected for a mid to late seral state of this plant community, prairie junegrass, Sandberg bluegrass, bluebunch wheatgrass are on the lower end of what is expected for a mid to late seral state and Idaho fescue is below what is expected as it was not found within the EcoPlot or C&T data. The data results are quite different between the EcoPlot and C&T readings for both bare ground and litter, which is most likely the result of differences in data collection. From 2002 to 2008, the number of direct hits decreased by half, from an average of 18 to an average of 9 hits respectively.

Soil stability was not collected at this site.

HISTORY

There is not much history associated with this plot other than it is located within very close proximity to the 4600 Forest Service road and a logging road, located in the south west corner of the Cold Springs Allotment. For these reasons, it is suspected that this site has received heavy use from livestock and timber harvesting practices over the years. In the 1980's grazing on this allotment ceased with the cancellation of a term grazing permit due to non-compliance for overgrazing and not following the terms and conditions of the term grazing permit. The allotment was then intermittently grazed and rested from the 1980's until 2006 due to a need for forage resources and fire disturbance. In 2006, a term grazing permit was re-instated for annual seasonal grazing from the beginning of August until the middle of October.

COLD SPRINGS 2

This site is located in the North Cold Springs Pasture of the Cold Springs Allotment and is located on the Cold Springs Ridge top. The condition of this site exhibits an early Idaho fescue-prairie junegrass (mounds), plant association (Johnson and Simon 1987). This site has been read as C&T's in 1957, 1962, read in 1976 as an EcoPlot and read in 1981, 2002, and 2008 as an EcoPlot and C&T. Unfortunately, the EcoPlot methods used to read this site prior to 2008 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-20. Site results for Cold Springs 2

COLD SPRINGS 2						
SPECIES	**ECOPLOT (%)[1]**		**C&T (HITS)[2]**	**C&T (HITS)[3]**	**SIGNIFICANT CHANGE[4]**	**MID-LATE SERAL RANGE[5]**
	2008 Canopy Cover		2002 Relative Cover	2008 Relative Cover		
Prairie Junegrass	0.00		0.00	0.00	None	0 - 15
Sandberg Bluegrass	0.02		9.00	0.00	Decrease	0 - 20
Bluebunch Wheatgrass	1.97		0.67	12.33	Increase	0 – 25
Idaho Fescue	30.52		20.00	54.67	Increase	15 – 85
Kentucky Bluegrass	0.35		0.00	3.33	None	0 – 25
Tailcup Lupine	2.62		7.00	5.67	None	0 – 3
Invasive Annuals	0.08		N/R[6]	N/R	None	0 – 25
	Basal Cover		Coverage	Coverage		
Bare Ground	8.00		8.00	9.00	None	1 – 30
Moss/Lichen	0.00		0.00	0.00	None	0 – 20
Litter	92.00		56.33	69.33	Increase	0 – 90

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[3] Only the last two years of the readings are shown

[4] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[5] According to Johnson and Simon (1987)

[6] N/R is not recorded

In the data prior to the 2002 reading, the composition of the plant species was different. In 1957 through 1981, prairie junegrass averaged between 16 and 10 relative cover during each reading of the site. Prairie junegrass was not within the EcoPlot or C&T data collected in 2002 or 2008. Sandberg bluegrass had significant decrease in relative cover from 2002 to 2008, and also from 1962 to 1981 (from 36 to 4.3 hits, respectively). Bluebunch wheatgrass significantly increased in relative cover from 2002 to 2008, however in prior readings, bluebunch wheatgrass was never recorded to have more than an average of one hit. Since 1962, Idaho fescue appears to be increasing with significant increases in relative cover from 1962 to 1981 and again from 2002 to 2008. Kentucky bluegrass relative cover significantly decreased from 1981 (39 hits) to 2002. Bare ground and moss/lichen has also declined over the years. Litter has significantly fluctuated over the years, but reached its highest levels in

2008. Direct hits have varied throughout the years as well, the last two readings have averaged in the 20's. Only three of the nine indicator species for this site were present at the time of the 2009 reading. However, most of the attributes of this site are within the expected range for a mid to late seral plant community (Johnson and Simon 1987).

The soil stability reading on this site for under vegetative cover averaged 5.4. The soil stability rating for areas not under vegetative cover averaged 4.4. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

This site is located on the same ridge as Cold Springs 5-77, and Cold Springs 6-76. This areas has been subject to several ground disturbing activities due to its ridgetop location and along a main route between Wallowa County and the Asotin area. Used over the last century by sheepherders and travelers it has received high amounts of grazing pressure.

This site was burned in the 1988 Teepee Butte fire and experienced a second less intense burn during the 2000 Eastside Complex. In the 1980's grazing on this allotment ceased with the cancellation of a term grazing permit due to non-compliance for overgrazing and not following the terms and conditions of the term grazing permit. The Allotment was then intermittently grazed to meet forage resource needs and rested after wildfires from the 1980's until 2006. In 2006 a term-grazing permit was re-instated for this pasture to allow grazing annually in spring during June and July then again in the fall as cattle trail off of the allotment.

COLD SPRINGS 5-77

This site is located in the South Cold Springs Pasture of the Cold Springs Allotment within close proximity to "Frog Pond" on the Cold Springs ridge top. The condition of this site exhibits an early to very early Idaho fescue-prairie junegrass (mounds) plant association (Johnson and Simon 1987). This site was read as EcoPlots in 1977 and 1981. Unfortunately, the EcoPlot methods used to read this site prior to 2010 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-21. Site results for Cold Springs 5-77

COLD SPRINGS 5-77			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	**2010 Relative Cover**	
Prairie Junegrass	3.08	7	0 – 15
Idaho Fescue	1.45	3.33	15 - 85
Bluebunch Wheatgrass	0.00	0.33	0 - 25
Intermediate Wheatgrass	22.75	48.67	--
Kentucky Bluegrass	1.85	6.00	0 - 25
Sandberg Bluegrass	1.07	9.67	0 - 20
Invasive Annuals	0.15	0.00	0 - 30
	Basal Cover	**Coverage**	
Bare Ground	23.67	15.00	1 - 30
Moss/Lichen	0.67	0.00	0 - 20
Litter	71.33	28.00	0 - 90

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[3] According to Johnson and Simon (1987)

Within this site a total of less than 10 percent canopy and relative cover for prairie junegrass, Sandberg bluegrass, bluebunch wheatgrass, Idaho fescue, and Kentucky bluegrass was found. Other than Idaho fescue, the mentioned species were in the low range of what is expected for this site, in a mid to late seral range for the Idaho fescue-prairie junegrass (mound) plant association, and Idaho fescue was below the expected range. Intermediate wheatgrass was found to have the greatest abundance; however, the amount cannot be compared to the plant association since this species is not a native perennial. It is most likely that intermediate wheatgrass came onto this site as result of areal seeding post fire. Although this species is non-native it is helping the site to function by providing roots to hold the soil and maintain the soil integrity. Less than one percent of the basal or relative cover was found to contain invasive annuals. Bare ground was found to be close to the expected mid to late seral state range. The number of direct hits on perennial species averaged 56.

The soil stability reading on this site under vegetative cover averaged a rating of 3.4. There were not any readings for the "no cover" as all of the random transects picked were located under vegetation. However, in 2008, soil stability for this site was taken and averaged 4.5 for transects under cover and 4.4 for transects without cover. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

This site is located next to a main water source, (Frog Pond), along a main route used over the last century by sheep herders and travelers (coming to and from the Asotin area), and topographically, along a ridgetop. Past EcoPlot collections show that prior to 1988 Teepee-Butte Fire, the plant community at this site appeared to be a combination of a Kentucky bluegrass meadow with inclusions of Idaho fescue-prairie junegrass (ridgetop), exhibiting an early seral state (Johnson and Simon 1987). According to Johnson and Simon (1987), as Idaho fescue-prairie junegrass plant communities are overgrazed, Kentucky bluegrass often increases into these communities. After the Teepee-Butte fire, planted perennials were broadcast over the burn area to promote vegetation re-growth. An increase in intermediate wheatgrass was noted in the 1981 and 2010 readings. By 2010, it appears that the intermediate wheatgrass had become the dominant species over the native perennial grasses. In the 1980's grazing on this allotment ceased with the cancellation of a term grazing permit due to non-compliance for overgrazing and not following the terms and conditions of the term grazing permit. The Allotment was then intermittently grazed and rested from the 1980's until 2006 due to a need for forage resources and also fires, respectively. A term grazing permit was re-instated in 2006 and this pasture has been grazed annually from the beginning of August until the middle of October.

COLD SPRINGS 6-76

This site is located in the North Cold Springs Pasture of the Cold Springs Allotment and is located on the Cold Springs ridgetop. The condition of this site exhibits a transitional state between Idaho fescue-prairie junegrass (ridgetop) in a mid seral state, and an Idaho fescue-bluebunch wheatgrass (ridgetop) in a mid seral state (Johnson and Simon 1987). This site has been read in 1959 as a C&T, 1976 as an EcoPlot, and 1981 and 2010 as both an EcoPlot and C&T. Unfortunately, the EcoPlot methods used to read this site prior to 2010 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-22. Site results for Cold Springs 6-76

COLD SPRINGS 6-76					
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**C&T (HITS)[3]**	**SIGNIFICANT CHANGE[4]**	**MID-LATE SERAL RANGE[5]**
	2010 Canopy Cover	1981 Relative Cover	2010 Relative Cover		
Prairie Junegrass	0.43	4.33	1.33	None	0 – 15
Sandberg Bluegrass	2.95	47.00	22.00	None	0 – 25
Bluebunch Wheatgrass	6.38	1.67	9.33	None	0 – 40
Idaho Fescue	17.27	4.67	28.00	Increase	10 – 60
Onespike Oatgrass	1.80	5.67	7.33	None	0 – 15
Kentucky Bluegrass	0.08	0.00	1.00	None	0 – 25
Invasive Annuals	0.50	N/R[6]	0.00	None	--
	Basal Cover	Coverage	Coverage		
Bare Ground	23.67	23.67	26.67	None	0 – 40
Moss/Lichen	6.67	25.33	3.00	Decrease	0 – 60
Litter	58.67	17.33	13.33	None	1 - 80

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[3] Only the last two years of the readings are shown
[4] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.
[5] According to Johnson and Simon (1987)
[6] N/R is not recorded

This site contains many of the dominant native perennial grasses of the Wallowa-Snake Province. Idaho fescue has shown an increase in relative cover and is the only species within this site that has significantly changed from 1981 to 2010. The relative cover of Sandberg bluegrass has decreased by half, but not significantly. Bluebunch wheatgrass exhibited an increase from 1981 to 2010, while prairie junegrass and onespike oatgrass have remained fairly static. Other than bluebunch wheatgrass, the amount of canopy cover found at this site in 2010 is within the expected mid to late seral ranges for these plant associations. Invasive annuals were found at less than one percent canopy cover within the site. A significant decrease in coverage of moss and lichen occurred from 1981 to 2010.
Bare ground had decreased since 1959 (37 hits), and has similar coverage in the mid-twenties range in both 1981 and 2010. The current bare ground basal cover is within the expected mid to late seral range for Idaho fescue – prairie junegrass (ridgetop) is also in the mid to late seral stage. Prairie junegrass, Sandberg bluegrass, onspike oatgrass, and

Kentucky bluegrass were in the low range of the mid to late seral states of the Idaho fescue-prairie junegrass (ridgetop) or Idaho fescue-bluebunch wheatgrass (ridgetop) plant associations, and bluebunch wheatgrass was at expected levels. The average number of direct hits on species was found to be significantly higher in 1981 (26 hits) than 1959 (10.67 hits), and again significantly higher in 2010 (52 hits) than 1981. It should also be noted that the difference in readings between the EcoPlot and the C&T for both Sandberg bluegrass and litter is probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 2.8. There were not any readings for the "no cover" as all of the random transects picked were under vegetation. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

History

The history of this site is very similar to Cold Springs 2 and 5-77 in that this area has received significant use by livestock over the last century as it is located adjacent to a main thoroughfare between Wallowa County and the town of Asotin, and was a migrant area for sheepherders. This site is also located on a ridgetop and therefore receives more use from both wild ungulates and livestock. In 1988, the Teepee-Butte fire also burned through this area. However, a significant change in species or species composition was not noted post fire. In the 1980's grazing on this allotment ceased with the cancellation of a term grazing permit due to non-compliance for overgrazing and not following the terms and conditions of the term grazing permit. The Allotment was then intermittently grazed and rested from the 1980's until 2006. This was due to a need for forage resources and the area experiencing wildfire disturbance. In 2006, a term grazing permit was re-instated, and this pasture has been grazed annually in spring, June and July and again in the fall as cattle trail off the allotment.

COLD SPRINGS 8A

This site is located in the South Cold Springs Pasture of the Cold Springs Allotment on the Cold Springs ridgetop. This site appears to be mosaic patches of mountain sage-mountain snowberry/mountain brome, which does not have associated seral states as defined by Johnson and Simon (1987), intermixed with a scabland-type community dominated by Wyeth's buckwheat and invasive forbs such as tarweed species (not defined by Johnson and Simon 1987). This site was established and read in 1962 as a C&T, read in 1976 as an EcoPlot, and read in 1981 and 2010 as a C&T and EcoPlot. Unfortunately, the EcoPlot methods used to read this site prior to 2010 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-23. Site results for Cold Springs 8A

COLD SPRINGS 8A					
SPECIES	**ECOPLOT (%)[1]**		**C&T (HITS)[2]**	**C&T (HITS)[3]**	**SIGNIFICANT CHANGE[4]**
	2010 Canopy Cover		1981 Relative Cover	2010 Relative Cover	2010
Prairie Junegrass	1.33		2	0.67	None
Sandberg Bluegrass	0.13		0.00	1.67	None
Bluebunch Wheatgrass	0.00		0.00	0.33	None
Idaho Fescue	0.45		1.33	1.00	None
Intermediate Wheatgrass	5.25		0.00	25.67	None
Kentucky Bluegrass	0.80		6.33	4.67	None
Wyeth's buckwheat	17.57		14.67	29.67	None
Mountain Brome	1.15		31.67	4.00	Decrease
Mountain Snowberry	7.75		1.67	10.97	None
Invasive Annuals	0.37		N/R[5]	0.00	None
	Basal Cover		Coverage	Coverage	
Bare Ground	30.67		17.33	15.67	None
Moss/Lichen	0.67		0.00	0.33	None
Litter	60.67		63.67	35.00	Decrease

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[3] Only the last two years of the readings are shown

[4] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[5] N/R is not recorded

As this site is not considered a native grass dominant plant community, it cannot be compared to a seral state within Johnson and Simon (1987). The 2010 data exhibited values of less than two percent canopy and relative cover of the following attributes: prairie junegrass, Sandberg bluegrass, Idaho fescue, invasive annuals, and moss or lichens. Intermediate wheatgrass was not recorded within this site in 1981, but was the dominant species in the 2010 reading. Kentucky bluegrass has been identified on this site in low canopy and relative cover. A significant decrease in relative cover of mountain brome was also found at this site. Other species to mention include Wyeth's buckwheat, mountain snowberry, and tarweed that averaged 8.25 canopy cover. Bare ground coverage significantly decreased from 34.67 in 1962 to 17.33 in 1981, and appears to be static from 1981 to today. A significant decrease in coverage of litter was observed at this site. Finally, a significant change in direct hits was also observed, as they increased from an average of 17.33 in 1981 to 34 in 2010.

The soil stability reading on this site under vegetative cover averaged a rating of 3.9. The soil stability without cover averaged 4.5. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

This site is located on the same ridge as Cold Springs sites 2, 5-77 and 6-76, receiving heavy use throughout the last century due to location on the ridgetop, historic sheep migratory routes, and close proximity to a main thoroughfare between the town of Asotin and Wallowa County. For this reason, the history of this site is very similar to the other site's histories. Notes taken after the 1988 Teepee-Butte fire suggest that only the third transect of this plot burned in the fire and the intensity of the fire at third transect was light. In the 1980's grazing on this allotment ceased with the cancellation of a term grazing permit due to non-compliance for overgrazing and not following the terms and conditions of the term grazing permit. The Allotment was then intermittently grazed and rested from the 1980's until 2006 due to a need for forage resources and also fires, respectively. In 2006, a term grazing permit was re-instated, and this pasture has been grazed annually from the beginning of August until the middle of October.

COUGAR CREEK 3

This site is located in the Cougar Creek Pasture of the Cougar Creek Allotment on a brow of a ridgetop. This site exhibits a mid to early seral state of a mosaic of both Idaho fescue – prairie junegrass (ridge tops) and stiff sagebrush/Sandberg bluegrass plant communities (Johnson and Simon 1987). This site has been read in 1958 as a C&T, 1976 as an EcoPlot, and in 1981, 2003 and 2008 as both an EcoPlot and C&T. Unfortunately, the EcoPlot methods used to read this site prior to 2003 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this sit e in the past.

Table VI-24. Site results for Cougar Creek 3

COUGAR CREEK 3							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICAN T CHANGE**	**MID-LATE SERAL RANGE[5]**
	2003 Canop y Cover	**2008 Canopy Cover**		**2003 Relative Cover**	**2008 Relative Cover**		
Prairie Junegrass	0	0.13	None	1.67	0.67	None	0 – 15
Sandberg Bluegrass	1.90	1.83	None	30.67	44.00	Increase	0 – 25
Bluebunch Wheatgrass	2.10	6.83	None	19.67	23.00	None	0 – 40
Idaho Fescue	0	0.43	None	1.33	0.67	None	0– 60
Invasive Annuals	7.63	2.98	None	N/R[6]	N/R	None	--
	Basal Cover	**Basal Cover**		**Coverage**	**Coverage**		
Bare Ground	41.00	34.00	None	39.67	35.33	None	0 – 40
Moss/Lichen	1.50	3.67	None	0	0.33	None	0 – 60
Litter	32.50	34.67	None	41.33	49.00	Increase	0 - 80

¹ Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
²Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.
³ C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
⁴Only the last two years of the readings are shown
⁵ According to Johnson and Simon (1987)
⁶ N/R is not recorded

The condition of the site has been on an upward trend from 2003 to 2008 as documented through the significant increase in Sandberg bluegrass and litter (C&T), and an increase in bluebunch wheatgrass, and moss and lichen amounts. From 2003 to 2008, this site also decreased in coverage of bare ground. Currently, Sandberg bluegrass, prairie junegrass, Idaho fescue, and moss and lichen are in the low range of expected for mid to late seral ranges of these plant communities, and bluebunch wheatgrass, bare ground and litter are at expected levels (Johnson and Simon 1987). Invasive annuals significantly increase from 1976 to 2008, and currently occupy less than 3 percent of the canopy cover. Within the site, direct hits averaged 4.67, the least amount since the establishment of the site in 1958 at 19 hits. The condition of this site decreased from 1981 to 2003, as the relative cover of bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, and moss and lichens decreased, and bare ground and litter increased. This trend was also noted in the EcoPlot readings of 1976 to 2003. The high difference in values for Sandberg bluegrass and bluebunch wheatgrass between the EcoPlot and C&T data is the result of these two species being the most prolific species within the area around the site, however, based on the EcoPlot data, direct hits, and photograph data, it becomes apparent that there are large interspaces between these species.

The soil stability reading on this site under vegetative cover averaged a rating of 2.4. The soil stability without cover averaged 3.8. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

History

Prior to the 60's this pasture was grazed in the spring. At some point in the 1960's the permittees built an electric fence that spanned the length of the pasture and kept the cattle away from the tops of the slopes as these areas were receiving damage from livestock use (Birkmaier 2010). From the 1980's until now, the rotation in this pasture had changed to one in which every third year, the pasture is grazed from July through mid August, and during the other two years, the pasture is grazed from mid-September through October (Birkmaier 2010). In 2003, one permittee within the Cougar Creek Allotment Permittee Association sold out, and from 2003 through 2008, the cattle numbers reduced by approximately one third. Since 2008, the permit has been re-instated, and full numbers are currently grazing the allotment. In addition, from the 1980s until today, there has been a steady increase of the amount of timber in this pasture, limiting the space for livestock to graze. Although some thinning projects have occurred, these efforts have not been enough to decrease the overall growth of the timber.

COUGAR CREEK 7

This site is located in the Sumac Pasture of the Cougar Creek Allotment in a timbered ridgetop. This site is located within 400' of the corner fences that connect the Sumac Pasture with the Cougar and Trap Canyon Pastures. The plant community exhibits a mosaic of Ponderosa pine/Idaho fescue and Douglas fir/pinegrass in an early seral state (Johnson and Simon 1987). The site was most likely more of a Douglas fir/pinegrass site but has experienced several different timber harvests since this site was established in 1958. This site had been read in 1958 as a C&T, 1976 as an EcoPlot, and 1981, 2003, and 2010 as a C&T and EcoPlot. Unfortunately, the EcoPlot methods used to read this site prior to 2003 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-25. Site results for Cougar Creek 7

COUGAR CREEK 7							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICANT CHANGE**	**MID-LATE SERAL RANGE[5]**
	2003 Canopy Cover	**2010 Canopy Cover**		**2003 Relative Cover**	**2010 Relative Cover**		
Prairie Junegrass	0.17	0.23	None	0.67	3.33	None	0 - 10
Sandberg Bluegrass	0.70	0.58	None	11.33	3.00	None	0
Bluebunch Wheatgrass	0.30	0.57	None	5.67	1.00	None	0 – 25
Idaho Fescue	7.17	6.45	None	52.00	28.00	None	0 - 65
Pinegrass	0.30	1.78	None	4.33	1.00	None	0 - 85
Invasive Annuals	0.30	0.12	None	N/R[6]	0.33	None	0 - 35
	Basal Cover	**Basal Cover**		**Coverage**	**Coverage**		
Bare Ground	18.67	8.00	Decrease	17.00	6.00	Decrease	0 – 20
Moss/Lichen	2.33	2.67	None	0.00	1.67	None	0 – 20
Litter	72.67	86.00	Increase	73.33	74.67	None	40 - 99

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2]Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.
[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[4]Only the last two years of the readings are shown
[5] According to Johnson and Simon (1987)

From 1958 until today, there has been a decrease in relative cover of pinegrass, which averaged 32 in 1958, elk sedge which averaged of 5 in 1958, Sandberg bluegrass which averaged 18 in 1958 and bluebunch wheatgrass which averaged 6.3 in 1958. The relative cover of Idaho fescue significantly increased from 26 in 1958, an average of 48 in 1981, and increased again to 52 in 2003. However, by 2010, the relative cover of Idaho fescue decreased, and in both 2003 and 2010, Idaho fescue occupied less than eight percent of canopy cover. In a mid to late seral state of these plant associations, Sandberg bluegrass should not be present, and the other species found within this site today are at the low levels of what is expected, with the exception of Idaho fescue (Johnson and Simon 1987). Invasive annual grasses were found to be very limited at this site. Between 2003 and 2010, bare ground has significantly decreased basal cover and coverage. Moss and Lichen cover has increased at this site, currently representing approximately 3 percent canopy cover and a significant increase in the litter was also found and is most likely due to increased pine needle coverage. Finally, it should be noted that the number of direct hits reached its lowest point in 2003 with an average of 7 hits per transect. This level of hits was significantly different then both the prior reading (14 hits in 1981) and post reading (14 in 2010).

The soil stability reading on this site under vegetative cover averaged a rating of 4. The soil stability without cover averaged 4.5. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

Based on the photographs within the C&T file, there is evidence of logging between the 1958 reading and the 1976 reading of this site. The fences that created the Trap Canyon and Sumac Pastures were built around 1970. After these fences were built, cattle have grazed the Sumac Pasture annually during the month of June. From 2003 until 2008, with the Joseph Creek Rangeland Analysis EIS decision, and with a 1/3 decrease in livestock numbers (mentioned in the history of the Cougar Creek 3 site), this pasture was grazed every other year during the month of June. In 2009 and re-initiation of a term grazing permit the livestock numbers are back to carrying capacity, and annual spring grazing through the month of June has resumed (Birkmaier 2010).

COUGAR CREEK 8

This site is located in the Sumac Pasture of the Cougar Creek Allotment and is located on an east facing ridge brow and within an eighth of a mile from a fence line, road, and pond. The plant association at this exhibits a very early seral state of a bluebunch wheatgrass/Sandberg bluegrass (basalt) (Johnson and Simon 1987). This site was read in 1958 as a C&T, 1978 as an EcoPlot, and 1981, 2003, and 2010 as a C&T and EcoPlot. Unfortunately, the EcoPlot methods used to read this site prior to 1981 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-26. Site Results for Cougar Creek 8

COUGAR CREEK 8							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICANT CHANGE**	**MID-LATE SERAL RANGE[5]**
	2003 Canopy Cover	2010 Canopy Cover		2003 Relative Cover	2010 Relative Cover		
Prairie Junegrass	0	0	None	0	0	None	--
Sandberg Bluegrass	2.70	2.78	None	74.67	83.33	None	1 – 20
Bluebunch Wheatgrass	0.30	0.57	Increase	13.00	12.00	None	20 – 65
Idaho Fescue	0.00	0.65	None	0.00	0.67	None	--
Invasive Annuals	3.23	4.27	None	N/R[6]	8.33	None	--
	Basal Cover	Basal Cover		Coverage	Coverage		
Bare Ground	44.17	52.00	None	65.33	35.67	Decrease	1 – 40
Moss/Lichen	0.00	0.33	None	0.00	0.33	None	0 – 20
Litter	32.17	37.67	Increase	25.33	42.33	Increase	0 - 40

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.
[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[4] Only the last two years of the readings are shown
[5] According to Johnson and Simon (1987)
[6] N/R is not recorded

From 1981 to 2003, there was a significant increase in relative cover of Sandberg bluegrass, but fairly consistent canopy cover. Bluebunch wheatgrass significantly decrease in canopy cover 1981 to 2003, dropping from 20 percent in 1981, than significantly increased by 2010. Invasive annual grass canopy cover has consistently been between 7 and 4 percent from 1981 to 2010. A significant increase basal cover and coverage in bare ground was noted from 1981 to 2003, and basal cover of 52 percent was recorded in 2010. Moss and lichen, and Idaho fescue have reappeared on this site since 2003, but in quantities of less than 1 percent. Litter cover has increased continuously since 1981, with a significant increase in relative cover from 2003 to 2010. Sandberg bluegrass and litter were above expected values for a mid to late seral range for these plant communities, Idaho fescue is not expected, and other attributes of this site are within the expected mid to late seral ranges bluebunch wheatgrass/Sandberg bluegrass (basalt) (Johnson and Simon 1987). The presences of Idaho fescue indicates that this site was once a different plant association and has transitions to the current association. Unfortunately, the absence of several indicator species makes identification of past plant association unlikely. Direct hits reached a low in 2003 (averaging 1.67 per transect), significantly decreasing from the 1981 value of 17. In 2010, the direct hits increased to average 12. The high difference in values for Sandberg bluegrass and bluebunch wheatgrass between the EcoPlot and C&T data is the result of these two species being the most prolific species within the area around the site, however, based on the EcoPlot data, number of direct hits, and photographs, it becomes apparent that there are large interspaces between these species. Additionally, the difference in readings between the EcoPlot and the C&T for bare ground is probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 1.9. The soil stability without cover averaged 2.8. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

The fence for this pasture was constructed around 1970. After it was built cattle have grazed the Sumac Pasture annually during the month of June. To entice cattle into using this section of Al Cunningham Ridge of the Sumac Pasture, a pond was developed within approximately 300 feet of the first transect line of this plot (Birkmaier 2010). In 2003, one permittee within the Cougar Creek Permittee Association sold out, and from 2003 through 2008, the cattle numbers decreased by approximately one third. Since 2008, the permit has been re-instated and full numbers are currently grazing the allotment, and annual spring grazing through the month of June has resumed on this Allotment (Birkmaier 2010).

COUGAR CREEK 20

This site is located in the Peavine #4 Pasture of the Fine Allotment on a flat ridgetop on a large open scabland area. This site exhibits an early to mid seral state of a Sandberg bluegrass-onespike oatgrass plant association (Johnson and Simon 1987). This site was established in 2008 and read in 2010.

Table VI-27. Site results for Cougar Creek 20

COUGAR CREEK 20			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	2010 Relative Cover	
Onespike Oatgrass	2.38	4.33	1 - 40
Sandberg Bluegrass	9.73	62.67	5 - 30
Bluebunch wheatgrass	0.00	0.00	0 - 1
Invasive Annuals	6.88	4.67	--
	Basal Cover	Coverage	
Bare Ground	42.00	31.33	0 - 15
Moss/Lichen	8.33	1.00	5 - 60
Litter	41.33	15.00	0 - 3

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[3] According to Johnson and Simon (1987)

The vegetation at this site primarily consists of onespike oatgrass, Sandberg bluegrass, and annual invasive grasses. The amount of Sandberg bluegrass, bare ground and litter were above levels expected for a Sandberg bluegrass-onespike oatgrass plant association in mid to late seral range (Johnson and Simon 1987). Onespike oatgrass was within the expected range, and moss and lichens were below (Johnson and Simon 1987). An average of 23 direct hits occurred at this site. The high difference in values for Sandberg bluegrass between the EcoPlot and C&T data is the result of this species being the most prolific perennial species within the area around the site, however, based on the EcoPlot data and photographs, it becomes apparent that there are large interspaces between these species.

The soil stability reading on this site under vegetative cover averaged a rating of 2.9. The soil stability without cover averaged 2.4. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

History

This allotment has been grazed annually for at least the last 40 years, including the plot site. In the past, this section of land was in private ownership, switching through various landowners eventually becoming national forest lands under the Forest Service. For most of those 40 years, the four-pastures that make up this part of the Fine Allotment were grazing in a rotational manner (Kooch 2010).

CROW CREEK 1

This site is located in the Doe Gulch Pasture of the Crow Creek Allotment on a west-facing brow of a ridgetop. This is site was established because it is within known habitat for *Silene spaldingii*. The plant association at this site exhibits a mid to early seral state of an Idaho fescue/prairie junegrass (ridgetop) (Johnson and Simon 1987). This site was established in 2008 and read for the first time in 2010.

Table VI-28. Site results for Crow Creek 1

CROW CREEK 1			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	2010 Relative Cover	
Prairie junegrass	1.50	3.33	0 - 15
Sandberg bluegrass	1.93	13.67	0 - 25
Bluebunch wheatgrass	21.60	41.00	0 - 40
Idaho fescue	10.90	14.00	10 - 60
Sedge species	0.10	0.67	--
Kentucky bluegrass	1.82	5.67	0 - 25
Invasive Annuals	18.05	8.67	0 - 13
	Basal Cover	Coverage	
Bare Ground	3.33	3.33	0 - 40
Moss/Lichen	8.33	1.00	0 - 60
Litter	84.00	40.67	1 - 80

[1] *Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.*
[2] *C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.*
[3] *According to Johnson and Simon (1987)*

This site has an average of 51 percent direct hits on perennial vegetation. The indicator vegetation and other attributes were within the expected range for a mid to late seral Idaho fescue/prairie junegrass (ridgetop) plant association (Johnson and Simon 1987). The exception to this was bluebunch wheatgrass, which was slightly above expected values. Also, Idaho fescue, prairie junegrass, bare ground and moss and lichens were at the low end of the mid to late seral range for this plant community (Johnson and Simon 1987). Invasive annuals are occupying over 18 percent of canopy cover. The difference in readings between the EcoPlot and the C&T for bluebunch wheatgrass and litter is probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 4. The soil stability without cover averaged 2.7. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

Prior to 2003, and the finding of *Silene Spaldingii*, this pasture was grazed in the spring and fall annually. Post 2003, grazing in this pasture occurred only in the fall, and every other year in late summer (Birkmaier 2010).

CROW CREEK 2

This plot is located in the North Crow Pasture of the Crow Creek Allotment. This site is located on a west facing ridgetop brow, and in potential *Silene spaldingii* habitat. This site exhibits a mid-seral state of the Idaho fescue-bluebunch wheatgrass (ridgetop) plant association (Johnson and Simon 1987). This plot was established in 2008, and read for the first time in 2010.

Table VI-29. Site results for Crow Creek 2

CROW CREEK 2			
SPECIES	ECOPLOT (%)[1]	C&T (HITS)[2]	MID-LATE SERAL RANGE[3]
	2010 Canopy Cover	2010 Relative Cover	
Prairie junegrass	0.28	0.00	0 - 1
Sandberg bluegrass	1.73	34.67	1- 15
Bluebunch wheatgrass	20.38	43.00	3 - 25
Idaho fescue	2.15	4.00	10 - 25
Onespike oatgrass	0.27	2.00	0 - 15
Invasive Annuals	9.98	4.00	0 - 1
	Basal Cover	Coverage	
Bare Ground	11.33	16.33	0 - 20
Moss/Lichen	35.67	23.00	10 - 40
Litter	31.33	16.67	1 - 15

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground,

moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[3] According to Johnson and Simon (1987)

This site is more of a dry-mesic Idaho fescue-bluebunch wheatgrass (ridgetop) plant association (Johnson and Simon 1987). Vegetation primarily consists of bluebunch wheatgrass and Sandberg bluegrass at levels higher than expected for a mid to late seral range of this plant association (Johnson and Simon 1987). Idaho fescue, prairie junegrass and onespike oatgrass are also present, and at lower than expected or within the low range of expected range for a mid to late seral range of this plant association (Johnson and Simon 1987). Annual grasses were found to occupy approximately 10 percent of the canopy cover and 4 percent relative cover, but should only represent 0 to 1 percent of cover (Johnson and Simon 1987). Direct hits on perennial vegetation averaged 30 percent. It should also be noted that the difference in readings between the EcoPlot and the C&T for Sandberg bluegrass, bluebunch wheatgrass and litter is probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 3.9. The soil stability without cover averaged 4.5. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

History

Prior to 1995, this pasture was grazed annually each spring and fall for approximately one month. Starting in 1995 through today, grazing in this pasture occurred two out of three springs for one month. The pasture is used every other year as a fall bull pasture (Birkmaier 2010).

DAVIS CREEK 10

This site is located in the East Davis Pasture of the Davis Creek Allotment on a west-facing mid-slope. The plant association at this site exhibited a mid seral state of an Idaho fescue – bluebunch wheatgrass/arrowleaf balsamroot (Johnson and Simon 1987). In 1959, this site was established as a C&T, it was read again in 2003 and 2008 as both a C&T and EcoPlot.

Table VI-30. Site results for Davis Creek 10

DAVIS CREEK 10							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICANT CHANGE**	**MID-LATE SERAL RANGE[5]**
	2003 Canopy Cover	2010 Canopy Cover		2003 Relative Cover	2010 Relative Cover		
Prairie Junegrass	1.41	2.67	None	3.33	0.33	None	0 - 3
Arrowleaf Balsamroot	4.07	2.67	None	1.67	1.67	None	0 - 20
Bluebunch Wheatgrass	33.9	10.67	Decrease	52.33	41.33	None	10 - 65
Idaho Fescue	2.15	6.6	None	9.00	39.67	Increase	3 - 40
Invasive Annuals	0.11	0.03	None	N/R[6]	N/R	None	0 - 18
	Basal Cover	Basal Cover		Coverage	Coverage		
Bare Ground	27.00	23.00	Decrease	43.00	25.00	Decrease	1 - 40
Moss/ Lichen	1.33	0.00	None	0.00	0	None	0 - 20
Litter	62.00	73.67	Increase	30.33	52.33	Increase	3- 70

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2]Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[4]Only the last two years of the readings are shown

[5] According to Johnson and Simon (1987)

[6] N/R is not recorded

Over the years, this site has experienced many significant attribute changes. From 1959 to 2003, bluebunch wheatgrass and Idaho fescue significantly decreased and bare ground and litter significantly increased. From 2003 to 2008, significant changes were noted in both the EcoPlot and the C&T data as bluebunch wheatgrass and bare ground significantly decreased, and litter significantly increased (EcoPlot). Idaho fescue and litter significantly increased, and bare ground significantly decreased (C&T). Direct hits within this site have shown a decrease since 1959 (57 hits), with the lowest reading in 2008 which averaged 19.33 hits, a significant decreased was observed from 1959 to 2003. Overall, this site shows a decrease in condition since the establishment of the site in 1959, and appears to have shifted from a late seral state (Johnson and Simon 1987) to a mid seral state by 2003. It should be noted that the difference in readings between the EcoPlot and the C&T for bluebunch wheatgrass and Idaho fescue is probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 4.13. The soil stability without cover averaged 4.17. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

When this site was established, there was just one big pasture that now encompasses the current East Davis, West Davis, and South Davis Pastures. With the concerns over the listing of fish, enclosures were built along Davis Creek from about 1985 to 1990 (Smith 2011). These enclosures eliminated riparian grazing, and consequently the livestock began utilizing the upland areas more, this is most likely the main reason for the shift from a late to mid seral state. In 2004, a cross fence was built which created the East Davis Pasture and added flexibility to the spring rotational patterns used by the permittee (Smith 2011). This fence line again changed the utilization patterns at the Davis Creek 10 site. This pasture has been used during the month of October annually.

DAVIS CREEK 15

This site is located in the Starvation Springs Pasture of the Davis Creek Allotment on a large plateau. This site exhibits an early to mid seral state of a Ponderosa pine/common snowberry plant association (Johnson and Simon 1987). The vegetation at this site exhibits characteristics of a very xeric form of this plant association. This site was established and read in 1959, and was read as a C&T plot in 1971, and as a C&T and EcoPlot in 1982, 2003 and 2008. Unfortunately, the EcoPlot methods used to read this site prior to 2003 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-31. Site results for Davis Creek 15

DAVIS CREEK 15							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICANT CHANGE**	**RANGE[5]**
	2003 Canopy Cover	2010 Canopy Cover		2003 Relative Cover	2010 Relative Cover		
Prairie Junegrass	0.00	0.00	None	0.00	0.00	None	0 - 3
Sandberg bluegrass	0.81	3.93	None	5.67	25.67	Increase	--
Bluebunch Wheatgrass	0.00	0.17	None	0.00	0.33	None	3 - 40
Idaho Fescue	2.07	2.65	None	18.67	9.33	None	0 - 40
Pinegrass	3.33	0.87	None	5.33	3.67	None	0 - 20
Onespike Oatgrass	0.00	0.67	None	0.00	4.67	None	--
Common Snowberry	11.78	7.1	None	15.33	16.00	None	5 - 75
Ponderosa Pine	18.67	N/R[6]	None	29.67	30.33	None	10 - 65
Invasive Annuals	0.11	0.03	None	N/R	N/R	None	--
	Basal Cover	Basal Cover		Coverage	Coverage		
Bare Ground	27.33	16.67	Decrease	24.67	10.67	Decrease	--
Moss/Lichen	3.67	3.67	None	3.67	1.33	None	--
Litter	64.67	72	None	55.33	76.67	Increase	--

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[4] Only the last two years of the readings are shown

[5] According to Johnson and Simon (1987). Different seral states have not been determined for this plant association.

[6] N/R is not recorded

This site is very dry compared to the ponderosa pine plant associations identified by Johnson and Simon (1987). Some of the species found within this site are not identified within the ponderosa pine plant associations including Sandberg bluegrass and onespike oatgrass. This site may therefore be a mosaic of ponderosa pine/common snowberry and a scabland –type plant association. It should be noted that for this plant association, a mid to late seral range was not identified by Johnson and Simon (1987), but rather a range of plant composition within this plant association is identified. By reading the description of the ponderosa pine/common snowberry plant association, and the values expected of indicator species including bare ground for a dry site, the values at site Davis Creek 15 appear to be in a mid to early seral state (Johnson and Simon 1987). When looking over the past readings of this site, a change in the plant community composition is noted. Prairie junegrass has decreased over time, averaging almost five percent relative cover in 1959 to zero percent in 2003. Bluebunch wheatgrass has also decreased since the establishment of this site. Common snowberry, onespike oatgrass, and Idaho fescue have increased at this site since 1959. From the reading in 2003 until the reading in 2008, Sandberg bluegrass and litter significantly increased in relative cover and coverage, respectively. Bare ground significantly decreased in both basal cover and coverage. Finally, because of the xeric state of this site the range of plant composition as well as a seral state cannot be positively identified. However, when considering the history, the past, and current condition of the site, observations indicate the condition of the site has remained fairly static over time.

The soil stability reading on this site under vegetative cover averaged a rating of 5. The soil stability without cover averaged 4.3. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010

History

This site is located adjacent to the main thoroughfare through this area prior to the construction of the 4600 road. Logging activities, past heavy livestock use, as well as increased human activity occurred at this site. The condition of this site has remained fairly static since the 1980's. Logging in this area has not occurred for quite some time. This site is part of a rotationally grazed allotment and currently grazed annually for two weeks in the month of July.

DAVIS CREEK 16

This site is located in the Elk Creek Pasture of the Davis Creek Allotment on a west facing shoulder of a ridgetop. A road exists through the site, and a fence has been constructed within 100 yards of the site. The plant association at this site exhibits characteristics of a ponderosa pine/Idaho fescue plant association, however, the site has been so degraded that it has taken on characteristics of Sandberg bluegrass – onespike oatgrass mixed with Idaho fescue – bluebunch wheatgrass/arrowleaf balsamroot plant associations. The seral state at this site could not be determined as the site appears to have crossed a threshold and is currently transitioning to a different state. Established in 1959 this site was read as a C&T plot, an EcoPlot in 1982, and then a C&T and EcoPlot in 2003 and 2008. Unfortunately, the EcoPlot methods used to read this site prior to 2003 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-32. Site results for Davis Creek 16

DAVIS CREEK 16							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICANT CHANGE**	**MID-LATE SERAL RANGE[5]**
	2003 Canopy Cover	2008 Canopy Cover		2003 Relative Cover	2008 Relative Cover		
Prairie Junegrass	0.00	0.05	None	0.00	1.00	None	0 - 10
Sandberg bluegrass	7.7	3.32	None	52.33	33.33	Decrease	--
Bluebunch Wheatgrass	1.50	0.23	None	9.00	5.67	None	0 - 25
Idaho Fescue	2.9	1.98	None	17.33	21.67	None	4 - 65
Arrowleaf balsamroot	0.00	0.58	None	0.00	1.00	None	--
Onespike oatgrass	0.67	1.72	None	4.67	7.67	None	--
Invasive Annuals	2.17	0.7	Decrease	N/R[6]	N/R	None	0 - 30
	Basal Cover	Basal Cover		Coverage	Coverage		
Bare Ground	35.43	26.67	None	37.67	21.33	None	0 - 20
Moss/Lichen	2.83	0.33	None	0.00	0	None	0 - 20
Litter	44.37	62.33	Increase	50.33	62.67	None	40-99

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[4] Only the last two years of the readings are shown

[5] According to Johnson and Simon (1987). Different seral states have not been determined for this plant association.

[6] N/R is not recorded

Since the establishment of this site in 1959, the attributes of this site have not change with much significance. From 1959 to 2003, the only significant change was a decrease in the number of direct hits that shifted from an average of 9 to an average of 2.67, respectively. From 2003 to 2008, a significant in canopy cover of invasive annuals, a decrease in relative cover of Sandberg bluegrass, and an increase in basal cover of litter were observed. This site did not easily fit any of the plant associations of Johnson and Simon (1987). Probably as a result of the alterations that have occurred at this site. When comparing trend through photographs, it appears that the Ponderosa pine are returning to the site, and the bunchgrasses have more vigor. It should be noted that the difference in readings between the EcoPlot and the C&T for Sandberg bluegrass, bluebunch wheatgrass and Idaho fescue are probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 5.3. The soil stability without cover averaged 4.65. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

At some point in time between 1959 and 2003, a timber road was constructed through the Davis Creek 16 site. The road was blazed and the extra material was dumped on the lower side of the roadbed. Prior to this occurring, and prior to the 1959 reading, the site had been logged, which had already changed the composition of the plant community and altering the state of the site. After the road was constructed, it was used as a thoroughfare for timber harvests, as well as, a route livestock could easily travel on. A fence was constructed just north of the site sometime between 1959 and 2003 causing further livestock impacts, as cattle tend to congregate next to fences especially at gates. For these reasons, the site has continued to receive high levels of activity. This pasture is grazed annually for the last two weeks in June and beginning of July.

DOBBINS 1

This plot is located in the Dobbins Pasture of the Dobbins Allotment on a ridgetop within approximately 100 yards of a road, and a quarter mile from a fence line. The plant association at this site exhibits a mid to early seral state of a mosaic of Sandberg bluegrass-Onespike oatgrass and Douglas' buckwheat/Sandberg bluegrass plant associations (Johnson and Simon 1987). This plot was established in 2008, and read for the first time in 2010.

Table VI-33. Site results for Dobbins 1

DOBBINS 1			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	2010 Relative Cover	
Onespike Oatgrass	7.28	10.00	1 - 40
Sandberg Bluegrass	6.63	47.67	5 - 30
Bluebunch wheatgrass	0.08	0.00	0 - 1
Buckwheat species	3.30	6.67	0 - 40
Invasive Annuals	13.23	2.33	
	Basal Cover	Coverage	
Bare Ground	25.33	19.00	0 - 15
Moss/Lichen	12.33	10.00	3 - 60
Litter	33.33	16.00	0 - 3
Rock/Pavement	30.00	33.00	15 - 90

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[3] According to Johnson and Simon (1987)

Vegetation on this site primarily consists of Sandberg bluegrass, onespike oatgrass, buckwheat species, moss and lichens, and the invasive annual grass, ventenata, (12.65 percent of canopy cover). Aside from the bare ground, and the annual grasses and therefore the increased amount of litter, this site exhibits indicator plant species to be on the low side of the mid to late seral range for these plant associations (Johnson and Simon 1987). However, it should also be noted that Johnson and Simon (1987) suggest that the Douglas' buckwheat/Sandberg bluegrass plant association may be a product of past soil loss resulting from overgrazing and subsequent soil and wind erosion. It should also be noted that the difference in readings between the EcoPlot and the C&T for Sandberg bluegrass is probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 3.5. The soil stability without cover averaged 2.1. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

History

Prior to around 2003, the private land to the south and east of this allotment was encapsulated into the Dobbins Allotment and was grazed season long as a single pasture. Post 2003, the private landowners fenced off the private land creating additional pastures and creating a rotational grazing system. The current allotment has had a high percentage of weeds for quite a long time, and most likely is the result of management practices of the Homesteading era (Smith 2011). Since 2003, livestock have grazed the allotment in June through the middle of August and again in the month of October.

HUNTING CAMP 3

This plot is located in the Kirkland Pasture of the Hunting Camp Allotment on a southwest facing shoulder of a ridgetop. The plant association at this site exhibits an early to mid seral state of a Douglas-fir/common snowberry plant association (Johnson and Simon 1987). This site was established and read in 1965 as a C&T, read in 1976 as an EcoPlot, and read in 1982 and 2010 as C&T and EcoPlot. Unfortunately, the EcoPlot methods used to read this site prior to 2010 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-34. Site results for Hunting Camp 3

HUNTING CAMP 3						
SPECIES	**ECOPLOT (%)[1]**		**C&T (HITS)[2]**	**C&T (HITS)[3]**	**SIGNIFICANT CHANGE[4]**	**MID-LATE SERAL RANGE[5]**
	2010		1982	2010	None	
Ponderosa pine	N/R[6]		29.00	16.67	None	5 - 60
Douglas fir	N/R		0.00	5.67	None	5 - 80
Common Snowberry	3.22		0.67	7.67	None	1 - 60
Oregon Grape	1.12		1.33	3.33	None	0 - 25
Roses	6.38		0.67	23.33	Increase	0 - 15
Elk Sedge	2.12		0.00	1.00	None	0 - 50
Mountain Brome	0.72		0.33	1.00	None	--
Idaho Fescue	0.00		2.00	0.00	None	--
Pinegrass	35.62		49.00	73.00	None	0 - 75
Kentucky bluegrass	0.37		1.33	0.67	None	--
Invasive Annuals	0.38		0.00	0.00	None	--
	Basal Cover		Coverage	Coverage		
Bare Ground	6.00		2.67	4.33	None	--
Moss/Lichen	0.67		0.67	0.00	None	--
Litter	93.00		81.67	55.33	Decrease	--

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2]Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[4] Only the last two years of the readings are shown
[5] According to Johnson and Simon (1987)
[6] N/R is not recorded

The Lone Dog Timber sale of 2003 had a unit harvested at the location of this site sometime between 2003 and 2005. This harvest resulted in the plant association shifting from one with a shrub understory dominated by current species to one dominated by rose. From 1982 to 2010, the relative cover of rose significantly increased, and the coverage of litter significantly decreased. Also in this period, direct hits increased from average of 13.67 to an average of 40.33. From 1965 to 1982, only elk sedge significantly changed as it decreased from an average of 12 hits to zero. Unfortunately, the practice of recording of shrubs and overstory at this site did not occur until 1982. As a result, the trend of shrubs and trees prior to 1982 were unable be established or changes documented. In this plant association, early seral stands are characterized by a ponderosa pine overstory and with pine regeneration more common in tree understories; snowberry-rose patches are more extensive under very open tree overstory (Johnson and Simon 1987). Additionally, the difference in readings between the EcoPlot and the C&T for roses, pinegrass, and litter are probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 2.3. There were not any readings for the "no cover" as all of the random transects picked were located under vegetation. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

This site is less than a quarter mile from Huffman Springs, which is currently a watering site for the livestock, but at one time was also a cow camp. This allotment was a sheep allotment until sometime in the 1930's or 1940's, at which time the livestock switched to cattle (Childers 2011). In the 1970's and 1980's the permittee had the private land to the north of the allotment and annually used this area earlier in the grazing season during the push to higher ground, and later in the season as the cattle trailed toward home. In the late 80's the permittee changed, the number of livestock decreased and rotation changed (Childers 2011). This pasture is currently on a deferred rotation with one year of summer use and the next year fall use.

HUNTING CAMP 4

This site is located in the Tamarack Pasture of the Hunting Camp Allotment on a ridge top less than 100 yards from a fence and a road. The plant association at this site exhibits a mid to late seral state of an Idaho fescue-bluebunch wheatgrass (Johnson and Simon 1987). This site was established in 1962 and read as a C&T in 1965, the site was read as an EcoPlot in 1976 and as a C&T and EcoPlot in 1982, 2002, and 2008. Unfortunately, the EcoPlot methods used to read this site prior to 2002 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-35. Site results for Hunting Camp 4

HUNTING CAMP 4							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICANT CHANGE**	**MID-LATE SERAL RANGE[5]**
	2002 Canopy Cover	2008 Canopy Cover		2002 Relative Cover	2008 Relative Cover		
Sandberg bluegrass	12.70	2.77	None	8.33	21.00	Increase	1 - 15
Bluebunch Wheatgrass	7.57	14.33	None	23.67	36.00	Increase	3 - 25
Idaho Fescue	5.90	15.55	Increase	15.67	15.67	None	10 - 25
Invasive Annuals	0.00	0.5	Increase	N/R[6]	N/R	None	0 - 1
	Basal Cover	Basal Cover		Coverage	Coverage		
Bare Ground	12.33	17.33	Increase	17.33	13.33	None	0 - 20
Moss/Lichen	26.70	24.67	None	21.00	15.67	Decrease	10 - 40
Litter	50.60	50.00	None	25.00	54.67	Increase	1 - 15

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[4] Only the last two years of the readings are shown

[5] According to Johnson and Simon (1987)

[6] N/R is not recorded

This data for this site exhibits several significant changes since its establishment in 1965. From 1965 to 1982, the relative cover of Sandberg bluegrass (68 to 28.6), and bare ground (31.33 to 13.33) (C&T) significantly decreased, and bluebunch wheatgrass (14.33 to 31), Idaho fescue (8 to 22), and litter (8.3 to 33) significantly increased. From 1982 to 2002, the relative cover of Sandberg bluegrass and moss and lichen (30.33 in 1982) significantly decreased. Direct hits significantly increased from 1982 to 2002 (from an average of 12.33 to an average of 28.67), but significantly decreased from 2002 to 2008 (to an average of

11.33). From 2002 to 2008, Idaho fescue, invasive annuals, and bare ground significantly increased (EP), and Sandberg bluegrass, bluebunch wheatgrass, and litter significantly increased (C&T), while coverage of moss and lichen significantly decreased. Observations indicate the site appears to be trending toward a later seral state as an increase in Idaho fescue and bluebunch wheatgrass. The Idaho fescue-bluebunch wheatgrass plant community type is a transitional type between Idaho fescue-bluebunch wheatgrass communities of the steep canyons, and Idaho fescue-prairie junegrass or Sandberg bluegrass-onespike oatgrass gentle ridgetop communities (Johnson and Simon 1987). In the late seral stages of the Idaho fescue-bluebunch wheatgrass plant association, Idaho fescue and bluebunch wheatgrass are co-dominant, Sandberg bluegrass and prairie junegrass have low to no coverage (Johnson and Simon 1987), as exhibited at this site. Also noted is that the difference in readings between the EcoPlot and the C&T for Sandberg bluegrass is probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 3.5. The soil stability without cover averaged 4.25. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

The closest developed watering site to this site is Allen Springs, which is located approximately ¾ of a mile from the site. This allotment was a sheep allotment until sometime in the 1930's or 1940's, at which time the livestock switched to cattle (Childers 2011). In the 1970's and 1980's the permittee had the private land to the north of the allotment and annually used this area to catch cattle (as it is in the corner of the Tamarack Pasture) before moving the cattle to higher ground (Childers 2011). During this same timeframe, there was also a large resident elk herd which used the area in the spring and summer months. In the late 80's the permittee changed, the number of livestock decreased and rotation changed (Childers 2011). This pasture is currently on a deferred rotation with one year of summer use and the next year fall use. Once every three years this pasture is rested, then grazed the other two years mid-May to mid-June.

JOSEPH CREEK 1

This site is located in the Joseph Creek Pasture of the Joseph Creek Allotment on an east facing foot slope above a historical homestead site. The plant association at this site exhibits a very early seral state of a bluebunch wheatgrass-Sandberg bluegrass (basalt), (Johnson and Simon 1987). This site was established in 1967, and read in 1987 and 1983 as a C&T, and read in 2010 as both a C&T and EcoPlot.

Table VI-36. Site results for Joseph Creek 1

JOSEPH CREEK 1						
SPECIES	**ECOPLOT (%)[1]**		**C&T (HITS)[2]**	**C&T (HITS)[3]**	**SIGNIFICANT CHANGE[4]**	**MID-LATE SERAL RANGE[5]**
	2010 Canopy Cover		1983 Relative Cover	2010 Relative Cover	None	
Sandberg Bluegrass	0.25		1.67	1.67	None	1 - 20
Bluebunch wheatgrass	3.53		0.00	9.33	None	20 - 65
Timothy	11.50		52.00	61.67	None	--
Lupine	0.90		16.33	1.33	None	0 - 3
Invasive Annuals	32.33		14.00	2.67	None	0 - 15
	Basal Cover		Coverage	Coverage		
Bare Ground	20.67		8.00	10.00	None	1 - 40
Moss/Lichen	0.00		0.00	0.00	None	0 - 20
Litter	62.67		81.33	47.00	Decrease	0 - 40

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2]Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[4]Only the last two years of the readings are shown

[5] According to Johnson and Simon (1987)

[6] N/R is not recorded

From 1983 to the reading in 2010, litter was the only attribute that showed a significant change. However, in this timeframe, the relative cover of lupine decreased. From the time that this site was first established in 1967 to 1983, the relative cover of Sandberg bluegrass (33 in 1967), and mosses and lichens (2 in 1967) significantly decreased. Timothy was non-existent on the site in 1967, and significantly increased to 52 in 1983, at the same time, Lupine decreased on the site. The Timothy found on this site may have been a range prescription, a fire aerial seeding, or remnant from the hay field located at the Wilder Homestead. From 1967 to 1983, the number of direct hits significantly increased from 1 to 9.33, respectively. The condition of this site was rated at a very early state (Johnson and Simon 1987). This was due to the large canopy cover of invasive annuals, and the less than expected levels of bluebunch wheatgrass and Sandberg bluegrass and the higher than expected levels of litter (due to the invasion of annuals). The canopy cover of annual forbs including tall annual willowweed, which averaged 35.55 percent, and chickweed which averaged 7.65 percent, were not included in the invasive annual percent displayed in the above table. According the Johnson and Simon (1987), early seral stages of this plant association may show greater frequency of annual bromes, yarrow, arrowleaf balsamroot, tall annual willowweed, and others. Although Timothy is non-native, it is allowing the site to function by providing a perennial root system to hold the soil and maintain soil structure. Another note is that the difference in readings between the EcoPlot and the C&T for Timothy and invasive annuals is probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 3.8. The soil stability without cover averaged 3.5. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

Just a few hundred yards down the hill from this site was a homestead called the "Wilder Place, " which was founded around 1903, and inhabited until around 1929 (Kooch 2005). During this period, cattle were located on the private land and adjacent federal land year round (Childers 2011). After 1929, Alvin McFetridge bought the land, other than about an acre or so, and ran sheep from mid-March through mid-January in conjunction with his Forest Service permit (Kooch 2005), (Childers 2011). The private land was annually hayed as well (Childers 2011). As this land was a hub for livestock in the winter and early spring months, this site probably received a large amount of use. Sometime around 1950, the livestock switched to cattle, which have been grazed on the allotment since. Currently, livestock are permitted to use this allotment during the month of May and from November through mid-December. However, the allotment is often rested in the fall, which generally is the time when the livestock drift down to the location of the C&T site.

SWAMP CREEK 1

This site is located in the Barney Flat Pasture of the Swamp Creek Allotment on a southwest facing shoulder of a ridge. The plant association at this site exhibits a mosaic of Douglas fir/common snowberry, stiff sagebrush/Sandberg bluegrass, and Idaho fescue-prairie junegrass. Because of the mosaic of plant associations, there is not enough data to determine seral state of these plant associations. This site was established in 1977 and read in 1977 as an EcoPlot, and read in 1983 and 2010 as both a C&T and EcoPlot. Unfortunately, the EcoPlot methods used to read this site prior to 2010 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-37. Site results for Swamp Creek 1

SWAMP CREEK 1					
SPECIES	**ECOPLOT (%)[1]**		**C&T (HITS)[2]**	**C&T (HITS)[3]**	**SIGNIFICANT CHANGE[4]**
	2010		1983	2010	
Prairie junegrass	0.68		3.00	0.67	None
Sandberg Bluegrass	0.33		17.67	10.33	Decrease
Bluebunch wheatgrass	7.33		14.33	17.00	None
Idaho fescue	6.62		17.00	24.33	None
Strict Buckwheat	6.27		7.67	6.33	None
Invasive Annuals	0.10		N/R[5]	1.33	None
	Basal Cover		Coverage	Coverage	
Bare Ground	16.00		16.00	11.33	None
Moss/Lichen	6.33		1.33	4.00	None
Litter	57.67		36.00	27.67	None

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2]Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.
[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[4]Only the last two years of the readings are shown
[5] N/R is not recorded

This site showed only one recorded significant change, which was a decrease in relative cover of Sandberg bluegrass from 1983 to 2010. Kentucky bluegrass was present on this site during the 1983 reading, but was not present in the 2010 reading. Other species recorded at this site, not shown on the table include: silky lupine, low sage, rose, common snowberry, Douglas fir, and onespike oatgrass. The data suggests that many of the indicator species including prairie junegrass, Sandberg bluegrass, and Idaho fescue are at low levels for these plant associations. The direct hits at this site increased from an average of 25.67 in 1983 to 31 in 2010. The difference in readings between the EcoPlot and the C&T for Idaho fescue and litter are probably a result in the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 3.25. The soil stability without cover averaged 4.5. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

When reviewing the C&T file, it appears that this site was established prior to 1977, but during the 1977 reading, it was discovered that a pond had been built where Transect 2 had been placed, so a new Transect 2 was established, and the data collection started over. The 1983 data collection noted that this site lies on several plant communities and that the site has been moderately grazed. Since 2005, this pasture experienced grazing every other year, in the spring from the middle of April through the month of May.

SWAMP CREEK 10

This site is located in the Below Cow Camp Pasture of the Swamp Creek Allotment on a floodplain of Swamp Creek. The plant association at this site exhibits a black hawthorn/Mesic forb plant association with influences of thinleaf alder (Crowe and Clausnitzer 1997). A state could not be determined. This site was established and read in 1952, then 1962 as a C&T, read in 1977 as an EcoPlot, and read in 1982 and 2008 as both a C&T and EcoPlot. Unfortunately, the EcoPlot methods used to read this site prior to 2008 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-38. Site results for Swamp Creek 10

SWAMP CREEK 10					
SPECIES	**ECOPLOT (%)[1]**		**C&T (HITS)[2]**	**C&T (HITS)[3]**	**SIGNIFICANT CHANGE[4]**
	2008		1982	2008	
Kentucky Bluegrass	32.75		53.00	86.33	Increase
Sedge species	2.37		0.00	2.67	None
Tuffed hairgrass	0.00		4.50	0.00	None
Invasive Annuals	0.10		0.00	N/R[5]	None
	Basal Cover		Coverage	Coverage	
Bare Ground	4.33		11.50	12.00	None
Moss/Lichen	0.33		0.50	0.00	None
Litter	95.33		29.00	61.67	None

[1] *Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.*

[2] *Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.*

[3] *C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.*

[4] *Only the last two years of the readings are shown*

[5] *N/R is not recorded*

This site is the only riparian C&T/EcoPlot site used for the Lower Joseph Creek Watershed Assessment; however only two transects were read during 1962 and 1982 readings. The classification and information available for these plant associations varies from information available for upland sites, and therefore the information presented will be slightly different. According to information gathered from Crowe and Clausnitzer (1997 and Wells (2006), the black hawthorn/mesic forb plant association is generally a disturbance-induced seral stage of a different shrub or forest plant association. This site has not had many significant changes in herbaceous vegetation since the site establishment in 1952. The relative cover of Kentucky bluegrass significantly increased from 1982 to 2008, and from 1962 to 1982 a significant decrease in relative cover of tuffed hairgrass was observed. Direct hits at this site have decreased from an average of 56 in 1982 to 26 in 2008, and the change may be a factor of the decadent material present on the site in 2008 as observed through photographs. In past readings, incidences of Alder, Hawthorn or conifers were not recorded within the transect. For this reason, trend of riparian hardwoods and conifers could not be determined. However, during the 2008 reading, a relative cover of 7 percent was found for alder, 21.67 percent for hawthorn, and 2.67 for snowberry. Photograph observations of this site also indicate an increase in number and condition of riparian shrubs from the time the plot was established to 2008 and from 1982 to 2008, a decrease in bull thistle and a denser layer of herbaceous vegetation. According to Crowe and Clausnitzer (1997), grasses often increase in cover with grazing under these stands.

This site did not have the soil stability rated.

HISTORY

After reviewing past photograph data, it appears that this site was once dominated by either a thicket of riparian hardwoods including hawthorn and alder, or a conifer stand which, included Ponderosa pine and fir species. At some point in time (prior to 1950's), the timber at this site was cut or the riparian hardwoods were cleared to create a transportation system for timber harvesting practices, and at the same time, the riparian areas were grazed by livestock summer long (Birkmaier 2010). This management transitioned this site into a meadow system and current management is allowing the site to further transition to a site dominated by riparian hardwoods as explained by Crowe and Clausnitzer (1997) and Wells (2006). By comparing photographs, the intensity of grazing at this site appears to have decreased since first established in 1952. Considered sacrifice areas prior to the 1960's, riparian areas received heavy grazing without regard for ecological condition. This type of management started to change in the 1970's, and further with the listing of fish in the 1990's. The management of the Swamp Creek riparian area transitioned to exclude grazing except for a few months during the summer. Current management of this pasture has cattle use of up to three weeks in the month of July, annually.

SWAMP CREEK 12

This site is located in the Little Elk Creek Pasture of the Swamp Creek Allotment on a south west facing shoulder of a ridge, less than 100 yards from a road. The plant association at this site exhibits an early to very early seral state of Idaho fescue – bluebunch wheatgrass/arrowleaf balsamroot (Johnson and Simon 1987). This site was established in 1957 and read in 1957, 1962 as a C&T, and read in 1982, 2002 and 2008 as both a C&T and EcoPlot. Unfortunately, the EcoPlot methods used to read this site prior to 2002 are not conducive for a comparison or a trend of EcoPlot data, but do give an idea of the species and frequency of species found on this site in the past.

Table VI-39. Site results for Swamp Creek 12

SWAMP CREEK 12							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICANT CHANGE**	**MID-LATE SERAL RANGE[5]**
	2002 Canopy Cover	2008 Canopy Cover		2002 Relative Cover	2008 Relative Cover		
Prairie Junegrass	0.00	0.05	None	1.33	0.00	Decrease	0 - 3
Sandberg bluegrass	4.52	4.28	None	45.33	44.33	None	0 - 20
Bluebunch Wheatgrass	11.02	12.78	None	41.00	45.67	Increase	10 - 65
Idaho Fescue	1.16	0.00	None	0.67	0.00	None	3 - 40
Arrowleaf balsamroot	3.00	4.92	None	1.67	1.00	None	0 - 20
Invasive Annuals	6.10	3.07	None	N/R[6]	N/R	None	0 - 18
	Basal Cover	Basal Cover		Coverage	Coverage		
Bare Ground	9.57	7.00	None	10.33	7.67	None	1 - 40
Moss/Lichen	1.12	1.33	None	1.33	0.33	None	0 - 20
Gravel/Rock	41.50	47.33	Increase	43.33	3.00	Decrease	0 - 60
Litter	13.33	46.00	Increase	23.67	74.33	Increase	3 - 70

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.
[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[4] Only the last two years of the readings are shown
[5] According to Johnson and Simon (1987)
[6] N/R is not recorded

Many of the attributes within the site have increased and decrease with significance throughout the years of readings. As expressed in the table above, prairie junegrass, bluebunch wheatgrass, gravel and rock, litter and direct hits (which decreased from an average of 21.33 in 2002 to 14.62 in 2008) all had significant changes (C&T). Also noted is the changes for gravel and rock are very different when comparing 2002 to 2008 data for C&T's, which may be a result of the data collection techniques, and either identifying the loop as gravel and rock or litter. From 1982 to 2002, relative cover of bare ground significantly increased from 3.33 in 1982, and direct hits significantly increased from 7.67 that same year. From 1962 to 1982, coverage of bare ground and litter significantly decreased while gravel and rock significantly increased. Finally, from 1957 to 1962 Idaho fescue and litter significantly increased, and gravel and rock significantly decreased (C&T). The significant changes of the attributes appear to be caused by two factors, changes in condition based on climate and differences in the way the plot was read. This second factor becomes evident by comparing past litter and gravel/rock readings to the readings of 2008. The current condition of the plot appears to be in an early to very early seral state (Johnson and Simon 1987) as evident by minimal amounts of prairie junegrass and with Sandberg bluegrass, bluebunch wheatgrass, and arrowleaf balsamroot in the low range for what is expected for a mid to late seral state for this plant association. Idaho fescue was not found within the plot, while litter and gravel are on the high end of what is expected (Johnson and Simon 1987).

HISTORY

Due to the high acreage, location and other attributes, the Little Elk Creek Pasture has been used as a "catch" pasture and to transition different herds of livestock throughout the grazing season or to hold all livestock on the allotment for a said amount of time. Over the last 10 years, use in this pasture has generally started around July 1st and continued to October 1st. Currently, at any one time during this grazing season 173 to 550 cattle can be found within this pasture. Since 2005, the number of livestock on this allotment, and further in this pasture has been reduced by 346. This site is also adjacent to a logging road, making the site more accessible to livestock for grazing.

SWAMP CREEK 20

This site is located in the Catchfly Pasture of the Swamp Creek Allotment and is located on the top of a ridge. This site was chosen and established in a well-known *Silene spaldingii* location.

The plant association at this site exhibits a very early to a disclimax (*Ventenata dubia*) seral state in a predominately Idaho fescue – Prairie junegrass (mounds) with occasional swales of bluebunch wheatgrass- Sandberg bluegrass scabland (Johnson and Simon 1987). This site was established in 2008 and with a first time reading in 2010 (C&T and EcoPlot).

Table VI-40. Site results for Swamp Creek 20

SWAMP CREEK 20			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	2010 Relative Cover	
Prairie Junegrass	0.17	1.00	0 - 15
Sandberg bluegrass	1.20	34.33	0 - 20
Bluebunch wheatgrass	16.18	28.00	0 - 25
Idaho fescue	1.37	7.00	15 - 85
Onespike Oatgrass	3.23	19.00	--
Invasive Annuals	31.73	15.00	0 - 30
	Basal Cover	Coverage	
Bare Ground	8.33	11.67	1 - 30
Moss/Lichen	9.67	11.33	0 - 20
Litter	66.00	38.33	0 - 90

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.
[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[3] According to Johnson and Simon (1987)

The condition of this site has been rated as very poor to a disclimax (*Ventenata dubia*). The site has transitioned or possibly even crossed a threshold from its historical state. This change becomes evident by two factors, this first is the plant composition of the indicator species on the site; prairie junegrass, Sandberg bluegrass, and Idaho fescue are either at the bottom end or below the expected levels for the mid to late seral range for the plant association (Johnson and Simon 1987). Secondly, when looking at the canopy cover, *Ventenata dubia*, an invasive annual occupies 31.45 percent of the canopy cover. Generally, a disclimax of this plant association occurs when either Kentucky bluegrass or Wyeth's buckwheat dominate this site, however at this location *Ventenata dubia* is the dominating species. According to Johnson and Simon (1987), very early seral Idaho fescue – prairie junegrass and areas where disclimax species have invaded maybe characterized by the complete loss of Idaho fescue, red avens, and red besseya, and an always present, in very early seral communities are, high amounts of Sandberg bluegrass, cheatgrass, and Douglas' knotweed. Swamp Creek 20 was a composition different than describe above, all of the plant species listed in the above sentence were found on this site, however every species was found to be a very low levels (less than two percent). The amount of litter found at this site was high, most likely due to the annual invader, but is still within the expected range for a mid to late seral state (Johnson and Simon 1987). Finally, the number of direct hits at this site averaged 28.

The soil stability reading on this site under vegetative cover averaged a rating of 3.1. The soil stability without cover averaged 4.3. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

Prior to 1999, this pasture was part of the Dorrance Pasture of the Swamp Creek Allotment, and grazed by 171 pairs of cattle in the spring for one month, and approximately 850 pair for not more than one month in the fall annually (Birkmaier 2010). A fence was constructed around the year 2000, with the listing of the fish and the known *Silene spaldingii* location, which created the Catchfly pasture and eliminated spring grazing in most of Crow Creek and the known *Silene* sites. Currently, this pasture receives grazing by livestock in the fall by approximately 496 pair for various times, but not more than one month annually and every other spring by up to 15 dry cows for 30 days. Additionally, for the years of 2007 through 2010 only two permittees and approximately 350 cattle were on the Swamp Creek Allotment and used the Catchfly pasture for 5 days in the fall.

TABLE MOUNTAIN 1-52

This site is located in the Joseph Breaks Pasture of the Table Mountain Allotment on a south facing shoulder slope. The plant association at this site exhibits an early seral state is Idaho fescue – bluebunch wheatgrass/silky lupine plant association in an early seral state (Johnson and Simon 1987). This site was established in 1952, and was previously read in 1952 and 1959 as a C&T, and 2003 and 2010 as a C&T and EcoPlot.

Table VI-41. Site results for Table Mountain 1-52

TABLE MOUNTAIN 1-52							
SPECIES	**ECOPLOT (%)[1]**	**ECOPLOT (%)**	**SIGNIFICANT CHANGE[2]**	**C&T (HITS)[3]**	**C&T (HITS)[4]**	**SIGNIFICANT CHANGE**	**MID-LATE SERAL RANGE[5]**
	2003 Canopy Cover	2010 Canop y Cover		2003 Relative Cover	2010 Relative Cover		
Prairie Junegrass	0.13	0.00	None	0.33	0.00	None	0 - 3
Sandberg bluegrass	4.5	2.7	None	30.33	29.33	None	0 - 5
Bluebunch Wheatgrass	12.00	9.12	None	43.67	44.33	None	10 - 65
Idaho Fescue	0.33	0.77	None	1.67	3.00	None	5 - 20
Silky Lupine	0.70	0.50	None	0.33	1.33	None	0 - 15
Wyeth's Buckwheat	5.83	8.02	None	13.67	19.33	Increase	0 - 20
Invasive Annuals	0.50	3.37	None	N/R[6]	1.67	None	0 - 25
	Basal Cover	Basal Cover		Coverage	Coverage		
Bare Ground	42.83	47.67	None	47.67	44.67	None	0 - 25
Moss/Lichen	0.17	0.67	None	0.67	1.33	None	0 - 75
Litter	42.83	40.67	None	34.33	13.33	Decrease	3 - 80

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.

[3] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.

[4] Only the last two years of the readings are shown

[5] According to Johnson and Simon (1987)

[6] N/R is not recorded

When comparing this site to Johnson and Simon (1987), this site fits the Idaho fescue – bluebunch wheatgrass/silky lupine plant association the closest; however, this site has less slope (8 percent) and lupine than expected for the plant association. Throughout the years of readings of this site, the attributes varied, however, not significantly other than a significant increase in relative cover of bluebunch wheatgrass from 1959 (32.67) to 2003, and a significant decrease in coverage of litter from 2003 to 2010. In addition, many of the indicator species for this plot are at levels either; lower than expected or at the lowest level for the mid-to-late seral range including Idaho fescue, bluebunch wheatgrass, silky lupine, and moss/lichen (Johnson and Simon 1987). The amount of bare ground within this plot is almost twice as high as the expected range. The amount of direct hits within this plot have varied over the years, however the 2010 reading which averaged 29 direct hits was significantly higher than the reading in 2003 which averaged only 12 direct hits. The differences in readings between the EcoPlot and C&T for Sandberg bluegrass, bluebunch wheatgrass, and Wyeth's buckwheat are probably the result of the differences in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 3.46. The soil stability without cover averaged 2.2. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

History

Similar to the Joseph Creek 1 site, sheep grazed this site from before the turn of the 20th century until around 1950. The site is located at the head of Slide Creek and traditionally been used as a driveway to move livestock to the top of Table Mountain (Childers 2011). Currently, this pasture is utilized annually in early spring and fall as the cattle are moved on and off the allotment. Because there are not any division fences in the pasture, a deferred rotational schedule has been in place since 2005 in which the cattle are pushed to the north end of the pasture one year and the south end the next year (Childers 2011). Additionally, elk utilization of this site occurs annually in the early spring months.

TABLE MOUNTAIN 7

This site is located in the Horse Pasture Ridge Pasture of the Table Mountain Allotment on the top of a ridge. This site is located within the proposed Horse Pasture Ridge RNA site. The plant association at this site exhibits a mid to late seral state of Idaho fescue – bluebunch wheatgrass/arrowleaf balsamroot (Johnson and Simon 1987). This site was established and read for the first time in 2010.

Table VI-42. Site results for Table Mountain 7

TABLE MOUNTAIN 7			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	2010 Relative Cover	
Arrowleaf balsamroot	3.37	2.33	0 - 20
Sandberg bluegrass	1.03	4.00	0 - 20
Bluebunch wheatgrass	16.80	33.67	10 - 65
Idaho fescue	14.22	45.00	3 - 40
Wyeth's buckwheat	2.90	5.67	0 - 10
Invasive Annuals	0.83	0.00	0 - 18
	Basal Cover	Coverage	
Bare Ground	13.00	6.33	1 - 40
Moss/Lichen	12.00	9.00	0 - 20
Litter	43.33	28.33	3 - 70

[1] Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.

[2] C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.
[3] According to Johnson and Simon (1987)

An average of 32 percent of direct hits occurred on perennial vegetation. Vegetation at this site primarily consists of bluebunch wheatgrass, Idaho fescue, Wyeth's buckwheat and arrowleaf balsamroot. All of the indicators show that this site is within the mid to late seral state for this plant community (Johnson and Simon 1987). Also noted was the difference in readings between the EcoPlot and the C&T for bluebunch wheatgrass, Idaho fescue, and litter, probably a result of the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 2.4. The soil stability without cover averaged 2. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

Similar to the Joseph Creek 1 site, sheep grazing occurred on this site from before the turn of the 20th century until around 1950. The site is located just off a ridgetop and most likely received intense use by sheep (Childers 2011). In 2003, and with the proposal of the RNA, the permittee stopped encouraging use to this area. This pasture is currently used three out of four years for either 4 or 6 weeks from mid-May though the month of June.

TABLE MOUNTAIN 8

This site is located in the Wilder Pasture of the Table Mountain Allotment on a southwest facing brow of a narrow ridge. This site is located within the proposed Haystack Rock RNA site. The plant association at this site exhibits a mid to late seral state of Idaho fescue – bluebunch wheatgrass/silky lupine plant association (Johnson and Simon 1987). This site was established in and read for the first time in 2010.

Table VI-43. Site results for Table Mountain 8

TABLE MOUNTAIN 8			
SPECIES	**ECOPLOT (%)[1]**	**C&T (HITS)[2]**	**MID-LATE SERAL RANGE[3]**
	2010 Canopy Cover	2010 Relative Cover	
Sandberg bluegrass	1.88	18.33	0-5
Bluebunch wheatgrass	29.32	40.67	10-65
Idaho fescue	18.22	24.00	5-20
Silky Lupine	2.33	3.33	0-15
Invasive Annuals	1.63	1.67	0-25
	Basal Cover	Coverage	
Bare Ground	12.33	3.33	0-25
Moss/Lichen	1.00	1.00	0-75
Litter	50.67	23.33	3-80
Pavement/Gravel	33.00	27.00	0-49

An average of 56 percent of direct hits occurred on perennial vegetation. Vegetation at this site primarily consists of bluebunch wheatgrass, Idaho fescue, and silky lupine. In the late seral stage, bluebunch wheatgrass dominates over Idaho fescue (Johnson and Simon 1987). Also, note that this type of plant association is generally associated with higher levels of pavement and gravel. All of the indicators show that this site is within the mid to late seral state for this plant community (Johnson and Simon 1987). Additionally, the difference in readings between the EcoPlot and the C&T for bluebunch wheatgrass, Sandberg bluegrass, bare ground, and litter is probably a result of the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 2.9. The soil stability without cover averaged 2.3. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

Similar to the Joseph Creek 1 site, sheep grazing occurred from before the turn of the 20th century until around 1950, at which time the livestock transitioned to cattle. Currently, this pasture receives annual usage in both early spring and fall as the cattle are moved on and off the allotment. Because there are not any division fences in the pasture, a deferred rotational schedule has been in place since 2005 in which the cattle are pushed to the north end of the pasture one year, and the south end the next year (Childers 2011).

TEEPEE BASIN 1

This site is located in the Rock Creek Pasture of the Elk-Teepee Allotment on a ridge shoulder. The plant association at this site exhibits an early to mid seral state Idaho fescue –

bluebunch wheatgrass/arrowleaf balsamroot (Johnson and Simon 1987). This site was established and read in 1952, and read in 1959 (C&T), and in 2010 (C&T and EcoPlot).

Table VI-44. Site results for TeePee Basin 1

TEEPEE BASIN 1						
SPECIES	**ECOPLOT (%)[1]**		**C&T (HITS)[2]**	**C&T (HITS)[3]**	**SIGNIFICANT CHANGE[4]**	**MID-LATE SERAL RANGE[5]**
	2010		1959	2010		
Prairie Junegrass	0.35		0.00	0.00	None	0 - 3
Sandberg Bluegrass	4.12		43.67	31.33	None	0 - 20
Bluebunch Wheatgrass	18.08		46.67	50.00	None	10 - 65
Idaho Fescue	2.28		6.67	2.67	None	3 - 40
Arrowleaf balsamroot	0.93		0.33	1.00	None	0 - 20
Invasive Annuals	1.68		N/R[6]	0.67	None	0 - 18
	Basal Cover		Coverage	Coverage		
Bare Ground	26.00		37.67	13.33	Decrease	1 - 40
Moss/Lichen	1.00		2.00	0.67	None	0 - 20
Litter	38.67		38.67	22.33	None	3 - 70

[1] *Ecoplot (%) represents the percent canopy cover for the vegetation species listed and percent basal cover for the bare ground, moss/lichen and litter cover across all plots within the site. Litter cover represents both live and dead basal plant material.*

[2]*Increase or decrease values are presented only if change was significant using a paired t-test to n = .05.*

[3] *C&T (hits) is the average of the three transects of both direct and indirect hits for the vegetation species listed, this type of measurement is also referred to as Relative Cover. Direct hits represent plots were the loop landed directly on a perennial plant, indirect is the closest perennial plant to the plot. Invasive annuals, bare ground, moss/lichen, and litter are only represented as direct hits and can therefore be considered as a percent of ground cover (Coverage). Litter only represents annual vegetation and the prior year's perennial plant growth.*

[4]*Only the last two years of the readings are shown*

[5] *According to Johnson and Simon (1987)*

[6] *N/R is not recorded*

This site rated as early to mid seral, Johnson and Simon (1987), as the indicator species of Idaho fescue, bluebunch wheatgrass and Sandberg bluegrass were in the low range or below expected levels for a mid to late seral state of this plant association. Only three attributes have changed significantly within this site since establishment in 1952: from 1952 to 1959, a significant increase in relative cover of litter was found, and from 1959 to 2010 both relative cover of bare ground (significantly decreased) and direct hits (significantly increased from an average of 23 to 34, respectively). In addition, it should be noted that the difference in readings between the EcoPlot and the C&T for Sandberg bluegrass and bluebunch wheatgrass are probably a result of the difference in data collection methods.

The soil stability reading on this site under vegetative cover averaged a rating of 4.6. The soil stability without cover averaged 3. The expected range of stability is a rating between 3 and 5; where 1 is the lease stable and 6 is the most stable (USDA NRCS 2010).

HISTORY

For at least the last twelve years, the pasture where this site is located has been grazed in the spring, June and July, rested throughout the remaining summer months, and grazed again in the fall as the livestock are pushed off of the summer range onto the private land. This land was also most likely heavily used during the sheepherding era around the turn of the 20th century.

LOWER JOSEPH CREEK C&T PLOT SUMMARY

To attempt to monitor the long-term trend in the Lower Joseph Creek Watershed existing Condition and Trend plots were selected across the landscape. These plots were selected based on several criteria including: each allotment was required to have at least one C&T plot, the plot had to be located in an area that received adequate livestock use, and special areas such as proposed RNA's or areas with threatened, endangered or sensitive species or habitats were selected to have a plot. The site selection for C&T and EcoPlots locations for the Lower Joseph Creek Watershed Assessment was, decided upon by the Rangeland Sub-Committee, further information can be obtained from the project file. After selecting the existing plots available and within the established criteria, several new plots were established. New site location locations were carefully considered to make sure that representative sites were read that covered areas with data gaps in watershed. Twenty-eight plots were reread or read with this assessment.

The expected vegetation in the Lower Joseph Creek Watershed, as identified in the Plant Association of the Wallowa-Snake Province (Johnson and Simon 1987), is dominated by Idaho fescue, bluebunch wheatgrass and prairie junegrass. Sub-dominant species include; pinegrass, Sandberg bluegrass, onespike oatgrass, and the forbs; arrowleaf balsamroot, Wyeths buckwheat and silky lupine. Shrubs and trees that are expected to cover the landscape include snowberry, stiff sage, Ponderosa pine, Douglas fir and Tamarack.

This contrasts with the findings from the 2009 and 2011 readings of C&T plots which identified the dominant grasses as bluebunch wheatgrass, Idaho fescue and Sandberg bluegrass, and the sub-dominant species of prairie junegrass, arrowleaf balsamroot, Wyeths buckwheat, onespike oatgrass, silky lupine, pinegrass, Kentucky bluegrass and the introduced grasses of intermediate wheatgrass and timothy. Trees and shrubs found included Ponderosa pine, snowberry and riparian shrubs. Additionally invasive annual weeds including cheatgrass and ventenata were found.

These plots indicate a shift in the species in the plots from a dominance of Idaho fescue as the most abundant grass, to the dominance of bluebunch wheatgrass. Additionally Sandberg bluegrass is more prominent than expected in these plots.

Historically this watershed has been used heavily for a variety of activities, beginning with the presence of Native Americans. For centuries before, and since the white man's presence in the 1880's there has been logging, grazing, hunting, camping, wood gathering, site seeing and homesteading. These activities have precipitated the building of roads, railroad grades, fences, ponds and trails.

History also tells us that significant heavy grazing was conducted in the watershed in the early 1900's. By the mid 1900's grazing had become regulated, and by the 1980's significant changes had occurred in livestock management with rotational grazing and limiting numbers of livestock being used on the landscape.

Since the establishment of the C&T plot sites (starting in the 1950's), many of the activities described above have occurred in close proximity to the C&T plot sites. The vast majority of the C&T sites read for this analysis are located on the tops of ridges, the shoulders of ridges, or the plateaus that connect these ridges. Historically these areas have been used very heavily. Many ridge tops had "stock driveways" that were used to move the sheep bands from the winter grazing to the summer grazing. In addition, much of the Lower Joseph Watershed Assessment area is forested, and therefore attracted the early loggers as the plateaus are relatively flat and has excellent timber. No less than 13 of the total 28 sites were impacted in some way by the above-mentioned activities.

One of the disappointing aspects of the C&T plot results was the inability to calculate a definite trend on most sites. The C&T plot analysis indicates that the range condition has been impacted by previous activities as discussed. As a result, many of these sites show significant change from what is expected. The management changes incorporated 30 to 50 years ago by the natural resource managers and the private landowners has clearly moved most of the land in this watershed in an upward trend. There are a few exceptions, but overall, the sites across the watershed are stable or improving.

Wildlife has been abundant, particularly elk. The Billy meadows area is the site where elk were released in Northeast Oregon in 1912. Today, the Chesnimnus unit, which encompasses part of the Lower Joseph Watershed Analysis area, is one of the prized elk hunting tag locations. The elk census shows over 5,000 elk in the Chesnimnus unit alone. Heavy use by wildlife is evident in many places within the assessment area.

The seral state found in the Lower Joseph Creek Watershed Assessment area based on the C&T plots are as follows: three sites show mid to late seral, (11% of the sites) four sites show mid seral (14% of the sites), six are mid to early (21% of the sites) and four sites are early seral (14% of the sites). Two sites are early to very early, two are very early (14% of the sites) and one site is very early to disclimax. These conditions show wide variance of conditions across the lower Joseph Creek watershed. Seral state could not be determined on three sites, and three sites showed they had been "prior converted" to either Intermediate wheatgrass or Timothy.

If we look into the causes we can identify that many of these C&T plots have had management imposed upon them, that has potentially altered the results compared the collective landscape. This makes us question if they should be included in the "seral state" final summary. Many of these sites have been impacted by management decisions such as a significant timber harvest that changed the potential of the site, and the site is no longer has the same ecological characteristics. Other sites have had ponds built in the middle of them, or fences and roads built in close proximity that have altered the grazing patterns and travel situations of cattle and wildlife. However, the large degree to which land management decisions and footprint have a presence throughout the entire watershed demonstrates that the C&T the data as a whole still has value.

Soil Stability tests were completed followed the protocol developed by Herrick et al. (2004).Where soil is rated between 1, unstable and 6 highly stable. Soil stability ratings within this watershed area should predominantly fall between 3 and 5 in the classification for soil stability.

Twenty-four sites had soil stability tests conducted both in areas without canopy cover and under canopy cover. Within the areas without cover, sixteen of these sites met expected stability and 18 sites met the expected stability in areas with canopy cover. Five areas without canopy cover and one of the canopy cover sites had a rating of at least 2.7, very close to the expected rating. Only three of the areas without canopy cover and 5 of the canopy cover sites had low stability ratings(less than 2.7).

To summarize, much of the C&T data indicates that positive management changes have already been made on most of the areas as indicated by an upward trend, where a trend could be determined. Although many of the sites could not lead us to an official trend; the data did show, from the species present, that general trends are encouraging in the Lower Joseph Creek watershed. There is still work to be done as some sites are not responding adequately to the change in management that has occurred, or has crossed over a threshold that limits their ability to respond, offering a new and limited site capability.

GENERAL RECOMMENDATIONS

THEMES

1. Change season of use
    a. Defer grazing every other year until after seed set
        i. Defer grazing until after flowering of Bluebunch wheatgrass
    b. Defer grazing season every fourth year
    c. Graze pasture in July Aug or Sept every other year
    d. Graze pasture in July Aug or Sept every third year
    e. Graze when the ground is frozen or after seed set, when soils are not soft.
    f. Shorten season of use
2. Change frequency of use
    a. Graze pasture every other year
    b. Rest pasture from grazing
3. Change season of use and frequency of use

   a. Use a rest-rotation schedule in which all pastures are grazed with the following schedule: One-year rest, one-year spring grazing, and one year summer grazing.

4. Fix the fences
5. Continue to monitor with long term monitoring.
6. Active restoration

MANAGEMENT CONSIDERATIONS

The following are intended as general goals and tools to use for future management of public and private land in the LJCW:

Goals and Rationale:

- Maintain the social, economic and cultural values of livestock production –

  The rangeland group recognizes the economic, social, and cultural value associated with livestock production. Long-term stewardship by people with a vested-interest in the ecological health and productivity of a place is essential.

- Prevent and Control noxious weeds –

  Noxious weeds compete with and can dominate previously healthy landscapes degrading their productivity, diversity, and viability. Integrated management should work to prevent, control, eradicate and reduce the potential spread of weeds.

- Revegetation of early seral areas –

  These sites are particularly susceptible to noxious weed invasion or invasive annual grasses and can be subject to higher rates of erosion than later seral stages. However, there is a normal and natural presence of very early and early seral stages that is within HRV and the resilient range for the landscape. Some early seral sites may, by nature, have low potential for revegetation. Where very early seral stages are the result of past and/or present management, or they are in areas subject to high risk of weed invasion, they should be revegetated with appropriate perennial vegetation for current management objectives. Sites should be evaluated on a site-by-site basis for causal factors, weed risk and appropriate revegetation species and potential. All early and very early seral sites should be closely monitored for noxious weed presence and treated accordingly.

- Improve vegetative cover/condition of riparian area hot spots –

  In riparian areas identified as having been degraded of their ecological function by historic uses, utilization should be limited (by herding, barriers – Large Woody Debris, or fencing, change in the time of use, etc.) Condition could be enhanced by revegetation (e.g. grasses or shrubs) if appropriate. Sites should be evaluated on a site-by-site basis for causal factors and appropriate actions.

- Upland water development and enhancement –

  Water sources are essential to dispersing livestock use patterns. Clean water sources also can improve wildlife habitat. Where possible, water sources should be developed or redeveloped in a manner that protects the sources and the associated vegetation. Sites should be evaluated considering cost, maintenance requirements, and use potential.

- Maintain and/or enhance native plant communities, T&E and S plant species and habitat – Grazing practices should, at minimum, maintain and improve where practical.
- Improve productivity of old-field sites –

  Where applicable, restoration opportunities should be applied. Some of these areas could be improved by the addition of other grasses and forbs to improve forage production and weed resistance.

- Improve and diversify forage opportunities –

  Management that expands current forage opportunities (e.g., thinning of overstocked forest stands) could provide livestock with a greater variety of options and can disperse usage.

- Improve livestock distribution –

  The LJCW provides ample forage for wildlife species and domestic livestock. It is recognized that in specific areas/times livestock can cause damage to riparian and rangeland resources. These areas will be addressed by improving spatial and temporal distribution of cattle.

TOOLS POTENTIALLY TO BE USED:

- Weed management (including inventory, control, revegetation, and monitoring)
- Prescription fire
- Thinning in the timber zone
- Fencing and/or barriers (riparian and allotment)
- Off-stream water developments that are wildlife friendly
- Revegetation
- Improved co-management of allotments (explore vacant allotment uses i.e., grass banks, reissuance of allotments)
- Alternatives to traditional management (e.g., pastoral grazing systems, altering season of use)
- Increase herding (riders)
- Encourage livestock behavioral conditioning and low stress livestock handling techniques

- Multi-species grazing
- Cut out trails to improve cattle distribution
- Incidental take permits (allows grazing along riparian areas during spawning)
- Placement of woody debris
- Targeted grazing for vegetative management
- Changes of season of use and frequency of use
- Continue to monitor with long term monitoring.
- Active restoration

INVASIVE SPECIES/NOXIOUS WEEDS

INTRODUCTION

Weeds threaten ecological integrity by reducing biodiversity, altering native plant communities, altering stream nutrient release cycles, and increasing soil erosion. Weeds damage rangeland health by simplifying riparian and upland plant community's structure and function, and reduce forage quality and quantity. These impacts degrade economic and social values of agricultural lands, rangeland, forestlands, and wetlands. Annual economic losses from 21 of the 99 noxious weeds listed by Oregon, estimated in 2000, were $83 million dollars, or about 3,329 jobs per year (ODA 2001). Noxious weeds can spread at an estimated rate of 8 to 14% per year (Whitson 1998), and for some species, at rates of 60% growth per year (Prather and Callahan 1989). In the past, control and management of noxious weeds has had mixed success; while some weeds have been contained successfully, many others continue to rapidly spread across landscapes. New focus on inter-jurisdictional coordination, new herbicide technologies, wildland restoration, and the expanded use of biological controls gives current weed management efforts a much better rate of success.

Both the Wallowa County and Asotin County Weed Boards have developed Integrated Weed Management Plans. Integrated Weed Management (IWM) is a strategy for managing the invasion of noxious weeds using the most effective combinations of chemical, mechanical, and biological control methods to minimize inputs and maximize weed control. The challenge for weed managers is to define desired plant communities, tolerable thresholds of non-native plants, and to target non-native invaders for eradication and/or containment.

In an effort to effectively, and strategically manage noxious weeds across the state lines in the lower Grande Ronde, the Wallowa Canyonlands Partnership (WCP) was started in 2000. WCP is a Cooperative Weed Management Area (CWMA) that works with federal, state, and county agencies, private landowners and the Nez Perce Tribe to manage noxious weeds across jurisdictional boundaries. The WCP steering committee includes the Wallowa-Whitman National Forest, Wallowa Resources, Tri County CWMA, Oregon Dept. of Agriculture, Wallowa County Vegetative Dept., The Nature Conservancy, Asotin County and Washington Dept. of Fish and Wildlife.

ASSESSMENT METHODOLOGIES

The Lower Joseph Creek Watershed Assessment for noxious weeds began in 2008. Assessment work included data collection from partners and new field inventories. Distribution maps were created in collaboration with the Wallowa Whitman National Forest, Nez Perce Tribe, Asotin County and Wallowa County Weed Boards.

The assessment gathered distribution data about noxious weeds in the watershed and use the information to further the development of management objectives and treatment goals. The assessment used contracted survey crews to identify new weed locations in high-risk areas. The ground-based methods covered 10,700 acres and were performed by contracted surveys crews using hand held GPS systems to mark and record information in areas that could not be seen from the air. Aerial inventories covered 3,500 acres using a helicopter with Digital Aerial Sketch Mapping (DASM) technology with a trained weed specialist to record weed locations (Rew and Pokorny, 2006). These inventories play critical role in providing managers context for decision-making. The early detection of noxious weeds in a particular area allow managers to implement a quick and aggressive treatment response and the delineation of larger infestations can provide details needed for designating containment areas etc.

Weed distributions in Lower Joseph Creek were identified and compared with existing management strategies. Management plans for the area are guidelines set forth by the four managing agencies in the watershed (Oregon Dept. of Ag, Wallowa County, Washington Dept. of Ag, and Asotin County). See table one below for a summary of classifications for the highest priority weeds in Lower Joseph Creek and appendix 1-4 for complete management plans with explanations of classifications. The agencies use a system of classification that categorizes species into lists based on the dangers they pose to ecological health and economic production, how difficult they are to control and their current distribution across the landscape. The classification systems give managers guidelines for each weed species from the perspective of each agency.

The challenge for noxious weed managers in Lower Joseph Creek is that it is located at the overlap of several managing entities. WCP managers have to blend four different classifications into on the strategy on the ground. WCP works hard to communicate with all managing entities and area landowners to make plans that serve all of the stakeholders. Details of this inter jurisdictional plan are presented in management options/recommendations section below.

Table VI-45 lists species by Managing Agency. Classification of the assessment teams choice of the 12 important species by managing agency. A-listed have a high threat and a limited distribution. They are the highest priority for the listing entity. T-listed weeds mean that the managing entity will prioritize the treatment of said weed and create a particular plan for the management of it. B-listed weeds are economically important but widespread within the listing entities area of jurisdiction.

Table VI-45. Listed Species by Managing Agency.

LISTED SPECIES BY MANAGING AGENCY				
Species	State of Oregon	Wallowa County	State of Washington	Asotin County
Yellow starthistle	B (T)	A	B	B
Meadow hawkweed	A (T)	A		A
Rush skeletonweed	B(T)	A	B	A
Common crupina	B	A	A	A
Plumeless thistle	A (T)	A (T)	B	
Orange hawkweed	A (T)	A (T)		A
Whitetop	B	A		A
Perennial pepperweed	B (T)	A	B	
Spotted knapweed	B (T)	A	B	B
Sulfur cinquefoil	B	A	B	A
Scotch thistle	B	A		B
Tansy ragwort	B (T)	A (T)	B	

OVERVIEW/ SUMMARY OF CONDITIONS

Weeds a have been present in the watershed for many decades and will continue to be in the near future. Both natural and human disturbances and activities have contributed to the introduction and expansion of noxious weeds. Natural disturbances such as fire and localized flooding have historically played vital ecological roles in the watershed by being the catalyst for nutrient cycling and habitat creation. However, with the introduction of noxious weeds, these processes now may have unintended consequences of weed dispersal. The presence of weeds can often be correlated with range condition. Areas with poor range condition and/or the absence of native plant communities typically have a high proportion of non-native annual grasses that disrupt successsional processes by precluding the establishment of native perennials grasses. Like natural disturbances, human activities have also contributed to weed establishment in the watershed. Management activities such as road building, livestock grazing, forest management, and recreation have altered plant communities and provided pathways for weed dispersal.

The watershed currently has 12 known species of importance that are classified as (A), (B), or (T) weeds by the managing agencies. There are many other noxious weeds present throughout watershed that receive minimal management due to their widespread distribution and the high associated cost of management. Three of the 12 (A and B) listed species currently receive the most attention from managers.

They are yellow starthistle, rush skeletonweed, and meadow hawkweed

Yellow starthistle occupies much of the northern canyon lands of the watershed with the greatest distribution being in the Joseph, Cottonwood, and Horse Creek drainages (Map 3). It generally occupies sites with the southern aspects that lack significant proportions of native species. In 2010 and 2011 [redacted]

Figure VI-1. Distribution of Meadow Hawkweed, Rush Skeletonweed, and Yellow Starthistle in Lower Joseph Watershed

Meadow hawkweed is a relatively new invader to the watershed. It was first discovered in 2006 in the southern riparian zones of Swamp, Davis, Elk, and Joseph Creeks, and in the upland forest near Coyote Campground. Current management approach has been to attempt to eradicate meadow hawkweed from the watershed with herbicide. These treatments have proven to be effective in the reduction of population density and size, but complete eradication has proven to be difficult. A possible change in management strategy is under discussion by managers, due to the potential lack of funding and meadow hawkweeds distribution across Wallowa County.

INVENTORY:

Once weeds in the watershed are identified, attempts should be made to inventory populations and prevent spread. Managers should keep a detailed inventory of weed sites throughout the watershed; compiling data from all land owners USFS, BLM, Nez Perce Tribe, and private. Inventories make management of noxious weeds focused and strategic through the detailed mapping of locations and trends of noxious weeds. Both aerial and ground inventories methods should be used in the inventory process. Ground based inventories provide the most detailed information about population size and density and should be utilized when looking for noxious weeds that may be hard to see because of a limiting factor like plant size or forest overstory. Aerial inventories work best for species that are easy to see and cover large areas. They are very helpful in delineating boundaries of weeds that have a wide distribution.

TREATMENT:

Prioritize treatments using the noxious weeds list created by managing agencies and should take eradication, containment, or control treatment strategy. If available, incorporate bio controls with herbicide treatments.

ERADICATION:

Focus on an early detection and treatment approach on species that occur in limited enough numbers throughout the watershed where eradication is attainable.

The weeds listed below have very limited known distributions within the watershed and they also have the greatest potential for impact. All populations of these weeds should be treated aggressively with eradication as the goal. Managers should actively inventory for new sites in high-risk areas and any new sites found should be immediately and aggressively treated (Map X).

- *ORANGE HAWKWEED, (HIERACIUM AURANTIACUM)*

There is one known site of orange hawkweed located in the watershed. It was found in Davis Creek in 2010. The site has been aggressively treated for two years and is now down to a few plants. An aggressive approach should be continued until no plants remain. Managers should also continue to monitor site for a period of years to ensure complete eradication of remaining seed.

- *PLUMELESS THISTLE, (CARDUUS ACANTHOIDES)*

There is one known site of plumeless thistle in the watershed. This site occurs in the southern portion of Swamp Creek on private property. It has been treated annually since the site was found and will continue to receive aggressive treatment.

- *WHITETOP, (LEPIDIUM DRABA) AND PERENNIAL PEPPERWEED (LEPIDIUM LATIFOLIUM)*

Both whitetop and perennial pepperweed have very limited distribution in the watershed. Whitetop has a containment strategy throughout a portion of Wallowa County but should be treated aggressively in the watershed because of the small present population and the high potential for negative impacts.

- *TANSY RAGWORT, (SENECIO JACOBAEA)*

Tansy ragwort is known to occur on two sites in the watershed, both being in the starvation ridge area. The Oregon Department of Agriculture and Wallowa Whitman National Forest have been successfully treating these sites for years, and now only a few plants have occurred from year to year. There is an effective biocontrol that has dramatically reduced the population in Western Oregon but it does not survive the cold winters of Eastern Oregon.

CONTAINMENT:

A containment strategy should be used on species to slow or stop the spread into new locations. The containment strategy is used on weeds that have high populations in one area of the watershed but minimal to no occurrence in other areas. This strategy creates a treatment line where weeds on one side do not get treated and all weeds on the other side of the line receive treatment. This effectively splits the treatment strategy into two parts, one side being limited control and other being aggressive eradication. This strategy is already being used in the watershed with the management of yellow starthistle. The Wallowa County Integrated Management Plan will formally adopt the containment line in February 2012.

– *YELLOW STARTHISTLE, (CENTAUREA SOLSTITIALIS)*

Intensive management has been occurring in the watershed since 2000. Aerial and ground inventories in Joseph, Cottonwood, Broady, and Trail creeks covered more than 14,000 acres and helped delineate where it occurs in the watershed. Treatments are still needed to finish containment line and are being planned to treat in 2012. Even with all the treatment occurring there are gaps in the containment line. The Nez Perce Tribe has not completed an EIS that would allow them to use aerial treatment. With large areas of yellow starthistle present on their property a concerted effort should be made to begin their EIS process and use aerial treatments as soon as they become available.

– *RUSH SKELETONWEED, (CHONDRILLA JUNCEA) AND SPOTTED KNAPWEED, (CENTAUREA STOEBE)*

Management should continue to be aggressive with all sites being visited every year. Inventories should be completed periodically in areas of high risk to ensure that rush skeletonweed remains at a manageable level. An inventory for portions of Joseph Creek is being planned for the summer of 2012.

– *MEADOW HAWKWEED, (HIERACIUM PRATENSE)*

Meadow hawkweed is a relatively new invader to the watershed. It was first discovered in 2006 in the riparian zones of Swamp, Davis, Elk, and Joseph Creeks, and has since been found in the upland forest near Coyote Campground. Current management approach has been to eradicate meadow hawkweed from the watershed with herbicide. These treatments have proven to be effective in reducing population size and density, but complete eradication has proven difficult. A possible change in management strategy is being discussed by managers due to potential lack of funding, and meadow hawkweeds wide distribution across Wallowa County. The strategy may change from eradication to containment. One containment line would keep meadow hawkweed from becoming well established in Joseph Creek and another would be made to the population around Coyote Campground from spreading into Broady, Cougar, and Peavine Creeks.

– *COMMON CRUPINA, (CRUPINA VULGARIS)*

Common crupina is an “A” listed weed in Wallowa County that has not received much attention from managers. It is dispersed over roughly 1500 acres in the Joseph Creek drainage (Map 8). While management in the watershed has been limited, Asotin County and Washington Dept. of Agriculture have interest in keeping it out of Washington. Therefore, more intensive inventories should be conducted to better delineate boundaries. Once distribution information is obtained a containment strategy can be implemented to stop the northern spread.

CONTROL:

- Scotch thistle (Onopordum acanthium)
- Sulfur cinquefoil (Potentilla recta)
- Others B listed weeds as appropriate

RECOMMENDATION SPECIFIC TO WEEDS

All of these weeds have very wide distributions across the watershed making eradication and containment of these weeds unfeasible. Therefore, a control management strategy should be applied.

ISSUES

- Yellow starthistle occupies much of the northern canyon lands of the watershed with the greatest distribution being in the Joseph, Cottonwood, and Horse Creek drainages.
- Rush skeletonweed is dispersed in isolated pockets through much of the watershed. Sites generally range from a few plants to a few acres in size.
- Meadow hawkweed is a relatively new invader to the watershed. It was first discovered in 2006 in the southern riparian zones of Swamp, Davis, Elk, and Joseph Creeks, and in the upland forest near Coyote Campground.
- There is need for a process to map and respond to new discoveries and management response options.
- A possible change in management strategy is under discussion by managers, due to the potential lack of funding and meadow hawkweeds distribution across Wallowa County.

Treatment should be site specific and focus on agricultural lands or where protection of other important values is needed, such as, wildlife habitat or recreation sites. Biocontrol agents should be used if they are available.

MANAGEMENT OPTIONS/RECOMMENDATIONS

Management guidelines should consult the integrated weed management plans developed by the managing agencies (Wallowa County, Oregon Dept. of Agriculture, Asotin County, and Washington Dept. of Agriculture). Planned activities should work across these jurisdictional boundaries whenever beneficial to maximize effectiveness and leverage funding sources. Management should use Integrated Weed Management techniques and include all effective techniques available for the detection, treatment and monitoring of noxious weeds.

WEEDS RECOMMENDATIONS

- Current management approach has been to attempt to eradicate meadow hawkweed from the watershed with herbicide. These treatments have proven to be effective in the reduction of population density and size, but complete eradication has proven to be difficult
- Planned activities should work across these jurisdictional boundaries whenever beneficial to maximize effectiveness and leverage funding sources.
- Management should use Integrated Weed Management techniques and include all effective techniques available for the detection, treatment and monitoring of noxious weeds.
- Once new weed discoveries are known in the watershed, attempts should be made to identify and inventory populations and prevent spread. Both aerial and ground inventories methods should be used in the inventory process.
- More intensive inventories should be conducted to better delineate boundaries for Common crupina (Crupina vulagris).
- Control noxious weeds –
- Noxious weeds compete with and can dominate previously healthy landscapes degrading their productivity, diversity, and viability. Integrated management should work to prevent, control, eradicate, and reduce the potential spread of weeds.

WEED MONITORING

Monitoring provides baseline information about site condition and noxious weed presence. Monitoring changes and trends in weed populations and species composition is an important tool to measure treatment efficiency and success. Monitoring sites should be developed and incorporated in the treatment process and be located in areas that represent conditions existing throughout the watershed. Examples of monitoring activities include taking photo points, GIS trend mapping, vegetation transect, and chemical use comparisons.

- Photo points visually portray vegetation response to treatment.
- GIS and GPS mapping software tracks priority weed locations and patch size over time.
- Vegetation transect information tracks native and non-native response to management activities.
- Chemical use comparisons are use to gage response of weed treatments at specific application rates.

Monitoring utilizes GPS and GIS information and software to map and track high priority weed locations.

RANGE INTEGRATION

It is recognized that grazing has played a significant role from historic discoveries of herbivores throughout the Intermountain West extending back to the Pleistoncene Era. (Dr. Burkhardt, 1996). Dr. Burkhardt relates that the fossil record shows evidenceof a multitude of large herbivores during the Pleistocene Era (2.5-10 million years B.P.), and that that by 2.5 million years B.P. the flora of the Intermountain West was similar to today. Pleistocene magafauna represented in the fossil record include species of wooly mammoths, various horses and burros, yesterday‘s camel, extinct bison, and more.

Acquisition of the horse by the Nez Perce ca.1730 (Haines, 1938:429-436) had a profound impact on Nez Perce socio-political organization and other cultural systems. Within a few generations, the Nez Perce had become horse pastoralists. The Nez Perce in 1877 were thought to possess between 50 and 100 horses. U.S. census figures for the year 1876 indicate that the Nez Perce in Idaho maintained 14,000 head of horses and 9,000 head of cattle.

Today’s cattlemen continue to utilize woodlands for grazing through a balance of ecosystem management and integration of resource management. Integration has provided a means to create a balance of utilization, restoration, and resiliency for LJCW ecosystems. Through integration, resources were able to identify strategic management opportunities to promote ecosystem health and continued forage use.

Treatments were supported toward riparian improvements, enclosures of springs, installation of troughs, increased forage through forest management, and allotment assessments. A combination of approaches will meet multiple resource needs through coordination and combined efforts.

A variety of species such as ungulates, aquatics, birds of prey, will benefit from increase forage production and riparian management. Treatments of large homogenous timbered stands were supported to promote forage because this also results in meeting other resource needs of silviculture, fire management and wildlife. Proposed landscape diversity of stand structures will contribute to a wider distribution of wildlife, livestock and flora species habitat while promoting healthy ecosystems. This would aid the US Forest Service’s mandates to meet a number of standards on behalf of wildlife, wildlife habitat, access and usability.

Range recommendations were provided by, a diverse group of agencies managers and private citizens through numerous discussion forums. These include the Nez Perce Tribe, U.S. Forest Service, Oregon State University Extension, Natural Resource Conservation Service (NCRS), members of the Cattleman’s Association, private landowners, and ranchers.

INTEGRATED ECOLOGICAL RECOMMENDATIONS AND MANAGEMENT CONSIDERATIONS

Through resource integration, many strategies of weed and rangeland management can be accomplished in LJCW. The following general goals and tools are intended for use in future management of public and private land in the LJCW. Grazing practices should, at minimum, maintain the following goals and improve them where practical. Specific geographical recommendations are provided on maps VI – 38 and VI – 39.

GOALS AND RATIONALE:

Maintain the social, economic, and cultural values of livestock production –

- Long-term stewardship by people with a vested interest in the ecological health and productivity of a place is essential.

Control noxious weeds –

- Noxious weeds compete with and can dominate previously healthy landscapes degrading their productivity, diversity, and viability. Integrated management should work to prevent, control, eradicate, and reduce the potential spread of weeds.

Re-vegetation of early seral areas –

- These sites are particularly susceptible to noxious weed invasion and can be subject to higher rates of erosion than later seral stages. A presence of very early and early seral stages within the HRV is considered normal. Some early seral sites may naturally have low potential for re-vegetation.
- Where very early seral stages are the result of past and/or present management, or they are in areas subject to high risk of weed invasion, they should be vegetated with appropriate perennial vegetation for current management objectives.
- Conduct evaluations of areas on a site-by-site basis for causal factors, weed risk and appropriate re-vegetation species and potential.
- Conduct close monitoring of all early and very early seral sites for noxious weed presence and treated accordingly.

Improve vegetative cover/condition of riparian area hot spots –

- Utilization should be limited in riparian areas identified as having been ecologically degraded of their function by historic uses. (Examples include: herding, barriers – Large Woody Debris, or fencing, change in the time of use, etc.)
- Enhanced riparian conditions by re-vegetation (e.g. grasses or shrubs) if appropriate. Evaluate areas on a site-by-site basis for causal factors and appropriate actions.

Upland water development and enhancement –

- Water sources are essential to dispersing livestock use patterns. Cleaning of water sources can also improve wildlife habitat.

- Where possible, develop water sources in a manner that protects the sources and the associated vegetation.
- Evaluate sites taking into consideration of cost, maintenance [redacted]

Figure VI-2. Landowner and permittee range specific recommendations.

opportunities –

- Management that expands current forage opportunities (e.g., thinning of overstocked forest stands) is encouraged because it provides livestock with a greater variety of options and can disperse usage. Through forage improvements, there is opportunity for an increase in livestock numbers.
- Conversion of stands to fire tolerant species is consistent with historical conditions where low intensity fires interaction on the landscape provided lush forage availability.

Improve livestock distribution –

- The LJCW provides ample forage for wildlife species and domestic livestock. It is important to recognize that in specific areas/times livestock can cause damage to riparian and rangeland resources. These “hot spots” will be addressed by improving spatial and temporal distribution of cattle, fencing, or placement of woody debris, etc.

PROPOSED FUTURE PROJECTS

<u>All proposed projects should be field verified and defined</u>.

In forested areas of the watershed, developing a sequential program to open forest overstory canopies to allow optimal response of herbaceous understory vegetation should be considered, when appropriate these [redacted]

Figure VI-3. Approved geographical site specific projects from the full multi-resource group integration: Water sites and Weeds.

Specific geographical recommendations are identified on the following maps, VI – 38 and VI – 39. These recommendations were disclosed to participating resource groups during the full LJCW integration meetings.

Local permittees and landowners provided an extensive amount of input into areas needing both improvements and restoration. Through their widespread knowledge of the area is was helpful with specific site assessments of existing conditions. These recommendations were filtered through the range resource group and then through the multi-resource group full integration team for the LJCW.

Detailed dialogue ccurred for each recommendation clarifying any additional issues that other resource entities may be aware of for that area. Some areas were dropped and left for future review based on lack of needed information, anticipated adverse impacts to another resource, conflict with another resource recommendation for the same area or on site conditions needing further ground truthing assessments.

Approved recommendations include water site development and improvement, noxious weed treatments, rocking of water gaps, trail work improvements, and both repair of current fences and building of fence new fences.

The LJCW resources full integration group agreed to move forward toward implementation [redacted] were determined to be the best [redacted] the watershed would receive.

Figure VI-4. Approved fence work, establishment of water sources and trail work.

Management options discussed in the meetings of the LJCW group are designed to provide administrators with a diversity of restoration tools.

Management Strategies and Tools:

- Weed treatment (including inventory, control, re-vegetation, and monitoring)
- Prescription fire
- Thinning in the timber zone
- Fencing and/or barriers (riparian and allotment)
- Off-stream water development
- Prescription grazing
- Re-vegetation
- Improved co-management of allotments (explore vacant allotment uses i.e., grass banks, reissuance of allotments)
- Alternatives to traditional management (e.g., pastoral grazing systems, altering season of use)

- Increase herding (riders)
- Livestock herding and behavioral conditioning
- Multi-species grazing
- Incidental take permits (allows grazing along riparian areas during spawning)

SUMMARY OF GENERAL CONDITIONS FOUND IN LJCW

The current conditions was reviewed by 4 different tools – condition and trend plots, Interpreting Indicators of Rangeland Health, weed surveys and input and sensitive species input. There are 28 C&T plots, 34 interpretive indicator plots with 6 of those on private land. Input from the landowners and forest permittees was also gathered. The watershed had been heavily used by a variety of activities including: grazing, hunting, camping, wood gathering, sightseeing, and homesteading. Activities precipitated the building of roads, fences, ponds and trails. Grazing in the watershed began in the early 1900's. Overgrazing occurred during this time. It was pretty much left uncontrolled until the 1930's – 1950's until rules and regulations set in place for number control. Mid 1980's brought about significant changes in livestock management through rotation of grazing and numbers allowed on the landscape in the Lower Joseph Creek.

Interpretive indicator information found was current management seems to be maintaining ecological conditions on the south facing plateaus and ridge side slopes. North facing foot slopes and concave swells. Soil erosion appears to be consistent with the hillside slope of hydrology and summer thunderstorms infiltration limitations of the shallow soils, rocky sites, open meadows, scablands and steep inter-slopes.

Erosion on the north slopes, flat plateau slopes, and inter-concave slopes appear to be consistent with current hillside dendrology. Sites with well vegetated mid to late serial perennial bunch grasses and annual grasses and forb plant communities the soils are generally finely aggregated stable in forbs.

C&T PLOTS were mostly re-reading of established sites. Interpretive indicator used a rather random selection of sites across the Watershed to make sure we had a good distribution of sites on the majority of the types of landforms that were out there.

C&T plots were established in the 1950's under different protocol in areas of particular use. You will not find them in areas of potential little impact. They are generally set up to monitor management in areas where activities were occurring. Vast majority of these plots are located on the tops of ridges, shoulders of the ridges and plateaus that connect the ridges. Historically, the ridges, tops and stock right-a-ways used to move the sheep in from winter grazing in the canyons to summer grazing in the rest of the county. No less than 13 of the 28 C&T plots were impacted by in some way by roads, fences, ponds or other issues that had come along since the plots were established.

Summary of what was found in the C&T plots: Much of the plot data indicates management changes in most of the areas indicated by an upward trend or a trend could be efficiently determined. Trends are difficult to determine since process changes every 15 years. Trends would be based on species changes over time. This methodology utilized lists of what was there, what should be there and what is there today to determine an unofficial trend of how are things going. Using that methodology the majority of the plots showed an upward trend. There are some sites that did not show an improving trend and there is concern with percent of annuals, the lack of cover, or the type of cover that is there. In the 70's and 80's there was a change in management of grazing livestock in Wallowa County. We are seeing the plots showing improvement since that time, some of it slow and some of it robust. There are some that improvement is not occurring and we need to discuss management on those sites.

Risks to the whole area are encroachment of annual cheat grass, medusa head and other invasive annuals. A decline in native bunch grass and increase in native vegetation was noticed in some of the areas. Current range management focuses on the sites ability to maintain mid-to-late serial vegetation communities and enough surface protection to prevent accelerated erosion.

There are two federally listed species that were looked for: Mcfarlands Four Oclock, that was not found and Spaldings Catchfly, significant amount of work looking for it has been done. Wallowa Rice Grass – was found in a few areas of the watershed. There are one or two more that are not currently on the list but may be soon. One of them is a Lily.

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VII. Riparian Condition

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CONTEXT

The Lower Joseph Creek watershed (LJCW) is host to a significant range of complex habitat that supports a disproportionate quantity and diversity of species, both specialists and generalists, as compared to the adjacent upland watersheds. These riparian areas also serve as essential habitat corridors for wide-ranging resident and migratory aquatic and terrestrial species. Riparian areas provide important hydrology benefits as well. Various conditions affect riparian health and function, including natural factors, and management or lack of management.

Common management activities, both in the upland and the riparian area, which may impact riparian habitat are timber harvest, road construction, existing roads, livestock grazing, recreation, failure to control noxious and invasive species, fire suppression, and other issues and conditions. Natural processes can also negatively impact these sites, including, disease outbreaks, drought, fire, invasive species, flooding and erosion, migratory pressures, population cycles, and others.

Historic information from locations in eastern Oregon illustrates that over the past century, many streambanks have been modified by loss of riparian vegetation, trampling and downcutting (USFS Upper Joseph Creek watershed Assessment, 1995). The LJCW exhibits these historic effects as well, especially along the more accessible headwaters of Rush and Tamarack Creeks and streams such as Davis, Swamp and Upper Joseph creeks.

The upper part of Joseph Creek (and Chesnimnus Creek upstream of Joseph Creek) has been significantly modified by stream channelization and a reduction in the beaver population. Sumac Creek has been channelized by the draw-bottom roads constructed in the early 1940s taking up one-half to two-thirds of the narrow draw-bottoms.

The cumulative effect of these and other disturbances is partially incised creeks, areas of increased sediment, widening of stream channels, increased water temperatures and reduced water retention which in turn decreases ground water storage and the ability of the watershed to recharge and/or contribute to late summer stream flows. The results can be excess sediment that is a detriment to water quality and salmonid habitat. Species population and density may have been altered in some areas.

The complex mosaic of private and public lands and associated lands management objectives complicate restoration and enhancement activities on a larger scale. However, an improving trend over the last twenty to thirty years has resulted from increased awareness and understanding of the influence of management on hydrologic functions and a substantial effort in riparian restoration. Examples include changing of grazing rotations, draw bottom roads hardened or eliminated, vegetation protectors installed, and other practices.

Natural events such as flooding, droughts etc. often add to the time it takes for restoration and repair.

HYDROLOGY

Recent stream gauging data is not available. Eighty years ago, a U.S. Geological Survey (USGS) stream gauging station was in operation from July 1931 to September 1933. The station was located at a place called Chico Guard Station on Chesnimnus Creek just above confluence of Chesnimnus and Crow creeks. From the limited data produced by this station, a hydrograph was developed which showed that at that time, peak flows generally occurred in April and May, with low flows from June through February (USFS Lower Joseph Creek Assessment, 2001). In the subsequent decades, there has not been an active stream gauging station within the Lower Joseph Creek Watershed.

SPRINGS AND PONDS

There are no natural lakes in the watershed, but there are approximately 140 named springs and a few wetland areas, mostly along Swamp Creek. Springs often occur on mountain slopes that have exposed bedrock formations. Some of these springs may flow for only a few yards before water percolates back into the soil.

In order to facilitate livestock distribution in years past, stock ponds were excavated, and springs were developed by installing spring boxes and troughs. The developed springs may provide cleaner, cooler water than ponds, but in spite of the quality, they both provide upland water utilized by both livestock and wildlife. 126 pond sites have been identified in GIS. Since the early 2000s, fences have been built around many of the developed springs to protect the soils, plants and the springs themselves.

Prior to 2008, the USFS maintained all the exclosure fencing around streams as well as pond and spring improvements on USFS land. Due to continued decreases in federal funding, maintenance of pond and spring improvements was transferred to the permittees with the material needed supplied by USFS.

A number of the ponds and springs in the lower Joseph Creek watershed are in need of cleaning and/or rehabilitation. Identifying priority water sites for future projects is imperative given the role of these water developments in keeping livestock dispersed evenly across the landscape/allotments and enticing livestock and wildlife away from the riparian areas[1].

Past observations have speculated that water developments and ponds may contribute to altered flow regimes in the basin through water retention during spring runoff and evaporative loss by exposing subsurface water to the surface /during the summer heat (USFS 2001 LJC WA). This does not seem to be supported by existing science.

[1] Salt and mineral blocks can also be placed strategically to assist with dispersal.

CHANNEL INCISION

Channel incision is another condition that reduces the amount of water stored in a watershed. During high water, the deeper the incision, the more water is left instream leaving less water to disperse out in the flood plain. This, in some cases, causes a change in the flood plain's species composition from a wetland species to a dry land species.

There are channel segments within Swamp and Davis Creek that have incised 2-5 feet through fine-grained valley soils because of historic events[2] and practices, creating terraces and altered channel width/depth ratios. Vegetation has been planted along some of these streams to help reduce provide bank stability and stream shade.

Locating roads directly adjacent to an existing channel especially in a narrow valley bottom also creates or accelerates channel incision. If a channel is unable to maintain its natural sinuosity or curvature, channel gradient gets steeper and the water has the ability to do more work, which erodes the channel bottom and banks.

The entire length of Sumac Creek and some of its tributaries have old roads running right next to them, crowding their ability to develop appropriate sinuosity and a healthy riparian area. Consequently, Sumac Creek is incised in some areas creating an increased width/depth ratio. Cougar Creek is another waterway with a road adjacent to it for part of its length and along most of its tributaries. The Cougar Creek valley is wider and contains more vegetative than Sumac's and so the road impacts are not as great, but areas still have a decrease in sinuosity, a corresponding increase in stream gradient and power, and areas of incision.

AQUATIC SPECIES

NATIVE FISH SPECIES

Snake River Steelhead (Oncorhynchus mykiss)

Steelhead are the anadromous form of *Oncorhynchus mykiss* while redband trout are the resident form. In Oregon, the Joseph Creek steelhead population is managed by Oregon Department of Fish and Wildlife (ODFW) as a wild steelhead population without hatchery influence. The Joseph Creek steelhead population occupies both the Upper and Lower Joseph Creek Watersheds.

Snake River (SR) steelhead were listed by the National Marine Fisheries Service (NMFS) as threatened under the federal ESA on March 25, 1999. SR steelhead are also a WWNF

[2] Deposits initially derived from paleodeposits of glacier sediments from the ancestral north flowing Wallowa River, and further accumulated by old beaver ponds (see Spencer & Carson, 1994. Northwest Science).

management indicator species for aquatic habitat. Critical habitat for SR steelhead was designated on September 2, 2005, and is present in the LJCW.

Adult SR steelhead trout leave the Pacific Ocean after typically spending one year in the ocean. They enter the Columbia River from June through August, and migrate up the Columbia, Snake, and Grande Ronde rivers until reaching Joseph Creek. Early returners will arrive during November and winter over in deep pools while late returners will arrive the following spring after wintering over in the Grande Ronde and Snake rivers. Spawning takes place from March through May. Eggs incubate during the spring and emergence of fry occurs from June through July depending on water temperatures.

Juveniles typically spend two to three years in freshwater. Generally, juvenile steelhead utilize habitats with higher water velocities, and in winter they are found in deep pools with abundant cover. Juveniles may reside in their natal stream for their entire freshwater rearing phase or may migrate to other streams within a watershed.

Smoltification occurs during late winter/early spring and smolts emigrate from the LJCW to the ocean from March through May, normally in their second year.

Distribution

Steelhead are widely distributed in the LJCW. However, the majority of spawning and rearing habitat for the Joseph Creek steelhead population is located in the Upper Joseph Creek Watershed.

Based on current StreamNet data (2009, www.streamnet.org), there are 132.3 miles of steelhead habitat in the LJCW. Of this habitat, 56.2 miles of spawning and rearing habitat are present on U.S. Forest Service Lands and 68.4 miles are present on non-FS lands. There is an additional 7.7 miles of migration habitat present on the lower reach of Joseph Creek.

Abundance

The Grande Ronde Sub-basin Plan (GRSP 2004) estimates that returns of adult steelhead to the Joseph Creek system have been reduced by 74% compared to estimated historic returns.

Historically the Joseph Creek steelhead population contributed an estimated 24% of the return of adult steelhead to the Grande Ronde River system. This proportion has declined slightly to an estimated 21% (GRSP 2004).

Based on redd count surveys from 1960 to present, by Oregon Department of Fish and Wildlife (ODFW) in index areas the Joseph Creek steelhead population has averaged 4.2 redds per mile. Peak redd numbers for the population occurred in 1961-1963 (7.2 redds/mile); 1965-1967 (9.5 redds/mile); and 1985-1990 (9.2 redds/mile).

Swamp Creek has been included in the survey since 1964. During this 45 year time period Swamp Creek has exceeded the annual mean number of redds 60% of the time indicating that Swamp Creek is key spawning stream for the population.

Key spawning reaches have also been noted on private land for Cottonwood Creek, Horse Creek, and Broady Creek.

The Joseph steelhead population was reduced to very low levels from 1970 through 1984 when the average number of redds was 1.5 per mile. Joseph Creek was closed to steelhead fishing in the 1970’s.

Figure VII-1. Steelhead Distribution, Habitat and Critical Habitat in the LJCW

Redband Trout (Oncorhynchus mykiss)

Redband trout, the resident form of *Oncorhynchus mykiss*, are a Region 6 sensitive species and a WWNF management indicator species for aquatic habitat. Behnke (1992) classifies the rainbow trout species "east of the Cascades" as steelhead and redband trout. Redband trout may or may not be reproductively isolated from steelhead and may share a common gene pool with steelhead from the same geographic area.

Redband trout are sensitive to changes in water quality and habitat. Adult redband trout are generally associated with pool habitats, although various life stages require a wide array of habitats for rearing, hiding, feeding, and resting. Pool habitat functions as important refugia during low water periods. An increase in sediment lowers spawning success and reduces the quantity and quality of pool and interstitial habitat. Other important habitat features include healthy riparian vegetation, undercut banks and large woody debris (LWD).

Spawning takes place from March through May. Redds tend to be located where velocity, depth and bottom configuration induce water flow through the stream substrate, generally in gravels at the tailout area of pools. Eggs incubate during the spring and emergence occurs from June through July depending on water temperatures. Redband trout may reside in their natal stream or may migrate to other streams within a watershed to rear. Habitat requirements are similar to those for juvenile steelhead.

Distribution

Redband trout occupy roughly the same habitat as steelhead in the LJCW. Based on WWNF GIS data, about 147 total miles of redband trout spawning and rearing habitat is present in the LJCW. Based on the 1966 ODFW and 1994 USFS stream surveys, the upper reaches of Cottonwood Creek are key areas for redband trout spawning and rearing habitat.

Abundance

Abundance estimates for redband trout are not available for the LJCW. Observations made during stream surveys indicate that redband trout are abundant in upper Cottonwood Creek upstream of steelhead spawning areas.

Fall Chinook Salmon (Oncorhynchus tshawytscha)

The National Marine Fisheries Service (NMFS) listed Snake River fall Chinook salmon as a threatened species under the Endangered Species Act (ESA) in 1992, and critical habitat for this species was designated in 1994. These salmon currently exist in the Grande Ronde, Imnaha and Snake Rivers at depressed levels (USFS 1994).

Historically, lower Joseph Creek may have contained fall Chinook salmon as reported by Chapman (1940) and Stout (1957). In 1992, the Wallowa Mountains Fish and Wildlife Zone received several letters from long-time local residents, some being the same individuals referenced by Stout in his study (1957), who indicated that to their knowledge Chinook salmon did not exist in Joseph Creek, but steelhead did exist and were often referred to as salmon.

There are no past substantiated reports of Chinook salmon within Joseph Creek, however in 2013, Fall Chinook redds were observed in Lower Joseph Creek during the aerial spawning survey along the lower Grande Ronde River. ODFW and Idaho Fish and Game (Garcia 2000) have no records of Chinook salmon existence in Joseph Creek. However, Nez Perce Tribe fisheries biologists have estimated historical fall Chinook spawning and rearing habitat to occur in Joseph Creek from its mouth to its confluence with Cottonwood Creek, a total of 4.2 miles (WC/NPTSRP 1993).

Other Native Fish Species

Other native fish species present (D) or suspected (S) to be in the LJCW include:

- Bridgelip sucker (D) (Catostomus columbianus)
- Mountain sucker (S) (Catostomus platyrhynchus)
- Speckled dace (D) (Rhinichthys osculus)
- Longnose dace (D) (Rhinichthys cataractae)
- Redside shiner (D) (Richardsonius balteatus)
- Chiselmouth (D) (Acrocheilus alutaceus)
- Northern pike minnow (D) (Ptychocheilus oregonensis)
- Mottled sculpin (S) (Cottus bairdii)
- Torrent sculpin (S) (Cottus rhotheus)
- Paiute sculpin (S) (Cottus beldingii)

NON-NATIVE FISH SPECIES

There are a number of non-native fish species that have been introduced into the Snake River system that are present (D) or suspected (S) to be present in Joseph Creek downstream of the National Forest Boundary. These include:

- Smallmouth bass (D) (Micropterus dolomieui)
- Pumpkinseed (S) (Lepomis gibbosis)
- Black crappie (S) (Pomoxis nigomaculatus)
- Bluegill (S) (Lepomis macrochirus)
- Carp (S) (Cyprinus carpio)
- Channel catfish (D) (Ictalurus punctatus)

Smallmouth bass have been observed in Joseph Creek upstream of the USFS boundary during summer months when water temperatures have warmed.

Of these six non-native species, smallmouth bass and channel catfish are likely predators of juvenile salmonids.

MUSSELS

WESTERN RIDGED MUSSEL (GONIDEA ANGULATA) (USFS R6 SENSITIVE)

The western-ridged mussel is a USDA Forest Service Region 6 sensitive species. It is sedentary as an adult and relatively long lived, and thus can be an important indicator of habitat quality. Like other freshwater mussels, this species is a filter feeder that consumes plankton; beds of western-ridged mussels can filter and purify large quantities of water.

Western-ridged mussels spawn from late March through mid-July. To reproduce, adult females release fertilized eggs, or glochidia, in packets called conglutinates. A fish host is required for successful reproduction of western-ridged mussels. Glochidia attach to the gills of a host fish for several weeks while transforming into a juvenile.

Glochidia have been observed on fish from late March to early August (Spring Rivers 2007, Xerces Society species profile). When fully developed, the juveniles detach from the host fish and drop to the streambed to develop into adult mussels. Unlike western pearlshell mussels (*Magaritifera falcate*), western ridged mussels do not require a specific fish species as host.

Western-ridged mussels occur in streams of all sizes and are rarely found in lakes or reservoirs. They are found mainly in low to mid-elevation watersheds in mud, sand, gravel, and cobble substrates. They are tolerant of fine sediments and occupy depositional habitats and banks, but are usually absent from habitats with highly unstable or very soft substrates.

Western-ridged mussels have not been documented in the LJCW. However, western pearlshell mussels (*Margaritifera falcate*) are known to be present in Swamp Creek and Crow Creek. Based on their similarity of habitat characteristics, western-ridged mussels may be present in the LJCW as well. Distribution and habitat of western-ridged mussels and western pearlshell mussels overlap in the John Day river system.

AMPHIBIANS

INLAND TAILED FROG (*ASCAPHUS MONTANUS*) (USFS R6 SENSITIVE)

Inland tailed frogs are a USDA Forest Service Region 6 sensitive species and were documented in Broady, West Fork Broady, East Fork Broady and Cottonwood Creeks during Forest Service's stream surveys in the 1990s (Table 1).

Other streams that may provide habitat for tailed frogs are Peavine Creek, Rush Creek, Horse Creek, Deadhorse Creek and the Cottonwood tributary south of Deadhorse Creek. Tailed frogs are discussed in more depth in the Wildlife Section.

Table VII-1. Observations of Inland Tailed Frog During Stream Surveys

OBSERVATIONS OF INLAND TAILED FROG DURING STREAM SURVEYS			
STREAM NAME	**DATE**	**T/R/SEC**	**COMMENTS**
Broady Creek	8/11/1992	T05N/R46E/Sec 33	Tailed frog larvae; Confluence of Broady and E.F. Broady creeks
Cottonwood Creek	8/17/1994	T04N/R47E/Sec8	Tailed frog larvae
	8/18/1994	T04N/R47E/Sec8	Adult tailed frog sighted up Trib 11
	8/23/1994	T04N/R47E/Sec16	Tailed Frog (adult and Larvae) in W.F. Cottonwood
E.F. Broady Creek	6/17/1997	T05N/R46E/Sec33	Tailed frogs observed
W.F. Broady Creek	8/04/1994	T05N/R46E/Sec32	Adult and larval tailed frog observed

AQUATIC HABITAT

Viable, stable populations of fish require abundant, high quality, and diverse aquatic habitats that satisfy requirements for all life stages.

Proper riparian function will meet most habitat objectives for fish. In many streams, degradation of the riparian areas has decreased the habitat diversity and complexity necessary to support strong fish populations and to mitigate effects from extreme temperatures, fires, floods, and other natural or human-caused events. Healthy riparian areas require preserving water quality, diverse and complex vegetative communities, and stream channel morphology.

Decline in aquatic habitat can occur from various natural and management events and activities. The most significant effects on fisheries from land management activities are indirect and cumulative. Historic land management activities have negatively influenced these elements in localized sections of most streams in the LJCW where riparian areas are low gradient and easy to access. These conditions can be seen in sections of Swamp, Davis, Cougar and Sumac Creeks as well as the headwater areas of Rush and Tamarack Creeks. Changing land management practices over the last few decades have led to improvements in riparian condition and function. These observations support the need to develop and maintain alternative water sources to attract livestock and wildlife away from riparian areas.

GENERAL HABITAT – 9 CREEKS

JOSEPH CREEK

Joseph Creek is the main stream in the assessment area and flows downstream at approximately a 1% gradient. Limiting aquatic habitat factors for Joseph Creek are elevated stream temperatures and lack of pool habitat. Portions of Joseph Creek have been channelized resulting in channel incision and a reduction in channel heterogeneity.

SUMAC CREEK

Sumac Creek is a small tributary to Joseph Creek. Water quantity is limiting in Sumac Creek as it starts to flow intermittently in July. No Forest Service stream survey data exists for this creek, though it had two Proper Functioning Condition (PFC) surveys conducted in 2009. The main spawning area for steelhead is a 1-mile reach upstream of the Forest Service boundary.

COUGAR CREEK

Cougar Creek is a tributary to Joseph Creek and has relatively cool water temperatures compared to Joseph Creek. It likely provides cool water refugia for salmonids when water temperatures in Joseph Creek warm above 64°F (see water temperature section). Stream habitat in Cougar Creek is in good condition with respect to pools, water temperature, fine sediment and stable streambanks.

PEAVINE CREEK

Peavine Creek is a tributary to Joseph Creek and provides habitat for pacific yew and steelhead/redband trout. Pacific yew (*Taxus brevifolia*) is present in the riparian area indicating that this is a cool water drainage.

SWAMP CREEK

Swamp Creek is a major tributary to Joseph Creek. Habitat conditions in Swamp Creek have gradually improved as a result in changes in livestock management practices. High fine sediment levels were noted as late as the mid-90's; however, fine sediment levels would be considered to be moderate based on the 2004 stream survey data. Pool habitat and LWD are still below recommended management objectives.

DAVIS CREEK

Davis Creek is the major tributary to Swamp Creek. Pool habitat and fine sediment were limiting factors in the 1990s. Salvage of burned trees occurred along Davis Creek following the 1986 Joseph Canyon Fire.

COTTONWOOD CREEK

Cottonwood Creek is a 22-mile long major tributary to Joseph Creek. Cottonwood is the primary stream draining the eastern portion of the LJCW and provides a major portion of the spawning and rearing habitat for SR steelhead and redband trout. Cottonwood Creek has a moderate, uniform stream gradient, low pool-to-riffle ratio (1:5), cobble/boulder substrate, narrow stream floodplain with steep side slopes, numerous small springs, and abundant large woody debris. ODFW surveyed the stream during mid-May to early June in 1966, from the Oregon/Washington border to within 1.5 miles of the headwaters. The majority of steelhead redds were observed on private land (Section 5 of the survey) between Lent Canyon and Bear Creek but a few redds (possibly resident redband trout) were observed in the upper four miles of the stream (up to 1.5 miles from the headwaters). The private land section of Cottonwood Creek is 2.9 miles long and was purported to have 14.8 redds/mile! No juvenile salmonid were observed below Basin Creek. Old beaver sign was noted along the reach from Broady Creek to Lent Canyon.

Cottonwood Creek was impacted during the 1988 Teepee Butte Fire with 75% of the riparian area experiencing a moderate to high severity burn. Water temperatures and fine sediment likely increased following the fire and were still high in 1994 when the stream was last surveyed.

BROADY CREEK

Broady Creek is a tributary to Cottonwood Creek and has relatively cool temperatures on USFS land (see water temperature section). Large woody debris and fine sediment levels are high. In 1966, ODFW counted 35 redds in Broady Creek during a physical survey. Riparian timber harvest has occurred along Broady and West Fork Broady Creeks. The Broady Creek drainage provides habitat for Pacific yew, inland tailed frog and steelhead/redband trout.

HORSE CREEK

Horse Creek is a tributary to Cottonwood Creek. In 1966, ODFW counted seven redds in Horse Creek during physical survey, all on private land from the mouth to Road Gulch.

ASSESSMENT METHODOLOGY

The USFS has conducted stream surveys on most major creeks in the LJCW, but virtually all of those reports were destroyed in the Wallowa Mountains Office fire of July 2010. The data retrievable from other storage sites are included under “R6 Stream Surveys” below. Stream temperature, fine sediment, habitat modification and connectivity are other indicators used to assess aquatic habitat health, and are discussed after the Forest Service Stream Survey section.

FOREST SERVICE STREAM SURVEYS

Protocol

Stream habitat on WWNF land is assessed using the Region 6 Level II Stream Survey Protocol. The Level II survey protocol is an adaptation of the Hankin and Reeves Stream Survey Method (Hankin and Reeves 1988). The protocol has evolved since its creation in 1989, and is used to compare stream habitat conditions to PACFISH Riparian Management Objectives (RMOs).

Critical aquatic habitat elements as defined by the 1990 Land and Resource Management Plan (Forest Plan, including the 1995 PACFISH amendment) and the 1995/98 Forest Plan Biological Opinions (BOs) include:

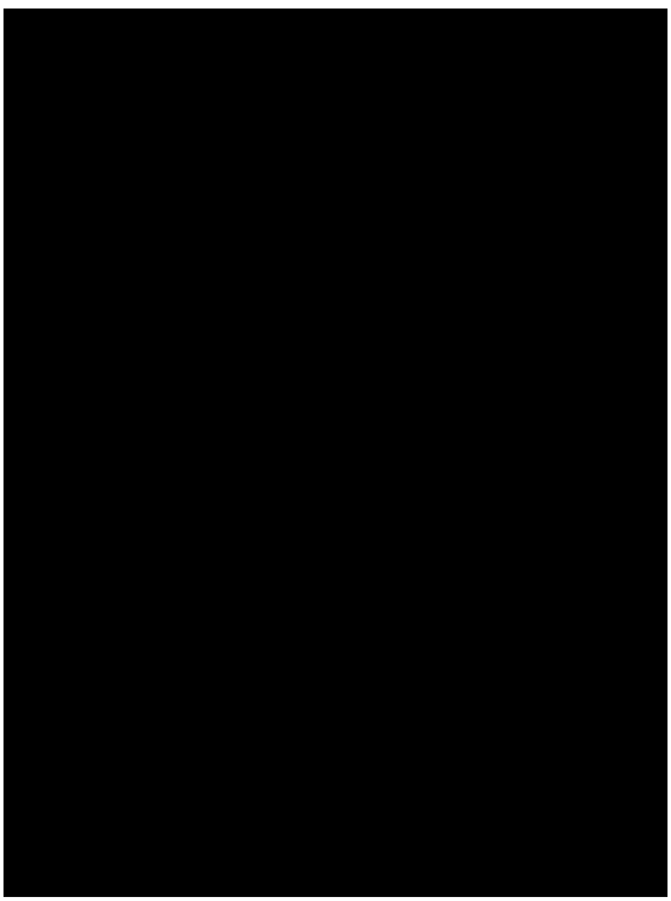
1. pool frequency
2. water temperature
3. large woody debris
4. bank stability
5. width to depth ratio, and
6. fine sediment levels

These habitat elements are considered to be important indicators of aquatic habitat function and health.

SITE SELECTION

All eight streams on FS land in the LJCW that are known to contain steelhead have been surveyed since 1992. Five of the eight streams were surveyed in the 1990s. Joseph, Cougar and Swamp creeks were surveyed more recently and those data likely reflect current conditions. The results of these surveys are summarized under "*Data Collection*" below.

Figure VII-2. Completed R6 Stream Surveys in the LJCW



DATA COLLECTION

Table VII-2. Stream Survey Habitat Data Summary for Fish-Bearning Streams in the LJCW - Shaded boxes indicate Riparian Management Objectives (RMOs) were met.

STREAM SURVEY HABITAT DATA SUMMARY FOR FISH-BEARING STREAMS IN THE LJCW						
STREAM NAME	YEAR SURVEYED	POOLS/MILE (RMO)	PIECES LWD/MILE	% OF FINE SEDIMENT	WETTED W/D RATIO	% STABLE BANKS
Broady Creek	1992	23 (56-96)	101	31.4	15.7	no data
Cottonwood Creek	1994	29 (56-96)	76	34.8	16.3	95
Cougar Creek	2005	55 (56-96)	2	15.9	19.6	95
Davis Creek	1995	26 (56-96)	67	35.4	9.9	95
E Fork Broady Creek	1997	34 (56-96)	113	25.2	6.6	99
Joseph Creek	2005	3 (26-47)	<1	10.9	16.8	no data
Swamp Creek	2004	8 (56-96)	6	13.3	22.1	78
W Fork Broady Creek	1994	28 (56-96)	70	25.3	8.6	94
RMO/Indicator		RMO based on stream width	20	<20%	<10	>90
Percentage of Streams Meeting RMO		0%	63%	50%	50%	93%

CONDITIONS AND ANALYSIS

Fish habitat in the assessment area generally does not meet PACFISH RMOs for pool habitat, fine sediment, and width-to-depth ratio (Table 2). Approximately 60% the fish-bearing streams are meeting the RMO for Large Woody Debris (LWD). Half of the fish-bearing streams are meeting the fine sediment and width-to-depth ratio RMOs. None of the fish-bearing streams are meeting the RMO for pool habitat; although Cougar Creek falls just short of the target range. The majority of streams surveyed are meeting the bank stability RMOs indicating stable streams.

Broadly, fish-bearing streams in the assessment area lack pool habitat, have high fine sediment levels, and are wider than desired. These habitat characteristics are likely the result of past management activities and may represent a long-term decline in aquatic habitat conditions.

Pools are a key habitat feature throughout all salmonid life stages (Bjornn and Reiser, 1991). Pools provide: 1) adult holding habitat for anadromous and adfluvial salmonid species; 2) rearing habitat for juvenile, sub-adult salmonids; and 3) rearing habitat for stream resident adult salmonid. Pools serve as refugia during low flow periods and during cold winter temperatures.

Pools slow the transport of nutrients through streams, storing nutrients that foster food production both within pools and in adjacent riffles. Pools serve as sediment storage sites creating optimal spawning areas for salmonids due to hydraulic gravel sorting and intergravel flow through pool tail-out areas.

Composition of the stream substrate is an important feature of aquatic habitat. Cobble and gravel substrates provide habitat for a diverse assemblage of benthic macroinvertebrates as well as eggs and early life stages of numerous fish species. Macroinvertebrates represent a substantial portion of the diet available to various fish species, particularly stream dwelling salmonids.

Fine sediment in streams is a normal component of salmonid habitat; however, major disruptions of aquatic ecosystems occur when sediment levels substantially exceed natural levels. Filling of interstitial spaces (i.e. the gaps between rocks on the stream bottom) with fine sediment (particles < 2 mm in size) eliminates habitat for many macroinvertebrates. Fish eggs and early life stages can also be buried and smothered when interstitial spaces are embedded with fine sediment. Studies have shown that an increase in 1-3mm size sand from 20% to 30% can decrease emergent survival of salmonid species from 65% down to 40% (Phillips et al. 1975). Fine sediments are known to impact fry emergence and survival, and fine sediment (<6.5mm in size) levels above 40% can effectively eliminate salmonid populations and many macroinvertebrate species (Everest and Harr 1982). Winter habitat for juvenile salmonids is also lost as interstitial spaces in cobble-sized and larger streambed material are embedded with fine sediment.

Increases in fine sediment can occur from both increased transport of fine sediment from upland areas and from destabilized stream banks. Increases can result from both episodic sources such as wildfires or from chronic sources such a native surface roads. Episodic sources normally result in short-term increases that return to pre-disturbance levels through natural recovery processes. Chronic sources can result in long-term changes of stream channels, aquatic habitat, and aquatic communities.

Width-to-depth ratio provides a dimensionless index of channel morphology. The ratio can be used as an indicator of the change in the relative balance between sediment load and sediment transport capacity (Knighton, 1987). High and/or increasing width-to-depth ratios are often linked to reduced channel depth. During summer months, widening and shallower channels may result in increases in water temperatures that can result in thermal stress to fish and other aquatic organisms. During winter months, widening and shallower channels may result in decreases in water temperatures resulting in ice formation that can stress fish and other aquatic organisms and trigger large ice flow events. Also during winter months, widening and shallower channels may result in large ice flow events that can result in channel scour thus physically damaging aquatic habitat.

Low and/or decreasing width-to-depth ratios may indicate that channel entrenchment (i.e. gullying) has or is occurring. Channel entrenchment can result in the loss of floodplain connectivity and channel complexity.

SUMMARY

All streams surveyed on National Forest system lands provide spawning and rearing habitat for SR steelhead and redband trout. Stream surveys provide a snapshot in time of aquatic habitat conditions. Unfortunately, the majority stream surveys are dated; being more than 10 years old. Of the three streams surveyed most recently (Joseph Creek, 2005; Cougar Creek, 2005; and Swamp Creek, 2004) most RMOs were not met.

Of the five RMOs evaluated, pool frequency was the one RMO that was not met. In general, pool habitat increases as LWD increases (Dollof and Warren, 2003; Montgomery et al., 1995). However, the relationship is less clear between LWD and pool habitat in steeper streams (Montgomery et al., 1995) or in streams with low stream power (Jackson and Sturm, 2002). Cougar Creek is illustrative; Cougar Creek had the second lowest amount of LWD yet had the highest pool frequency of the eight streams surveyed.

RMOs were developed to provide benchmarks for what was considered to constitute good habitat for anadromous fish (USDA/USDI 1995). RMOs are defined by PACFISH as “Quantifiable measures of stream- and streamside conditions that define good anadromous fish habitat, and serve as indicators against which attainment, or progress toward attainment, of the goals will be measured.” (USDA/USDI 1995). Default RMOs came from a review and synthesis of data from stream inventories and monitoring studies throughout the western United States where “high quality” habitat occurred (USDA/USDI 1995).

PACFISH RMOs are meant to apply to two broad-based ecosystems– forested and nonforested ecosystems (USDA/USDI 1995). The pool frequency RMO is considered a key feature and applies to both forested and nonforested systems. Supplemental features include: water temperature (all systems), large woody debris (forested systems), bank stability (nonforested systems), lower bank angle (nonforested systems, and width/depth ratio (all systems).

The intent of these RMOs was to provide benchmarks to agency biologists and managers for evaluating the current conditions of streams and to initiate changes in management where management activities were preventing the attainment of RMOs. PACFISH states that RMOs must be met to consider anadromous habitat to be in good condition. However, the utility of PACFISH/INFISH RMOs and other similar channel-based indicators have been questioned with regards to their sensitivity to management activities and for describing high quality fish habitat (Reid and Furniss, 1998; Kershner and Roper, 2010).

Additionally, PACFISH does not specify the methodology with which channel-based RMOs are measured. Natural variability in stream channel dimensions/characteristics through time, variability in monitoring methodologies, and variability in observers can result in wide differences in measurements of PACFISH RMOs (Whitacre et al., 2007; Al-Chokhachy et al., 2001).

STREAM TEMPERATURE

Stream temperatures influence the metabolism, behavior and health of aquatic organisms, and are a critical factor in maintaining and restoring healthy salmonid populations. Solar radiation, stream shade, ambient air temperatures, channel morphology, groundwater inflows, as well as stream velocity, volume, and flow, all influence water temperatures. High stream temperatures have been identified as a major limiting factor for summer steelhead production in the LJCW.

According to NMFS (2008), the primary man-caused contributors to high stream temperatures is a loss of riparian vegetation from historic road building and timber harvest, and historic and current livestock grazing (NMFS 2008). Natural contributors are also factors contributing to high stream temperatures, including low elevation, high air temperatures, long-term drought, and early snowmelt patterns, which lead to low summer flows. Low summer flows are also influenced by increased forest stand density. The loss of wetlands and floodplain connections also contributes to low summer flows and elevated stream water temperatures in the watershed.

The 1972 Federal Clean Water Act (CWA) requires States to set standards for stream temperature and other water quality parameters, and then to identify those waters within its boundaries that do not meet these Standards. Streams with water temperatures above the Standards are considered “water quality limited”. The Oregon Department of Environmental Quality (ODEQ) has this responsibility and updates the list of water quality limited waters every two years or as often as possible. The list is commonly referred to as the 303(d) list.

Oregon stream temperature standards are typically based on the most sensitive beneficial use of a stream reach. In the LJCW, the most sensitive beneficial use of all steams is “salmon and trout rearing and migration habitat” and it has a corresponding state temperature standard of a seven-day average maximum temperature of 64.4°F (18.0°C). Joseph Creek from (River Mile) RM 8.1 to RM 48.2, is the only stream in the watershed to be listed on the most recent 303(d) list for exceeding the state standard (ODEQ, 2004).

The CWA further requires that Total Maximum Daily Loads (TMDLs) be developed for all streams on the 303(d) list. A TMDL defines the amount of a pollutant – fine sediment or heat, for example – that can be present in a water body while meeting water quality standards. In 2010, ODEQ completed the temperature and sediment TMDLs for the Lower Grande Ronde Subbasin, which includes the Lower Joseph Creek Watershed. These TMDLs superceded the State Water Quality Standards and said that all streams in the Lower Grande

Ronde Subbasin were at their Natural Thermal Potential (whatever temperature the creek attains is the applicable temperature criteria for that water body). The TMDL for temperature was struck down by the Court in 2011 for not having enough data to support its claim, and for ignoring all of the historical influences still impacting stream channels. Consequently, streams in the LJCW are still being compared to the state standard of 64.4°F.

ASSESSMENT METHODOLOGY AND PROTOCOL

"HOBO" temperature probes are small data loggers for use in monitoring indoor, outdoor, and underwater environments. HOBO temperature probes are checked for accuracy with a NIST (National Institution for Standards and Technology) thermometer and deployed in spring – usually June or early July – when high flows have receded enough so that the probe can be placed in a location that will be under water when low flows occur. The probe is then left in the creek through the entire summer and picked up in October. The data in the probes are then downloaded and the probes checked for accuracy again.

SITE SELECTION

Most of the temperature sites were chosen more than a decade ago by fisheries biologists and hydrologists interested in gathering temperature at a given site. Many sites are at the mouths of creeks before they join a larger river, or at the furthest downstream or upstream point that is still on FS land.

The sites on Swamp Creek were chosen to be three miles apart from each other starting at the FS boundary.

The sites on Davis Creek were chosen to capture any difference that a 2-mile long exclosure, built in the late 1980's, might have on existing stream temperatures.

DATA COLLECTION

Following are a collection of graphs showing 7-day Mean Annual Maximum Temperatures for Davis, Swamp, Joseph, Cougar and Broady Creeks across a variety of years. Also shown are Chesnimnus Creek above Crow Creek, and Crow Creek above Chesnimnus Creek. The confluence of these two creeks is the start of Joseph Creek, so these two graphs show the temperature influences at the beginning of Joseph Creek. The Upper Davis temperature site goes dry in the middle of summer, which is why the temperature lines seem to end abruptly (all data after the probe is exposed to air is deleted).

In contrast, the Lower Davis temperature site is in a pool that does not go dry, but because the stream ceases to flow at this location, temperature data is deleted after the same date as the Upper Davis site. The rest of the temperature sites are in perennially flowing streams.

The ODEQ state temperature standard for each stream is shown on all graphs for comparison purposes. It is the same for all fish-bearing streams in the LJCW: 64.4°F for salmon and trout rearing and migration habitat.

Figure VII-3. Temperature Monitoring Sites in the LJCW.

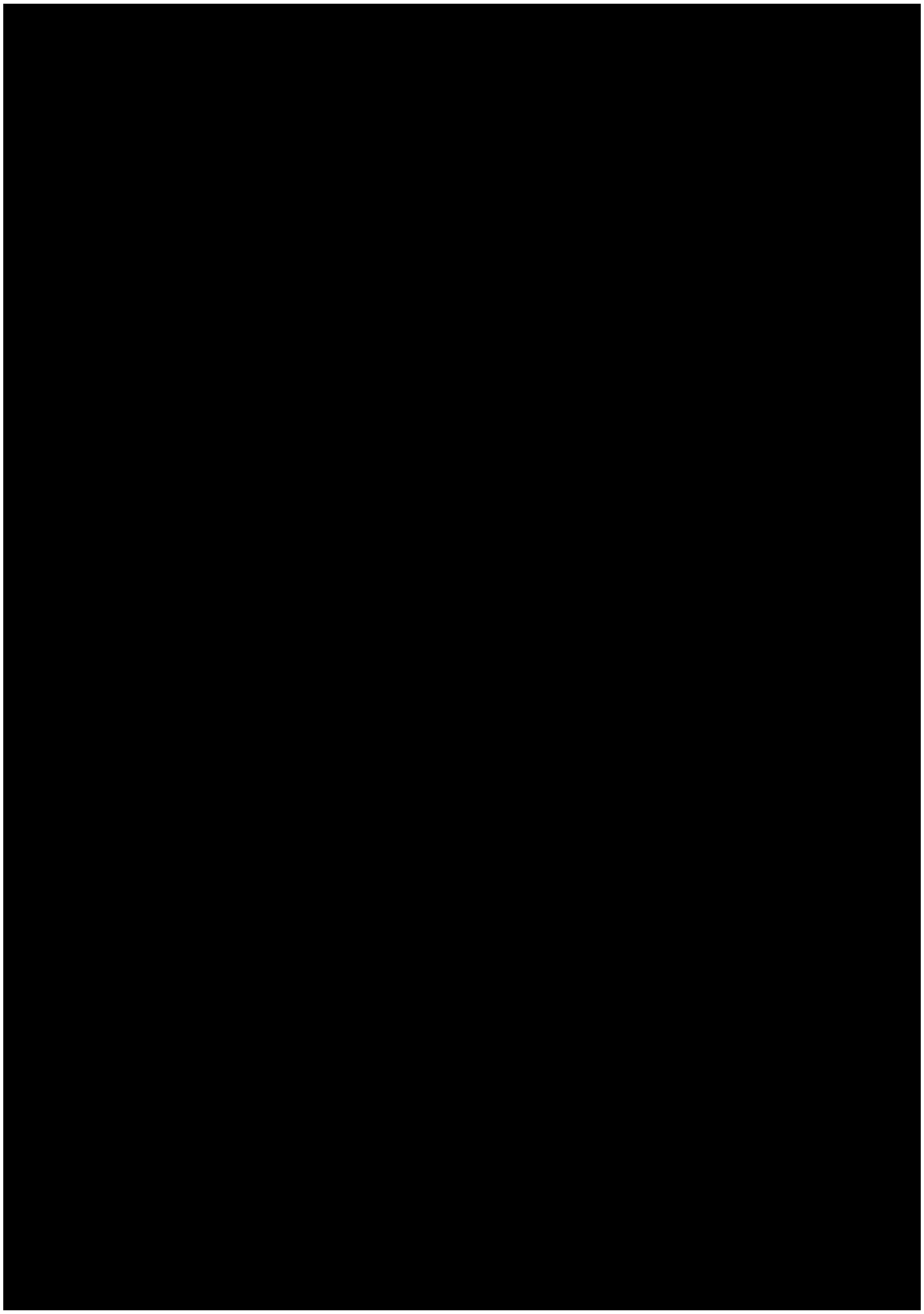
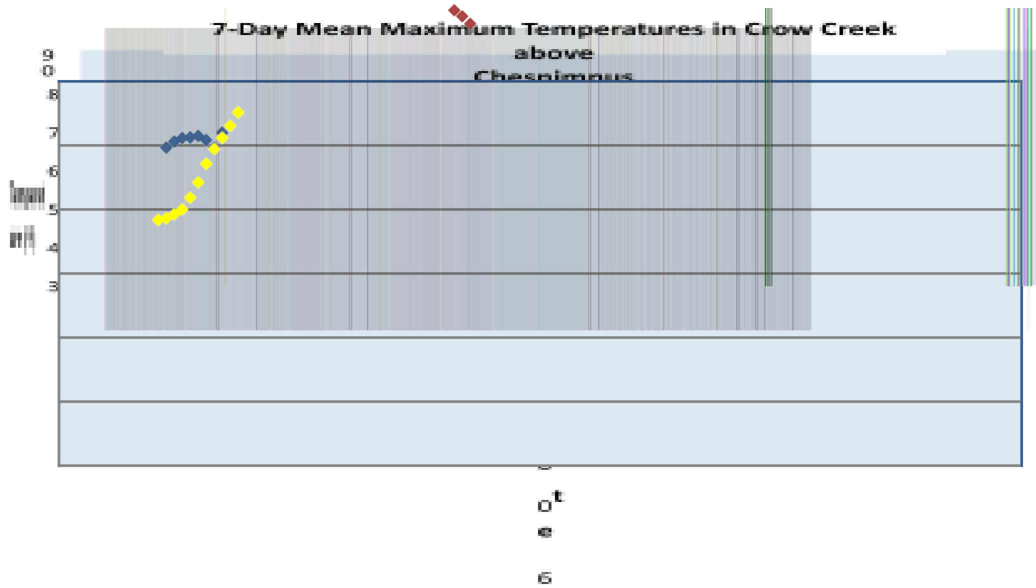
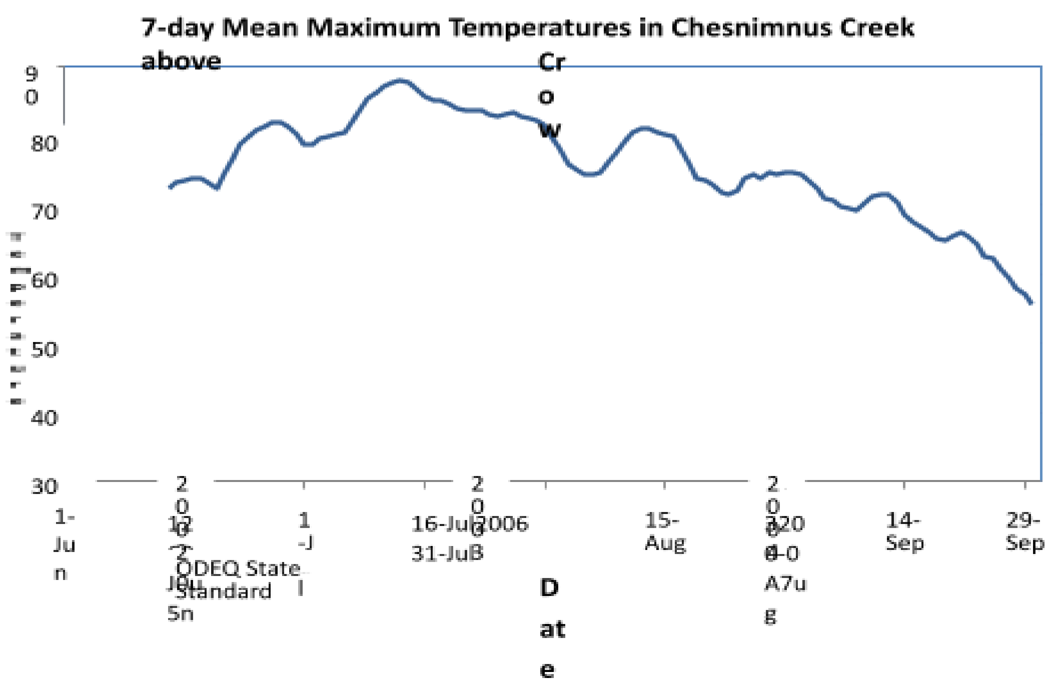
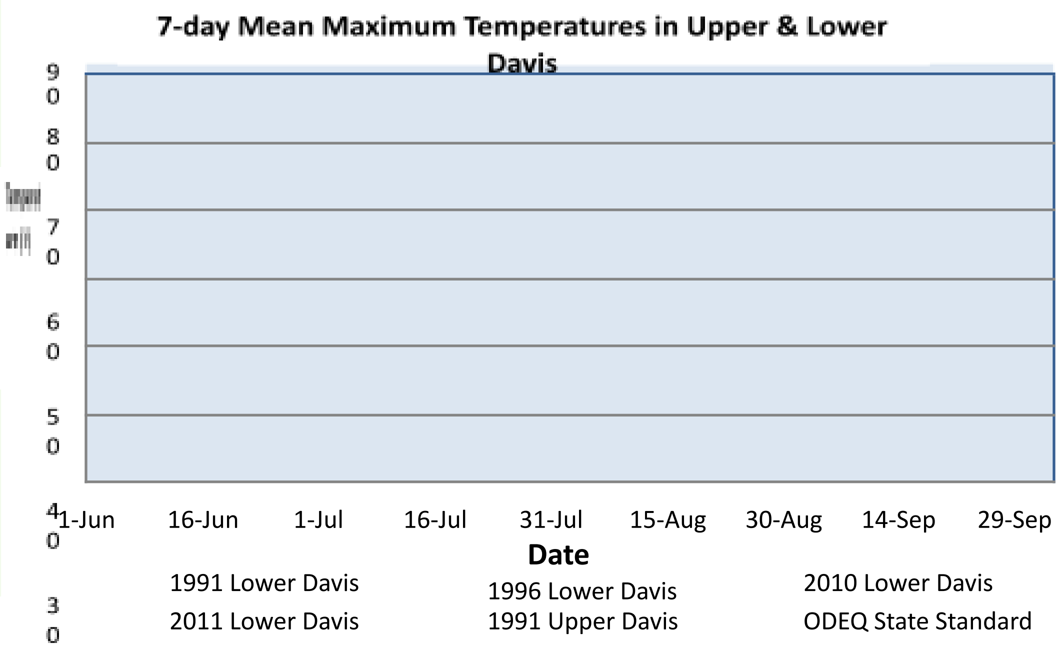
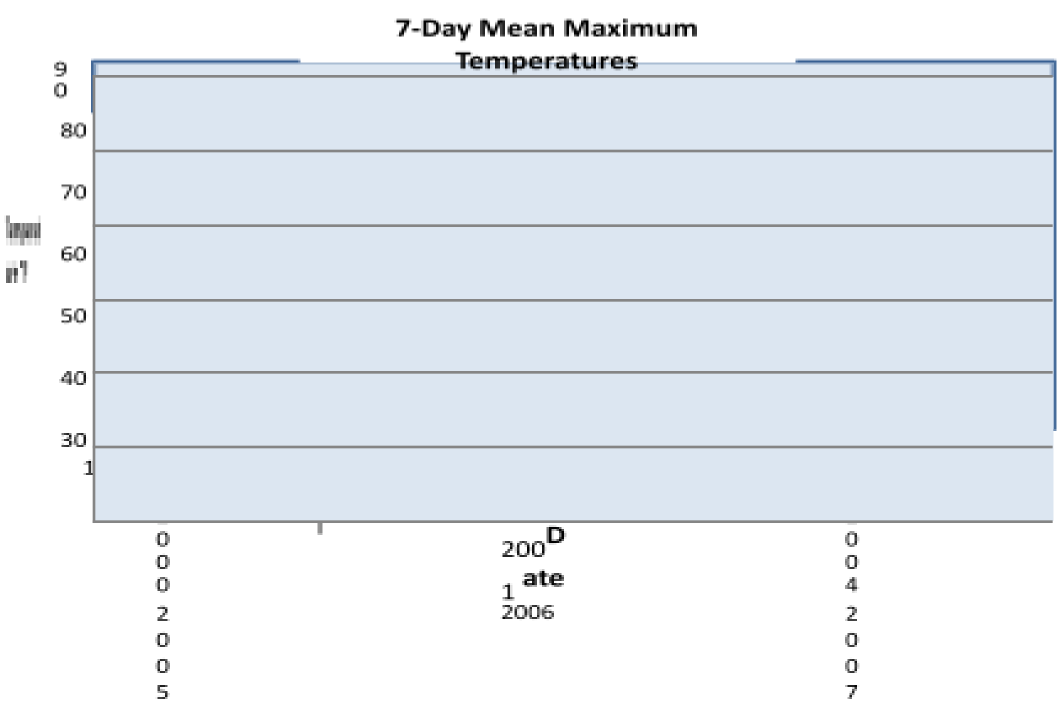


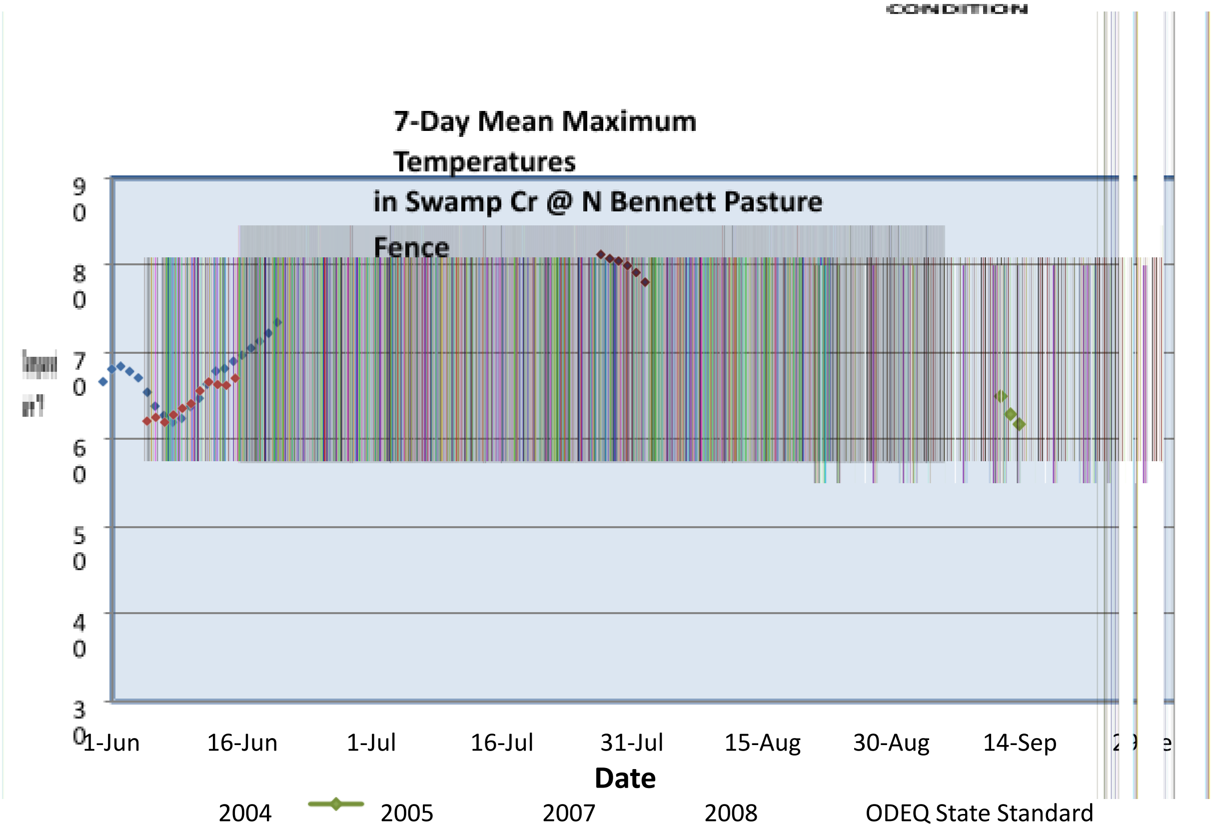
Figure VII-4. 7 Day Creek Temperature Chart Series

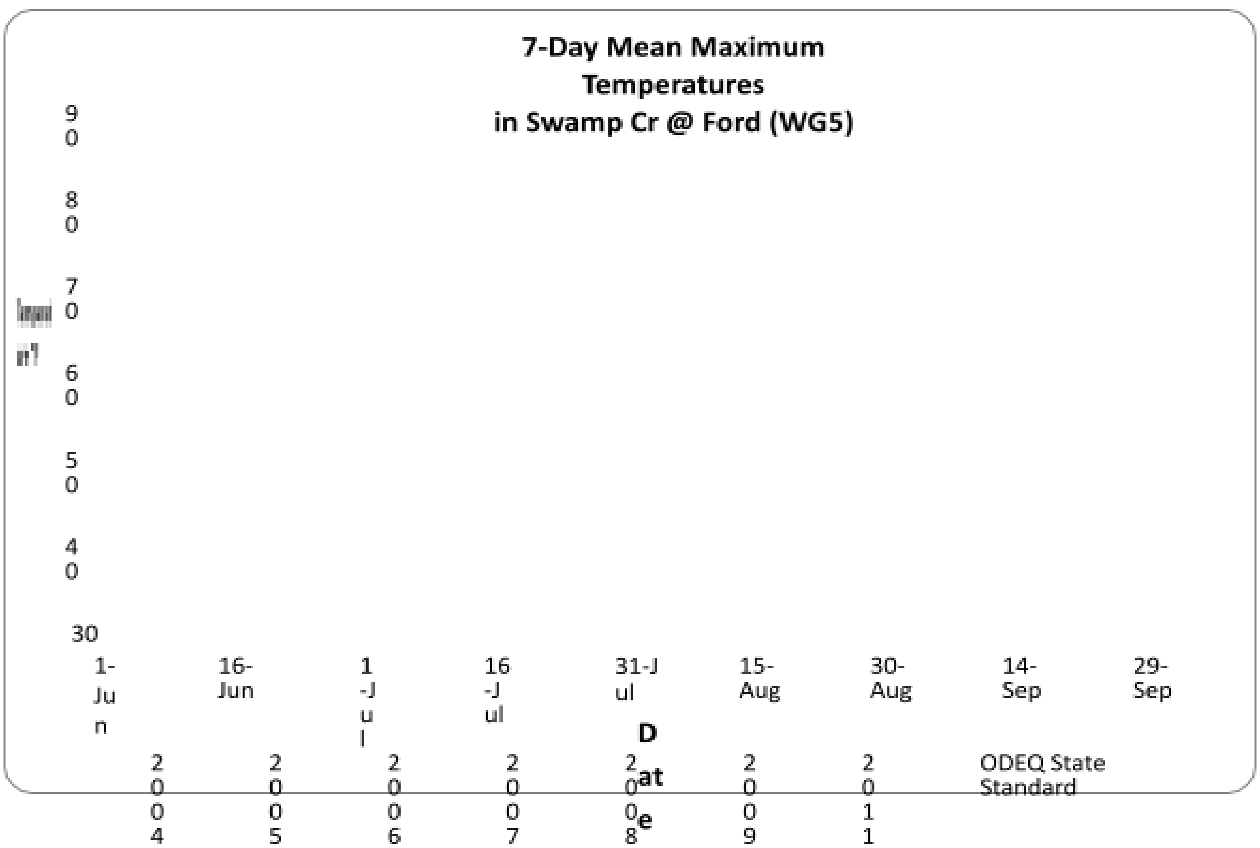


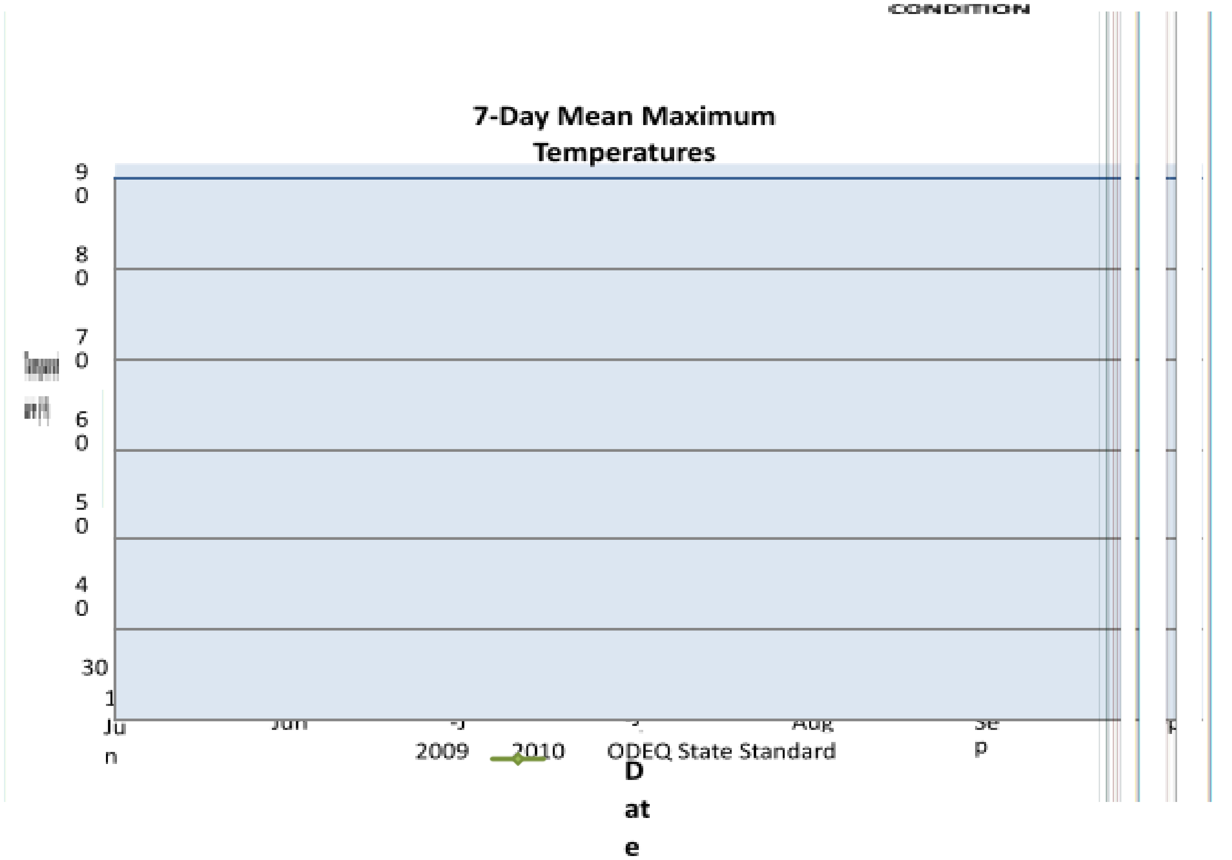


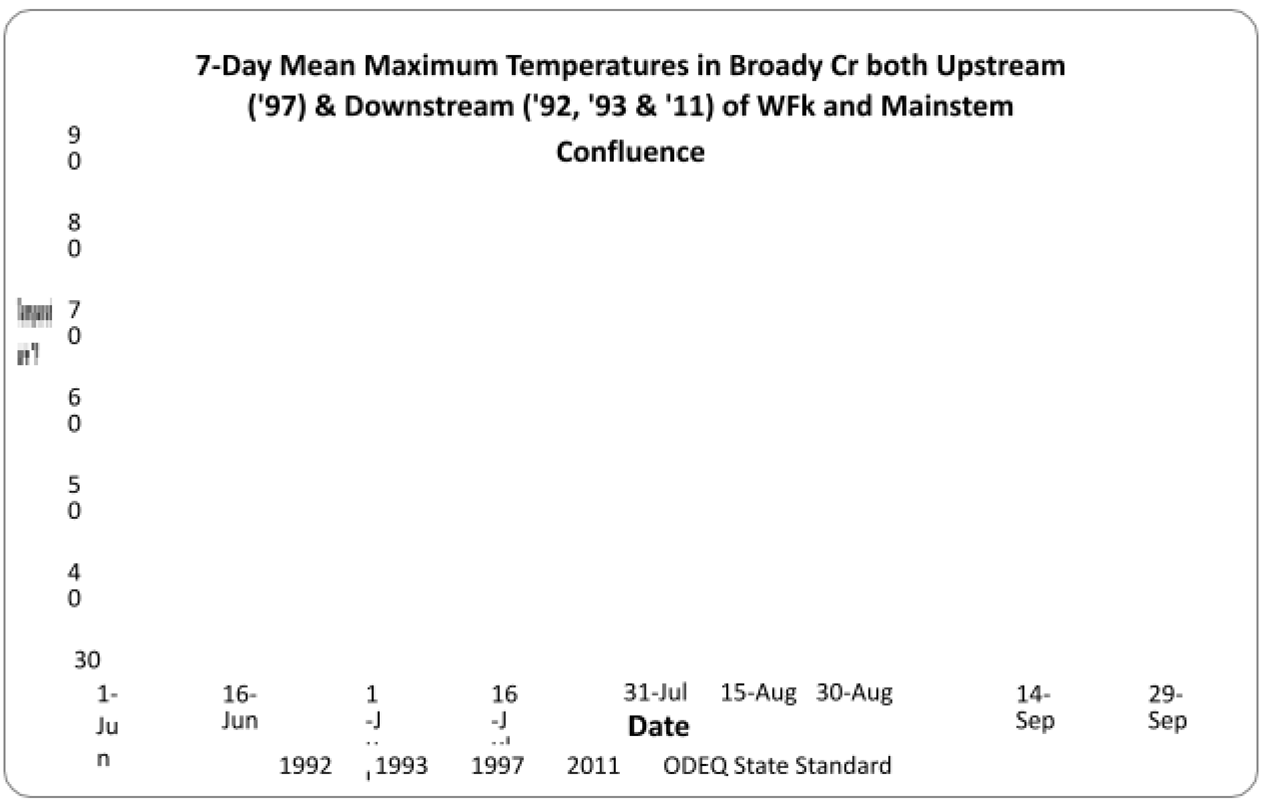

7-day Mean Maximum Temperatures in Upper & Lower Davis
90
80
70
60
50
40
30
1-Jun
16-Jun
1-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
Date
1991 Lower Davis
1996 Lower Davis
2010 Lower Davis
2011 Lower Davis
1991 Upper Davis
ODEQ State Standard


7-Day Mean Maximum Temperatures
90
80
70
60
50
40
30
Date
2000
2001
2004
2005
2006
2007


7-Day Mean Maximum Temperatures
in Swamp Cr @ N Bennett Pasture Fence
90
80
70
60
50
40
30
1-Jun
16-Jun
1-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
Date
2004
2005
2007
2008
ODEQ State Standard


7-Day Mean Maximum Temperatures
in Swamp Cr @ Ford (WG5)
90
80
70
60
50
40
30
1-Jun
16-Jun
1-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
Date
2004
2005
2006
2007
2008
2009
2011
ODEQ State Standard


7-Day Mean Maximum Temperatures
90
80
70
60
50
40
30
2009
2010
ODEQ State Standard
Date


7-Day Mean Maximum Temperatures in Broady Cr both Upstream ('97) & Downstream ('92, '93 & '11) of WFk and Mainstem Confluence
90
80
70
60
50
40
30
1-Jun
16-Jun
1-Jul
16-Jul
31-Jul
15-Aug
30-Aug
14-Sep
29-Sep
Date
1992
1993
1997
2011
ODEQ State Standard

OVERVIEW AND SUMMARY OF CONDITIONS

ANALYSIS

The data above show that, in general, stream temperatures in the LJCW peak in late July. The warmest monitored stream on USFS land at that time is Chesnimnus Creek above Crow Creek which has 7-day mean maximum temperatures typically in the mid-80s, followed by Joseph Creek at RM 43.7 (low-80s to mid-70s) and then Crow Creek above Chesnimnus and Swamp Creek at Ford which are both in the mid- to low-70s.

As noted above, this data combines non-flowing pool temperatures with flowing water temperatures, which could skew temperatures higher.

These four sites exhibit temperatures above the state standard, which means that it is likely that there are salmonids in those streams that would seek cool water refugia during that time of the year, elsewhere in the creek or in its tributaries. Swamp Creek at the Bennett Fence and Swamp at the USFS boundary both hover around the state standard, and Upper Davis Creek is below the standard.

Only three of the creeks monitored are consistently below the state standard – Broady Creek, Cougar Creek and Lower Davis Creek. These creeks likely offer the best salmonid habitat.

SUMMARY

Chesnimnus and Crow Creeks have some of the warmest temperatures and are the two streams that join to create Joseph Creek, which may explain its warm temperatures at RM 43.7, although a long stretch of private land with little riparian vegetation may help to explain its warm temperatures as well.

Swamp Creek temperature remains relatively constant between the USFS boundary and the North Bennett Pasture Fence, but it warms up noticeably over the next three miles before reaching the Ford (an identified stream crossing). The mouth of Swamp Creek was monitored one year in 1991 and the data show that for that year the temperatures hovered between 70°F - 73°F from late July to late August. The mouth of Davis Creek was monitored the next year in 1992, and its temperatures varied from the low- to high-60s. If those were representative years, Davis Creek likely adds cooler water to Swamp Creek, and Swamp may add slightly cooler water to Joseph Creek at their confluence.

Cool water refugia off of Joseph Creek are found in Broady and Cougar Creeks. Peavine, Rush and Horse Creeks likely offer refugia as well, but need further data to support that claim. Ebersole et al. (2001) documented the importance and use of cold water refugia for salmonids in Joseph Creek and Cottonwood Creek when stream temperatures exceeded 64.4°F.

FINE SEDIMENT

In addition to high stream temperatures, excess fine sediment resulting from roads, historic timber harvest, and livestock grazing affects many stream reaches in the LJCW, limiting incubation success and rearing habitat (NMFS 2008).

Excess fine sediment in water has been linked to detrimental effects on fish, amphibians, and other aquatic species. Fine sediment inputs to streams may come from roads, traffic by ungulates or overland flow across adjacent burned areas. While there are currently no burnt areas contributing sediment, there are several areas of streambank that are accessible to ungulates for water all of which are in the gentle-gradient headwater areas; there are no signs of this in the steeper canyon areas. Watergaps between riparian exclosures are also sources of localized sediment.

Roads impact aquatic habitat through two main processes: erosion and extension of the drainage network. Erosion from road surfaces is one of the major sources of increased fine sediment in streams (Furniss *et al.* 1991).

There are several roads in the LJCW that contribute fine sediment to the stream network, specifically the numerous Sumac and Cougar Creek roads that run right next to each tributary and along the mainstems of each creek. East Fork Sumac Creek has jumped its banks and is currently running down 40 feet of the road next to it before diverting back to its channel. There are several road slumps in each of the drainages that contribute fine sediment as well.

Road surfaces and cut slopes increase the drainage network of a subwatershed by intercepting subsurface flow and capturing rainfall, and transporting water to stream channels more rapidly than natural processes (Wemple *et al*. 1996). The Sumac and Cougar drainages exhibit this increase more than any other subwatershed in the LJCW. They are both heavily roaded and some or the roads have been abandoned and decommissioned in the USFS road database but they still exist on the landscape.

HABITAT MODIFICATION AND CONNECTIVITY

Habitat modification has occurred in the LJCW both through channel straightening and through stream simplification. Joseph Creek, Davis Creek, and every tributary and main branch of Sumac and Cougar Creeks has experienced channel straightening, which is the moving of a stream channel to one side of the floodplain.

Stream simplification (removal of large woody material in the stream channel) occurred mostly in many streams throughout the state in the 1960s. There is no data that we know of that references this activity in the lower Joseph Creek watershed, but we assume some of the large woody debris was removed in some of the waterways in this watershed since it was the norm back then.

Habitat modification reduces the available fish habitat as it increases stream gradient, decreases habitat features (such as large wood), decreases the ability for the stream channel to remain stable, and decreases allochthonous inputs into the creek, which decreases the number of macroinvertebrates able to survive, decreasing the amount of food available to salmonids.

Habitat connectivity is another important feature of aquatic habitat. Connectivity allows aquatic species to move from one reach to another and between streams, and thereby to repopulate areas impacted by disturbances. Connectivity between stream reaches in the assessment area is seasonally disrupted for salmonids by low flows and high water temperatures. Connectivity has also been disrupted as a result of passage barriers created at road crossings. The assessment area has relatively few passage issues due to the relatively low road densities and prevalence of ridge top and mid-slope roads. About 26% of the LJCW is located in inventoried Roadless areas.

Six culverts in the LJCW have been identified as partial and full fish passage barriers through the Fish Passage Culvert Assessment conducted by the USFS and Nez Perce Tribe in 2001. Results of the Assessment are presented in Table 3 below.

Table VII-3. Fish Passage Assessment Results

FISH PASSAGE ASSESSMENT RESULTS							
GIS POINT ID	CULVERT TAG	ROAD NUMBER	NEW SUBWATERSHED NAME/HUC #	STREAM	AQUATIC ORGANISM PASSAGE (AOP) RESULT	SIZE	2011 RECOMMENDATION
22	c20	4600505	Broady Creek 170601060604	WF Broady Trib	Red	54 cmp	Replace if possible; part of Stormproofing Project
23	c19	4600505	Broady Creek 170601060604	WF Broady Cr	Red	104x60 ob arch	Replace if possible; Remove trash rack at very least; part of Stormproofing Project
27	c16	4600505	Broady Creek 170601060604	Broady Creek	Red	48x66 arch	Replace if possible; part of Stormproofing Project
26	c17	4600505	Broady Creek 170601060604	E.F. Broady Creek	Red	43x72 arch	Top priority to replace; much too small for steep stream; part of Stormproofing Project
21	c83	4602120	Davis Creek 170601060506	Davis Creek	Red	120x58 ob arch	1) Remove trash rack 2) Replace culvert
34	c86a	4600190	Joesph Cr - Sumac Cr 170601060504	Sumac Creek	Red	72x38 arch	Rated red through stream gradient; Replace if possible

None of the six culverts identified are complete barriers. Some level of passage is evidenced by the presence of spawning and juvenile salmonids above each one. However, these six culverts impede passage during various times of the year through a combination of excessive gradient, being undersized (flow is too fast) or having a perch greater than 4 inches. Habitat connectivity can be increased by removing and/or replacing these barriers.

Of the six culverts identified above, the culverts on West Fork Broady and East Fork Broady Creeks on FSR 4600-505 were rated as high priorities for completion. A trash rack located on the upstream side of the West Fork culvert collects debris that has the potential for creating a passage barrier and damaging the culvert and/or roadbed.

The East Fork culvert is approximately one-third full of substrate, partially blocked by woody debris, and is severely undersized for the substrate and wood that is just upstream. It has the potential to fail and should be replaced. Other culverts that hamper fish passage in the LJCW may be present on non-USFS lands; however these have not been surveyed.

RIPARIAN VEGETATION AND BANK STABILITY

ASSESSMENT METHODOLOGY

The USFS (FS) uses two monitoring protocols to determine the condition of riparian areas: Multiple Indicator Monitoring (MIM) and Properly Functioning Condition (PFC) Assessments. A MIM Assessment is a quantitative assessment while a PFC is qualitative assessment of riparian and stream channel condition.

MULTIPLE INDICATOR MONITORING

PROTOCOL

The Multiple Indicators Monitoring (MIM) protocol was developed as the implementation monitoring for the USFS. The MIM protocol is composed of two modules: implementation monitoring and effectiveness monitoring.

MIM is conducted in Designated Monitoring Areas (DMAs): the locations in riparian areas and along streambanks where quantitative monitoring takes place to provide information concerning the management of critical areas. Essentially, DMA selection relies on the theory that if proper management occurs in that location, proper management will be occurring throughout the rest of the management unit.

Implementation (endpoint indicator) monitoring measures indicators to determine if current management is being applied as prescribed, and that the effects of management are sustaining or improving the natural resources. It provides information to assist with making decisions under adaptive management.

Presently, implementation monitoring includes the following: modified extensive browse utilization (Interagency Technical References, 1996), modified stubble height (Interagency Technical Reference, 1996 and Challis Resource Area, 1999), and streambank alteration (Cowley, 2004). These procedures are intended to provide information to refine and make annual adjustments to livestock grazing management practices necessary to meet long-term management objectives (adaptive management).

Effectiveness (riparian objective) monitoring is designed to address the question of whether or not management practices currently applied to the area are achieving the desired results. These procedures are designed to measure changes in vegetation and streambank stability over time. Effectiveness monitoring includes the following elements: greenline monitoring, woody species regeneration monitoring, and streambank stability monitoring. These provide data and information concerning the present conditions and trend of riparian vegetation and streambanks.

DATA COLLECTION

Data was collected in the summers of 2009 and 2010, by Larry Nall. Nall attended the official USFS MIMs training in Bend, OR.

SITE SELECTION

Eleven MIM sites were decided upon by the NRAC Range/Riparian Sub Group based on local knowledge of the streams and riparian areas in the watershed, as shown in Figure 4 on the following page.

ANALYSIS

Site-specific results of the MIMs data collection is presented below.

BROADY CREEK 1

The Broady Creek 1 DMA is managed by the USFS. Wallowa Mountains office and is grazed by cattle. The DMA is located on Broady Creek in the Rock Creek Pasture of the Teepee-Elk Allotment.

MIM monitoring was completed after the 2010 scheduled grazing season. A summary of quantitative measurements is:

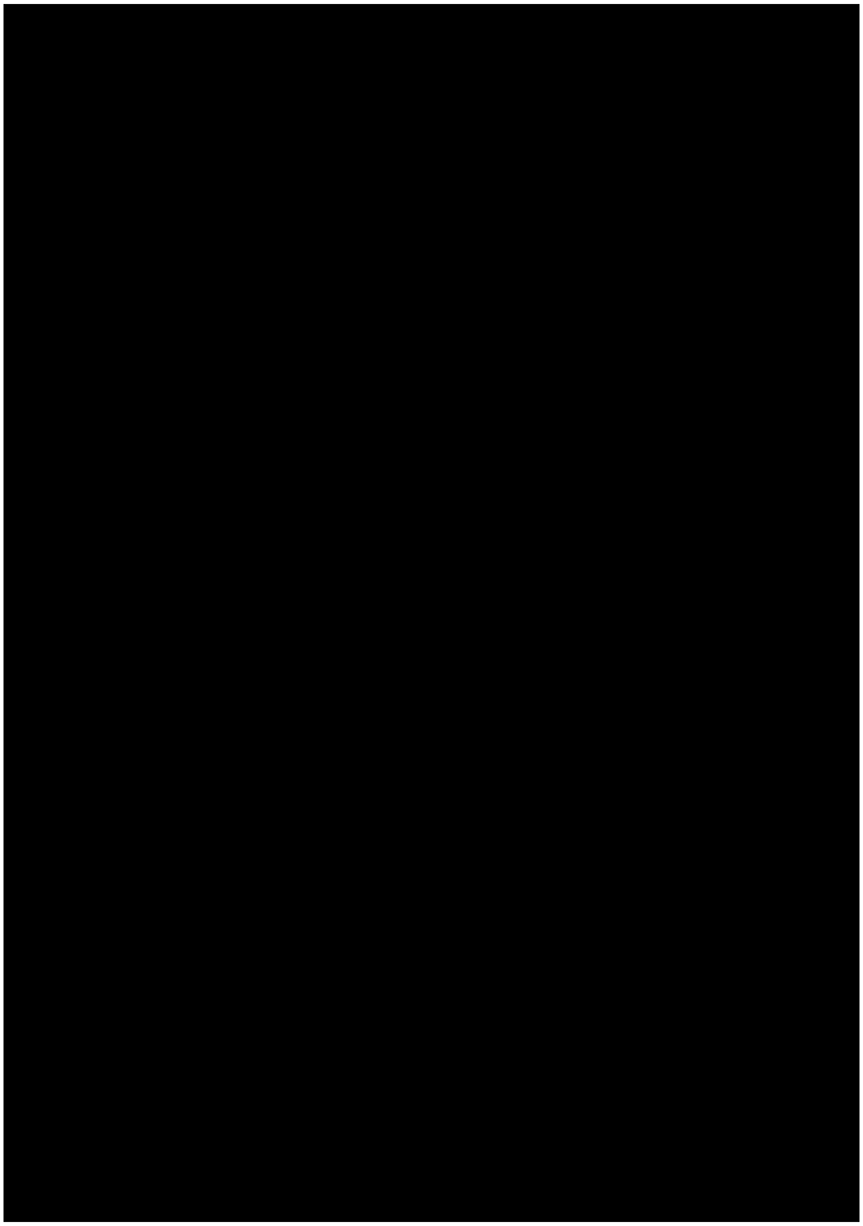
- Median SH (stubble height): 16”
- Average SH: 16.7”
- Dominant key species and average height: (CAREXRH) 14.67”
- Woody browse use: 10%; stream bank alteration: 0%; stream bank stability: 100%
- Stream bank cover:

100% The MIM PFC validation

states:

- The age-class distribution of woody vegetation is 25% mature, 60% seedling and 12% young
- 3 hydric species are present and 54 obligate wetland and facultative wetland species are present
- The hydric vegetation present is 8% of the total vegetation and is contributing to 100% bank stability and 100% covered banks
- 0% of the plant community is contributing large woody debris to the system
- Stream movement and natural sinuosity is facilitated by 100% bank stability and 100% covered banks
- Stream substrate is 1% fines (sediment).

Figure VII-5. MIMs Monitoring and PFC Surveys in the LJCW



Cougar Creek 1

The Cougar Creek 1 DMA is managed by the USFS Wallowa Mountains office and is grazed by cattle. The DMA is located on Cougar Creek in the Trap Canyon Pasture of the Cougar Creek Allotment.

MIM monitoring was completed after the 2010 scheduled grazing season. A summary of quantitative measurements is:

- Median SH (stubble height): 15.5”
- Average SH: 16.8”

- Dominant key species and average height: (CAREXRH) 13.89 inches
- Woody browse use: 10%; stream bank alteration: 0%; stream bank stability: 100%
- Stream bank cover:

100% The MIM PFC validation

states:

- The age-class distribution of woody vegetation is 43% mature, 1% seedling and 53% young
- Six hydric species are present and 63 obligate wetland and facultative wetland species are present. The hydric vegetation that is present is 44% of the total vegetation and is contributing to 100% bank stability and 100% covered banks
- 1% of the plant community is contributing large woody debris to the system
- Stream movement and natural sinuosity is facilitated by 100% bank stability and 100% covered banks
- Stream substrate is 2% fines (sediment)

DAVIS CREEK 1

The Davis Creek 1 DMA is managed by USFS. Wallowa Mountains office and is grazed by cattle. The DMA is located on Davis Creek in the Upper Davis Pasture of the Swamp Creek Allotment.

MIM monitoring was completed near the end of the 2010 scheduled grazing season. A summary of quantitative measurements is:

- Mmedian SH (stubble height): 15”; average SH: 16.5”
- Dominant key species and average height: (JUEN) 13.25 inches
- Woody browse use: 10%; stream bank alteration: 6%
- Stream bank stability: 99%
- Stream bank cover:

99%. The MIM PFC validation

states:

- Tthe age-class distribution of woody vegetation is 34% mature, 38% seedling and 25% young
- 4 hydric species are present and 65 obligate wetland and facultative wetland species are present. The hydric vegetation that is present is 42% of the total vegetation and is contributing to 65% bank stability and 63% covered banks
- 0% of the plant community is contributing large woody debris to the system
- Stream movement and natural sinuosity is facilitated by 99% bank stability and 99% covered banks
- Stream substrate is 4% fines (sediment)

Davis Creek 2

The Davis Creek 2 DMA is managed by the F.S. Wallowa Mountains office and is grazed by cattle. The DMA is located on Davis Creek in the Upper Davis Pasture of the Swamp Creek Allotment. MIM monitoring was completed near the end of the 2010 scheduled grazing season.

A summary of quantitative measurements is:

- median SH (stubble height): 15”
- average SH: 15.7”
- dominant key species and average height: (CAREXRH) 12.48 inches
- woody browse use: 10%
- stream bank alteration: 0%
- stream bank stability: 99%
- stream bank cover:

96%. The MIM PFC validation

states

- the age-class distribution of woody vegetation is 0% mature, 67% seedling and 33% young
- Three hydric species are present and 59 obligate wetland and facultative wetland species are present. The hydric vegetation that is present is 20% of the total vegetation and is contributing to 65% bank stability and 63% covered banks
- 0% of the plant community is contributing large woody debris to the system
- Stream movement and natural sinuosity is facilitated by 99% bank stability and 96% covered banks
- Stream substrate is 1% fines (sediment).

Swamp Creek 1

The Swamp Creek 1 DMA is managed by the F.S. Wallowa Mountains office and is grazed by cattle. The DMA is located on Swamp Creek in the riparian below Cow Camp Pasture of the Swamp Creek Allotment. MIM monitoring was completed after the 2010 scheduled grazing season.

A summary of quantitative measurements is:

- median SH (stubble height): 22”
- average SH: 22.2”
- dominant key species and average height: (SCMI2) 27.2”
- woody browse use: 10%
- stream bank alteration: 0%
- stream bank stability: 100%
- stream bank cover:

98% The MIM PFC validation

states:

- the age-class distribution of woody vegetation is 83% mature, 8% seedling and 8% young
- 4 hydric species are present and 66 obligate wetland and facultative wetland species are present
- the hydric vegetation present is 30% of the total vegetation and is contributing to 100% bank stability and 98% covered banks
- 0% of the plant community is contributing large woody debris to the system
- Stream movement and natural sinuosity is facilitated by 100% bank stability and 98% covered banks
- stream substrate is 1% fines (sediment)

Swamp Creek 2

The Swamp Creek 2 DMA is managed by the F.S. Wallowa Mountains office and is grazed by cattle. The DMA is located on Swamp Creek in the Bennett Pasture of the Swamp Creek Allotment. MIM monitoring was completed before the 2010 scheduled grazing season.

A summary of quantitative measurements is:

- median SH (stubble height): 6”
- average SH: 9.3”
- dominant key species and average height: (CAAQ) 19.43”
- woody browse use: 10%
- stream bank alteration: 37%
- stream bank stability: 77%
- stream bank cover:

72% The MIM PFC validation

states:

- the age-class distribution of woody vegetation is 74% mature, 10% seedling and 10% young
- 4 hydric species are present and 33 obligate wetland and facultative wetland species are present
- the hydric vegetation present is 43% of the total vegetation and is contributing to 77% bank stability and 72% covered banks
- 0% of the plant community is contributing large woody debris to the system
- stream movement and natural sinuosity is facilitated by 77% bank stability and 72% covered banks
- stream substrate is 100% fines (sediment)

Swamp Creek 3

The Swamp Creek 3 DMA is managed by the F.S. Wallowa Mountains office and is grazed by cattle. The DMA is located on Swamp Creek in the Bennett Pasture of the Davis Creek Allotment. MIM monitoring was completed after the 2010 scheduled grazing season.

A summary of quantitative measurements is:

- median SH (stubble height): 8”
- average SH: 8.9”
- dominant key species and average height: (CAAQ) 9.71”
- woody browse use: NA%
- stream bank alteration: 22%
- stream bank stability: 80%
- stream bank cover:

79% The MIM PFC validation

states:

- the age-class distribution of woody vegetation is 34% mature, 38% seedling and 25% young
- Three hydric species are present and 58 obligate wetland and facultative wetland species are present
- the hydric vegetation that is present is 38% of the total vegetation and is contributing to 80% bank stability and 79% covered banks
- 0% of the plant community is contributing large woody debris to the system
- stream movement and natural sinuosity is facilitated by 80% bank stability and 79% covered banks
- stream substrate is 100% fines (sediment)

SWAMP CREEK 4

The DMA is located in an enclosed parcel of land on Swamp Creek within the Bennett Pasture of the Davis Creek Allotment. The Davis Creek Allotment is the most upstream allotment managed by the USFS on Swamp Creek.

A summary of quantitative measurements is:

- median SH(stubble height): 23”
- average SH: 24.8”
- dominant key species and average height: (SCMI2) 28 inches
- woody browse use: 10%
- stream bank alteration: 0%
- stream bank stability: 99%
- stream bank cover:

96% The MIM PFC validation

states:

- the age-class distribution of woody vegetation is 75% mature, 13% seedling and 5% young
- 4 hydric species are present and 66 obligate wetland and facultative wetland species are present
- the hydric vegetation that is present is 42% of the total vegetation and is contributing to 99% bank stability and 96% covered banks

- no large woody debris is present in the system

- stream movement and natural sinuosity is facilitated by 99% bank stability and 96% covered banks
- stream substrate is 49% fines (sediment)

JOSEPH CREEK 1

The Joseph Creek 1 DMA is privately owned with unknown disturbance activities. The DMA is located on Joseph Creek at least 1 mile but less than 2 miles north of the forest boundary and the Wild and Scenic portion of Joseph Creek.

A summary of quantitative measurements is:

- median SH(stubble height): 20.5”
- average SH: 27.1”
- dominant key species and average height: (SCMI2) 21 inches
- woody browse use: 10%
- stream bank alteration: 0%
- streambank stability: 99%
- streambank cover: 96%

The MIM PFC validation states that

- the age-class distribution of woody vegetation is 88% mature and 8% young
- Three hydric species are present and 75 obligate wetland and facultative wetland species are present.
- the hydric vegetation that is present is 59% of the total vegetation and is contributing to 100% bank stability and 100% covered banks.
- 1% of the plant community is contributing large woody debris to the system.
- Stream movement and natural sinuosity is facilitated by 99% bank stability and 96% covered banks.
- Stream substrate is 0% fines (sediment).

JOSEPH CREEK 2

The Joseph Creek 2 DMA is managed by the F.S. Wallowa Mountains office and is grazed by cattle. The DMA is located on Joseph Creek in the Joseph Breaks Pasture of the Table Mountain Allotment. MIM monitoring was completed before and after the 2010 scheduled grazing season.

A summary of quantitative measurements is:

- median SH (stubble height): 18”
- average SH: 21.1”
- dominant key species and average height: (JUBA) 18.38”
- woody browse use10%;
- stream bank alteration0%;
- streambank stability: 100%;

- streambank cover:

100%. The MIM PFC validation

states:

- that the age-class distribution of woody vegetation is 79% mature, 3% seedling and 15% young
- Six hydric species are present and 69 obligate wetland and facultative wetland species are present.
- The hydric vegetation present is 34% of the total vegetation and is contributing to 100% bank stability and 100% covered banks
- 1% of the plant community is contributing large woody debris to the system. Stream movement and natural sinuosity is facilitated by 100% bank stability and 100% covered banks
- Stream substrate is 1% fines (sediment).

JOSEPH CREEK 3

The Joseph Creek 3 DMA is owned by Bob Lathrop and likely grazed by cattle. The DMA is located on Joseph Creek within the forest boundary on private land, not associated with a grazing permit.

A summary of quantitative measurements is:

- median SH (stubble height): 16”
- average SH: 16.8”
- dominant key species and average height: (SCMI2) 17.60”
- woody browse use: 10.2%
- stream bank alteration: 10%
- streambank stability: 96%
- streambank cover:

89%. The MIM PFC validation

states:

- the age-class distribution of woody vegetation is 48% mature, 18% seedling and 34% young
- 5 hydric species are present and 62 obligate wetland and facultative wetland species are present
- the hydric vegetation present is 30% of the total vegetation and is contributing to 96% bank stability and 89% covered banks
- 0% of the plant community is contributing large woody debris to the system
- Stream movement and natural sinuosity is facilitated by 96% bank stability and 89% covered banks
- Stream substrate is 0% fines (sediment).

SUMMARY

With regard to streambank stability and amount of fine sediment at each location, most of the sites are exhibiting reference conditions. The exceptions to this are Swamp 2, Swamp 3 and Swamp Creek 4 where fine sediment comprises 49% - 100% of the entire stream bottom, and stable banks at Swamp 2 are less than 80%. These fine sediment findings agree with the FS hydrologist's recollection of much of Swamp Creek, but do not agree with the 2004 Stream Survey findings (Table 2).

PROPERLY FUNCTIONING CONDITION ASSESSMENT

PROTOCOL

Properly Functioning Condition (PFC) assessments are conducted by the USFS to assess the condition of riparian areas based on Prichard *et al.* (1998). PFC assessments are a qualitative method for determining the condition of riparian areas and stream channels, and are conducted with a journey-level interdisciplinary team. They are a rapid assessment tool for hydrologic and riparian area function and do not consider plant species. It should point the management agency to areas that should have the MIMs protocol performed.

The functionality of riparian areas and stream channels is rated using three condition levels:

1. PFC – vegetation, landforms, or large woody debris are present to adequately dissipate stream energy associated with normal high flows events without channel degradation. A PFC rating does not necessarily mean that a site is at its natural potential. However, in order for some types of stream channels (Rosgen stream types E, C and some Bs) to be at PFC, a majority of streambank vegetation would need to be mid- to late seral species.
2. Functional at Risk (FAR) – riparian areas are still functioning. However, the condition of one or more attribute makes the channel susceptible to degradation during normal high flow events.
3. Nonfunctional (NF) – riparian areas that do not provide adequate vegetation, landforms or large woody debris to dissipate stream energy during normal high flow events.

In addition to the three condition levels, condition trend is also rated as either "static" (no recognizable trend), "upward" (riparian and/or channel conditions improving), or "downward" (riparian and/or channel conditions declining).

PFC assessments can be an appropriate starting point for determining and prioritizing the type and location of quantitative inventory such as MIMs or monitoring necessities, and is an excellent communication tool, bringing a wide diversity of public groups to agreement.

SITE SELECTION

Twelve PFC sites were decided upon by the NRAC Range/Riparian Subgroup to be representative of each stream area based on local knowledge of the watershed. See Figure 4 for site locations.

DATA COLLECTION

PFC Assessments were conducted in the summers of 2009 and 2010.

ANALYSIS

The following table provides a summary of the results.

Table VII-4. Proper Functioning Condition Summary

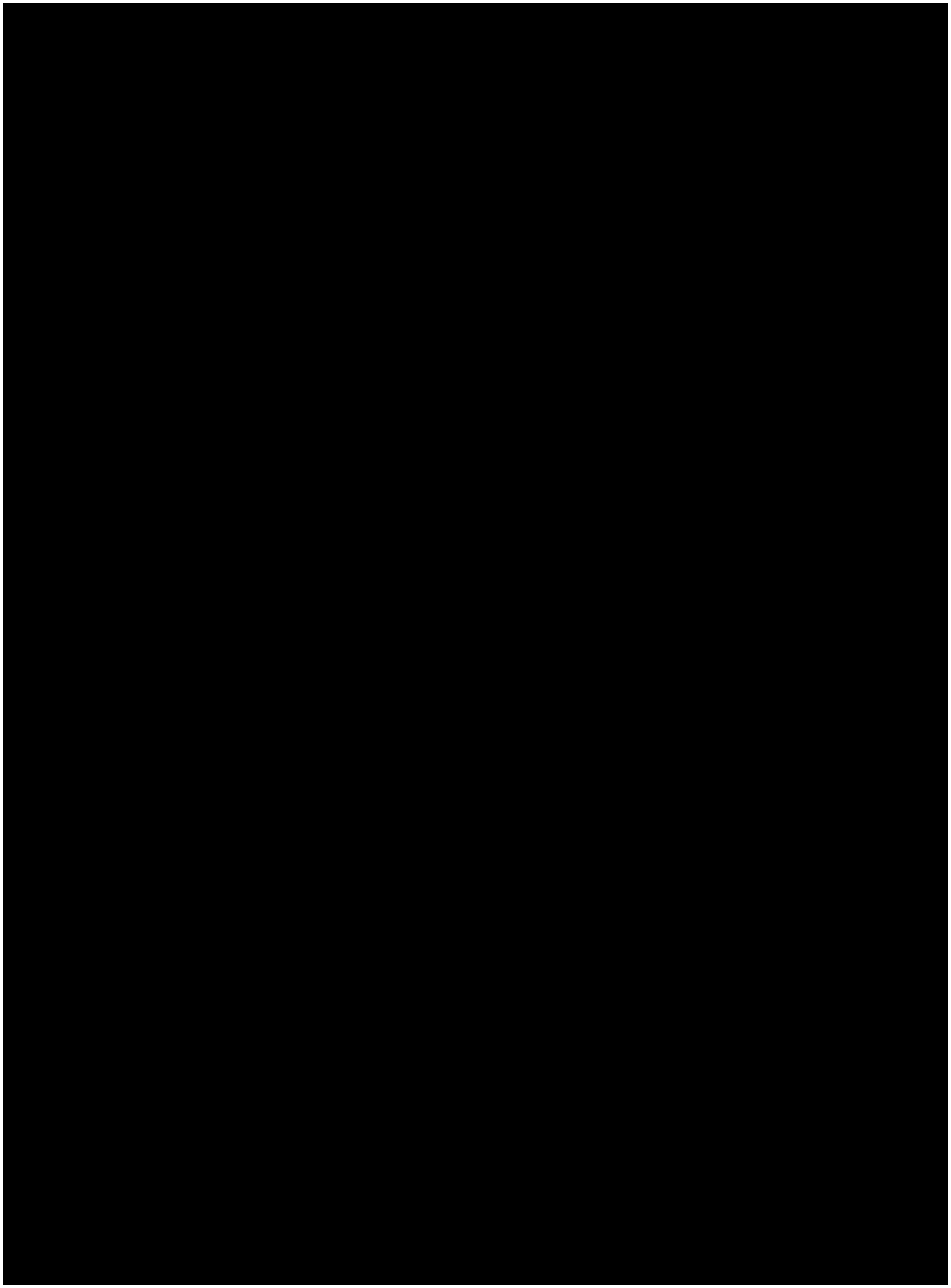
STREAM	REACH	ALLOTMENT	DETERMINATION/ TREND	COMMENTS
Broady Creek	1	Teepee-Elk Rock Creek Pasture	PFC/static	Grand fir PA-little impacts from timber harvest or grazing-rock armored somewhat incised-intermittent –B3/4 channel
Cougar Creek	1	Cougar Cr-Cougar Pasture	PFC/static	Grand fir overstory-diverse hardwoods with large waterbirch-limited quantity of carex-creek somewhat constrained by adjacent road
Cougar Creek	2	Table Mt.-Thorn Hollow Pasture	PFC/static	Same comments as above however noted unique waterfall within this reach
Davis Creek	1	Swamp Creek-Upper Davis Pasture	PFC/downward	Trend due to past activities- timber harvest, railroad grade, grazing –question on Trend (Teresa)
Davis Creek Reference Exclosure		Exclosure in Upper Davis Pasture	FAR/upward	Due to past management as above-system does not show evidence of recovery vertically-still very downcut and erosion at cutbanks-sediment in stream-however some overhanging banks evident
Joseph Creek	1	Table Mt-Joseph Breaks Pasture at Slide Creek	PFC/upward	C4 to C3/4-Rock armored streambanks-stream widened-slightly high sediment-some erosion deposition-reed canary grass present
Sumac Creek	1	Cougar Cr-Sumac Pasture	FAR – but at its potential given constraints (?)	Highly disturbed system from past management,road, grazing, timber harvest activities and from current grazing activities – question on Trend being "...at its potential" (Dana)
Sumac Creek	2	Al-Cunningham-Sumac Pasture	FAR – but at its potential given constraints (?)	Highly disturbed system from past management-road-grazing-timber harvest activities and from current grazing activities – question on Trend being "...at its potential" (Dana)
Swamp Creek 1		Lower Swamp/Snake Pasture-downstream from Davis Cr confluence	PFC	Rosgen Cb3-Riparian species somewhat limited due to cobble nature of streambank-1986 fire large trees still actively falling in riparian area-weedy areas

Swamp Creek 2		Swamp Cr-Bennett Pasture	PFC/upward	Incised Rosgen C-5 channel-possibly formerly a G channel-high sediment-some being captured by alder and sedges-some weediness
Swamp Creek 3		Davis – Bennett Pasture	PFC/static	Rosgen C4/5-On the line with FAR due to early seral species-erosion occurring at cut banks however point bars are revegetating-high incidence of shrub use and mechanical damage in greenline-should look at grazing season
Swamp Creek Private-Snodderly		Private-between Swamp and Davis Creek Allotments	PFC/downward	Rosgen E channel-incised from historic disturbances-reed canary grass colonizing-less carex and more glyceria than expected

SUMMARY

Davis and Sumac Creeks are the creeks needing improvement, both in management and in restoration activities. Swamp Creek also has areas needing assistance, especially with regards to erosion at cut banks and reed canary grass colonization.

Figure VII-6. LJCW Potential Project Locations



POTENTIAL PROJECTS AND RECOMMENDATIONS

Many of the main creeks have historically been used as travel corridors; as a result accessibility has negatively affected riparian areas. Moderately-sloped watersheds like Cougar and Sumac Creeks received more attention as opposed to steep country like that in the Broady Creek, Horse Creek and Cottonwood Creek drainages which don't have as many roads or traveled as much.

The Joseph Creek Rangeland Analysis (USFS, 2005) rated the Davis and Sumac Sub-watersheds as high potential increased risk of cumulative effects from the selected alternative (Alternative 3 modified – continued grazing with mitigation measures and monitoring identified); the Lower Swamp and Cougar Subwatersheds rated moderately-high.

The same analysis found most pastures to be "satisfactory" in the analysis area except the Bennett and Upper Swamp Pastures of the Swamp Creek Allotment, the Bennett Pasture of the Davis Creek Allotment and the Sumac Pasture of the Cougar Allotment.

Sites should be evaluated on a site-by-site basis for causal factors and appropriate actions. The vegetative cover and condition of riparian hot spots can be improved. In riparian areas identified as having been degraded of their ecological function by historic uses, utilization should be limited perhaps by implementing barriers such as large woody debris, fencing, change in the season of use, and other management strategies including water and salt locations. Condition could be enhanced by re-vegetation (e.g. grasses or shrubs) if appropriate.

The following table contains a list of potential spring /creek projects.

Table VII-5. Potential spring/creek projects

POTENTIAL SPRING/CREEK PROJECTS				
GIS POINT ID	**CREEK OR SPRING**	**MILES OR LOC**	**ALLOTMENT**	**SUGGESTED ACTIONS (NEPA NEEDED)**
3	Rush Creek	T05N R45E Sec 36	Hunting Camp	Protect headwaters next to 045 road with fence of downed woody material and install off-site water development
5	North Cabin Spring	Sec 32-33	Table Mountain	At end of 4650-135 in draw; needs protection upstream of trough; extend exclosure fence to a less accessible area.
6	Road bend Spring		Hunting Camp	At beginning of 4655 road: rehab headcut in channel downstream from road; protect denuded and muddy channel from road to exclosure; re-evaluate broken buck/pole exclosure fence and re-create fence where needed today; move trough away from road and create rocked dip/drain in lowest spot back to channel or exclosure.

7	Wild-horse Sprin g		Cold Springs	Re-develop Wildhorse Spring, fencing off spring site, replace trough and springbox. Along the 4600-598 road or Trail #1693.

RIPARIAN ASSESSMENT WORKING GROUP MEMBERS

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- Dana Nave, Hydrologist USFS
- Allen Miller, Fish Biologist USFS
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VIII. Wildlife Species and Habitat Assessment

Table of Contents

INTRODUCTION

This report is a compilation of existing data and analysis from the USFS Lower Joseph Creek Watershed Analysis of 2001, as well as management plans for the Precious Lands Wildlife Management Area (PLWMA 2003), the Teepee Butte Fire EIS, the Grande Ronde Subbasin plan, and the Oregon Conservation Strategy. It also includes information from district records from the Wallowa Mountain Office of the Forest Service and Oregon Department of Fish and Wildlife Enterprise office, expertise from area biologists, Oregon Department of Forestry, Wallowa County GIS, and Oregon State University Extension personnel. Dale Dotson, Patricia Johnson and Sophia Millar USFS, Pat Matthews ODFW and Angela Sondenaa NPT, all provided a review of this chapter.

ASSESSMENT METHODOLOGY

The report is organized by habitat, and wildlife species that were selected to represent those habitats. Species selected are 1) listed by the US Fish and Wildlife Service as threatened or candidate, or 2) emphasized in other plans, or 3) abundant and easily surveyed or monitored, or 4) species that are commonly hunted, or 5) are species that are of concern due to low population numbers (see Species Table).

Some systematic surveys for wildlife have been conducted on Federal, Tribal and Private lands but large area formal surveys are lacking thus anecdotal information has been used as appropriate to determine their presence based on habitat in the assessment area.

OVERVIEW/SUMMARY OF CONDITIONS

LANDOWNERSHIP AND MANAGEMENT

The Lower Joseph Creek Watershed (LJW) includes 178,074 acres of land in the states of Oregon and Washington. The watershed lies within a portion of three wildlife management units (WMUs). Oregon Department of Fish and Wildlife manages 94% of the watershed in two WMUs: Sled Springs and Chesnimnus. The Washington Department of Wildlife manages the remaining 6% that lies within the Chief Joseph Wildlife Area. This land was purchased in the 1970s for big game ungulate winter habitat and upland game bird habitat. The Precious Lands Wildlife Management Area owned by the Nez Perce Tribe is 6% of the watershed. Their lands are managed to protect fish populations and wildlife habitat. Privately owned lands are approximately 35% of the watershed. The USDA-Forest Service (FS) owns 55% of the watershed and management is divided into nine Management Areas (MAs). The FS is responsible for managing wildlife habitat on all its lands with two MAs that specifically emphasizes wildlife habitat management: MA 15 Old Growth Preserve (3,086 acres) and MA 3 Wildlife/Timber Winter Range (36,084 acres). Two other MAs in the HCNRA are also managed for old growth. MA 10 HCNRA Forage Production forested acres (14,207 acres) and ten percent of the forested acres in MA 11HCNRA Dispersed Recreation/Timber Management are to be managed as old growth (890 acres).

VEGETATION

RIPARIAN

Riparian habitat includes streams, wetlands, ponds, springs, aspen and willow stands. Acres of riparian habitats were estimated as including a 25-foot buffer on either side of the 1-3 class stream channels on FS lands. This definition resulted in approximately 1119 acres or 1% of the Forest. Data is lacking for upland riparian habitat.

Acres of spring habitats were estimated with a 25-foot buffer around the spring site. This resulted in slightly more than one acre on the FS lands.

The four primary biophysical environments and structural stages in the Lower Joseph Creek Watershed area include warm/moist (G6), warm/dry (G7, G5), cool/dry (G4) and non-forested areas (see Forest Conditions section). The Precious Lands Wildlife Area contains 26.6 miles of stream supporting 161acres of riparian habitat. Four percent of the PLWMA supports riparian plant communities. About 2.3 miles of Joseph Creek flows through the Chief Joseph Wildlife Area and an additional 9.8 miles flows through the Precious Lands Wildlife Area.

Wildlife species representative of the riparian habitat are mountain quail, ruffed grouse, yellow warbler, lazuli bunting, willow flycatcher, beaver, spotted frog, Rocky Mountain tailed frog and Western toad.

FORESTED LATE AND OLD STRUCTURAL STAGES (LOS)

The forest condition has been assessed on FS lands in the context of the Historic Range of Variability (HRV) (see Forest Conditions section). Approximately 50% of the FS lands are forested. Forests on private lands have not been classified by structural stage but overall there are approximately 13% forested lands (ODF 2010 GIS data). Twelve percent of the PLWMA is forested. Conifer species are primarily Douglas-fir, grand fir and ponderosa pine.

Lacking is the single-storied large diameter tree stands (SSLT) structural stage, which is no longer represented in the watershed compared to the HRV.

Wildlife species representing SSLT are the flammulated owl and white-headed woodpecker. Multi-storied conifer stands with large trees (MSLTC) will also be addressed. Species representing this habitat type are the northern goshawk and forest dwelling bats. Bat species are the hoary and silver-haired bats and the California, long-eared, fringed and long-legged Myotis. MSLTC stands are lacking in the G4 biophysical environment and exceeding in the G7 biophysical environment when compared with the HRV.

DEAD WOOD HABITATS

Specific components of the forested environment that may be impacted by management are snags and large diameter down wood. The Wallowa-Whitman National Forest Land and Resource Management Plan designated a group of 13 primary cavity excavators as Management Indicator species (MIS) for snag habitat. This group utilizes multiple habitat types so some species will be addressed in several sections. As a subsection of snag habitat there is a discussion of large-scale disturbance areas (fire or windthrow) as it relates to three-toed and black-backed woodpeckers. The rubber boa will be used to analyze the downed wood habitat type.

GRASSLANDS AND DRYLAND SHRUBS

Fifty percent of the FS lands are classified as grassland communities. This vegetation type includes scablands and shrublands. Grasslands cover 74% of the PLWMA lands. Habitat was further delinated on the PLWMA into tall and short shrublands and occurs on 7.5% of the management area. Approximately 51% of non-forest service acres are non-forested. Wildlife species representative of the grassland communities are the golden eagle, Rocky Mountain bighorn sheep, Western rattlesnake, Western skink, Western fence lizard, vesper sparrow, Savannah sparrow and horned lark. The yellow-breasted chat represents the dryland shrub component of grasslands.

HABITAT GENERALISTS HABITATS

Habitat generalists include wolves and big game species on which they depend: primarily Rocky Mountain elk, mule deer and whitetailed deer. These species utilize all of the vegetation habitats within the watershed and receive the greatest amount of political and recreational focus of all wildlife species within and adjacent to the watershed. The rufous hummingbird and blue grouse will also be addressed.

Habitat generalists not known to be present in the Lower Joseph Watershed area are North American wolverine and Canada lynx. North American wolverines are a federal candidate species. The Lower Joseph Watershed area had no known denning, rendezvous sites or resident wolverines, however this area may be part of a foraging route or travel corridor. An ongoing survey conducted in Wallowa County documented wolverines in the Eaglecap Wilderness in 2011.

Canada lynx are a federal threatened species. The Lynx Conservation Assessment (USDA Forest Service 2006) was used to determine lynx habitat in the state of Oregon as “unoccupied” (USDI Fish and Wildlife Services and USDA Forest Service 2006). Lynx are not likely to be present in the Lower Joseph Watershed area because it is on the southern edge of lynx habitat and because of the natural biophysical limitations of the habitat in the area.

UNIQUE HABITATS

Unique habitats include caves, cliffs, rimrock and talus slopes. These habitat types are typically found in the lower elevations within the watershed but have not been quantified. The potential effect of management focuses on the vegetation adjacent to these habitats. Wildlife species representative of unique habitats are peregrine falcons, spotted bat and Townsend’s big-eared bat.

ASSESSMENT

RIPARIAN

Riparian woodlands and shrub habitats are typified by the presence of wetland hardwood trees and shrubs as well as herbaceous plant species. Flowing and standing water is an important component of these habitats. These habitats comprise the smallest portion of the landscape but have a disproportionably high level of wildlife diversity and density compared to surrounding habitats. Priority hardwood species are cottonwood, alder, aspen and willow. All four are deficient in the watershed due to past management activities including harvest, grazing and fire suppression. Severe flooding in the winter of 1996-7 also removed many overstory trees throughout the watershed.

The Lower Joseph Creek watershed assessment (September 2001) states that 900 acres of wetlands and riparian areas are unstable with a downward vegetation trend from climax to early to mid-seral on FS lands. (For additional information on riparian see the Riparian Condition Assessment section.) There are approximately 300 acres protected by natural barriers, fences or intense management exhibiting a stable trend. Seventy-five percent of Cottonwood Creek within the Forest boundary burned at high to moderate burn severities in 1988. FS personnel indicate that the shrub component has fully recovered since that time. Riparian areas are buffered on both FS and private lands based on stream type and size (Oregon Forest Resources Institute 2002).

Mountain Quail

Mountain quail are a resident species in Oregon and Washington and have been documented along Joseph Creek in both states. Habitat is diverse with water the limiting factor (USFWS 2010). Riparian areas with brushy cover or shrub habitat adjacent to water are important. The range of mountain quail has been reduced from historical accounts (Gabrielson and Jewett 1940) with populations declining significantly in Northeastern Oregon (Pope 2003). Declines in riparian plant structure due to road construction, grazing and the exclusion of fire may be contributing factors to their decline.

Conservation measures recommended by the USFWS (2003) include:

- Protecting existing shrub habitat and riparian areas
- Installing guzzlers where water is lacking during summer and fall months
- Protecting springs with fencing and creating small reservoirs near good quail cover
- Early season prescribed fires may coincide with peak hatch dates in late June and early July and should not be permitted then in occupied habitats

Ruffed Grouse

The Ruffed grouse is a permanent resident of the Lower Joseph Watershed Assessment area. Habitat includes riparian and early-seral stage deciduous forests. Habitat area has canopy closure less than 60 percent with dense understory and drumming habitat (down wood, boulders, rock walls, snowdrifts, exposed tree roots, or dirt mounds). Ruffed grouse are a popular game bird with regulated hunting seasons, bag limits and area closures. There is a decline in the number of hunters and the number of ruffed grouse taken in the last couple of years in northeast Oregon (ODFW 2011). Factors affecting ruffed grouse include: hunting, pesticides and degradation of habitat.

Management recommendations for this species:

- Thin from below leaving down wood, shrubs and forbs
- Maintain riparian areas

Moose

Moose are not anticipated to occupy the Lower Joseph Watershed. Moose have been documented in Tamarak and Joseph Creeks, but are considered transient animals (Angela Sosenaa, Nez Perce Tribe and Pat Mathews, ODFW).

Neotropical Migrant Birds (NTMB)

Neotropical migrant birds (NTMB) breed in temperate North America and spend the winter primarily south of the United States and Mexico border. Long-term population data on many of these birds indicate downward population trends (Cornell Lab of Ornithology (2010) and Sauer et al. (2008). Yellow warblers, lazuli buntings and willow flycatchers are NTMBs that nest in riparian woodlands and shrublands. Yellow warblers, lazuli buntings and willow flycatchers are all easily monitored due to their songs and are found on most stream systems within the watershed. The yellow warbler can be a good indicator of vegetative and structural diversity (Sondenaa and Kozusko 2003). Studies in Southeast Oregon found “dramatic increases” in willow flycatchers following a change in grazing management in willow habitats (Sedgwick 2000).

Considering the trend in riparian habitat in the watershed the following recommendations from the Conservation Strategy for Landbirds in the Northern Rocky

Mountains of Eastern Oregon and Washington (PIF 2000) should be addressed:

- Plan and locate recreational facilities away from riparian habitat and minimize recreational activities in riparian areas during nesting season
- Maximize contiguous areas of riparian habitat
- Restore natural hydrological regimes (roads can impede this)
- Control invasive weeds, with biological controls if possible
- ODFW (2005) further recommends discouraging cowbird use by seasonal timing of grazing and maintaining high grass heights

Beaver

The beaver is almost always associated with riparian habitats. Trapping data is by county so we have no historical population estimates for this watershed but Vic Coggins (ODFW wildlife biologist) has seen an increase in beaver within the watershed due to riparian restoration. High gradients and low waterflows may limit beaver distribution throughout the entire watershed (P. Matthews, ODFW biologist, personal communication). The NPT chose beaver as a target species to measure riparian habitat. Limiting factors from their surveys were seasonal water fluctuation and a lack of small diameter hardwood trees on some streams.

Management to increase the distribution of beaver includes:

- Restoring hardwood habitats in lower gradient stream courses. Beavers assist in the restoration of wet meadows to the benefit of all wildlife species in riparian habitats.

Columbia Spotted Frogs

Columbia spotted frogs are highly aquatic. Breeding habitat is usually backwaters in slow moving streams and permanent ponds. Adults will disperse overland following breeding. There have been no surveys specifically for spotted frogs within the watershed but habitat is available and the species may exist along the perennial low gradient streams or ponds in the upper elevations. Management activities have altered habitat with timber harvest, grazing and road construction with the down cutting of streams and pond siltation (USDA-FS 2001).

Conservation recommendations are to:

- Conduct baseline population or presence/absence surveys
- Control invasive species at priority sites
- Maintain vegetative buffers adjacent to water (ODFW 2005)

Western Toads

Western toads lay their eggs in sunny ponds and lakes with little vegetation. There have been individual sightings of western toads in the watershed and three ponds with tadpoles. Overall surveys are lacking. Threats to western toad habitat and conservation recommendations are the same as the spotted frog.

Tailed Frogs

Tailed frogs were documented during stream surveys in high gradient, cold water streams. Adults and larvae were sighted in East Fork, West Fork and mainstream Broady Creeks and in Cottonwood Creek between 1992 and 1997 (Bull and Carter 1996). There is no information on the historical distribution of tailed frogs in the watershed. Limiting factors identified by ODFW (2005) are low reproductive rate, stream sedimentation from roads or forest harvest practices and increased stream temperatures in degraded riparian habitat.

Conservation actions are to:

- Modify activities to provide riparian cover,
- Minimize sediment
- Maintain shade.

FORESTED LATE AND OLD STRUCTURAL STAGES

Mature and old growth habitats decreased from 29% to 11% in the Upper Cottonwood Creek subwatershed with the Teepee Butte fire in 1988. Historically the single stratum (SSLT) older ponderosa pine habitat type would have occurred on 25 to 40% of the warm/moist and warm/dry biophysical environments in the watershed. Habitat is now limited within the watershed and there is no SSLT stands on Federal lands. Multistoried conifer stands with large trees (MSLTC) stands currently exceed that which was estimated to be in this area historically by 14% in one biophysical environment. A change in the dominance of tree species has also occurred. Repeat photography comparing vegetation from 1908 to 1992 show a loss of pine dominated stands. Currently there is Douglas or grand fir in what was a ponderosa pine forest (Chico Trail photo point). Photos from Billy Meadows (just south of the LJW) shows a conversion from lodgepole pine forests to a mix of Engelmann spruce, grand and subalpine firs, lodgepole pine and western larch (Skovlin and Thomas 1995).

Flammulated Owls

Flammulated owls nested in the large soft snags historically present in this habitat.

Management recommendations for this species:

- Manage old forest multi-strata stands and stem exclusion with open canopy for single stratum structure. For the flammulated owl, McCallum (1994) suggests that silvicultural practices can improve habitat as long as old growth aspects are retained (large snags, foraging substrates and roost sites).
- ODFW (2005) conservation actions are to retain large diameter snags (>1/acre) in areas with sapling thickets and small grassy openings and restrict insect control in these areas.

Mature ponderosa pines with an abundance of cones are year round habitat for the white-headed woodpecker. Pine seed are the primary food source for white-headed woodpeckers especially in winter.

Management recommendations for this species:

- Retain large snags (>21 in. dbh) as they always nest in dead wood,
- Maintain relatively open canopies (10-40% cc) with a sparse understory and provide an abundance of pines with large cones and high seed production (Garrett, et al. 1996). Territories in central Oregon were measured to be 260 acres in continuous forest and 803 acres in fragmented forests (Dixon 1995).
- To increase SSLT manage young multi-strata stands toward single stratum stand structure that reflects the HRV.
- Where appropriate, MSLTC could be managed to provide habitat in the short term. A return of historic fire intervals will increase habitat and food for both the flammulated owl and white-headed woodpecker.

Management Area 15 (Old Growth Preservation) on FS lands was delineated to provide habitat for wildlife species that utilize old structure forest for most of their life stages. Currently only 13% of MA 15 meets the MSLTC structural stage. Forest Plan Amendment #2 requires a network of contiguous forested areas, “connectivity corridors”, to connect all old growth areas and LOS habitats. These will be designated at the project level for the FS lands in the watershed. The pileated woodpecker, northern goshawk and American marten were selected as management indicator species of the abundance, distribution and quality of mature and old growth forest. Pileated woodpeckers will be discussed in the deadwood section. The elevations in the LJW are too low for marten (V. Coggins, ODFW biologist, personal communication) and will not be addressed.

Goshawk

The goshawk is a year round resident in the watershed. There are no historical accounts of abundance of this species but research by DeStefano et al. (1994) estimates nesting territory densities ranging from 0.105 to 0.356 per 1000 acres. There are 18 historic nest sites on FS lands in the watershed. This is below the average densities stated above. Timber harvest has been considered the primary threat to nesting populations of goshawks (Squires and Reynolds 1997). A disruption in fire return intervals may have reduced foraging and nesting habitat also (Marshall 2003).

Management recommendations for this species:

- Maintain late successional forests and natural openings with prescribed fire and thinning (ODFW 2005).
- On FS lands there are specific recommendations to maintain and enhance nesting stands, post-fledging areas and foraging areas that are considered during timber sale planning.

Bat Species

Eleven bat species have been documented in the watershed. Verts and Carraway (1998) state that bat populations in North America have declined since the 1940s due in part to pesticides, disturbance at roosts and hibernacula and loss of roosting habitat through timber harvest. Six of the bat species can be categorized as forest dwelling and dependent on large snags and hollow trees for day roosts and/or maternity colonies. Their importance in maintaining forest insect pest populations heightens the need for forest managers to maintain these structures.

Mark Perkins has conducted numerous bat surveys pre and post management on FS lands within the watershed. He recommends the following to maintain and enhance bat habitat (Perkins 2000):

- Timing of activities – conduct harvest and burns prior to June 1 or post September 1
- Commercial thinning – do not cut or remove snags or defective trees (cracks, broken tops, trees with exfoliating bark or cavities)

- Underburning – beneficial if understory plant and shrub vigor is increased
- Protect known roost sites (eg. buffers, signing)

DEADWOOD HABITATS – SNAGS AND DOWN WOOD

Management indicator species for snag habitat on FS lands are represented by 14 species. These are a group of birds that are collectively known as primary cavity excavators. Historically deadwood habitat to support these species was more abundant than today. Timber harvest activities started in the early 1900s and focused on removing large diameter ponderosa pine, western larch and Douglas fir. Many snags left on site were removed during the later part of the decade to meet safety concerns during falling and slash burning or as firewood. To accommodate viable populations of all primary excavators, it is important to provide snags and down wood in all stages of decomposition, evenly distributed across the forested landscape, in time and space, and in a variety of tree species and sizes.

Current direction is to:

- Maintain snag densities at the 100% population level for primary cavity excavators. Large diameter snags can require from 100 to 250 years to be replaced. Species that require this habitat generally do not have a substitute habitat that results in the long-term absence of some woodpeckers and the secondary cavity nesters that rely on their cavities.

An advisory tool called DecAID has been developed to help managers evaluate the effects of existing or proposed activities on organisms that use snags and down wood. DecAid is based on scientific field research of wildlife species use of snags and down wood (Mellen-McLean *et al*. 2012). DecAID is used at the project level to estimate or evaluate sizes and densities of amounts of dead wood that provide habitat for many species and ecological processes to help meet wildlife management objectives (Mellen-McLean *et al*. 2012).

- The Oregon Department of Forestry requires on average at least 2 snags or 2 green trees per acre that are at least 30 feet tall and 11” dbh and 2 down logs or down trees at least 6 feet long per acre. There may be higher numbers needed near streams (OFRI 2002).

The Table below shows specifics on snags as described by MIS by Wildlife Habitat Type. Snag characteristics are from the Small/medium and Larger Tree Structural Condition Classes; refer to DecAID for other classes. All information is from DecAID version 2.2 (Mellen-McLean et al. 2012) unless noted.

Table VIII-1. Snag Characteristics by MIS Wildlife Habitat Type – East-side Mixed Conifer Forest

SPECIES/GROUP	SNAG SIZE (IN) FOR 30%, 50%, 80% TOLERANCE LEVELS	SNAG DECAY	PRIMARY SNAG SPECIES
Black-backed woodpecker	Nesting: 8.8, 12.0, 16.7 Roosting: 6.7, 10.9, 16.8 Foraging: 10.9, 14.0, 18.9	Moderate to Hard	Douglas-fir, western larch, ponderosa pine, lodgepole pine
Hairy woodpecker	Nesting: 10.5, 16.3, 25.2 Foraging: 8.3, 11.7, 17.0	Moderate	Aspen, ponderosa pine, western larch
Northern flicker	Nesting: 17.7, 22.2, 30.6 Foraging: 18.2, 21.8, 27.2	Moderate	Western larch, ponderosa pine, , Douglas-fir
Northern three-toed woodpecker	Nesting: 8.8, 10.8, 14.0 Roosting: 9.8, 11.7, 14.3 Foraging: 11.4, 14.7, 19.7	Soft to Moderate	Aspen, Douglas-fir, Lodgepole pine, western larch for nesting Lodgepole pine for foraging
Primary cavity nesters/ excavators/ woodpeckers	Foraging: 50% tl = 11.3 select > (12”) 30 cm dbh1	Soft to Moderate	Aspen, western larch, ponderosa pine for nesting Ponderosa pine1 and western larch for foraging
Pygmy nuthatch	Nesting: 14.7, 21.3, 30.8		Ponderosa pine
Red-breasted nuthatch	Nesting: 13.0, 20.0, 29.0	Moderate	Douglas-fir
Red-naped sapsucker	Nesting: 20.9, 26.3, 34.5		Western larch, lodgepole pine, Douglas-fir
White-breasted nuthatch	Nesting: 9.8, 21.2, 36.7		
White-headed woodpecker	Nesting: 20.8, 26.7, 35.9	Moderate	Ponderosa pine
Williamson’s sapsucker	Nesting: 16.0, 24.4, 37.0	Moderate	Douglas-fir, ponderosa pine, western larch

[1]*Lyons et al. 2008*

Table VIII-1 shows snag densities surrounding nest and/or roost sites of MIS by Wildlife Habitat Type. Snag densities are from the Small/medium and Larger Tree Structural Condition Classes; refer to DecAID for other classes. All information is from DecAID version 2.2 (Mellen-McLean et al. 2012) unless noted.

Table VIII-2. Snag densities surrounding nest and/or root sites byMIS Wildlife Habitat Type, East-side Mixed Conifer Forest

SPECIES	SNAG DENSITY/ACRE FOR 30%, 50%, 80% TOLERANCE LEVELS			
	Green Forests		Recent Post-fire	
	>10" dbh	>20" dbh	>10" dbh	>20" dbh
Black-backed woodpecker	2.5, 13.6, 29.2	0.0, 1.4, 5.7	57.2, 82.4, 119.2	
Hairy woodpecker			42.9, 67.2, 104.1	
Lewis's woodpecker			24.2, 39.5, 62.8	0.0, 6.2, 16.1
Northern flicker			26.8, 49.6, 84.1	2.2, 17.4, 39.6
Pygmy nuthatch	1.1, 5.6, 12.1	0.0, 1.6, 4.0		
White-headed woodpecker	0.3, 1.9, 4.3	0.0, 1.5, 3.8	18.6, 52.0, 98.7	
Williamson's sapsucker	14.0, 28.4, 49.7	3.3, 8.6, 16.6		

IMPACTS OF FIRE

Six large lightning-caused fires (greater than 100 acres) have occurred within the LJCW since 1970, burned NFS and private land. The Joseph Canyon fire occurred in 1986, followed by the Teepee Butte fire in 1988. Both fires burned on NFS and private lands for a total of approximately 62,865 acres. These fires ranged from low-intensity grassland fires to high-intensity stand replacement fires. An increase in large, more intense stand replacement fires over the past 25 years can be attributed to conditions that are outside HRV. (See fire occurrence table in fire section.)

Black-backed Woodpecker

The black-backed woodpecker is dependent on large-scale forest disturbances. Fire suppression and post-fire salvage have reduced this species habitat within the watershed. Because of the eruptive nature of this species management is focused on providing habitat following bark beetle outbreaks, blowdowns, or large fires.

Where salvage logging is planned:

- Retain snags in clumps at >104 – 123 snags/ha >10" dbh,
- Retain standing dead trees,
- Close roads and enforce fuelwood regulations post salvage logging to maintain snags (Dixon and Saab 2000).

Three-toed Woodpecker

The three-toed woodpecker is also an irruptive species associated with insect outbreaks following fires like the black-backed woodpecker yet feeds on wood-boring beetles rather than bark beetles. This species is difficult to detect but Breeding Bird Survey data indicates a decline in populations in North American and sharply declining populations in Europe (Leonard 2001). Loss of habitat through harvest of old growth timber, salvage logging and fire suppression has contributed to population declines. Management recommendations are to provide trees with heartrot in protected areas above 4000' elevation and rotating these areas as habitat becomes unsuitable. Patch size should be equal to 530 acres with minimal fragmentation (Leonard 2001).

Recommendations for all deadwood associated species include:

- Locate and protect aspen stands
- Retain existing large diameter snags
- Collect data on abundance and locations of large down wood
- Meet down wood requirements at the project level.

Rubber Boas

As a result of these fires snag densities exceeded 100% potential habitat for woodpeckers. The fire-killed snags were expected to stand for 20 years (USDA-FS 1989). These trees will add large woody material and increase habitat for species like the rubber boa, especially in areas adjacent to water. This species may be difficult to survey for as it is nocturnal but can be a good indicator of microhabitats (rotting stumps and logs) and forest litter (Brown et al. 1995) as well as small rodent populations (primary food source).

Recommendations for management of rubber boas includes:

- Retain snags and down wood at all stages of decomposition especially in riparian areas

GRASSLANDS

Weed control will benefit all wildlife species within these plant communities. Repeat photography on the Chico Trail within the LJW comparing 1908 to 1992 shows bluebunch wheatgrass in good condition with an increase in western yarrow and Wyeth buckwheat (Skovlin and Thomas 1995). The rangeland 3-way exclosure on Allen Springs Ridge was monitored following the Joseph-Starvation fire. After burning with moderate severity Idaho fescue and bluebunch wheatgrass increased in the following five years within the game exclosure and decreased in the livestock exclosure (Johnson 2007). Fifteen years after the fire both species co-dominate the grasslands within the livestock exclosure but Idaho fescue now dominates over bluebunch wheatgrass in the game exclosure Johnson 2007). Plant communities within the livestock exclosures are generally denser and more vigorous compared to plant communities within the game exclosures (Johnson 2007). Data were not comparable from the control plot, which was an open area on a different environment (site) than the exclosure sites (Johnson 2007). Overall climate and wild ungulate use seem to be the primary influence the grassland litter amounts and species dominance following this fire (Johnson 2007).

Golden Eagles

Golden eagles are year round residents within the LJCW. In eastern Oregon their breeding density has been estimated at 4 to 5 pairs per 40 mi^2 (Csuti et al. 1997) but population trends are unknown. There are no documented nest sites on USFS lands and one known on private land (Sondenaa and Kozusko 2003). Foraging habitat is grasslands with cliff sites and occasionally large trees providing nesting habitat. Upper Swamp Creek surveys have noted over 100 golden and bald eagles feeding on ground squirrels in spring (C. Miller per obs). There is a concern for golden eagles due to declining numbers across the Western US. Research in eastern Washington has found high levels of lead in golden eagle blood samples. Ingestion is thought to be through scavenged squirrels, coyotes, chuckars or ungulate gut piles (P. Wick, WDW biologist, personal communication). Though protected by provisions in the Bald Eagle Protection Act golden eagles have been found shot.

Management recommendations are to:

- Provide healthy prey numbers through management of shrub habitats and healthy grassland ecosystems (Kochert *et al.* 2002).
- Protect known nest sites from disturbance during nesting season.

Yellow-Breasted Chat

The yellow-breasted chat occupies shrub habitats within grasslands. The most common shrubs on FS lands in the LJW are common snowberry, rose, ninebark and black hawthorn. Overall most of these plant communities are in a late to mid seral condition (USDA Forest Service 2001). On PLWMA there are smooth sumac shrub communities in addition to the shrubs listed above. The chat is a NTMB that is a summer resident in the watershed. Habitat is edges of large dense thickets and shrub fields on PLWMA (A. Sondenna, Nez Perce Tribe biologist, personal communication). This species is easily surveyed early in the breeding season due to its song and display flight. There are no historical nest densities but surveys on Little and Big Sheep Creek outside of the watershed were 8-9 birds per mile (Vroman 2003).

Management for chats includes:

- Maintain upland shrub habitat and large areas of riparian shrub habitat (ODFW 2005).

Vesper and Savannah Sparrows

The Vesper and Savannah sparrows are both NTMBs that are summer resident in the watershed. Habitat includes grasslands, grassy meadows, and open areas with sparse tree and shrub cover. The most common grasses in the watershed are blue-bunch wheatgrass, Idaho fescue, pine grasses and elk sedge. The most common forbs are lupines, *Geum triflorum*, yarrow, arnica, balsamroot, camas, clarkia, fleabane and lomatium. Common weeds include bentenata, annual bromes, St. Johns wort, knapweed and meadow hawkweed. In the North American Breeding Bird Survey (1966-2010) in the state of Oregon the Vesper and Savannah sparrows have significantly declined over the years (Sauer *et al.* 2011).

Recommendations for management of Vesper and Savannah sparrows include:

- Maintain open grasslands with native grasses and forbs intermixed with dense vegetative area for nest sites

Horned Lark

The horned lark is a NTMB resident of the watershed. Habitat is open barren dry areas for foraging and nesting habitat. This habitat has bare ground and very short vegetation. Horned larks area one of the first bird species to utilize areas that have had the vegetation removed or greatly decreased. These areas have the highest number of densities during nesting season. In the North American Breeding Bird Survey (1966-2010) in the state of Oregon, the horned lark has significantly declined over the years (Sauer *et al.* 2011).

Recommendations for management of horned larks includes:

- Maintaining natural open barren areas for foraging and nesting habitat.

Bighorn Sheep

Historically bighorn sheep were abundant and thought to be one of the most common big game animals in the Western mountain ranges (Toweill and Geist 1999) inhabiting every canyon cliff and butte east of the Cascades in Oregon (Bailey 1936). By 1945 bighorn sheep were extirpated in northeast Oregon. In 1954, reintroductions were initiated. There is now an estimated 25-30 sheep within the Joseph Canyon herd (V. Coggins, ODFW District Wildlife Biologist, personal communication). Open rocky areas adjacent to grasslands provide bighorn habitat. Primary Bighorn sheep habitat in LJW is the lower elevations on private and tribal lands (see attached map) which includes bunchgrasses, forbs and shrubs with grasses predominating in the diet. The LJCW habitat is considered very good (P. Matthews, ODFW, Assistant District Wildlife Biologist, personal communication) and could support far greater numbers of sheep than what occur here currently. Disease continues to be the biggest factor limiting bighorn sheep recovery.

Recommendations for management are to:

- Maintain all livestock allotments as cattle or horse,
- Control noxious weeds with methods other than using domestic sheep or goats
- Utilize public hunting to keep carnivores at set population levels (P. Matthews 2002 personal communication).

Reptiles

The western fence lizard, skink and rattlesnake are known to occur in the watershed. There is no historical population data. Current surveys have only noted presence. It is surprising that so few lizards are seen in the canyon and a more thorough survey for each of these species would be beneficial. The Oregon Conservation Strategy suggests maintaining low grassland habitats near rocky areas for the western rattlesnake (ODFW 2005) as habitat loss and eradication efforts may be a limiting factor. Surveys in Idaho indicate rattlesnakes occupy habitats with higher than average rodent densities (Jenkins and Peterson 2005). As a keystone species rattlesnake densities indicate healthy grassland environments with abundant prey species.

Recommendation is to:

- Control noxious weeds.

HABITAT GENERALISTS

The Rocky Mountain elk, mule deer, whitetailed deer, gray wolf, wolverine, blue grouse and rufous hummingbird all use a wide variety of habitats including forest, woodlands, riparian areas and rangeland. The ungulates and blue grouse are year round residents of LJCW. Rufous hummingbirds are a NTMB that occurs seasonally. The wolf and wolverine are rare species that have been documented within and adjacent to LJCW. Populations of wolf, wolverine, blue grouse and hummingbirds have decreased compared to historical accounts, although wolf numbers are increasing.

Elk

Elk are a management indicator species for the WWNF. This species is an indicator of the abundance and quality of forage and cover. By providing secure and quality habitat for elk the needs of species that are sympatric or dependent on them may also be met.

Bailey (1936) reported elk populations to be numerous and widespread in the Blue Mountains prior to European settlement. Current populations are monitored in the three wildlife management units in LJW. The management objective (MO) for elk in Washington is being met with 150 elk wintering on the Schumaker Unit. The Sled Springs WMU population estimate is slightly down in 2009 from numbers estimated from 2005 through 2007. Bull to cow ratios have exceeded the MO since 2003.

The Chesnimnus WMU elk population has significantly increased since 1994. The total estimated number of elk in the Chesnimnus WMU is 5063 (ODFW). This WMU has two subunits: Zumwalt Subunit (1) and the National Forest Subunit (2).

The Zumwalt subunit has 69% or 3,483 elk with an estimated calf ratio of 25 calves per 100 cows. The National Forest subunit has 31% or 1,580 elk with an estimated calf ratio of 22 calves per 100 cows. The management objective (M.O.) for the Chesnimnus WMU is 3,500 elk. This M.O. was set over 30 years ago, a time when very few elk resided on Zumwalt Prairie. Bull to cow ratios are relatively stable.

Table VIII-3. 2012 Population Trend data Rocky Mountain Elk (ODFW)

WMU	POP. MO	POP. EST.	BULL/100 COW MO	BULL/COW EST.
Schumaker	150	150		
Sled Springs	2750	2700	10	10
Chesnimnus	3500	5500	10	13

Table VIII-4. 2012 Population Trend data Mule Deer (ODFW)

WMU	POP. MO	FALL POP. EST.	BUCK /100 DOE MO	BUCK/DOE EST.	FAWNS/100 DOES
Sled Springs	11000	8000	12	17	33
Chesnimnus	5700	2500	12	15	26

Spring white-tailed deer inventories report deer per mile and fawn survival. In 2012 there were 4.7 deer/sq. mi. in the Sled Springs unit with a fawn survival of 37 fawns per 100 does. In the Chesnimnus unit there were 1.4 deer/ sq. mi. with a fawn survival of 28 fawns per 100 does.

Acres of habitat are described as summer, winter, critical summer habitat and critical winter habitat (see attached map). For this watershed, there are 143,336 acres of summer habitat of which 17,721 acres are critical summer habitat and 116,964 acres of winter habitat of which 40,906 are critical winter range. These seasonal areas are managed differently in regards to open road densities on FS lands. Generally open road densities should not exceed 2.5mi/mi^2 and winter habitat road densities should not exceed 1.5 mi/mi ^{2}.

Cover to forage ratios and the Habitat Effectiveness Index with canopy closure (satisfactory, marginal, forage) estimates are tools used by the FS to determine ungulate habitat quality and abundance. These factors are calculated on each project equal to or greater than 5000 acres. Optimum habitat has a HEI value of 1.00.The HEI for the Lower Joseph Watershed area FS lands is 0.6. The HEI for each potential project will depend on motorized route densities or motorized route distance bands, cover and forage distribution, and cover to forage ratio.

Recommendations to improve elk habitat are:

- Prescribed fire,
- Supplemental salting,
- Stand management
- Management of motorized access in security habitat areas.

The Wallowa-Whitman National Forest Wallowa Valley Ranger District Sled Springs OHV Trail System and Road Management Plan decision notice was signed May 29, 2009 for the Sled Springs area. This Plan includes a thorough analysis of elk, habitat use and human influence on elk as well as the existing environment description.

Rufus Hummingbird

The rufous hummingbird is a NTMB that is found seasonally in LJCW in a broad range of habitats. They nest in a wide variety of habitats from meadows to mature forests. There is no historic population data for comparison. Current trends show a significant decline in Oregon and elsewhere. No regions show a positive trend but there is no clear reason for their decline (Healy and Calder 2006).

Management to retain or enhance nectar- producing flowering plants will benefit this species.

Blue Grouse

Blue grouse were studied within the LJW around Miller Ridge and Swamp Creek (Crawford et al. 1986, Crawford and Pelren 1996, Popper et al. 1996). Historic accounts mention having to beat off grouse to feed the chickens (LJWA 2001). Current density estimates are 5 to 50 birds per square mile.

Habitat recommendations are to:

- Utilize prescribed burns to maintain park like stands of conifers,
- Maintain open canopies,
- Maintain higher tree densities in winter range,
- Maintain shrub and grass cover in brood rearing habitat (Zwickel and Bendell 2005).

Gray Wolf

Gray wolves were reported to be common in Oregon yet the number of bounties paid on them refutes that (Verts and Carraway 1998). Wolves were believed to be extirpated from the state in 1946, but two specimens were collected in 1974 and 1978 (Verts and Carraway 1998). With the reintroduction of wolves in Idaho, there are now at least four packs in Northeast Oregon. Wolves are habitat generalists that follow their prey seasonally.

Due to the abundance of prey and year round habitat in the watershed there is no specific management recommendation to enhance habitat for this species. It is anticipated that they will recolonize the watershed if humans tolerate them here.

UNIQUE HABITAT

These habitats have not been mapped in the watershed. A GIS query is being developed at the Wallowa Mountain Office of the FS.

Peregrine Falcon

Peregrine falcons have been sighted within the watershed. Potential nest sites have been identified but suitable nest ledges are limited as are larger bodies of water for prey concentrations. There is no historical data for peregrines in the watershed. Though no longer listed as endangered, their numbers are still low and continuing to adhere to the recovery goals is warranted. Sightings of individuals and nest sites will continue to be documented.

Recovery goals for peregrines are to:

- continue monitoring efforts for detection of nests and determination of productivity,
- protect nest sites from habitat loss
- develop nest site management plans for active nests,
- and identify and maintain essential foraging areas near nest sites

SPOTTED BAT / TOWNSEND'S BIG-EARED BAT

The spotted bat and Townsend's big-eared bat occur in the watershed. They occur in many habitat types but often forage in dry ponderosa pine types. Roosting habitat is cliffs or rock crevices on canyon walls or abandoned mines and cabins. There is no historical population data for these species but spotted bats has been referred to as America's rarest mammal (Verts and Carraway 1998). Spotted bats have been located during surveys (Perkins 2000) adjacent to ponds are known to be residents of eastern Oregon (ODFW and Bat Conservation International Inc.). Big-eared bats were located in the Washington portion of the watershed and are assumed to be year-round residents there.

Management recommendations for these bats are to:

- Maintain open water sources,
- Manage rock features to avoid conflicts with recreationists,
- Protect known or potential roost sites (i.e. buildings used as roosts by big-eared bats),
- Maintain both snag and shrub steppe habitats (ODFW 2005).

GENERAL WILDLIFE NEEDS

- Determine populations status of species
- Inventory and assess habitat conditions – especially aspen
- Map habitats
- Inventory priority habitats

Table VIII-5. ESA listed and R-6 sensitive wildlife species

COMMON/SCIENTIFIC NAME	FWS STATUS	R-6 STATUS	OCCURRENCE IN WATERSHED
Gray wolf (Canis lupus)		Sensitive	Possible
Canadian lynx (Lynx canadensis)	Threatened		No denning or forage habitat
Columbia spotted frog *(Rana luteiventris)*	Candidate	Sensitive	Yes, private land
Bald eagle (Haliaetus leucocephalus)		Sensitive	Yes
Inland Tailed frog *(Ascaphus montanus)*		Sensitive	Yes
California wolverine *(Gulo gulo luteus)*		Sensitive	Yes
Peregrine falcon (Falco peregrinus anatum)		Sensitive	Foraging habitat
Bufflehead (Buchephala albeola)		Sensitive	No
Columbian sharp-tailed grouse (Tymphanuchus phasieanellus)		Sensitive	No
Greater Sage grouse (Centrocerus urophasianus)		Sensitive	No
White-headed woodpecker (Picoides albolarvatus)		Sensitive	Yes
Lewis woodpecker (Melenerpes lewis)		Sensitive	?
Pacific fisher (Martes pennanti)		Sensitive	No
Hells Canyon land snail *(Cryptomastix populi)*		Sensitive	No
Fir Pinwheel (Radiodiscus abietum)		Sensitive	No
Meadow fritillary *(Boloria bellona)*		Sensitive	No
Silver-boardered fritillary *(Boloria selene)*		Sensitive	No
Johnson's hairstreak *(Callophrys johnsoni)*		Sensitive	No

Table VIII-6. Management Indicator Species

Common and Scientific Name	Occurrence in watershed
Pileated Woodpecker *(Dryocopus pileatus)*	Yes
Northern goshawk (Accipitor gentillis)	Yes
American marten (Martes americana)	No
Rocky Mountain elk (Cevus elaphus nelsoni)	Yes
Primary cavity excavators[1]	Yes
Northern flicker; black-backed, downy, hairy, Lewis', three-toed and white-headed woodpeckers; red-naped and Williamson's sapsuckers; chestnut backed and mountain chickadees; pygmy, red-breasted and breasted white- nuthatches.	

Table VIII-7. Lower Joseph Watershed Assessment Wildlife Issues and Recommendations by Habitat Type

SPECIES	ISSUE	RECOMMENDATIONS
RIPARIAN		
Mountain quail	Decline in riparian plant structure due to: road construction grazing exclusion of fire	Protect existing shrub habitat and riparian areas Install guzzlers in areas lacking water summer and fall Protect springs with fencing Create small reservoirs near good quail cover Implement prescribed fire before nesting season or conduct fall burns
Neotropical Migratory Birds	Same as above	Conservation Strategy for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington (PIF 2000) Plan and locate recreation facilities away from riparian habitat. Minimize recreation activities in riparian areas during nesting season Maximize contiguous areas of riparian habitat. Restore natural hydrological regimes (roads can impede this). Control invasive weeds, with biological controls if possible. Discourage cowbird use by seasonal timing of grazing and maintaining high grass heights.
Beaver	Season water fluctuation Lack of small diameter hardwood trees	Restoring hardwood habitats in lower gradient stream courses
Columbia Spotted Frog	Past management activities (USDA FS 2001): Timber harvest Grazing Road construction with down cutting of streams Pond siltation	(ODFW 2005) Conduct baseline species surveys Control invasive species at priority sites Maintain vegetative buffers adjacent to water
Western Toad	Same as Columbia Spotted Frog	Same as Columbia Spotted Frog
Rocky Mountain Tailed Frog	(ODFW 2005) Low reproductive rate Stream sedimentation Increased stream temperatures	Modify activities to Provide riparian cover Minimize sedimentation Maintain shade
SPECIES	**ISSUE**	**RECOMMENDATIONS**
FORESTED LATE AND OLD STRUCTURE STAGES (LOS)		
Flammulated Owl	Lack of SSLT ponderosa pine forests	Manage MSLT for single stratum structure Maintain old growth aspects (large snags, foraging substrates and roost sites) Retain large diameter snags Retain small grassy openings

		Restrict insect control in these areas

White-headed Woodpecker	Lack of SSLT ponderosa pine forests	Retain large snags (>21in. dbh) with sparse understory Abundance of pine with large cones and high seed production Manage young multi-strata stands towards single stratum stands Manage MSLT to provide habitat Return to historic fire intervals
Northern Goshawk	Reduced forage and nesting habitat from: Timber harvest Disruption of fire intervals	Maintain late successional forests and natural openings with prescribed fire and thinning Maintain and enhance nesting stands, post fledging areas and foraging areas during timber sale planning Avoid timber harvest in nest site stands during reproduction season
Bat species (11 species with 6 that are forest dwelling)	Disturbance of roosts and hibernacula Loss of roosting habitat through timber harvest	Maintain and enhance bat habitat (Perkins 2000) Commercial thinning – do not remove snags or defective trees (cracks, broken tops, trees with exfoliating bark or cavities) Underburning – beneficial if understory plant and shrub vigor is increased Protect known roost sites (eg. Buffers, signing)
SPECIES	**ISSUE**	**RECOMMENDATIONS**
DEADWOOD HABITATS		
Primary cavity excavators	Snag removal Large tree harvest	Provide snags and down wood at all stages of decomposition, evenly distributed across the forested landscape Maintain snag densities at the 100% population level Reference DecAid
Pileated woodpecker	Same	Same
Rubber boa	Snag removal	Retain snags and down wood at all stages of decomposition especially in riparian areas
Black-backed woodpecker	Snag removal Large tree harvest	Provide habitat following bark beetle outbreaks, blowdowns, or large fires where salvage logging is planned Retain snags in clumps >104-123 snags/ha >10" dbh Retention of standing dead trees Close roads and enforce fuelwood regulations post salvage logging to maintain snags (Dixon and Saab 2000)
Three-toed woodpecker	Old growth timber logging Salvage logging Fire suppression	Provide trees with heartrot in protected areas above 4000' elevation
All deadwood associated species	Same as above	Locate and protect aspen stands Retain existing large diameter snags Collect data on abundance at locations of large down wood

		Meet down wood requirements at the project level
SPECIES	**ISSUE**	**RECOMMENDATIONS**
GRASSLANDS AND DRYLAND SHRUBS		
Golden eagle	Declining numbers	Provide healthy prey numbers through management of shrub habitat and healthy grassland ecosystems Protect any known nest sites from disturbance during nesting season
Yellow-breasted chat		Maintaining upland shrub habitat and large areas of riparian shrub habitat (ODFW 2005)
Rocky Mountain bighorn sheep	Disease transmission from domestic sheep and goats	ODFW P. Matthews recommendation personal communication 2002 Maintain all livestock allotments as cattle or horse Control noxious weeds NOT using domestic sheep or goats Utilize public hunting to keep carnivores at set population levels
Reptiles	Habitat loss Eradication	Maintain low grassland habitats near rocky areas (Oregon Conservation Strategy) Control noxious weeds
SPECIES	**ISSUE**	**RECOMMENDATIONS**
HABITAT GENERALIST		
Rocky Mountain Elk Mule Deer White-tailed Deer	Road densities Human disturbance Livestock grazing Loss of habitat Hunting	Prescribed fire Supplemental salting Stand management Access management Security habitat
Rufous hummingbird	Population decline	Retain or enhance nectar-producing flowering plants
Blue grouse		Prescribed burns to maintain park like stands of conifers Maintain open canopies Maintain higher tree densities in winter range Maintain shrub and grass cover in brood rearing habitat
Gray wolves		No recommendations
SPECIES	**ISSUE**	**RECOMMENDATIONS**
UNIQUE HABITATS		
Peregrine falcon	Population numbers low	Document sightings Survey for nests and reproduction success Protect nest sites from habitat loss Develop nest site management plans for active nest Identify and maintain essential foraging areas near nest sites

Spotted bat and Townsend big-eared bat		ODFW 2005 Maintain open water sources Manage rock features to avoid conflicts with recreationalists Protect known or potential roost sites (i.e. buildings used as roost sites by big-eared bats) Maintain both snag and shrub steppe habitats

Table VIII-8. Summary of Issues and Recommendations

ISSUE	RECOMMENDATIONS
Habitat Loss	Maintain mosaic of forested habitats (acres will be determined for each project) Restore habitats based on biophysical type Restore healthy upland and riparian shrub habitat Restore hardwood habitats in lower gradient streams Restore healthy grassland ecosystems
Loss of wildlife young and nesting habitat during prescribed burns	Implement prescribed burns prior to May 1 and after the end of August Restore historic fire regime Burn small areas at a time on a rotating schedule
Loss of aspen habitat	Locate and protect aspen stands by fencing Decrease competition in aspen stands by removing other tree species Use prescribed fire where fencing would be ineffective or unrealistic Re-establish aspen stands in appropriate habitat
Stream integrity (i.e. increased sedimentation and temperature)	Protect streams and riparian areas by providing alternate water sources for cattle
Forage competition with domestic livestock	Limit livestock numbers Use deferred and rest rotation of pastures in grazing allotments Open up dense mixed conifer stands to improve forage production Increase forage quality and quantity through prescribed burns
Cattle trampling stream and riparian habitat (nests, forage, springs, and stream banks)	Protect springs, streams and riparian areas by providing alternate water sources for cattle Restore and protect spring areas by fencing or using natural barriers (down logs or boulders)
Disease transmission	Maintain all livestock allotments as cattle or horse
Decrease in cover and basal area after timber harvest	Increase basal area depending on biophysical type and structural stages
Loss of standing dead tree habitat due to timber sales and firewood gathering	Retain standing dead trees during timber harvest or after fires where it’s safe to do so Designate snag retention areas located far from roads Reduce road densities Offer firewood sales or units to meet public demand

Disturbance from motorized vehicles	Maintain road stability especially in riparian areas Reduce road densities Maintain vegetation buffers with a higher basal area 25-50 feet wide along high use roads Provide elk security areas greater than 0.5 miles from roads Implement seasonal and permanent road closures to create elk security areas
Invasive species	Control noxious weeds NOT using domestic sheep or goats Practice early detection rapid response protocols
Recreational activities	Provide public with information of area (activities, road access, camping areas, wildlife, and projects) Manage rock features to avoid conflict with recreationalists Manage bat roost sites to avoid conflict with recreationalists Locate camp grounds outside riparian areas and other key habitats

INTEGRATION RESULTS – WILDLIFE RECOMMENDATIONS SUMMARY

The wildlife recommendations summary was not centralized to any specific geographical area but addresses the overall restoration needs of the watershed as it pertains to wildlife and habitat diversity. The overall desire for the watershed is to r**estore healthy ecosystems for diverse habitat.**

Table VIII-9. Integration Results – Wildlife

RECOMM. ACTION	RECOMM. APPROVED	INTEGRATION AGREEMENT	FURTHER DISCUSSION	COMMENT(S)
Habitat Loss Across Watershed	7 of 9 were approved	Forest mosaic needed Base improvements on biophysical type. Restore healthy upland/riparian shrubs; Restore grasslands; MSLT single stratum SSLT retention of large trees; Snag retention	Grass height-timing of grazing; Higher tree densities in winter range	Need more info on grass heights concern; Winter range-high % is grassland- areas need identified; Snags – consider safety
Loss of wildlife young and nesting habitat during prescribed burning	0 approved		Burn prior to May 1 and after end of August Restore historic fire regimes Burn small blocks at a time-distribute burning rotation	Recreational opportunities may be impacted.
Increase aspen habitat	3 of 4 approved	Decrease competition of other species Prescribed burn when fencing ineffective	Fencing of stands	Aspen is responsive to fire. Apply prescribed fire to all aspen first.

		Re-establish in appropriate habitat		
Improved Stream Integrity	All approved	Protect Streams and Springs- provide alternative water source for cattle		Upland, riparian shrub habitat and healthy grassland. Very supportive
Reduce Forage competition with domestic livestock	3 of 4 approved	Deferred and rest rotation of pastures; open dense stands; prescribed burning	Limit the number of livestock	Overlaps with Forestry and Range recommendations. See Integration comments below- # 1.
Increase amount riparian habitat	All 6 approved	Alternative water sources for cattle; Fencing; Restore shrub/hardwood; Facilities away from riparian habitat; Water for quail; Maximize contiguous areas of habitat.		Alternative water source for cattle; fencing; barriers
Increase Deadwood Habitat	1 of 4 approved	Offer firewood sales or units	Reduce road densities; retain snags during harvest; designate snag retention area	Primary concern is safety during harvest. Limiting road access would retain some snags; much access is already limited.
Disturbanc e from motorized vehicles	1 of 6 Approved	Maintenance for road stability especially in riparian areas.	Reduce road densities; Vegetation buffers along roads; Elk security areas of half mile from roads; Seasonal/ Permanent road closures; Vegetation buffers adjacent to water	Road density – leave for TMP; Vegetation along road obstructs suppression efforts; Key is seasonal and timing of road use; Some roads already naturally closed
Invasive species and Reduce disease transmission	1 of 2 Approved	Practice early detection and rapid response protocols	Limit number of livestock including sheep & goats	Livestock limit removes a tool for invasive weeds control.
Manage for Recreational impacts.	3 of 5 Approved	Provide information of area Manage rock features Manage bat roosts	Location of camp grounds away from key habitats hunting for carnivores population control	Ungulates, bat roost sites-rock features; No anticipated impact to other resources

CLARIFICATION OF TABLE 9, INTEGRATION RESULTS

Further notes from the integration discussions:

Regarding #1 – "Limit livestock numbers" Starkey Experimental Station research indicates that elk and cattle are not necessarily direct competitors as grazers.

- Competition occurs when there is bad pasture management
- Range has browse utilization standards also in place
- Season of use can also have effects
- Can create some positives:
  - Cattle precondition pasture for elk to graze
  - Vacant allotments should be stocked (ODFW)
  - Make attempts to improve elk distribution and use and reduce competition on private land
  - Fire can be good, but would need to do frequently and/or create mosaic burning – review cost ($'s, smoke, etc.). Burn block size is dependent of access and location. If done correctly could have many positive aspects, incorrectly could result in high negatives impacts.

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IX. Roads and Recreation Assessment

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INTRODUCTION

The Lower Joseph Creek Watershed (LJCW) provides excellent remote camping, riding and hiking opportunities and abundant game and fish. Although exceptional in many ways, the remoteness of the area and the limited access has protected it from over development. The Lower Joseph Creek Watershed is a difficult landscape for motorized recreational activities except on the southern portion. Few regions in the continental United States can match the combination of large scale, undeveloped areas and low human population density. Demand for natural appearing landscapes and a recreational opportunity is expected to outpace demand for modified landscapes.

The SCORP (State Comprehensive Outdoor Recreation Plan) predicts that recreation and trail use in less developed settings will be one of the fastest growing activities in Oregon. The presence of water has been and is expected to continue to be the most important draw for recreation visitors. LJCW offers a high percentage of remote land classified in “roaded natural” or “semi-primitive” on the Recreation Opportunity Spectrum (ROS).

ASSESSMENT/METHODOLOGY

While conducting the Wallowa County Travel Management Plan road assessment, information was collected on the use of the road and trail system in the Lower Joseph Creek Watershed. Hunting, dispersed camping (hunting camps) and firewood gathering are the highest use activities in the watershed. The use of Coyote Springs Campground and the Teepee Lake Area for family camping activities was also noted (Figure 1).

EXISTING CONDITION

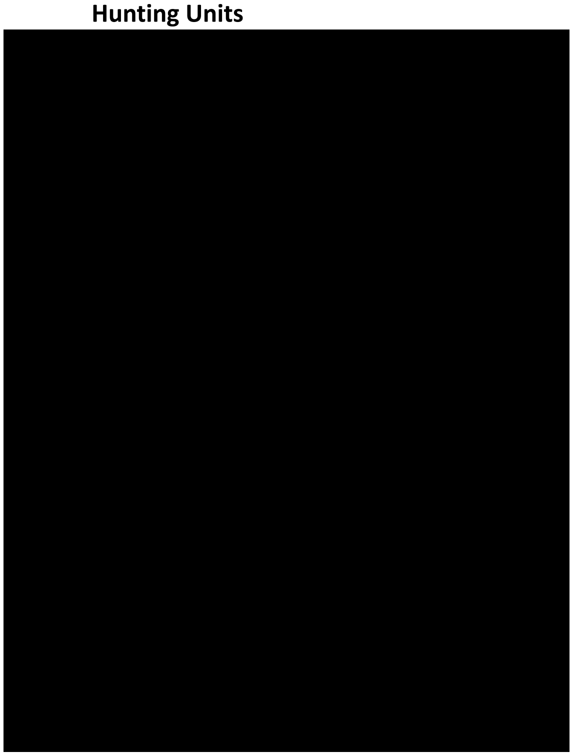
The Lower Joseph Creek Watershed is a relatively remote and difficult landscape for motorized recreational activities except on the southern portion. Coyote Springs Campground is a 10 site minimally developed Forest Camp (tables, fire rings, information boards, six outhouses, and no live or potable water). Visitation is estimated at 2800 user nights per year. Rifle deer and elk hunting enjoy about a 9% success rate on 125 and 250 tags respectively. Tribal hunting enjoys an additional 14% success rate. The 100 bow hunters enjoy an 8% success rate on deer and elk. Outfitter and guide activity in the watershed include one big-game outfitter with one base camp, two cougar and bear hunting guides and one mountain bike outfitter.

Although the number of tags available in the Chesnimnus unit has declined in recent years, hunting is considered the most popular activity. Portions of Chesnimnus and Sled Hunting units are within LJCW.

WILDLIFE MANAGEMENT UNITS (WMUS)

A ban in 1994 on the use of hunting dogs is associated with an increase in bear and cougar populations. According to ODF&W the increased predator population is potentially linked to an increase in elk calf mortality. The local wildlife biologist for ODF&W, Vic Coggins, provided information showing the numbers of hunting tags issued have declined over the past five years.

Figure IX-1. ODF&W Wildlife Management Hunting Units



The watershed lies within a portion of three wildlife management units (WMUs). Oregon Department of Fish and Wildlife manages 94% of the watershed in two WMUs, Sled Springs and Chesnimnus.

The Washington Department of Wildlife manages the remaining 6%, in the northern tip of the watershed, which lies within the Chief Joseph Wildlife Area. This land was purchased in the 1970s for big game ungulate winter habitat and upland game bird habitat.

Additional game that draws hunter interest is wild turkey, chukar, and mountain quail.

Other recreational use include driving for pleasure and viewing of wildlife, dispersed camping, OHV riding, biking, mushrooming and firewood gathering. With the downturn in the economy, there has been increased interest in firewood gathering. The majority of camping is dispersed and mainly associated with hunting activities. Coyote Springs and Dougherty Campgrounds are the only developed recreational sites in this watershed. They are open from mid to late May and until October with heaviest use occurring between August and October. The developed campgrounds are used throughout the season, but the majority of camping is dispersed.

Fishing occurs in association with trail use and public access. Limited motorized access and private land restrictions limit fishing opportunities.

There are approximately 41.6 miles of developed Forest Service trails in the watershed. An additional nine miles of trails located on national forest system lands in the watershed appear on various maps, but are not part of the current designated trail system. An additional thirteen miles of known trail (with no FS right-of-way) are located on private land. Trail use occurs mainly during the hunting season and consists primarily of horse and hiking, with limited motorized vehicle use. LJCW offers a high percentage of remote land classified in “roaded natural” or “semi-primitive” ROS (Recreation Opportunity Spectrum), relatively low visitation, and remoteness from population centers. The ROS is based on the premise that people expect certain levels of development related to the character of the setting and the type of recreation they prefer. For example, a facility intended to create a safe, controlled environment for large numbers of people should be highly developed using modern materials and providing ample conveniences. Consistent with visitor expectations, a more primitive "backwoods" area would have far fewer constructed elements. The LJCW offers recreationists both opportunities.

OUTFITTER AND GUIDES

Outfitter/guides who operate in the LJCW consist of one big-game outfitter with a base camp and operations occurring from a private lodge, and two cougar and bear hunting guides (USFS, 2011). There is a current mountain-bike outfitter permit; however, the permit has not been used for at least 3 years.

Each operation is authorized by a special use permit, which states the annual operating plan and requirements of the permittees. Management involves preparation of an annual operating plan and field inspections of the base camp.

In the past, the Asotin County Fair conducted an annual trail ride (July) on NF land via a special use permit. Approximately 125 horses and riders use 20 miles of existing roads and trails. The special use permit for this ride is issued annually. The Asotin ride has not occurred in recent years (USFS, 2011)

CONCLUSIONS AND RECOMMENDATIONS

Projections of population growth in the region within driving distance may warrant increased promotion and development of recreation opportunities in the watershed. This could include the development of the Teepee Lake Area into a campground and a self-guided auto tour along the Wellamotkin Road also known as forest road 4600-000.

The need to provide for access and benefit to the elderly and handicapped in the form of motorized recreational activities has been recognized in the Wallowa County Travel Management Plan. This use generally focuses on driving for pleasure and wildlife viewing.

ADMINISTRATIVE FACILITIES

Administrative facilities within LJCW include Coyote Campground, Hunting Camp Ridge Cow Camp (permitted), Swamp Creek Cow Camp (permitted), Red Hill Lookout and Interpretive Site, Joseph Viewpoint, Chico Trailhead, McCubbins Trailhead, Cold Springs Ridge Trailhead, and Kirkland Cabin.

Coyote Campground is an administrative facility with 10 campsites minimally developed with the following attributes: tables, fire rings, information boards, six old style single-hole outhouses, and no live or potable water. Yearly visitors are estimated at 2,800. This campground is currently maintained under a 20-year permit with Wallowa County.

Hunting Camp Ridge and Swamp Creek Cow Camps were constructed by grazing permittees in the early 1930s. These campsites are associated with grazing permits issued to adjacent allotment holders.

Red Hill Lookout straddles the hydrologic divide between Upper and Lower Joseph Creek Watershed. The site consists of a lookout tower (staffed periodically during fire season), one vault toilet, and a picnic table. There is no water source at this site. Yearly visitors are estimated at 2,300.

Joseph Viewpoint located on State Highway 3, is designated as a Level 1 (critical) viewshed within the Wallowa-Whitman National Forest. It is recognized as a Wayside site of the Nez Perce National Historical Park (co-managed with the Forest Service). It was reconstructed in 2003 to include a double vault toilet, new pavement, rock pillar and log fencing, an interpretive trail (approx. 700 feet), and interpretive signing. Yearly visitors are estimated to be over 76,000.

The Civilian Conservation Corps built Kirkland Cabin as housing for an adjacent fire lookout tower. This cabin is listed on the National Register of Historic Places. The tower is no longer present; however the cabin is still located on site.

Wild Horse Cow Camp was first recorded as an archeological site in 1980 during the Bluebird Timber Sale cultural resource inventory. In 1991 during the Bark Beetle Control Project the site was surveyed and the structural integrity was determined to be sound. Due to lack of use and care, the interior had deteriorated considerably. It was documented as uninhabitable by the USFS. (USFS, 2011)

COMMERCIAL FACILITIES

Privately owned ranches are the only known commercial facilities within LJCW.

There are two telephone lines with rights-of-way special use permits. The Asotin Telephone Company operates and maintains 0.8 miles of buried line along State Highway 3 (T. 4N, R. 44E, Sec. 12 & 13). Landowner contact to renew the Asotin permit is taking place as of October 2011. The second right-of-way (1.3 miles) is located in T.2N, R.45E, Sec. 1,2, &12 and is operated and maintained by a special use permittee (USFS, 2011).

ROADS ASSESSMENT

INTRODUCTION

Wallowa County's Natural Resource Advisory Committee developed recommendations with regard to the transportation system network in the Lower Joseph Creek Watershed. These recommendations reflect the results of an integration process with the other resource condition working groups involved in this watershed assessment, as well as outreach to specific user groups including the permittees, firewood cutters, and trail-riders, This section of the assessment provides information relative to the maintenance levels of open roads and provides a basis for deciding which roads should be left open to public travel. The existing condition on the ground – open and accessible by vehicle, evidence of current use, or naturally closed – provides the starting point for these recommendations.

The assessment has used the information Wallowa County gathered for the Wallowa – Whitman National Forests Travel Management Plan and field assessment in Hells Canyon National Recreation Area in 2009. The results of the assessment were reviewed by the Lower Joseph Creek resource subcommittees for current and future management needs.

The objective of this analysis is to develop recommendations for the management and maintenance of the road system in the Lower Joseph Creek Watershed. The intention is to provide for a transportation network that is safe, responsive to public needs and desires, minimally impacting ecologically, and fulfilling management needs.

Resource subcommittees in the Lower Joseph Creek Planning Process evaluated the roads and assigned a recommended status.

ASSESSMENT/METHODOLOGY

The analysis process utilized the United States Department of Agriculture, Forest Service roads database which contains all USFS, County, and private roads in the basin. Many of the roads have been broken into segments (average length (1.0 mi)) and identified by a segment number. All of the County roads, and all of the United States Department of Agriculture Forest Service roads (Objective Level 1 and above) were inspected and evaluated for work needed.

Signed environmental assessments from 1994 through 2009 have designated certain roads to be closed. Figure 4 shows existing environmental document names and roads that are recommended to remain open. Existing environmental documents were referenced during Wallowa County's information gathering for the Wallowa – Whitman National Forests Travel Management Plan. The roads shown in Figure 4 are for information only as the Wallowa – and provide a reference point for further analysis and stakeholder input. The Wallowa County Alternative to the Wallowa – Whitman National Forests Travel Management Plan has been accepted into Wallowa County's Land Use Plan.

EXISTING CONDITION

Maps were developed capturing the results from the county's assessment of current road conditions. Figures 2, 3, and 4 shows open roads, open OHV trails, administrative closed roads, physically closed roads, and roads that are naturally closed. The assessment also shows maintenance needs on the roads. The resource subcommittees reviewed the current situation. The resulting recommendations will be blended with other aspects of management to create project specific proposals during the NEPA process.

The Lower Joseph Creek Watershed has 372 miles of open roads and a road density of 1.34 miles per square mile (Lower Joseph Creek Assessment 2001). The assessment identifies which roads and trails should remain open to motorized use.

The 2001 analysis recorded 455 total miles of road of which 372 miles were open roads. Total road density in the watershed was 1.64 miles per square mile and the open road density was 1.34 miles per square mile. The following table presents the Wallowa – Whitman National Forest's Management Plan road densities by management area.

Figure IX-2. WWNF Management Plan's Road Densities by Mgt. Area

MANAGEMENT AREA	ACRES	AREA IN SQ. MILES	MILES OF ROAD	ROAD DENSITY (MILES / SQ. MILE)
1 – Timber Production	28,257	44.15	112.1	2.54
3 – Wildlife / Timber	36,067	56.35	31.4	0.56
7 – Wild and Scenic Rivers	2,500	3.91	0	0
9 – HCNRA Disp Rec / Nat Vegetation	5,629	8.8	10.2	1.16
10 – HCNRA Forage Prod	14,207	22.2	2.0	0.09
11 – HCNRA Disp Rec / Timber	8,898	13.9	36.0	2.59
12 – Research Natural Areas	762	1.19	0	0
15 – Old Growth Preservation	3,885	6.07	0.78	0.13

INTEGRATION

The resource subcommittees involved in the Lower Joseph Creek watershed assessment evaluated all roads to identify current and future management needs. All open roads in the watershed were visited and assessed during Wallowa County's information gathering for the Wallowa – Whitman National Forests Travel Management Plan, or during field assessment in the Hells Canyon National Recreation Area in 2009. For roads where disagreement existed as to current condition, their contribution to ecological concerns or their importance for current or future use, further site surveys were done by the resource subcommittees.

CONCLUSIONS AND RECOMMENDATIONS

The final recommendations of the roads assessment result in an open road density of 1.22 miles per square mile of national forest system lands in the watershed. The recommendations identify seasonal road closures in the Swamp/Davis Creek Area and the Horse Pasture Ridge Area. These recommendations received direct input from the local wildlife biologists from Oregon Department of Fish and Wildlife during the Wallowa County Travel Management committee meetings.

The schedule for and specific method of road maintenance, road reconstruction, road construction and road closure will be determined by future project-level analysis and planning. Issues relative to specifics such as culverts versus rolling dips, gates versus physical barriers, and reshaping of the road surface will be dealt with at that time.

The following figures and tables summarize the critical information relevant to the road system and recommendations.

Figure IX-2 - Current road status on the southern portion of the watershed

Figure IX-3 - Current road status within the center portion of the watershed

Figure IX-4 - Current road status in the north and northeast portion of the watershed

Figure IX-5 - Road treatments identified in previous environmental assessments that have had decision notices signed

Figure IX-6 - Roads recommendations identified by Roads and Recreation subgroup

Figure IX-7 - Road recommendations consistent with current road use and condition.

Figure IX-8 - Road recommendations that will cause a change to current road use status; requiring further analysis and consideration in conjunction with Travel Management Plan

Figure IX-9 - Geographic display of road recommendations consistent with current road use.

Figures IX-5 and IX-6 summarize the priority recommendations generated by the Roads and Recreation sub-committee. Figures IX-7, IX-8 and IX-9 summarize the recommendations resulting from the integration workshop with all other resource use groups.

SUMMARY

The forest, fire and fuels condition analysis identified a significant need for active management to restore forest conditions and resilience to disturbance. In addition, the watershed is a high use recreation area for various types of hunting, multiple gathering opportunities such as firewood, mushrooms, and educations field trips with various interest groups and local colleges. High ridges proved great views and scenic drives. A few local businesses work out of the watershed under special use permits.

The County's priority is to maintain current road use conditions and status. Over 80 miles of roads have naturally closed from lack of use. These provide ample opportunity for the USFS to meet its road density standards by management area. If and where wildlife considerations suggest additional action might be appropriate, seasonal closures should be the default management action. If specific road segments are determined to be causing clear and significant detriment to water quality, further consideration will be given to management options including potential road closure and/or decommissioning. In all instances of potential closure, it is critical that current and projected future needs are considered – including timber harvest, fire suppression, firewood gathering, hunting, camping, other recreational use, etc.

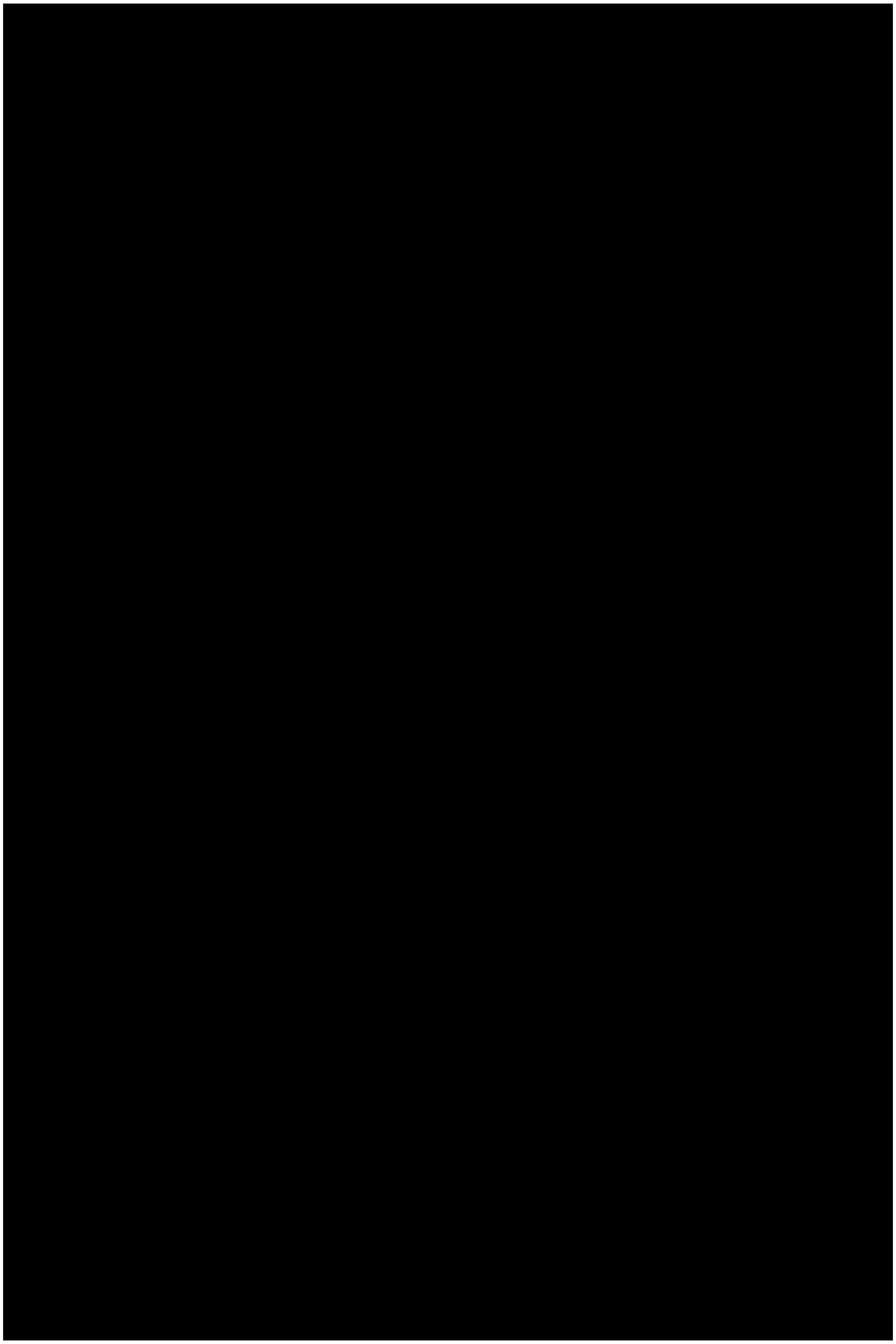


Figure IX-4. Current road status within the center portion of the watershed.

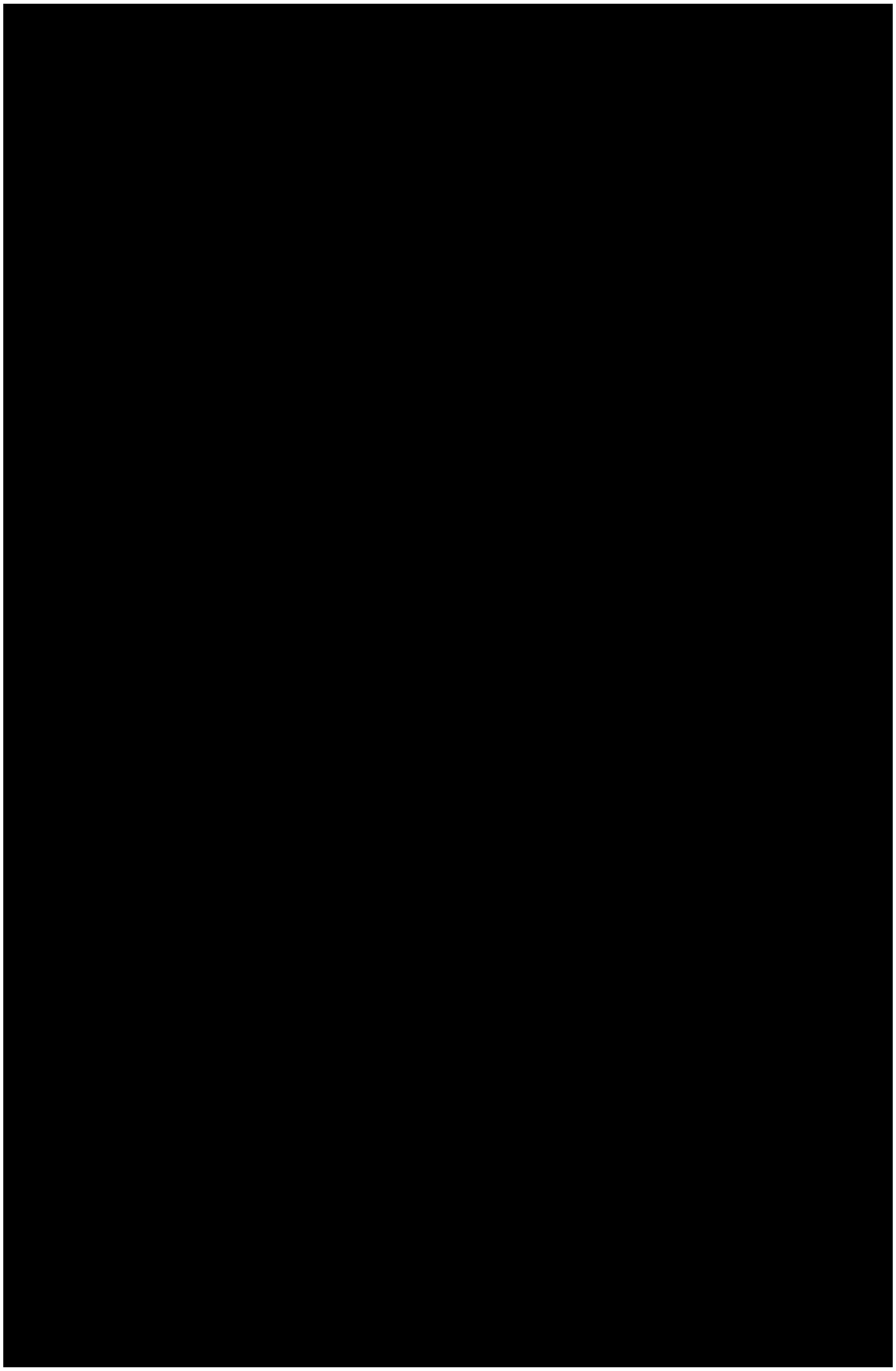


Figure IX-5. Current road status in the north and northeast portion of the watershed.

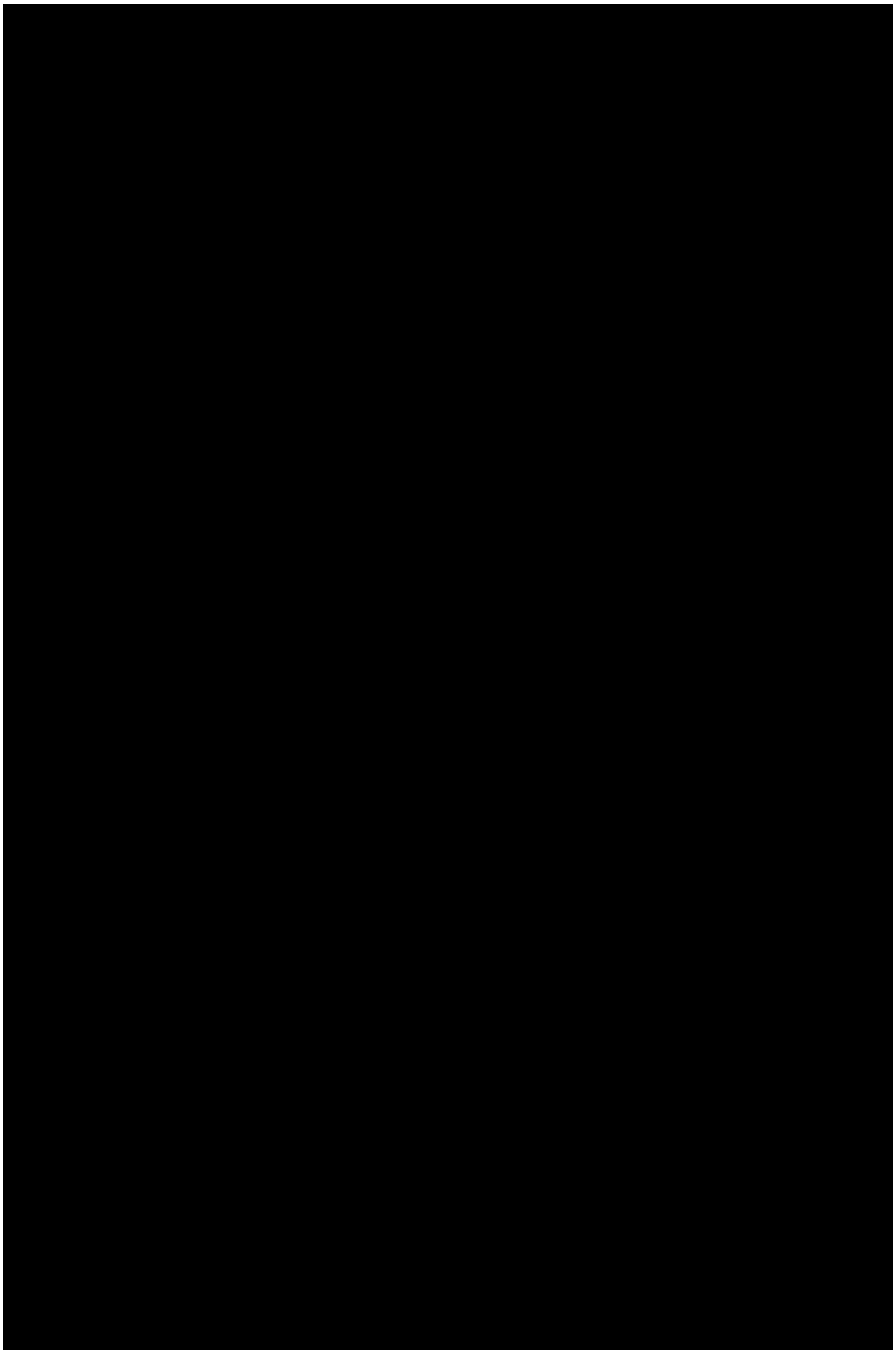


Figure IX-6. Road treatments in previous environmental assessments that have signed decision notices.

VEGETATIVE TREATMENT		
Environmental Assessment	Open Road	Open ATV
Baldwin	4600-495	
	4600-505	
	4600-570	
		4655-065
Lone Dog	4650-130	4600-377
	4650-135	4600-378
	4655-054	
	4655-050	
	4655-052	
	4655-155	
	4655-120	
	4650-150	
	4655-025	
	4655-070	
	4655-160	
	4650-081	
	4600-371	
Hungry Bob	4600-060	
	4600-069	
	4602-040	
	4602-080	
	4602-085	
	4602-120	
Bugcheck	4615-090	

Figure IX-7. Potential roads recommendations identified by Roads and Recreation subgroup.

ROAD NUMBER	PROJECT
4600-347	pull culvert, rock crossing
4600-192	pull culvert, rock crossing, and fix slide area
4655-045	fix creek crossing, rock
4655-200	fix creek crossing, rock
4600-381	pull culverts, rock crossing – ATV access
4600-382	pull culverts, rock crossing – ATV access
4600-390	pul culverts, rock crossing – ATV access
4600-394	pull culverts, rock crossing – ATV access
4600-505	stormproof – ATV access
4600-545	stormproof – ATV access

In a meeting held July 13, 2009 at Cloverleaf hall between the Wallowa County Travel Management subcommittee representatives (Rod Childers, Bruce Dunn and John Williams) and Vick Coggins and Pat Matthews of Oregon Department of Fish and Wildlife discussed Travel Management Planning in Wallowa County. ODFW indicated support for the County's survey results as long as it addresses resource concerns and the identified elk security areas.

During the meeting the following was discussed and agreed upon:

Support the use of designating wood cutting areas each year. This would be especially useful following storms or any other activity resulting in tree mortality

Suggest that ODFW be consulted in designating woodcutting areas.

Recommend the use of gate closures as preferred method when closing roads while working to reduce open road density to less than 2.5 mi/sq. mile within Wallowa County (Wallowa County Travel Management subcommittee, 2009).

Reducing open road densities was a major wildlife concerns. Emphasize closing lightly or unused roads where multiple roads go to the same destination, particularly in high road density areas, and use of seasonal closures to reduce impact on wildlife

Instead of spending money on decommissioning roads that the funding should be used to purchase and install signs and/or gates to allow seasonal or year around road closures.

HORSE PASTURE RIDGE

The following roads should remain open: (unless snow closure)

4655 000

4655 045

4655 095; and

4655 047

All other roads found open in that area by the county survey will be left open except for a seasonal closure that will use current green dot system from three days before the first elk season through the final day of the Chesnimnus Bull hunt. There was no agreement on the ATV trails.

DAVIS

There was agreement on the roads as presented by the county survey including the Swamp Creek road that is currently closed with administrative use only. There was no agreement on the ATV trail use.

ROADS INTEGRATION:

Resource groups provided road recommendations with the key resources being: Riparian, Roads/Recreation, Range

Road discussion points during integration:

Integration – Most actions related to stream crossing and culverts.

- Lack of common reference for definitions – storm proofing, de-commission, closed, etc.
- Some recommendations from previous NEPA
- Seasonal access
- Resource needs vs. roads recommendations - access where, how long, etc.
- Leave any changes of current road status to (TMP) Travel Management Plan (consideration needed for future projects – dependent on access – adds complexity)

During integration it was agreed that the Lower Joseph Creek Watershed Steering Committee would determine the best approach on roads recommendations:

The following was decided:

1. It was recognized that the TMP was also underway and a recommendation that would change the current road use status would be left for the TMP. Example: a Lower Joseph Creek Watershed recommendation to decommission a road and the current road status is open and in use.
2. To identify roads currently under an existing NEPA document that could potentially have the work shelf ready for implementation.
3. List what resource made recommendation, what it was, is the road segment under NEPA, is recommendation consistent with current road use status.

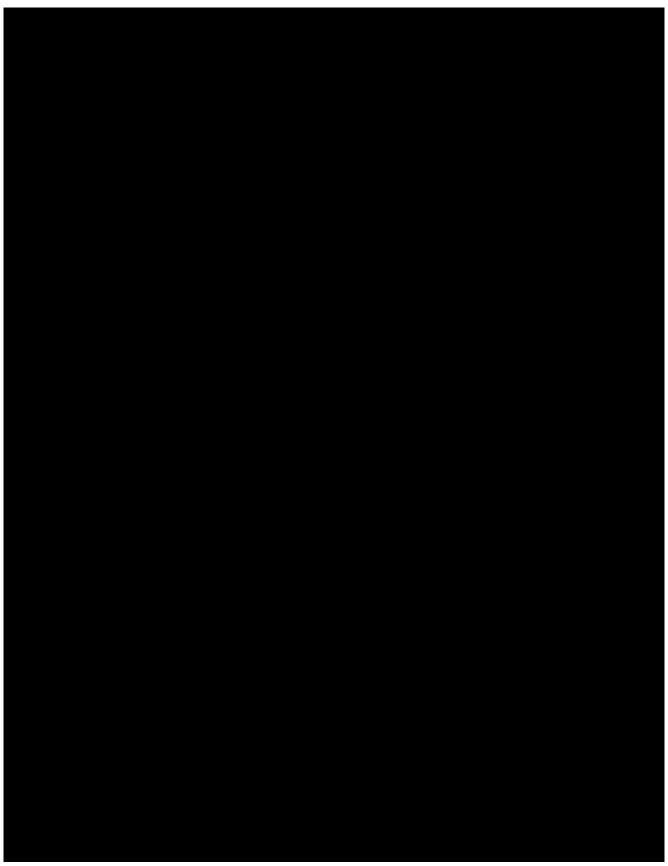
Table IX-1. Road recommendations consistent with current road use

ROADS RECOMMENDATIONS SUMMARY	
Treatments recommendations **consistent** with Current Road Use	
TOTAL road segments = 28	
NEPA done	needing NEPA
16	12
Available for funding and implementation	Complete NEPA Evaluate on severity of conditions on segment by segment basis.
A.= Roads recommendations that are consistent with the current road status and can be moved forward. 16 are shovel ready with completed NEPA and 12 will need NEPA completed.	

Table IX-2. Road recommendations that will cause a change to current road use status

B. ROADS RECOMMENDATIONS SUMMARY	
Treatment recommendations **changing** Current Road Use	
TOTAL road segments = 18	
NEPA done	needing NEPA
13	5
Leave for TMP	Leave for TMP
A.= Roads recommendation that will change the current road use status and are being left for the TMP.	

Figure IX-8. Geographic display of road recommendations consistent with current road use. Multiple recommendations may apply to one specific road number.



There were 46 road segment recommendations put forth from multiple resource groups. Twenty-eight recommendations were identified as consistent with current road use status. Some roads received more than one recommendation depending on specific issues for that area of road.

For instance, road segment 4600-347 received two recommendations: 1. Riparian – maintenance on multiple sections of road within 200 feet of the stream. 2. Roads and Recreation – pull culverts and rock crossing.

X. Socio-Economic Analysis

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INTRODUCTION

The citizens and leaders of Wallowa County have consistently confirmed the importance of natural resources as the central sector for Wallowa County's economic development – recognizing the importance of natural resources to farming, ranching, forestry, to private contracting and value-added manufacturing, as well as to tourism, recreation and the arts. Recent benchmarks for such confirmation are the 1996 Strategic Plan for Economic Development, the 2007 Regional Design Assistance Team Report, and the 2013-2018 Comprehensive Economic Development Strategy.

This strategy notes *"…public lands are not being managed in a way that enhances our regional economy or the communities within the region. A local collaborative planning approach could result in federal land management practices that better support the local economy. Key economic interests include: local government (including schools), timber/secondary wood products, forest health / fire management, minerals, grazing, and tourism/recreation."*

Infrastructure and workforce are key to creating jobs. Creating and retaining jobs, attracting working age families, and retaining young adults in the work force are critical to revitalizing Wallowa County. Given the significant distance to urban markets, and the relative isolation from regional economic clusters, this is no easy task. But the County hosts considerable natural resource wealth – assets that can be managed and cared for to produce a broad range of social and economic benefits, while still maintaining and enhancing critical ecosystem function and condition, as well as habitat for a diverse range of native wildlife.

Appropriately managing, utilizing and protecting these natural resources provides direct and indirect economic benefits to the county. Tourism and recreation generate some local economic returns but do not offset cumulative timber industry job and goods and service business losses that have occurred over the past decade. These losses have contributed to the three Northeastern Oregon counties, including Wallowa, as categorized by the State of Oregon as distressed based upon unemployment persistently above the state average.

Wallowa County recognizes its stewardship role. It has committed to these responsibilities in its Land Use Plan, the associated Wallowa County Nez Perce Tribe Salmon Habit Recovery Plan, and other plans, agreements and collaborations.

DEMOGRAPHICS

Wallowa County's population has fluxuated over the last 100 years, ranging from 8,364 people in 1910 to 7,102 people in 1960, to an estimated 6,814 people in 2013.[1] The county has experienced a 2.8 percent loss in population from April 1, 2010 to July 1, 2013 and county residents are trending upward in median age. The median age of Oregon residents in 2010 was 38.4, while Wallowa County Wallowa County had the highest median age of any county in Oregon at 50.8.[2] Approximately 56% of Wallowa County residents are working

[1] U.S. Census Bureau, State and County Quick Facts: Wallowa County, Oregon
[2] U.S. Census Bureau

age (20-64 demographic) with 23.21% 65 years of age or older. Wallowa County is among the eight slowest growing counties in the state, with a negative rate[3].

Fourteen percent of the residents of Wallowa County have incomes below the poverty level compared to the statewide county average.

Attaining a sufficient level of income to raise a family in Wallowa County based on the average earnings per job in the County can be difficult. Wallowa County's real average earnings per job are much lower than Oregon or the U.S. Wallowa County's average earnings $26,503 per job are 35th out of the 36 counties.[4] (Wheeler County has lower average earnings per job than Wallowa County.) The comparatively low average earnings per job may make recruiting younger workers to fill the gaps left by retirees difficult.

These economic metrics are well understood by local decision makers and the public. They are consistent with many other natural resource dependent economies as scientific discoveries and technological innovations have dramatically reduced the labor required per unit of output in both the agricultural and timber industries over the last century. These basic sectors of the economy became much more efficient. The service industries also became much more efficient and more competitive with sales by catalogue, internet, and big box retailers making it very difficult to maintain a main street business.

While these efficiencies have lowered the prices of goods and services to the consumers, they have also intensified the struggle to maintain population and income particularly in communities that are more distant from large markets or at least transportation links. Policy changes in the utilization, particularly of publicly owned natural resources, have also significantly increased the economic stress on Wallowa County.

FOREST ADMINISTRATION & ORGANIZATION

Wallowa County contains 2,034,000 acres of land, 58% public land and 42% private land. Over 400,000 acres – nearly 20% - of Wallowa County lands have been designated wilderness by the U.S. Government, including the Eagle Cap Wilderness and the Wenaha/Tucannon Wilderness areas. The county is also home to part of the Hells Canyon National Recreation Area.

The process of establishing these protected areas began many decades ago. On November 26, 1953, the U.S. Forest Service combined Wallowa National Forest with the Whitman National Forest, creating one administrative unit: the Wallowa-Whitman National Forest. Physical forest boundaries remained the same; the consolidation was in the administration of the two forests. Consolidation was completed July 1, 1954.

[3] http://www.usa.com/rank/oregon-state--population-growth-rate--county-rank.htm?sb=ASC&tag=Slowest+Growing+Counties+in+OR

[4] Northwest Area Foundation 1969-2007: Bureau of Economic Analysis, Regional Economic Data, Locatl Area Personal Income, Table CA34

In 1960 the Multiple Use Sustained Yield Act (MUSYA) was passed. This act expanded the management considerations of the Forest Service and the Bureau of Land Management. Pursuant to the 1897 Forest Service Organic Act, the Forest Service had been managing the national forests for timber supply, watershed protection, and forest preservation. MUSYA enacted a broader range of uses for the national forest lands including outdoor recreation, range, timber, watershed, and wildlife and fish. The act directs the Secretary to manage renewable resources for multiple uses. From that point forward, rangeland health, and hence livestock grazing, is one of the five main purposes managed for on national forest lands.

The federal government passed the Wilderness Act in 1964. By 2004, the total number of acres designated as federal Wilderness Areas in Wallowa County exceeded 400,000. One of the reasons that congress moved to declare wilderness areas was to protect endangered/threatened species. The major endangered/threatened species designations that have affected Wallowa County have been the Snake River Chinook Salmon in 1992, the summer steelhead in 1997, the bull trout in 1999, and Spalding's Catchfly in 2001.

The 1992 listing of the Snake River Chinook Salmon was the first listing of an anadromous fish in the United States, and spotlighted areas with the salmon. Wallowa County happened to be one of those areas.

The listing of the summer steelhead in 1997 and the bull trout in 1999 increased the complexity of the fisheries issues in relation to livestock and timber production. The Chinook salmon listing affected the Wallowa River stream complex, the Grand Ronde River, the Wenaha River, and the Snake River. When the summer steelhead was listed in 1997, all of the streams listed for the Chinook salmon plus the Joseph Creek Complex of streams were impacted. Then in 1999, the bull trout listing affected the upper reaches of all the previously mentioned streams.

The combined effect of these three listings is that virtually all of the stream courses in Wallowa County are now overlaid with an endangered species listing. Such listings require mitigation measures be incorporated into management activities to ensure these activities are not harming the listed species, which in turn causes increased time and money. These restrictions have significantly impacted economic returns from the county's forestlands and altered the resource of this area.

From the 1950's until 1992 the annual harvest from National Forest land in Wallowa County averaged 50 to 100 million board feet year, the highest in 1962 of 129 million board feet. Since 2000, the saw timber volume harvested from the National Forest Land in Wallowa is between 0 and 10 million board feet per year with an average harvest of less than 5 million board feet per year. Economic repurcussions have been short and long-term as the major employers of the county – working sawmills and associated contract operators such as loggers and haulers – were hard hit from harvest restrictions and policy and litagatory issues even constrained forest health projects. The last working sawmill of the county closed, resulting in the loss of more skilled jobs.

The constraints that came from the endangered species act list were identified in the Northwest Forest Plan (Spotted Owl plan) screens. Those screens important to Wallowa County are: Riparian Buffers, Eco screens (late and old structural phases of the forest), 21 inch diameter limit and Wildlife corridors.

In 1997 the dirt foresters of Wallowa County met to define the level of sustainable volume that could be expected from National Forest land with the east side screens in place. The meeting discussed both hard constraints and soft constraints and how they limited acres available for harvest. Hard Constraints were defined as constraint imposed by Congress and Soft Constraints were constraint imposed by rule. In that meeting, the following acres were identified:

Table X-1. Constraints to Sustainable Volume from National Forest Lands, 1997

CONSTRAINTS TO SUSTAINABLE VOLUME FROM NATIONAL FOREST LANDS, 1997			
Total national forest system land acres in Wallowa County (ac.)		1,387,231	100%
Hard constraints, other ownerships and natural attributes			
Wilderness acres	570,361		
Non-forested acres outside wilderness within WV and EC Ranger Districts	97,663		
Private land in-holdings (ac)	73,707		
Research Natural Areas (ac)	12,707		
BLM and State Lands (ac)	397		
Sub-Total Hard Constraints		754,035	54%
Hells Canyon NRA (non-wilderness, all federal ownership) (ac)		399,246	29%
Low production forestland (less than 20 cubic ft/acre)		24,000	2%
Acres available for commercial silviculture		209,950	15%

Of the 1,387,231 acres of land within the national forest system boundaries, 209,950 acres (15%) are potentially available for commercial silviculture activities, e.g. timber harvest.

Approximately 750,000 acres (54%) of the total national forest system lands are forested. Of the total forested acres, only 28% (209,950 acres) are available for commercial silviculture activities and more readily accessible for the types of active restoration treatments prescribed by Franklin and Johnson. The vast majority of the forested area within the national forest system boundaries is currently protected from commercial activities and any mechanical restoration by the existing wilderness area designations.

In 1997, the acres potentially available for commercial silviculture were considered to be further restricted by a series of “soft” policy constraints or their current stand conditions.

Table X-2.Constraints to Commercial Silviculture Due To Policy Constraints or Stand Condition, 1997

CONSTRAINTS TO COMMERCIAL SILVICULTURE DUE TO POLICY CONSTRAINTS OR STAND CONDITION, 1997			
Acres potential available for commercial silviculture activities		209,950	100%
Soft policy constraints			
Riparian buffers	52,490		
Eco-screens	5,000		
Wildlife corridors – provided by riparian corridors	0		
Sub-Total Soft Constraints		57,490	27%
Constraints from current stand conditions (1997)			
Clear-cut equivalents	23,479		
Green Tree Snag Replacement	1,174		
Stand Initiation Phase	12,780		
Sub-Total Stand Condition Constraints		37,433	18%
Acres available for commercial silviculture		115,027	55%

The numbers relative to the soft policy constraints and stand conditions have changed since 1997 – with further policy restrictions but fewer acres restricted by stocking condition. However, the larger picture from this analysis is important – there are significant hard and soft constraints protecting large areas of the federal forests within Wallowa County.

Furthermore, it is critical to note that the forested acres within the Lower Joseph Creek Watershed project area account for a significant amount of the forested land available for commercial silviculture. A coarse assessment indicates that forested land makes up more than 50,000 acres of the federal land in this watershed. More than 33,500 acres of these acres fall outside soft policy constraints (riparian buffers, old growth areas and inventoried roadless areas). These acres account for approximately 29% of the total acres available for commercial silviculture (115,027 acres) in the 1997 analysis.

The economic analysis of Lower Joseph Creek utilized the reports of all the other subgroups. It took the lists of outputs identified by the assessments and utilized a focus group to identify the values of the various outputs. The outputs were classified as either higher priority or lower priority. This classification mostly identified at what speed the expected outcome would occur. The highest priority is expected to be accomplished in the first round of activity (within 10 years). The lower priority activities were identified to be accomplished within the ensuing 10 years.

The first analysis is a gross assessment based solely on the outputs as identified by the watershed assessment and not reducing any expected outputs by any of the soft constraints discussed previously. There were two types of outputs identified, outputs that produced a saleable product such as timber harvest, and outputs that generated economic activity that would occur in the county but would not produce product immediately such as thinning or fencing or off-site-water improvements.

ECONOMIC DATA VALUES

FORESTRY AND FUELS

In determining the forestry and fuels economic value the data used was from the contractor's field analysis and the professional opinion of the members of the Wallowa County Natural Resource Advisory Committee.

The data collected revealed 20,000 of very high-risk acres due to fuel loads and overstocking of trees that could be commercially harvested. It was decided to defer 4,000 of these acres because they occurred in designated old growth areas leaving 16,000 acres to be treated. The high risk acres yielded and gross volume per acre of 8.8 MBF (thousand board feet, one board foot is a board 1 inch thick, 12 inches wide, and 1 foot long). The defect, reduction of sound wood from various types of rot and/or crooked material, associated with this volume was estimated to be 25 percent. By reducing the gross volume per acre by the defect the net volume of 6.6 MBF was obtained. This is the volume that was used in the economic analysis.

The various percent of trees species was determined in the contractor's field data collection:

- Ponderosa Pine - PP (10%)
- Douglas-fir/western larch - DF/L (45%)
- White Fir - WF (40%)
- Lodgepole pine/Engelmann spruce - ESLP (5%)

The value of the various species of sawlogs (PP @ $325/MBF, DF/L @ $395/MBF, WF @ $345/MBF, and ESLP @ $300/MBF) was open market delivered log prices from the third quarter of 2013 at Boise Cascade Corporation plants in Elgin and LaGrande Oregon.

Tons per acre of fuel load both on the ground and dead limbs attached to trees were gathered in the contractor's field data collection. The Fuel Treatment Specialist estimated a recovery of 1 MBF per acre (on 30% of the treated acres) of sawlogs at an average value of $363/MBF (developed using percent of various species and value of those species to BCC) and 25 tons per acre pulpwood at a value of $34/ton (delivered to Clearwater Paper

Company in Clarkston Washington) on those stands that were to be treated for fuels reduction (21,370 acres) and not considered commercially harvestable.

On these acres (to be treated for fuels reduction and not commercially harvestable) the US Forest Service cost estimates for fuels reduction and ladder fuel reduction (pruning) at $200/acre, hand piling at $400/acre, burning of hand piles at $10/acre and prescribed burning at $75/acre.

The total value of the above treatments is $67,690,468.

The same values and percentages used in the very high-risk commercial and non-commercial stands above were used in the development of the value to lower value stands to be treated in future. The future treatment acres of commercially harvested stands is 24,000 and the future treatment acres of non-commercial stands is 23,925.

The total value of the above treatments is $46,509,000.

ROADS

In determining the roads economic value the data used was from field analysis and the professional opinion of the members of the Wallowa County Natural Resource Advisory Committee.

Road work is needed on seventeen roads in the Lower Joseph Creek Watershed, including spot rocking with pit run rock (3 inches or less in size), installing of rolling dips (to intercept and divert water and sediment from road surface), culvert removal, sub grade reinforcement, culvert replacement, culvert removal replaced with rock crossing, and gravelling with crushed rock (3/4 inch or less in size).

The list of materials that could be used on the road projects include: pit run rock, crushed rock, culverts, and filter cloth (material that allows water to flow through but not rock or sediment).

The list of equipment to be used on the road projects include: lowboy and truck for moving equipment, excavator, frontend loader with bucket, crawler tractor, motor patrol (grader), vibrating grid roller, and dump trucks.

- Spot rocking and rolling dip installation on 4 roads. This work entails the construction of 65 rolling dips with placement of pit run rock with a value of $60,975 for materials and a value of $90,478 for equipment (lowboy and truck, excavator, frontend loader with bucket, crawler tractor, vibrating grid roller, and dump trucks).
- One culvert replacement. The value of the materials, culvert and pit run rock, is $1,800 and the value of the equipment is $1,600 (lowboy and truck, excavator, frontend loader with bucket, and dump trucks).
- Placement of crushed rock on one road. The value of the materials, crushed rock is $5,148 and the value of the equipment is $7,266 (lowboy and truck, dump trucks, vibrating grid roller, and motor patrol).
- General maintenance that includes drainage, spot rocking, and sub grade reinforcement on 26,730 feet of five roads. The value of materials (e.g. pit run rock

and filter cloth) is $53,388 and the value of the equipment is $77,082 (lowboy and truck, frontend loader with bucket, vibrating grid roller, and dump trucks).

- Pull culverts and rock the crossings occur in 36 locations. The value of the materials, pit run rock is $41,067 and the value of the equipment is $139,770 (lowboy and truck, frontend loader with bucket, excavator, and dump trucks).

The total value of the above treatments is $478,574.

RANGE

In determining the range economic value of the range assessment the data was from the range analysis conducted, input from the landowners and permittees in the in the watershed and the and the professional opinion of the members of the Wallowa County Natural Resource Advisory Committee.

The range work needed on the Lower Joseph Creek Watershed included fencing, both new and rebuilding, trail work, cleaning and maintaining ponds, spring development s and upgrades and rock water gaps or livestock/wildlife water sources.

More specifically 20.5 miles of fence including repairs, new fence and rebuilt fence; trail work on three miles mostly on trails passing through previous fires where blow down has made the trails unpassable; cleaning and maintaining 21 ponds; spring development or redevelopment in 5 locations; and rocking and reworking a water gap in one location.

- Fence: 5 miles of repair, 3.5 miles of new fence, and 12 miles of rebuild. It was estimated that new fence or fence rebuild would cost $2.90 per foot ($15312. Per mile). No price difference between rebuild and new due to remote locations and the need for mostly new material. Total value $237,321. Fence maintenance of 5 miles, assuming 1 mile/day, 10 hr day @ $25/ hour. Estimated cost $250 per mile. Total cost $1250.
- Trail work: 3 miles. Estimated cost of removing blow downs from previous fires ($500 per mile.) Total value $1500.
- Pond work: Twenty-one ponds. Estimated cost per pond of $400 based on actual experience of Ranchers using a trackhoe. Total cost of $8400.
- Spring developments: 5 springs. Each spring development is estimated to cost $1250. Total cost $5250.
- Water gap development: one water gap. The water gap cost including rock, fencing and landscaping the appropriate slopes etc. is $2,000.

The total value of the above treatments is $255,736.

ECONOMIC ESTIMATE OF FIVE AND FIFTEEN YEAR PROJECT EFFECTS

The total expenditures or value of the product received is not the total value of those dollars to a community. As those dollars work through the economy, they “respent” by others and “multiply” before leaving the community. This economic value is captured in the following data by Bruce Sorte, based on his analysis of the potential impact of investments in the Lower Joseph Creek Restoration Project using an input/output model.

Wallowa County is a natural resource dependent county that has experienced significant negative economic shocks over the last two decades from reduced logging in public forests. Projects associated with LJCW restoration and management have the potential to utilize underemployed people and capital resources to provide some level of mitigation to those negative shocks.

The following estimates are only for Wallowa County and are made based on tasks that will be completed within five years and tasks that will be completed in 15 years.

Table X-3. Five and Fifteen Year Task List Summary

FIVE AND FIFTEEN YEAR TASKS – PROJECT LIST	
FIVE YEAR TASKS	**FIFTEEN YEAR TASKS**
● 16,000 acres of silvicultural treatments – Timber Sales and Stewardship Contracts ● 21,370 acres of fuel reduction – commercial thinning, pre-commercial thinning and prescribed burning ● 17 road maintenance projects ● 20.5 miles of fencing – mostly rebuilding, about five miles of new fence ● 10 miles of trail work ● 21 pond maintenance projects ● 6 spring projects ● Rock water gap on Swamp Creek	● 24,000 acres of silvicultural treatments ● 12,925 acres of fuel reduction ● 11,000 acres of prescribed burning under acres previously treated in fifteen-year tasks

Many of the direct, indirect and induced economic effects (please read below for definitions of these terms) that “leak” out of the County will be “captured” by other Oregon counties. The economic effects estimated at the State level would be approximately 40% higher than the Wallowa County estimates. The key economic effects within the County are:

- Total expenditures of $114,933,778 for watershed enhancement can provide $146,968,942 in total economic output or sales effects over a fifteen-year period.
- Annual economic effects for the first five years were estimated: output, $21,300,250, total value added or income portion of output, $10,868,814, and employment both full and part-time jobs, 255 and for each of the remaining ten years: output, $4,046,769, total value added or income portion of output, $2,034,329, and employment both full and part-time jobs: 46.

These economic effects will be greatest in the logging, forestry support services, accommodations and food services sectors however, their respending effects will contribute to more than 90% of the business sectors.

Definitions:

- Resident contractors: Contractors with business homes within Wallowa County
- Direct effects: Contracts for the watershed enhancement tasks and expenditures by nonresident contractors for food and lodging within the County
- Indirect effects: Purchases from suppliers
- Induced effects: Workers and proprietors spending their earnings from the watershed project
- Output: Amount spent on products or services for sales within the region
- Total value added (Income): Output minus those intermediate goods or inputs that are purchased outside the County
- Employment: Full and part-time jobs

METHODS AND ASSUMPTIONS

County resident professionals with experience in natural resource production processes ground truthed the 2011 Wallowa County IMPLAN out-of-the-box input/output model and the following model edited the model to reflect their estimates. Watershed tasks were also analyzed to determine the percentage of expenditures that would be made to nonresidents and residents. All of the logging was projected to be done by resident businesses and forty percent of the support services were projected to be completed by resident businesses. In addition, twenty-five percent of the expenditures to nonresident contractors was projected to be used for lodging and feeding workers while they were completing the work. All of those lodging expenditures or twenty five percent of the sixty percent of nonresident payments were projected to be evenly split between accommodations and food services within the County.

ANALYSIS

The results of these estimates are shown in the three tables that follow.

Table X-4. Annual Economic Effects for the Five Year Tasks

Annual Economic Effects for the Five Year tasks			
Impact Type	Employment – Full and Part Time Jobs	Total Value Added or Income Portion of Output/Sales ($)	Output or Sales ($)
Direct	170	6,330,382	12,829,119
Indirect	8	520,757	1,047,429
Inducted	31	1,983,346	3,376,932
Total	209	8,834,485	17,253,480

Table X-5. Annual Economic Effects for the Fifteen-Year Tasks

Annual Economic Effects for the Fifteen Year Tasks			
Impact Type	Employment – Full and Part Time Jobs	Total Value Added or Income Portion of Output/Sales ($)	Output or Sales ($)
Direct	37	1,453,530	3,018,430
Indirect	2	122,829	248,581
Induced	7	457,970	779.758
Total	46	2,034,329	4,046,769

Table X-6. Aggregate Total Economic Effects for the Five and Fifteen Year Tasks

Aggregate Total Economic Effects for the Five and Fifteen Year Tasks			
Impact Type	Employment – Full and Part Time Jobs	Total Value Added or Income Portion of Output/Sales ($)	Output or Sales ($)
Direct	207/37	53,454,862	109,422,045
Indirect	10/2	4,446,215	8,965,867
Induced	38/7	16,786,278	28,581,030
Total	255/46	74,687,355	146,968,942

CONCLUSIONS

Wallowa County's economic history has been based on natural resource use since the beginning of ranchers moving into the county in the late 1800's. For much of the 20th century logging and sawmills were a major piece of the economy with significant harvest coming from both the private and public lands. Since the restrictions imposed by the Endangered Species Act, the clean water act and other rules and regulations the harvest of timber from public lands in Wallowa County has been reduced significantly.

The Lower Joseph Creek watershed assessment is the latest effort of the combined community of partners to improve the watershed conditions, reduce the very high risk of catastrophic fire while producing product to support the local community. Estimates from the late 1990's by foresters show that only a small portion of the national forest lands (approximately 115,000 acres at that time, may be somewhat larger than that currently) are available for watershed improvements, harvest. Our assessment of the total Lower Joseph Creek Watershed showed significant need for improvements to occur. These included actions to reduce the overstocked forest, improve the road system, and add improvements to the range to help cattle distribution and management. The 177,929 acre watershed includes approximately 50,086 acres of forested land.

Twenty thousand of those acres were of very high risk due to fuel loads and overstocking of trees that could be commercially harvested. An additional 21,370 acres not considered commercially harvestable were recommended to be treated for fuels reduction. These acres yielded a total value of **$67,690,468** if all actions the watershed assessment deemed needed were accomplished.

An additional 24,000 acres of commercially harvested stands is needed in the future and an additional treatment acres of non-commercial stands is 23,925. These additional acres would yield a total value of **$46,509,000** in today's dollars.

Road work showed a total value of **$478,574** to spot rock, install rolling dips, replace culverts, add crushed rock to a road, pull culverts create rock crossing. These actions include over 100 locations on multiple roads.

Range improvements showed a total value of **$255,736** to improve fences, build some new fence, open trails, conduct pond work and spring developments or redevelopments and fixing water gaps.

The total expenditures of these watershed activities and products is **$114,933,778** for watershed enhancement can provide **$146,968,942** in total economic output or sales effects over a fifteen year period.