

Forest Condition Assessment

Forest Condition Assessment Methodology

Under Wallowa County's Upper Joseph Creek Watershed Assessment process, the Forest Condition Working Group¹ devised a revised forest condition assessment methodology, which builds on the existing USFS system. The assessment focused on structure, function, composition and disturbance agents. Camp II Forest Management conducted the forest assessment on the 76,159 acres of public land in the Watershed from September to December 2001.

Canopy cover was used to designate stand boundaries. Stand stratification used canopy cover classes of 0-10% (non-forested), 10-40%, 40-70%, and 70%+. Of the total public acreage, 53,968 acres (71% of the area) were designated as forested (i.e. > 10% canopy cover). Forested lands were divided into 650 stand polygons averaging 83 acres in size. Non-forested land accounted for 22,121 acres broken into 560 polygons averaging 40 acres in size.

Field assessment took place in each of the forested stand polygons. Transects of at least 660 horizontal feet were established in all plots less than 40 acres. Stands larger than 40 acres were assessed along transects of at least 1320 feet. On each transect, a minimum of five observation points were established, marked and labeled. At each observation point, tree layer information and relative species cover by layer was obtained with a variable plot. Trees per acre and snag densities were measured with a fixed radius plot. Fuel loads were summarized following the walk-through, with a comparison to a USFS photo series. Damage, growth assessment, crown ratios, forest health evaluations, and wildlife habitat analysis were recorded in a written summary prior to exiting the stand. USFS and Wallowa Resources staff performed periodic quality control in the field, conducting assessment protocol in randomly selected plots and comparing the data with that secured by Camp II Forest Management. This random re-sampling confirmed the high quality of the data, with one exception – snags were undercounted in the initial plots. Additional details of the assessment methodology and data captured are provided in *Appendix 3: Forest Condition Assessment Description* and *Appendix 4: EVG Data Entry Form Definitions*.

Overview of Conditions

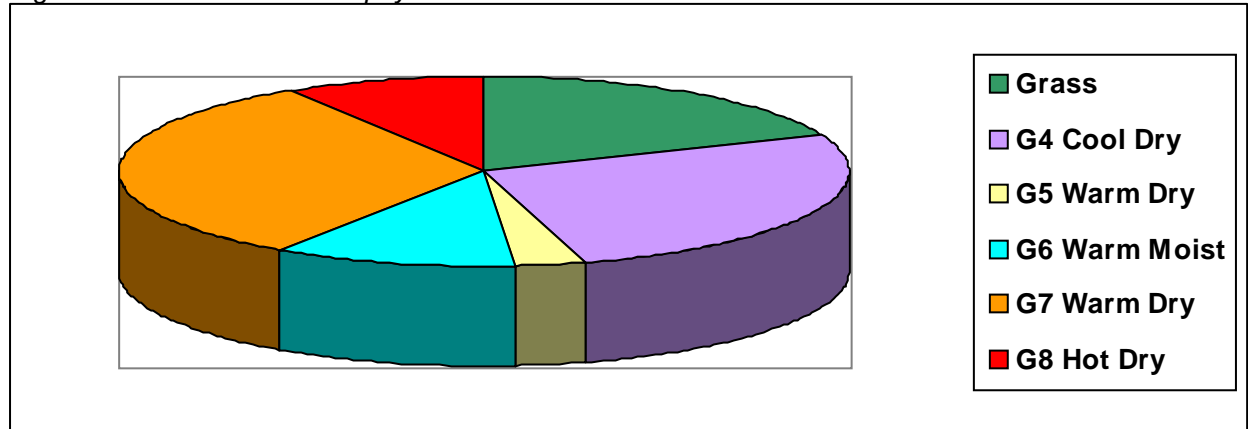
Forest vegetation of the UJC Watershed is characterized by a wide variety of vegetation types. A description of these vegetation types by biophysical environment is provided in *Appendix 5: Biophysical Environments*. Existing stand structures and associated species composition vary with landform, elevation, aspect, soil condition, and precipitation gradients.

The forested lands are dominated by warm dry Ponderosa pine – Douglas fir stands (G7) in the south and cool dry Grand fir (G4) stands in the north. Together these two forest types comprise 59% of the forested land base within federal ownership. Cold dry (G1) and cool moist (G2)

¹ Participants in the working group are identified in *Appendix 2: Participants*.

forests represent less than 0.25% of the area, and are not included in the pie chart below. Grasslands constitute 19% of the federal ownership. Forest types were assigned according to the biophysical environment classification adopted by the Interior Columbia Basin Ecosystem Management Project (ICBEMP)².

Figure III-1. Distribution of Biophysical Environments within the watershed



Changes in the structure and composition of forest vegetation are caused by succession and disturbance. These changes affect ecosystem function, as well as the value humans place upon ecosystems for commodity production and amenities. Vegetation changes through succession in the absence of disturbance. Planned (e.g. timber harvest, prescribed fire, domestic livestock grazing) and unplanned disturbance (e.g. insect and disease, wildfire, wildlife herbivory, flood, winds) cause transitions to different successional classes or hold back such changes.

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:

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

² Descriptions of the dominant plant associations within these biophysical environments are in *Appendix 5: Biophysical Environments*.

In the absence of disturbance, older forests will perpetuate the Multistory Stands with Large Trees (MSLTC) or Single Story Large Tree (SSLT) with the later prevailing in the warmer, dryer Ponderosa Pine sites with frequent ground fires. Where exotics dominate in a non-forested condition, it takes longer for the succession to Stand Initiation. In Stand Initiation, tree seedlings and saplings reach more than 50% canopy cover, usually distributed in clumps. In the Stem Exclusion Closed Canopy (SECC) structural stage, tree saplings and poles are dense, and the understory shrubs, grasses and forbs are the least abundant compared with other stages. Once some of the trees die, others regenerate to create the Understory Reinitiation (UR) structural stage. In UR stands, there is a separation between the overstory trees and establishing understory trees in the mortality induced gaps. Eventually, in the absence of disturbance a Multistory Stand develops with large trees unless these have been removed by timber harvest or killed by insect or disease.³ (*Appendix 6: Structural Stages of Stand Development* contains definitions and photographs of various stand stages in UJCW.)

Analysis of the 2001 assessment results reconfirmed the principal finding of the 1995 Upper Joseph Creek Watershed Analysis Report prepared by the Wallowa Whitman National Forest, USFS. The integrity of forest ecosystems within the UJCW has been compromised to various degrees due to:

- The removal of large, early seral over-story trees (especially Ponderosa pine, Douglas fir, and Western tamarack)
- The departure from native disturbances (e.g. active fire suppression, and periods of increased grazing), and,
- Successional processes influenced by human management over the last century, including the abrupt decline in management activity on public forest land since the early 1990's.

The recurring droughts (1986-1994, and 1999-2005) affecting Northeast Oregon exacerbate the impact of these factors on forest ecosystem functioning (*see Palmer Drought Index for Northeast Oregon on following page*). The current long-term drought (1999-2005) is the most severe since the dust bowl years of the 1930's.

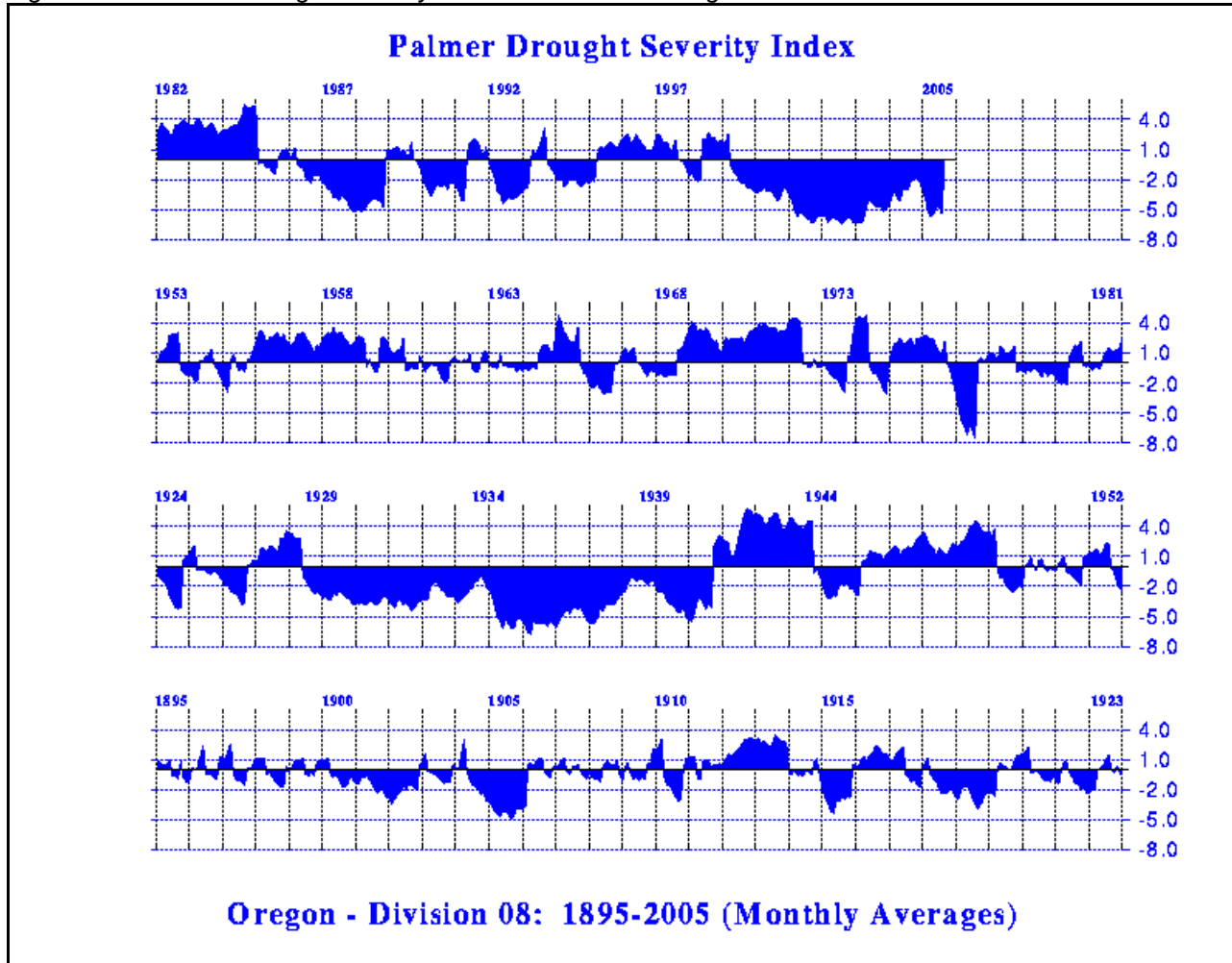
Healthy ecosystems, with high integrity, exhibit the ability to absorb and recover from disturbances without losing their inherent function. Natural fire regimes and common (endemic) insect and disease activity play a significant role in the cultivation of vegetative integrity within the Upper Joseph Watershed. Landscape patterns across any area and over time are shaped by the inherent dominant disturbance events associated with the site. In eastern Oregon, natural disturbance regimes functioned to create a variety of structural patterns across the landscape.

As a result of the human influence mentioned above, the landscape has become more homogeneous, patch sizes have become larger, and patches are fewer. Forest stands have been simplified, and are more heavily stocked. Insect and disease hosts and forest fuel continuity has been increased in the process. The results are significant—widespread insect and disease

³ Description from "Development of Management Scenarios for Modeling Disturbance Regimes and Succession in the Interior Columbia River Basin", Donald G Long, et. al. Jan 1998 Revised Draft. USDA Forest Service. USDI Bureau of Land Management. Administrative Report.

outbreaks, and large-scale stand replacement wildfires—unlike any that are believed to have occurred in pre-settlement time.

Figure III-2. Palmer Drought Severity Index for Northeast Oregon 1895-2005⁴



Examples of recent disturbance events exceeding historic norms within the Upper Joseph Watershed are numerous. In 1972, the Devil’s Run subwatershed experienced an epidemic infestation of Douglas-fir tussock moth and during the period of 1990-1994, the Douglas-fir bark beetle virtually eliminated the large tree Douglas-fir component of thousands of acres of stands in the vicinity of the TeePee Butte Fire.

Aggressive suppression facilitated by the extensive road system has prevented the outbreak of any large-scale fires within the watershed in recent history. More than 100,000 acres have burned in surrounding watersheds (Lower Joseph, Snake River / Rogersburg, and Lower Imnaha)

⁴ The Palmer Drought Severity Index provides measurements of moisture conditions that are standardized so that comparisons using the index can be made between locations and between months (Palmer 1965). It is a meteorological drought index. It responds to weather conditions that have been abnormally dry or abnormally wet.

since 1986. The 2002 Wallowa Whitman Fire Management Plan notes that the ecological conditions within the watershed are outside of the historical range⁵ and the risk of losing key ecosystem components to fire is high.

Silvicultural/ Fuels Management Outlook

The integrity of the forested ecosystems in the UJCW has been compromised to various degrees by past management practices and climate change, which have altered native disturbance regimes and successional processes.

The principal areas of concern are:

- Lack of stand structure diversity
- Reduction in early seral species across forest types
- High stand densities in a majority of stands, and
- High volume of dead standing and down fuel loads

These factors influence the ability of the forested ecosystems to absorb and recover from disturbances without losing their inherent function. All four areas of concern increase the risk of fire, insect and disease occurrences exceeding common (endemic) levels.

The watershed is deficient across all biophysical environments in size classes 5 & 6 (21”-31” and 32+” diameters, respectively) and the “Late and Old Structure” forest component. The cool dry Grand fir environment is deficit in early seral species (Lodgepole pine, Ponderosa pine, Douglas fir, and Western larch).

In addition, the decline in the deciduous component of the forested landscape is a concern. In particular, the decline in deciduous shrubs in the riparian area and hardwood stands impacts wildlife use and distribution in the UJC Watershed. Fire suppression, long-term drought, herbivory (by wildlife and domestic livestock) and conifer competition are agents that prejudice deciduous shrubs and trees across the watershed.

High forest stand densities also affect water tables and stream flow. The increase in stand density is largely a byproduct of historic overstory removal and fire management within the watershed. As forest vegetation increases, it slows or inhibits the flow of water from precipitation toward aquatic systems. The significance of this relationship is enhanced by the current cycle of drought, and the resulting concerns over water flow and temperature with respect to native fish populations and other aquatic life.

Various options exist to improve forest conditions within each biophysical environment. The Forest Conditions Working Group envisages an 80-100 year restoration plan with management activities in various parts of the forest every 5-10 years. This selective, incremental and

⁵ A discussion on historic range of variation is included in *Appendix 7: Forest Stand Historic Range of Variation*.

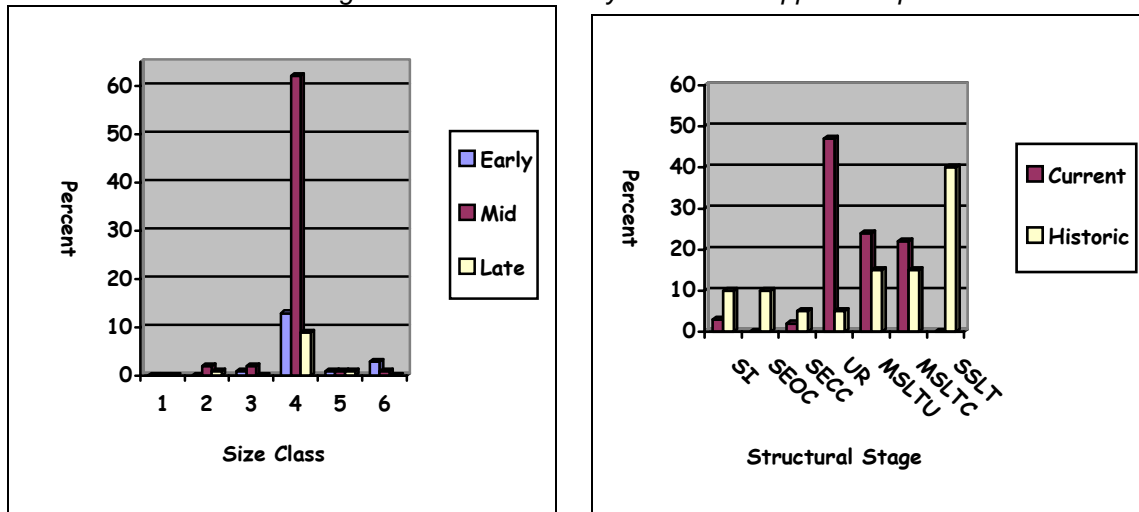
relatively slow approach to restoration allows for continued learning and economic benefits, and responds to the uncertainty in our knowledge of these systems.

In the course of this assessment, particular attention was devoted to the two main habitat types in the watershed – the cool dry Grand fir habitat, and the warm dry Ponderosa pine – Douglas fir habitat.

Warm Dry Management Options

The Warm Dry Biophysical Environment (G7) constitutes 32% of the watershed. The dominant forest structures today are Understory Reinitiation (UR) and Multistory Large Tree Uncommon (MSLTU), and Multistory Large Tree Common (MSLTC). These three stand types exceed their historic occurrence, with the extent of Understory Reinitiation stands far exceeding the historic pattern. The warm dry pine sites are particularly deficient in Single Story Large Tree (SSLT) stands. 9”-20” diameter trees (size class 4) and mid seral species (Douglas fir and Ponderosa pine) dominate the warm dry sites.

Figures III-3 and 4. First graph: Current distribution of size class and seral stage of warm/dry forest stands in the Upper Joseph Creek Watershed. Second graph: comparison of current and historic distributions of structural stage classes on warm/dry sites in the Upper Joseph Creek Watershed.



Warm/Dry environment. To be classified as “early seral”; ponderosa pine would constitute 70+% (by basal area) of the species composition of the dominant canopy layer. This early seral species would constitute 30-70% of mid seral stands and less than 30% of late seral stands.

Silvicultural prescriptions designed to increase the representation of “Single Storied Large Tree” structures within the biophysical environment would be desirable. However, the developmental history of the two layered, small diameter stands precludes many treatment options. The overstocked understory has developed poor crown ratios and has been subjected to “climax site” maladies (i.e. high incidence of insects and disease). Douglas-fir dwarf mistletoe is of special concern since it can be expected to cause catastrophic losses in infected stands that are incorrectly managed. Consideration also needs to be given to silvicultural prescriptions that reduce the risk of fire to existing multistoried structures and designated old growth areas.

Natural Disturbance Patterns. Disturbance events in this environment were cyclic, but generally consisted of low intensity surface fires with predictable return intervals of 20-30 years. Periodic, low intensity fire regimes functioned to eliminate the development of a floor stratum of conifers and maintained open, park-like structures of ponderosa pine and Douglas-fir. 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 could become established in the gaps created following the death of the overstory. The resultant stand structure appeared as a mosaic of younger ponderosa pine age classes nested within a matrix of single storied overstory Ponderosa pine and Douglas fir. Relatively uniform, open spacing was maintained within the clumps of advanced regeneration with the return of frequent, low-intensity fire regime.

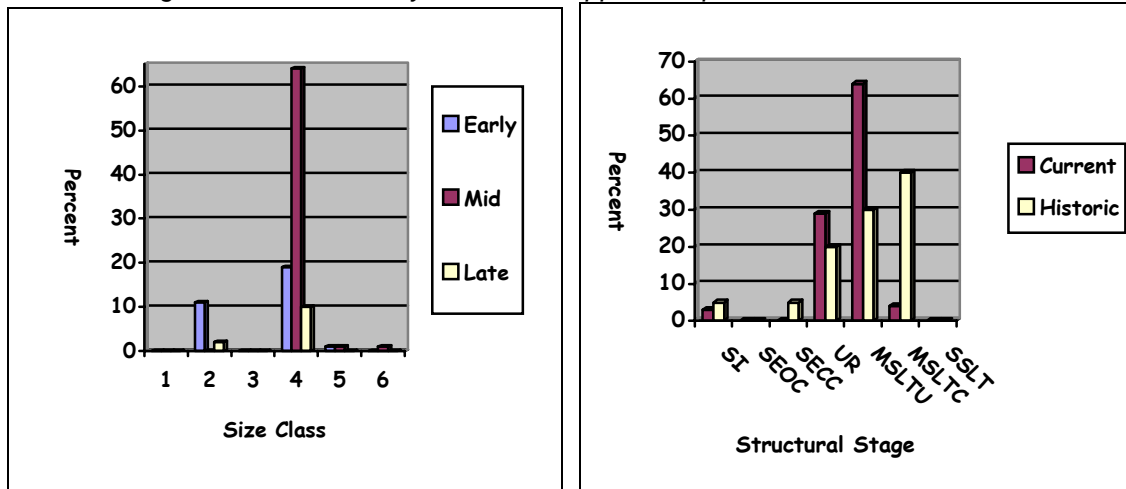
Silvicultural/ Fuels Treatment Opportunities. The Forest Condition Working Group identified the following opportunities. These opportunities are consistent with the management alternatives established in the Wallowa County – Nez Perce Tribe Salmon Rehabilitation Plan, Appendix O: Management Alternatives for Producing Various Stand Structures (1999).

- Intermediate thinning opportunities within single storied late seral structures provided stands are healthy and vigorous.
- Intermediate thinning opportunities within single storied early-mid seral structures designed to reduce inter-tree competition and fire risk, maintain the 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. Such stands within the warm/dry environment would have a substantial existing component of early-mid seral species represented in all crown strata. (Would include stewardship opportunities with limited merchantable volume recovery).

Cool Dry Management Options

The Cool Dry Biophysical Environment (G4) constitutes 27% of the watershed. The dominant forest structures today are Understory Reinitiation (UR) and Multistory Large Tree Uncommon (MSLTU). These three stand types exceed their historic occurrence, with the extent of Multistory Large Tree Uncommon stands far exceeding the historic pattern. The cool dry sites are particularly deficient in Multistory Large Tree Common stands. 9”-20” diameter trees (size class 4) and mid seral species (Douglas fir, and Western larch) dominate the overstory of the cool dry sites.

Figures III-5 and 6. First graph: Current distribution of size class and seral stage of cool/dry forest stands in the Upper Joseph Creek Watershed. Second graph: comparison of current and historic distributions of structural stage classes on cool/dry sites in the Upper Joseph Creek Watershed.



Cool/Dry environment. To be classified as “early seral”; ponderosa pine, western larch, Douglas-fir or lodgepole pine would constitute 70+% (by basal area) of the species composition of the dominant canopy layer. These early seral species would constitute 30-70% of mid seral stands and less than 30% of late seral stands.

Silvicultural prescriptions designed to increase the representation of “multi-layered with large tree” stands within the biophysical environment would be desirable. However, the developmental history of the layered, small diameter stands precludes many treatment options. The remnant, early seral component of these structures has been previously removed and the understory stocking levels were never managed to optimize development. Consequently, the overstocked understory has developed poor crown ratios and has been subjected to “climax site” maladies (i.e. high incidence of insects and disease). Douglas fir and Western larch dwarf mistletoe is of special concern since it can be expected to cause catastrophic losses in infected stands that are incorrectly managed.

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

The fire regimes operating within this biophysical environment ranged from frequent, light surface fires to long return interval crown fires and all combinations in between.

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.

In the absence of frequent fires, Grand fir becomes begins to dominate, because it is more tolerant of understory competition than Ponderosa pine, Douglas fir, and Western larch. This

results in a change in stand conditions to a dense multi-layered stand with a higher accumulation of down fuels.

Silvicultural/ Fuels Treatment Opportunities. The Forest Condition Working Group identified the following opportunities. These opportunities are consistent with the management alternatives established in the Wallowa County – Nez Perce Tribe Salmon Rehabilitation Plan, Appendix O: Management Alternatives for Producing Various Stand Structures (1999).

- Intermediate thinning opportunities within single storied early-mid seral structures designed to reduce inter-tree competition and fire risk, maintain the health and vigor of the residual stand, preserve future treatment options, and accelerate the development of large diameter trees.
- Individual tree selection regimes designed to maintain and improve the health of existing multi-layered structures of diverse specie composition, age and size classes. Such stands within the cool dry environment would have a substantial existing component of early-mid seral species represented in all crown strata. (Would include stewardship opportunities with limited merchantable volume recovery).
- Group selection variant of uneven-aged management designed to reintroduce horizontal patchiness, species, and size class diversity within homogeneous, late seral structures. Spatial and temporal distribution would be patterned to replicate naturally occurring disturbance regimes typical of cool dry sites.

Forest Conditions and Wildlife Habitat

The importance of forested areas for a wide range of wildlife in Upper Joseph Creek was recognized throughout the assessment process. Critical issues pertinent to terrestrial wildlife and forest management included the decline in deciduous vegetation in riparian areas, and the deficit in large snags and late old structure. With specific reference to game species (especially elk and deer), the importance of maintaining hiding and thermal cover was acknowledged – as was the potential impact of road closures (permanent and seasonal) on the overall status of these populations.

There are 3 significant divisions of habitat in the UJCW. The southernmost 56% (98,278 acres) is predominantly native grassland/prairie bisected by streams, riparian zones and patterned with a variety of brush lands. About ½ of the remaining 75,892 acres is predominantly ponderosa pine forest and prairie grasslands or a relatively dry ecotonal zone. The balance is moister upland forest of mixed conifer to true fir.

Wildlife use is largely describable by these distinctions with a tremendous amount of big-game (deer and elk) use in and adjacent to the ecotonal zones. It is also in this zone that the most capable streamside and riparian zones exist. These zones bear the evidence of ungulate use both domestic and wild.

Within the forested zone the US Forest service is mandated to meet a number of standards on behalf of wildlife, wildlife habitat, access and usability. One of those considerations is about

representative units of mature and old large tree forest patches and about some contiguity of access for big game, raptors, woodpeckers and others that may have limited ability to easily cross large stretches of non-habitat. Travelways have been mapped via GIS, largely along riparian zones that tie most units of Late Old Structure, Multistory Large Tree Common and designated old-growth (MA 15) units together. These are not acres removed from timber management or other use, but zones where some standards of canopy cover and visibility are directed that protect many species from isolation in islands of habitat.

The following forest management recommendations emerged from the analysis of wildlife issues in this watershed:

- Secure and promote the “heritage elements” of the habitat, consisting of mature and old timber stands, large old live and dead trees and large woody debris (logs) which are the most limited on this landscape, and the hardest to re-construct (at least over time).
 - Retain heritage forest elements where they remain in the landscape; large/old live trees, large old dead trees, logs and stumps.
 - Reduce the risk of wildfire to these remaining elements through fuel reduction activities (understory thinning, slash and down fine fuel treatment, raking duff accumulations away from base of trees, and prescribed burns).
 - Prescribe silvicultural (including fuels) treatments to accelerate the return of forest stands to the historic range of variability both temporally and spatially by “habitat type and structural stage”.
 - Target 30-80 acre blocks of late old structure distributed proportionally across the landscape and the various biophysical environments.
- Minimize reliance on “corridor/travelways” to connect highly fragmented habitats while restoring historic “continuity and connectivity”.
- When allocating new uses across the landscape of this watershed (OHV’s) consider temporal and spatial impacts and possible mitigative factors (screening via vegetation and/or topography, seasonal scheduling, etc.)
- Restore relict and remnant habitats as freestanding elements on the landscape towards suspected Historic Range of Variability including; Western yew, aspen clones, cottonwood galleries, willow carrs, hawthorn shrub-lands, alder stands, talus garlands, etc. These features are disproportionately important for the biodiversity they represent and the habitat options they provide.

A key element about which much less is known quantitatively is the presence of vigorous and abundant deciduous understory in mature to old open (ponderosa pine and dry mixed conifer) stands and in the riparian zone. The first euro-immigrant accounts of this area spoke of open park-like stands with abundant willow and serviceberry, and patches of currents (*Ribes* and *Rubus* species) where walking grouse (blue grouse) and brush pheasants (ruffed grouse) were abundant. The history of timber harvest and fire suppression, and the on-going competition for forage by domestic and wild ungulates, has reduced this component to remnants of what it may once have been. Restoration of the deciduous understory would require understory tree removal with harvest and prescribed fire, followed by planting and protection until successful establishment of willows (at least 5 species), serviceberry, elderberry, *Ribes* species, *Rubus* species, etc.

Monitoring of wildlife species and groups for habitat restoration purposes. In 1983 the Wallowa Valley Ranger District instituted a system of bird species monitoring intended to show changes in species composition and abundance along Elk Creek, Peavine Creek and Chesnimnus Creek where significant investments in habitat restoration had been and were continuing to be made. Monitoring was conducted to a systematically reproducible protocol with highly qualified local volunteers (Frank and Sue Conley). This monitoring continued through 2002, and the data is being entered on publicly accessible databases (<http://birdnotes.net/census>) and Cornell Laboratory of Ornithology and National Audubon 2003 (<http://www.ebird.org/MyEBird>).