IV. REFERENCE CONDITIONS

IV. A. Physical

IV. A. 1. Soils

Reference condition information was not available. The most notable changes in soil conditions since the 1860's include considerable but unmeasured soil loss particularly in open areas. This loss is from erosion due to extensive over grazing primarily by sheep from the 1870s to late 1920s. The second notable change in soil condition is due to compaction from tractor logging. Maps in Section VII. M. display the amount of timber harvest from one or more entries, most of which occurred by tractor logging.

IV. A. 2. Water Quality/Quantity

Reference conditions for stream temperatures, to determine the capability of streams in Wall Creek, are not readily available. Measurement of water temperatures were taken as part of a 1963 Oregon State Game Commission (OSGC) stream survey, which was conducted in mid July. Afternoon water temperatures taken at the time of the survey were as follows: lower Wall was 80°, mid Wall was 72°, Little Wilson was 60°, Wilson was 70°, Little Wall was 70°, Lovlett Creek was 60°, Skookum was 68°, and Swale was 64°. These observations indicate similar temperature distributions 30 years later. A second potential source of reference for stream temperature capabilities are riparian exclosures on main Wall, Lower Wilson, Little Wall, Bacon, and Swale Creeks, which were installed in the early 1990's. Recording thermographs located in the vicinity of these areas should be evaluated for trends in peak summer water temperatures in future years.

IV. B. Biological

IV. B. 1. Aquatic Habitat

Prior stream surveys:

Forest Service stream surveys of Wall Creek system streams were apparently begun in 1989. Data for the parameters discussed above are mostly unavailable prior to the USFS 1989 stream surveys. However, the OSGC inventoried some of the Wall Creek streams in 1963. They reported pool/riffle ratios and streamflows. **A flow volume for mainstem Wall Creek of 6.3 cuft/sec. was measured in July, which is 31 times larger than the summer low flow (0.2 cuft/sec) reported by recent (1992) Forest Service surveys.** The Forest Service surveys reported data gathered in August, so perhaps this could explain some of the difference. However, most streams in the southern Blue Mountains have reached low flow by early July, so such a large difference must be partly explained by other factors, perhaps the continuing drought and/or differences in measuring methodology. In any case, several years of flow data in combination with precipitation data would be required for meaningful comparisons.

For other fish habitat parameters, the OSGC inventories used a different protocol, so that direct comparisons of results to data produced by current Hankin and Reeves type surveys is not possible.

For example, the OSGC reports give percent riffles and pools for stream segments surveyed. Hankin and Reeves procedures (and the SMART program) produce figures for percent riffles, percent pools and percent glides. In any case, the OSCG 1963 figures would not be the preferable reference data because quite a lot of management activities had already been concluded by that date. For example, intense livestock grazing was already occurring by 1880.

Qualitative and anecdotal information:

There are however, other, non-quantitative reports about the fisheries resource in the Wall Creek stream system which hint at earlier conditions.

Oregon Department of Fish and Wildlife reports finding juvenile Chinook Salmon in Wall Creek in 1982 and 1983, the only years in which this creek was sampled for salmon. Chinook redds have not been found in the Wall Creek system, so it is presumed that these juveniles were spawned elsewhere and then moved into Wall Creek as juveniles seeking rearing habitat, and perhaps cooler water. It is conceivable that these fish represent a relict population of a once larger population which spawned in the John Day River and used Wall Creek as part of their rearing habitat. If so, habitat conditions in Wall Creek could be a factor in the recovery of John Day River Chinook Salmon populations?

The John Day River Subbasin Salmon and Steelhead Production Plan (1990) reports three traditional fishing sites on Wall Creek and Little Wall Creek used by the Umatilla and Columbia River Indian tribes. Apparently fish in Wall Creek were once sufficiently numerous to support a native fishery.

It seems entirely reasonable to expect that prior to intensive livestock grazing, riparian road construction and logging, stream shade would have been higher, sediment delivery to streams would have been lower, and fish cover in the streams would have been greater. It is probably not now possible to determine the precise magnitude of the differences, but it follows that stream temperatures should have been cooler and cobble embeddedness would have been lower, large woody debris more common, and pool frequencies and depths greater. In the absence of specific historical data for fish and aquatic habitat parameters, PACFISH RMO's and fish habitat requirements reported in scientific literature and discussed above, will be taken as reference conditions.

IV. B. 2. Forest Vegetation

Structural Stages and Their Historical Proportions for Plant Association Groups

Question II. B. 1a: What are the historic ranges in variability for plant association groups in the Wall subwatersheds?

Question II. B. 1b: What are the historic landscape patterns in the Wall subwatersheds? Mix of successional stages? Stand structure and composition?

Table 13 displays what is believed to be the historical percentages by structure for each plant association group. These percentages were derived by the Umatilla National Forest (8/9/93). For the lodgepole group, Hall's writeup on biophysical environments for vegetative screening was used. A very early stage was added to the lodgepole group since Hall's information began with the seedling/sapling stage.

Table 13. Historic Structural Stage Percentages by Disturbance Climax Plant Association Group (DCPAG)

DCPAG	VE	E	EM	MID	L/O
Lodgepole	1-5%	10-25%	10-40%	20-40%	N/A
Cool Grand Fir	0-20%	5-20%	5-20%	20-50%	20-40%
Warm Grand Fir	1-5%	5-10%	5-10%	15-30%	40-70%
Ponderosa Pine	1-5%	5-10%	5-10%	15-30%	40-70%

Ponderosa pine and warm grand fir have the same percentages because ponderosa pine is considered the dominant species in both groups due to "fire climax."

Table 14. Average Patch-Size Acres by DCPAG

DCPAG	Avg. Patch Acres
Lodgepole Pine	40-1000
Cool Grand Fir	300-1500
Warm Grand Fir	150-1000
Ponderosa Pine	10-200

1937 Data

The purpose in analyzing the 1937 map is to have an historic "snapshot" in time against which to compare our existing condition and to determine any "deviations" that have occurred from "historic" conditions. The 1937 data describes existing vegetation on the site at that point in time and does not directly correlate to comparison with disturbance condition plant association group (DCPAG) acres. The interpretation of the 1937 landscape is presented in Table 15.

Table 15. Interpretation of 1937 vegetation mapping codes

Type Number	Type Description	Structure	Wall Analysis Area All Acres	Wall Analysis Area FS Acres	% FS Acres
01	Non-Forest		20,410	12,616	13.25%
03	Subalpine	Not Defined	1,805	1,745	1.83%
04	Lodgepole Pine	Not Defined	900	900	0.95%
05	Juniper	Not Defined	471	471	0.50%
07	Douglas-fir, Large	Late/Old	739	739	0.78%
13	Ponderosa Pine, Large	Late/Old	9,972	8,896	9.35%

Type Number	Type Description	Structure	Wall Analysis Area All Acres	Wall Analysis Area FS Acres	% FS Acres
14	Pure Ponderosa Pine, Large	Late/Old	84,619	61,874	65.0%
15	Ponderosa Pine, Small	Middle	697	212	0.22%
16	Ponderosa Pine, Seedling, Sapling, Pole	Early/Middle	172	0	0.0%
17	Pine Mixture, Large	Middle	2,773	2390	2.50%
19	Fir Mixture, Large	Middle	4,131	4131	4.35%
25	Deforested Burns	Very Early	1,381	1,221	1.28%

According to this data, over 77 percent (73,372 acres) of the landscape (FS acres only) consisted of ponderosa pine or pine mixture, predominantly in the late/old structure. Table 16 shows the relationship of the existing vegetation in 1937 to the plant association groups (PAG's) derived from the forest datacell layer.

Table 16. 1937 Existing Vegetation by Plant Association Group (FS Acres only)

Type #	Pine	Warm ABGR	Cool ABGR	Lodgepole	Juniper	Other*
01	1,187	5,429	79	0	3,669	2,222
03	207	749	0	0	260	524
04	0	84	447	303	0	63
05	10	174	0	0	44	241
07	0	300	349	87	0	0
13	639	6,090	1,421	273	117	344
14	7,506	35,372	2,343	233	9,077	7,187
15	0	163	0	0	0	49
17	192	993	760	181	86	169
19	32	873	2,343	792	17	73
25	398	615	0	0	73	134
Total FS Wall Acres	10,171	50,842	7,742	1,869	13,343	11,006

*Other includes meadow, steppe, riverine, and rock.

Consideration of Non-Forest Land

We examined non-forest land to determine meadow encroachment by conifers. Groupings determined for non-forest land are meadow, steppe, riverine, and rock. Existing condition was derived from the plant association data in the forest datacell layer to determine number of acres in these non-forest groups. Historical condition was derived from the 1937 map simply under the category of non-forest. In 1937 there were 12,616 acres classified as non-forest, existing condition now shows 11,360 acres as non-forest. There are 1,201 acres that were forested in 1937 that today are less than 10 percent forested, of which 1,022 acres were described in 1937 as large, pure ponderosa pine.

Historical Role of Disturbance in the Wall Watershed (HRV)

Question II. B. 1c: How do these historic landscape patterns compare to existing conditions?

The Wall area is one of many Eastern Oregon watersheds where fire exclusion and forest management over the past 90 years has resulted in some significant changes in forest species and structure. An ecological assessment by Shilsky (1994) characterizes the current condition of the forest vegetation as extensive stands of dead and dying trees, especially the older, dense fir stands on the drier sites. Historically, sites that were dominated by multi-age ponderosa pine were maintained by frequent, low-intensity ground fires. These sites have progressed along the successional spectrum due to changes in the natural disturbance regime and are now dominated by shade tolerant climax species like grand fir. In addition, selective harvest of large ponderosa pine has also altered age structure. It is well established that these conditions are the result of fire exclusion, grazing, and selective logging. To provide the reader with a perspective on the natural disturbance processes within the Wall area, existing knowledge regarding the historical role of fire, insects, and grazing as agents of disturbance is summarized below:

Fire. The Blue Mountains with its long, dry summers and frequent lightning storms has the potential to experience wildfires across vast acres of the landscape. On low to middle elevation dry sites, ponderosa pine was once a major forest component. Fires burned in the understory and perpetuated an open parklike structure dominated by ponderosa pine with a component of western larch on the wetter sites. In the higher elevations and moist sites at the middle elevations, the structure was a mosaic of burned and unburned areas with a composition of western larch, Douglas-fir, lodgepole pine, and grand fir.

By the 1950's, fire suppression successfully extinguished all fires of low and moderate intensity (Agee 1991). This ability to suppress fires led to an increase of fuels and regeneration of shade tolerant species. The process of fire has changed from one of maintaining open stands of fire resistant species to severe wildfire that may burn uncontrollably in heavy fuels. Fire suppression has resulted in the expanded distribution of Douglas-fir and grand fir which has caused stands to be more susceptible to insect infestation, disease epidemics, and catastrophic wildfires.

Current high fuel loads caused by decades of fire suppression and recent catastrophic tree mortality have resulted in a change in the range of fuel models for the Wall watershed. Historically, these fuel models ranged from NFFL 2 through NFFL 8. Currently these models now range from NFFL 2 to NFFL 12. This has created a situation where the risk of a catastrophic wildfire is significantly higher than in historical times.

Insects. Insects are always present in the forest and have a cyclic fluctuation. Typically, the effect of insects is probably one of creating gaps or small openings on the landscape, but recent sporadic outbreaks of defoliating insects have caused severe defoliation of grand fir and Douglas-fir, especially in the northeastern portion of the analysis area. In recent years, the concern has been that current outbreaks appear to be more severe and involve larger areas than in the past (Torgersen 1993). The greater distribution of grand fir and Douglas-fir on sites following fire exclusion may account for some of that perception. Insect populations cause declining tree vigor, reduced growth, top-kill, and eventually mortality.

Grazing. Sheep grazing within the Wall watershed is well documented back to the 1870's. Holding 1937 as our benchmark in time, be believe that the 70 years of intensive grazing prior to that point in time had significant impact upon the vegetative condition. Fire frequency and intensity, as well as species regeneration and density had been markedly altered. With the decline of the sheep market, and tighter controls on grazing, grazing utilization changed to cattle in the 1950's and 60's and continues with cattle use today.

Studies show that livestock grazing contributes to changes in forest species composition and structure through an increase in woody plants and shrubs (including larger plants such as pinyon, ponderosa pine, and juniper) across the western United States. In addition, grazing has also been found to contribute to overstocking of trees by removing grasses which would otherwise prevent seedling establishment through competition (water, space, and nutrients). This removal of grasses and other fine fuels also acted to impede the progression of low-intensity ground fires.

IV. B. 3. Botanical Diversity

The Small-flowered White Flax (*Linum micranthum*) is apparently a disjunct from Central Oregon (Hitchcock et al, 1976) and grows only in the Skookum Grazing Exclosure. The rich steppe vegetation of this exclosure provides a barometer against which adjacent vegetational and edaphic conditions can be compared. The unique occurrence of this species within the exclosure could lead to the assumption that this species was historically more widespread within the Wall Creek Watershed, the Heppner District, and the Umatilla National Forest. Another plausible explanation for the relative scarcity of this species is that it is an accidental introduction into the Skookum Exclosure. Despite the questions concerning the apparent disjunction or possible introduction of this species, the species is not threatened by management activities unless the exclosure fence is not maintained or if wildfires destroy the protective structure that has been in place for some 60 years.

Due to the extensive sheep grazing that occurred into the 1930s and effect on herbaceous plants, grasses, and shrubs; and due to the lack of reference information on plant species presence or abundance, the Skookum Grazing Exclosure remains as the lone reference point for native plants in the Wall Analysis Area.

IV. B. 4. Fire, Insects and Disease

In developing fuel treatment prescriptions, consideration was given to soil protection and overstory vegetation survival. No ground truthing was completed in the Wall watershed to validate the conditions or assumptions used. All recommendations are based on Plant Association Groupings or simply stated the "potential vegetation without any disturbance."

Question II. B. 4a: What are the historic roles of fire?

Since 1970 (through 1994), a total of 302 fires in the Wall watershed have been recorded, equating to 3.2 fires per 10,000 acres per year. Better than half of the fires (161) occurred in the warm grand fir PAG. The largest fire (299 acres) also occurred in the warm grand fir PAG. Ponderosa pine and juniper plant communities are second and third with 38 and 33 fires respectively. Historically, fires have been spread fairly evenly across the watershed. Since some of the land (particularly the northwest and southeast portions) of the watershed are in private ownership, fire records are incomplete.

Table 17. Wall Watershed Historical Wildfire Summary (1970-1994)

Plant Association Grouping	Total Acres Burned	Acres Burned by Fire Size Class: 0-.25 Acre (A)	.25-10 Acres (B)	10-99 Acres (C)	100-299 Acres (D)	Total Number of Fires
Private Land	3.8	1.3	2.5	0	0	14
Cool Grand Fir	4.3	2.6	1.7	0	0	27
Juniper	93.2	2.7	8	83	0	33
Lodgepole	0.6	0.6	0	0	0	6
Meadow	0.3	0	0.3	0	0	1
Ponderosa Pine	38.7	3.1	15.6	20	0	38
Grass Steppe	4.6	1.8	2.8	0	0	20
Warm Grand Fir	360.1	14.0	40.0	0	299.1	161
Rock	3.3	0.3	3.0	0	0	2

Prescribed Fire Use

Prescribed fire has been used extensively in this watershed compared to other watersheds on the Forest. However, in comparison to the total number of acres in the watershed, the actual percentage of acres treated is low (see figures 2 and 3). Many of the critical subwatersheds have received little if any treatment by fire. Prescribed fire use has been focused on the ponderosa pine dominated stands and in closely associated juniper plant groupings. Most or all of the burns to date have been conducted in the spring when the duff and soil moisture is high. Under these conditions only, the fine fuels are consumed and only minor damage to the trees and other vegetation occur. These stands generally have not had an excessive fuel loading prior to burning. Fires occurring in areas that have been prescribed burned are usually easier to control. Little if any fire has been used in the cool grand fir and in the ponderosa stands. It is in the cool grand fir and in the warm grand fir that the largest potential for a destructive wildfire presents itself.

IV. B. 5. Vertebrate Biodiversity

Historic Condition of Wildlife and Habitats

Big Game:

Historic accounts of wildlife populations in the Blue Mountains are limited, and sometimes contradictory, particularly in regards to big game populations. Mule deer, elk, black and grizzly bear, pronghorn antelope, cougar and big horn sheep were native to the Blue Mountains (Irwin et al. 1994, Gildemeister 1992).

By the 1880s, big game populations in the Blue Mountains were beginning to collapse under the combined pressures of market and subsistence hunting, competition with domestic livestock, and habitat alteration. In the early 1900's hunting seasons were closed to prevent total extinction of elk in the Blue Mountains. With hunting banned, the State Game Commission set about re-establishing elk populations. Between 1910 and 1920, transplants of Rocky Mountain elk from Yellowstone National Park occurred in various areas of the Blue and Wallowa Mountains.

By 1933, elk numbers were rebounding, and a 3-day hunting season was opened in Wallowa County. Population trends continued upwards for both elk and mule deer in the Blue Mountains through the 40s, 50s and 60s. In the Wall drainage, located at the western end of the Blues, elk numbers recovered more slowly. Sightings of elk and deer on the Heppner Management Unit (ODFW) were not common until the 1960s. Populations continued to increase through the 1970s and early 1980s.

Almost all other big game and fur-bearing species in northeastern Oregon (with a few noteable exceptions) have declined since the late 1880s. As early as 1936, Oregon Game Commission researchers stated that "wildlife is diminishing in Oregon in spite of the fact that the natural habitat, for the state as a whole, is capable of sustaining many times the present wildlife population" (State Planning Board 1936).

A review of census summaries from this report shows low numbers for the Umatilla National Forest of many species known to occur in the Wall drainage. Beaver, marten, otter and mink are mentioned as species whose numbers had substantially declined by 1936. All of these species historically occupied the Wall area, and still do, although numbers, distribution and population health are largely unknown. Evidence of past and present beaver activity is found along Wall, Little Wall and Skookum Creeks.

Wolverine may have historically occurred within the Wall drainage at very low densities. Because the wolverine is largely a carrion eater, the decimation of big game herds in the late 1800s would have also led to declines in wolverine numbers by the turn of the century. Habitat alteration and, perhaps more importantly, increased human disturbance have resulted in continued habitat degradation for this species in the Blue and Wallowa Mountains.

Immigrant journals from the mid 1800s often mention blue and ruffed grouse as dinner fare for settlers traversing the Blues, suggesting that these species were fairly common. Today, both species occur in the Wall drainage in low numbers, and along with the mountain quail, may be experiencing depressed reproduction due to poor habitat conditions.

From Henry Spaulding's 1839 accounts, we know that bald eagles were present in the Wallowas during the summer months, feeding on spawning salmon. This summer presence suggests a nesting population. Information collected by biologists on the Ochoco NF, to the west of the Wall drainage, included references to eagles and hawks being "common" around the turn of the century. Based on these accounts, and the historic presence of salmonid fish in the drainage, it is conceivable that bald eagles historically nested along Wall Creek or some of it's larger tributaries.

Historic information for other non-hunted birds, small mammals, reptiles and amphibians is almost totally anecdotal. As noted in the Ochoco NF Viable Ecosystems Management Guide, higher water tables, more extensive riparian vegetation and aspen groves, and more beaver activity no doubt provided more suitable habitat for amphibians, waterbirds, songbirds, and riparian-associated small mammals such as shrews and mink, than do current conditions. Reports on the Heppner Reserve (1903, 1907), mention numerous wet areas and swamps in the headwaters areas of Skookum, Alder, and upper Little Wall Creeks.

IV. B. 6. Rangeland

References are many and consistent regarding the severe grazing impacts that occurred in the Wall Analysis Area from the 1870s-1930s. The following table shows a specific example from 1923 historic records, by which time permitted use numbers had substantially declined from the peak levels prior to establishment of the National Forest. See also discussion at Section VII. X.

WALL ANALYSIS AREA							
Historical Sheep Grazing, from 1923 Range Classification Report 2/							
Allotment	Altmnt #	AUM/ 1	Permitd Use	Carry Capc	Useable Ac	NF Acres	Ac/AUM 3/
Swail	101	4868	1217	1200	7501	4651	1.54
Texas Butte	102	4800	1200	600	5791	5050	1.21
MadisonBte	103	160	40	195	1565	1325	9.78
Tupper Bte	104	4000	1000	1008	7158	5624	1.79
Sun Flower	105	5200	1300	1305	7307	6667	1.41
Nine Top	106	4800	1200	1200	7125	5285	1.48
Skookum	107	4800	1200	1200	5960	5380	1.24
Two Spring	108	5820	1455	1455	7136	6699	1.23
Red Hill	112	4800	1200	1197	7190	6249	1.50
Wall Creek	113	1200	1200	138	832	832	0.69
3 Trough	114	4800	1200	1200	5055	3975	1.05
Brown Creek	116	4400	1100	948	7113	6372	1.62
Wall Area	TOTAL	49648	13312	11646	69733	58109	1.40

1/ AUM = 4 Ewe/lamb pairs, grazed per month

2/ Does NOT include Hardman Cattle & Horse (C&H) allotment in NE portion of Analysis Area or Tamarack/Monument C&H Allotment in SW portion of Analysis Area.

3/ For comparison, the 1907 Heppner Forest Reserve Inspection report discussed use by 67,000 sheep and 8, 000 cattle (300,000 AUMs) on 243,500 National Forest acres (1.23 ac./AUM). The Tamarack/Monument Allotment in 1994 had 9+ ac./AUM.