III. CURRENT CONDITION

III. A. Physical

III. A. 1. Geology

The analysis area is not geologically complex. About 94 percent of the area is composed predominantly of basic igneous rocks, such as basalts and andesites, of fairly young geologic age. The associated three geologic formations (Grande Ronde Basalt, Picture Gorge Basalt, Clastic Rocks and Andesite Flows, all three members of the Columbia River Basalt group) represent areas that are generally more stable and less subject to natural mass slope failures (landslides, debris flows, etc.). In contrast, the John Day Formation, present mostly in the northern portions of the area, contains a great deal of sedimentary rock that is less stable and more prone to mass failures.

III. A. 2. Soil Attributes

The soils of the area have been widely and significantly influenced by the deposition of Mt. Mazama volcanic ash. Deeper ash deposits (> = 14 inches thickness) occur on 37 percent of the acres reported in the Umatilla NF Soil Resources Inventory. Deeper ash varies among the subwatersheds from 23 to 56 percent of the SRI acres surveyed.

Deeper soils (>20 inches) make up about 52 percent of the overall SRI acres, deeper and more productive soils hold only a slight predominance compared to shallower soils. Deeper soils range from 33 to 82 percent of the subwatershed (SWS) areas surveyed.

The shallower soils (< = 20 inches total depth) are important to watershed characterization since they represent areas with the shortest distance from surface to groundwater in the rock layers below. Shallower soils exist on 48 percent of the surveyed portions of Wall Area and the SWS's vary from 18 to 67 percent. The very shallow soils (< = 10 inches) are the most sensitive to management disturbance and are the most difficult to rehabilitate from the standpoint of native vegetation replacement after surface disruptions have removed it. Very shallow soils represent 17 percent of the SRI area and range from 5 - 30 percent of the area within subwatersheds.

Sensitivity Summary:

Question II. B. 6: How do the subwatersheds compare with respect to attributes that reflect inherent sensitivity to resource management?

Notable differences in subwatershed sensitivity were indicated by combinations of attributes: four subwatersheds were rated in the higher sensitivity group (SWS's 24A, 24F, 25A, 26A.), seven SWS's rated medium and four were rated low. Of the latter four SWS's, 24C, 24D and 24E appeared best suited to long-term timber management.

Table 4.-- Summary of subwatershed sensitivities and associated management advisories.

Sensitivity	SWS's	Management Advisory Notes
Higher	24A, 24F, 25A, 26A	**L1HU** - applies to all four SWS's. Special grazing management attention, shallow soil rehabilitation and stream stability appear more important in these SWS's. Coordinate with botany and range
Medium	24G, 24B, 25B, 25C, 26B, 26D, 26F	Shallow soil rehab need appears high in SWS's 25B and 26B, coordinate with botany and range
Lower	24C, 24D, 24E, 26C	SWS's 24C, D, & E appear to have the best basic attributes for long-term timber management.

L1HU = Level 1 Heads Up - SWS whose attributes indicate extra consideration is advisable in developing management proposals.

Table 5a. --Subwatershed sizes in total, amount of National Forest area, the potentially forested areas within NF, and the Soil Resources Inventory (SRI) area within the Wall Analysis Area.

Subwatershed		National Forest		Potentially Forested PAG's within NF		Soil Resource Inventory
Number	Acres	Acres	% SWS	Acres	% NF	Acres
23C	4889	0	0	-	-	-
24A	13644	5988	44	5058	84	6448
24G	6510	5695	87	4707	82	5691
24B	7366	7082	96	6893	97	7363
24C	8186	8186	100	7803	95	8177
24D	8973	3928	44	3137	80	5423
24E	9336	4439	48	4220	95	6585
24F	8258	6396	77	4772	75	7877
25A	13655	6987	51	6449	92	7049
25B	8920	8746	98	7335	84	8751
25C	4088	4036	99	3717	92	4039
26A	9048	8612	95	7422	86	8707
26B	5381	5381	100	4050	75	5376
26C	8770	8770	100	8747	99	8784
26D	7734	7734	100	6696	86	7747
26E	3314	3119	94	2983	96	3313
Total	128,074	95,099		84,024		101,332

(PAG's include Juniper, Ponderosa Pine, Lodgepole, Warm Grand Fir, and Cool Grand Fir)

Question II. B. 5c: What Wall subwatersheds are of higher priority for soil treatment?

Table 5b. -- Subwatershed Summary of Soils Sustainability Concern

Concern Level	Subwatershed Number	Management Advisory Notes
Higher	25B	MA; Highest potential treatable acres by a factor of 2 (see Table 10, Section VII. M.)
Medium	24B, 24C, 24D, 24E, 24F, 24G, 25C, 26B, 26F	L2HU applies to four SWS's that had over 3/4 of their area in the one-only timber sale category: 24B, 24C, 24F, 24G
Lower	24A, 25A, 26A, 26C, 26D	N/A

L2HU = Level 2 Heads Up - applies to SWS's highlighted in Appendix M, Fig.13.
Management Alert (MA) for soil compaction applies to SWS's 24D and 26F as well as 25B, although applicable to much less area than in 25B (Appendix M, Fig. 14 and table 10).
Management Alert (MA) applies to SWS's 24B, 24C, 24E, and 26B that have the highest road densities (> =3.5).

Site Attributes

Elevations range from a low of 2,060 feet at the confluence of Wall Creek with the North Fork John Day (NFJD) River at the southeast corner of the analysis area to a high of 5,707 feet at Madison Butte on the northern border near the northeast corner. Higher portions occur in the northeast, northwest and southwest corners of the area and drainage tends to be West to East and eventually mostly southerly when Wall Creek empties into the North Fork John Day River in the SE corner of the Analysis Area. Overall elevational distribution of area shows that 25 percent of the area is between 2,060 and 3,500 feet, 30 percent between 3,500 and 4,000 feet, 34 percent between 4,000 and 4,500 feet and 11 percent between 4,500 and 5,707 feet (reference the area above 4,000 feet, Fig. 2 and the area above 4,500 feet, Fig. 3). Only 1 percent is above 5,000 feet (for details, see the General attributes matrix table 9 appended at the end or this paper). None of the area supports dominantly spruce-fir vegetation associations, which is a clue to the relatively lower elevation and warmer conditions that exist in the Wall watershed compared to other areas of the Blue Mountains.

III. A. 3. Water Quality and Flow

Question I. A. 12: What is the relative contribution of the flow of the Wall Creek system to the North Fork John Day Subbasin?

The contribution of the flow of Wall Creek to the flow of the North Fork John Day River is relatively small. While the percent of the NFJD drained by Wall Creek is about 8 percent, the average flow contribution of Wall Creek to the NFJD is probably less than 8 percent of the average annual flow of the NFJD River. Estimated average annual flow for Wall Creek is 80 cfs, which is about 6 percent of the average annual flow of the NFJD. Wall Creek is a lower elevation watershed in the NFJD subbasin and supplies proportionally less flow to the river, compared to other, higher elevation tributaries like Camas Creek.

Question I. A. 13: What is the contribution of the discharge from Wall Creek system to temperature and sediment concerns of the NFJD river?

Stream temperatures reach maximum in late July and early August, when streamflows are low and the cumulative heating of surface waters is at a maximum. The temperature of Wall Creek at the confluence often reaches 80°F during the summer. What is not known is the relative contribution of Wall Creek during low flow to the NFJD River. It is likely that the NFJD River temperature is lower than Wall Creek because of the greater volume of flow and contribution of higher elevation areas in the upper watershed. As a result, Wall Creek is probably contributing warmer water to the main river. However, because of the small contribution of flow, the dilution effect is large; even though warm water from Wall Creek enters the NFJD River, the effect on water temperature in the NFJD is small.

The relative contribution of Wall Creek to the sediment load of the NFJD is not known. Sediment discharge peaks with flow, so that the variability of streamflow peak in Wall Creek suggests highly variable sediment discharge at the mouth of the watershed. Again the small relative contribution of Wall Creek to the flow of the NFJD indicates relatively small sediment contributions.

Overall, the contribution of Wall Creek to the quantity and quality of the NFJD River is relatively small, however, recent listing of the NFJD River as Water Quality Limited brings attention to all existing and potential sources of nonpoint sources of pollution, however modest.

Designated beneficial uses of water from Wall Creek include private domestic water supply, irrigation, livestock watering, anadromous fish passage, salmonid fish rearing, salmonid fish spawning, resident fish and aquatic life, wildlife and hunting, fishing, and aesthetic quality.

Water quality criteria include numerical values for temperature, turbidity, pH, dissolved oxygen, and bacteria. Narrative standards prohibit the presence of "deleterious materials" in amounts harmful to users.

The 1988 Statewide assessment identified Wilson Creek, Big Wall Creek, and Little Wall Creek as having severe water quality problems (A1) from a variety of pollutant types including low dissolved oxygen, nutrients, and low flow. Beneficial uses affected include cold water fish, wildlife, stockwatering, irrigation, and aesthetics. Probable causes include riparian disturbance, erosion, changes in flow, loss of thermal cover, and water withdrawals (DEQ, 1988).

Forest Service monitoring of water temperatures in the Wall Creek watershed began in 1989. Monitoring consistently shows water temperature problems on most of the major tributaries in the watershed. Summer water temperatures do not meet current basin standards (68°F) on main Wall Creek, Wilson Creek, Little Wall Creek, and Swale Creek. Skookum Creek and Wilson above Bull Prairie Lake are the only major streams that meet the basin standard. Alder Creek and upper Wilson meet the proposed standard of 64°F.

A "vulnerability assessment" identifies waterbodies that are vulnerable, or have the potential for adverse response to disturbance activities, where adverse response is defined as exceedance of water quality criteria. Under this definition, most of Wall Creek is vulnerable. Watershed conditions that have contributed to elevated stream temperatures include removal of streamside shade through harvest and road construction, and changes in channel structure (wider and shallower) through multiple sources including livestock grazing. Inherent watershed character of low precipitation, low flows, and high evaporation rates establish a narrow "margin of safety", or higher vulnerability. Increases in maximum stream temperatures are associated with loss of riparian shade, channel widening, loss of bank stability, and reduced streamflows.

In summary, water temperatures are not meeting state water quality standards and are likely jeopardizing beneficial uses. Causes for excessive water temperatures include a harsh climate, channel conditions that expose more channel area to heating (discussed in Stream Channel section), and management activities that have reduced streamside shade and exacerbate inherent conditions. Most of the streams in Wall Creek are vulnerable to climatic conditions (drought), the lingering effects of severe flood events, and the continual, chronic effects of streamside roads, livestock grazing, and early seral riparian vegetation.

III. A. 4. Stream Condition, includes general riparian information

At the broad level, stream types can be broken out by the longitudinal profile of the stream and the valley form. Stream profiles for Wall Creek and its tributaries are straight (e.g. Wilson), convex (e.g. Little Wall), and stepped (all). The shape of the profile reflects geologic control, with layers of interbedded basalt (different erosion rates). Valley forms are generally V-shaped or trough, and narrow (<200' wide).

Common stream types in Wall are associated with landscape position, in the upper watershed, the gentle terrain of Porter Creek, Upper Wilson, and upper Swale, stream types include C, E, and B. In headwater areas, geologic breaks, and in steep tributaries to the canyon streams, are A-type channels (lower Porter, Indian Creek, lower Little Wall, lower Skookum, and lower Swale). Some reaches are entrenched, G-type channels, with small terraces evident (lower Wilson). And a few low gradient meadows have reaches of E-type channel.

Many miles of Wall Creek and its tributaries are not in optimum condition. Unstable banks, incised channels, long continuous high-gradient reaches, are common features. A variety of factors have contributed to channel disturbance, including past flooding, roads within floodplains, livestock grazing, and riparian harvest. These are the same factors contributing to water quality degradation. The physical channel system is clearly linked to water quality and to riparian function. Stream types vary in their sensitivity to disturbance and in their recovery potential. Riparian vegetation also varies by site conditions. Notable riparian vegetation recovery is occurring within livestock and big game exclosures, particularly on Wilson and Big Wall creeks. The analysis team observed that riparian shrub vegetation within the Wilson exclosure is slowed by big game browse, but clearly shrub recovery is greater here than in other riparian areas where livestock still have access. This knowledge can contribute to a restoration strategy that prioritizes streams for restoration activities, identifies reasonable timeframes for response, and identifies appropriate species for replanting.

III. B. Biological

III. B. 1. Fish and Aquatic Habitat

The fish habitat in many of the stream reaches in the Wall Creek system is clearly in poor condition. Sediment levels are high in many reaches. In many reaches, Wall Creek streams meet PACFISH RMO's for frequency of large woody debris; however, where temperature data is available, many streams do not meet PACFISH RMO's for that parameter. Livestock and past timber management appear to have contributed significantly to temperature increases. Data is insufficient to determine whether Wall Creek system streams meet RMO's for bank stability, lower bank angle or wetted width/depth ratios but stream survey narratives imply that they most likely do not.

Question I. A. 1: What is the relationship of the fish populations in the Wall and its tributaries to the fish metapopulation structure of the rest of the John Day River basin?

This question will be more thoroughly addressed in the Interior Columbia Basin Ecosystem Assessment. The information reported here is specific to the Wall Creek system.

The Wall Creek watersheds contain approximately 730 miles of streams (Table 2). Perennial streams comprise approximately 184 of these miles and 107 miles are fish-bearing. About 96 miles host anadromous *Onchorynchus mykiss* (Steelhead) during some part of the year. The Pacific Northwest Region of the National Forest System lists Steelhead as a sensitive species. Oregon Department of Fish and Wildlife has conducted Steelhead spawning ground surveys in parts of Wall Creek or its tributaries most years (Table 6). ODFW fisheries biologists feel that Steelhead redd numbers have shown a declining trend over the past few years, but they have not yet been able to perform the statistical tests necessary to substantiate this (Unterwegner, 1995, personal communication). Chinook Salmon are not known to spawn in Wall Creek or any of its tributaries, but juvenile Chinook have been observed in lower Wall Creek (ODFW annual Reports, 1982, 1983). Bull Trout (*Salvelinus confluentius*) have not been recorded from the Wall Creek system. Most waters in the Wall Creek system are presently too warm (Table XX3) to support Bull Trout. Rainbow Trout (non-anadromous *Onchorhynchus mykiss*) are found throughout the fish-bearing portions of the streams in the watershed. Non-game fish found in streams of the Wall Creek watershed include: Dace (*Rhinichthys osculus*), Sculpins (*Cottus bairdi*), Shiners (*XX*) and Suckers (*Catostomus columbianus*).

Table 6. Five-year averages of Steelhead redd counts in Wall Creek and its tributaries reported as redds per mile of stream surveyed

	Year					
Stream	**1980 - 1985**	**1985 - 1990**	**1986 - 1991**	**1987 - 1992**	**1988 - 1993**	**1989 - 1994**
Wilson Creek	5.7	9.2	3.0	1.2	0.8	2.3
Wall Creek	2.0	7.9	4.3	2.1		2.2

Data source: ODFW Summer Steelhead spawning ground counts, Unpublished data.

All fish bearing portions of streams in the Wall Creek Watersheds have been surveyed within the past 6 years. Many miles of Wall Creek and its tributaries are not in optimum condition. Unstable banks, incised channels, long continuous high-gradient reaches, are common features. A variety of factors have contributed to channel disturbance, including past flooding, roads within floodplains, livestock grazing, and riparian harvest. These are the same factors contributing to water quality degradation. The physical channel system is clearly linked to water quality and to riparian function.

Question I. A. 3 & 4: What are the current conditions of the aquatic habitat in the Wall Creek watersheds? Which biophysical factors influence fish habitat in Wall Creek and its tributaries?

PACFISH Objectives and related information

For a discussion on methodology and rating system for PACFISH stream parameters refer to Section VII Q.

a. Stream temperature:

None of the stream reaches for which data were available met the applicable PACFISH or Oregon State standards for water temperature. Present summer water temperatures in most streams in the Wall Creek system are warm (Table 7) compared to established needs of most Salmonids. Although some salmonids can survive at relatively high, but sublethal, temperatures, most are placed in life threatening conditions when temperatures exceed 73.5-77°F (23 - 25°C). Vigor and productivity are usually reduced and susceptibility to disease increased when temperatures vary much from the optima. Preferred temperatures for steelhead are 50-55°F (10-13°C). Temperature records are not available for all Wall Creek system streams, but most of the streams for which records are available exceed the preferred range for steelhead nearly every day for much of the summer.

Table 7. Temperatures of some streams in the Wall Creek watersheds.

Location of Temperature Monitoring Station	Applicable PACFISH Temperature Standard	Seven-day Average Maximum Temperature F°*	Subwatershed
Wall Creek mouth	64	77.6	23c
Wall Creek at Forest Boundary	60	80.4	24a
Wall Creek upper reach	60	69.1	24c
Lower Indian Creek	60	83.4	24g
Wilson Creek above Bull Prairie Lake	64	64.6	24e
Wilson Creek below Bull Prairie Lake	60	75.8	24e
Wilson Creek above Wall Creek**	60	80.0	24f
Skookum Creek below Alder Creek	60	69.9	26a
Alder Creek	60	66.5	26c
Swale Creek, upper reach**	60	70.3	26d
Swale Creek, middle reach	68	84.2	26d

* Seven-day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive seven-day period.

**Data were missing for some of the warmest parts of the summer for these stations, so temperatures may have actually gone higher than indicated here.

b. Width/depth ratios:

Bankful width/depth ratios ranged from 2.0 (Alder Creek, reach three) to 35.3 (Wilson Creek, reach one). Out of 48 stream reaches with data available, 20 showed a width/depth ratio >10. Four subwatersheds scored poor, five scored fair and five scored good for average bankful width/depth. Section VII. Q. Table 6 gives scoring by subwatershed.

c. Canopy cover

Stream reaches with canopy cover in category 1 (poor) are: Reaches 1, 2, 3 of Big Wall Creek, reach 2 of Colvin Creek, reaches 1 and 2 of Wilson Creek, reach 3 of Lovelett Creek, Three-trough Creek and reach 3 of Little Wall Creek. Stream reaches in categories two and three would score two (fair) in the subwatershed scoring system developed by the watershed analysis team. Twenty-nine stream reaches would fit this scoring category. Eleven stream reaches have enough canopy cover that stream shade should not be a major concern. Stream survey reports mention evidence of past streamside timber harvest in many reaches throughout the Wall Creek watersheds.

d. Substrate:

1) Embeddedness:

Average cobble embeddedness of streams in the Wall Creek system is reported as greater than 35 percent for 22 of the 52 stream reaches for which data are available. Sand is given as the dominant substrate for an additional five streams for which embeddedness data is not available. These streams should probably also be considered embedded. Yet another four stream segments are reported as not embedded but list sand as the dominant substrate. This seems problematic. The report for one of the streams (East Fork Alder Creek) states: "...sand, which was mostly silt and clay, was the much larger percentage of the substrate, and in many units it was the only substrate." and: "Embeddedness was low due to the low percentage of gravel and cobble." More sand and less cobble should equate to higher, not lower, embeddedness! This inconsistency is addressed in Section VI. 2. Recommendations.

The substrate cannot be considered as a high quality component of the fish habitat for 31 of the 52 reaches with data available. Of course, in some settings, for example, some meadow streams, high levels of fine sediments may be a natural, normal condition.

2) Rearing substrate:

Another six (non-embedded) reaches list gravel as the dominant stream substrate. Although gravel is a necessary component of the substrate in spawning habitat, it provides little or no hiding cover for juvenile fish and therefore does not qualify as high quality rearing habitat.

In summary, the stream survey data suggest that in 37 out of 63 reaches, substrate contributes little to the quality of rearing habitat for salmonids. This makes other components of hiding cover (deep pools, instream wood, overhanging vegetation, bank undercutting) more important.

3) Spawning substrate:

Cobble embeddedness bears a less direct relationship to quality of spawning habitat, since salmonids tend to flush at least some of the fine sediments from the gravel during redd construction. However, to the extent that high cobble embeddedness indicates a high sediment load for the stream, it also indicates a potential reduction in quality of spawning habitat. Sediment deposition during the time that eggs are in the gravel warrants the greatest concern, since sediment deposited over the redd can restrict the flow of water through the redd, reducing oxygen and metabolite flux. In excessive quantities, fine sediment could also form a cap over the red, preventing the emergence of alevins from the gravel.

Summarizing substrate quality then, 31 of 63 stream reaches should be considered poor salmonid spawning and rearing habitat and an additional 6 reaches are counted as poor rearing habitat due to excessive amounts of sediment. It seems clear that measures to reduce production and delivery of fine sediments to streams could improve salmonid habitat in Wall Creek and its tributaries.

d. Instream woody debris:

Woody debris frequency data for Wall Creek system was collected following at least two different protocols. In at least some of the stream surveys prior to 1993, standing trees which might fall into the stream or into the bankful width area were counted as well as wood that was actually down and in the stream. Beginning in 1993, only wood that was actually down and in the stream or down and at least partially within the bankful width area was counted.

Standing trees and snags within the riparian zone may represent future large woody debris, but since they are not yet functioning in the hydrologic system or aquatic habitat of the stream, they are best counted separately. The PACFISH RMO of 20 large (> 12" x 35') pieces of woody debris per mile for streams east of the Cascade crest does not seem to contemplate counting trees or snags which are still standing, but does include large down wood which is at least partially within the bankfull width (PACFISH, 1995 and USFS Section 7 fish habitat monitoring protocol for the Upper Columbia River Basin, 1994). Twenty-six stream reaches have been surveyed using the later protocol. Of these, 19 meet the PACFISH RMO's. In fact, eight reaches average more than 40 pieces per mile. This in spite of evidence of past logging which removed trees right down to the streambank. When reaches surveyed before 1993 are included, 47 reaches out of 52 for which data are available contain more than 20 pieces of large wood per mile. In fact, as of fall 1994, the median value for woody debris frequency for stream reaches in the Wall Creek system was 32.95 pieces of large wood per mile. The overall range is from 0.8 (Dark Canyon Fork -- 1994 data)) to 202.1 (Hog Creek reach 2 -- 1992 data) with an arithmetic mean for all reaches of 38.8 pieces/mile (std. dev. = 26.97).

e. Fish cover:

Stream survey reports rated most streams in the Wall Creek system as cover class 1 or 2 (32 out of 52 for which data were available). Only eight were rated in cover class four (> 40% cover). All eight of these reaches were in three streams, Alder Creek, Dark Canyon Creek, and Dark Canyon Fork. Hiding cover is not abundant in the remainder of the Wall Creek system.

f. Pools:

1) Pool frequency:

Pool frequency in the Wall Creek system varies from 0.54 pools per mile (reach two of Alder Creek) to 32.1 pools per mile (Wilson Creek, reach 1). Most of the pools in reach one of Wilson Creek were constructed by the Forest Service in an attempt to speed improvement of degraded habitat. In fact, all stream reaches with pool frequencies > 15 pools/mile contain a high proportion of constructed pools.

2) Residual pool depth:

Not only are pools relatively scarce in the Wall Creek system, those pools that are present are mostly shallow. Average residual pool depth was 1.5 ft. or less for 40 out of 58 reaches for which data was available. Only four reaches had average residual pool depths of three feet or greater, and for one of these the data is anomalous.

3) Deep pools per mile:

Only 12 reaches had pools deeper than 3 feet. Of those 12, only two had more than ten deep pools per mile. Both of those were reaches with many pools that had been mechanically constructed as mitigation/habitat restoration by the Forest Service. In fact it is likely that all of the deep pools in these reaches were mechanically constructed. Natural deep pool habitat is clearly scarce in the Wall Creek system.

Question I. A. 4: Do present fish population levels meet Forest Service objectives?

The 1990 Umatilla Forest Plan defined an objective of doubling anadromous fish smolt production by the year 2000. Although a base level population was not identified for the Wall Creek system, the decline in redd counts reported previously in Table 6 indicates a declining production trend which is obviously contrary to the identified objectives.

III. B. 2. Forest Vegetation

The basic process used for the analysis of historic range of variability (HRV) was to compare the "potential" disturbance climax vegetation structure on the landscape (as defined below for the plant association groups) against the existing condition. The existing vegetation on the Forest was classified according to a structural and species composition matrix for each of the disturbance-climax plant association groups (DCPAG's). Each forest stand was identified in terms of its structure (very early, early, early/middle, middle, and late/old), major species, and its species composition within the natural succession for that DCPAG. When existing vegetation is classified into the appropriate DCPAG and structural/species matrix within that PAG, the existing vegetation can be compared to what would have been sustained if natural disturbances had managed the landscape. Landscape structure parameters used in this project were identified using data from many sources, including memos from Regional Ecology staff, Forest Staff, regional guides and published literature, and local knowledge of the Wall watershed area. We have essentially integrated historical maps (1937), fire history data, interpretations by staff ecologists on the Forest, and working papers by Region 6 ecologists. Although much of the data on historic and natural conditions is sparse and not well developed, they are sufficient to identify gross changes in the landscape vegetation and structure that have resulted from anthropogenic activities.

Table 8. Existing Structure by PAG (FS acres only)

Structure	PIPO	Warm ABGR	Cool ABGR	LAOC	JUOC
Very Early	563	2,120	782	270	4,079
Early	79	212	6	15	571
Early/Middle	1,472	3,350	54	12	3,975
Middle	6,543	28,457	3,121	1,036	3,597
Late/Old	1,515	16,687	3,775	422	1,120
Totals	10,172	50,826	7,738	1,755	13,342

PIPO = ponderosa pine, ABGR = grand fir, LAOC = lodgepole, JUOC = western juniper

Consideration of Private Land

Data from Pacific Meridian Resources (PMR) was used to determine existing condition land types (i.e., forested vs. non-forested) on private land within the Wall Watershed. However, due to time constraints and difficulty with the PMR data layer, we were unable to determine forest structural stages existing on adjacent private lands within the watershed. From observations in the field, aerial photographs, and discussion with industrial forest managers, it is known that the majority of the forested private land in the watershed has had one or more selection tree harvest entries and currently is stocked with trees in an early to middle structural stage. Within the Wall Analysis Area it was determined that there are 32,900 acres of non-National Forest lands with 21,200 acres having greater than or equal to 15 percent canopy closure; approximately 64.4 percent of that land base is in a forested condition.

Timber Harvest

Table 9. Summary statistics on Wall Area timber sales.

Harvest Info. Category	% of the Watershed	% of the NF area	SWS Ranges in NF %
>= 1 Timber sale	48	65	21 - 99
>= 2 Timber sales	14	19	2 - 74
Only 1 Timber sale	34	46	17 - 90

Question II. B. 7: How do subwatersheds compare with respect to harvest and constructed road influences on sustainability of upland vegetation?

SWS 25 is the one standout among subwatersheds regarding sustainability problems and is the only one rated in the higher category. There is need for sustainability attention to several other SWS's, based mainly on detrimental soil conditions and excessive road densities. Only five of the SWS's were judged to be in the lower concern category, so there is considerable subwatershed area of medium and higher concern.

III. B. 3. Floristic Biodiversity

The Forest-wide species habitat affinity database was linked to each of the 614 species that appeared on the final Wall Creek checklist of plant species. Other Umatilla National Forest databases employed in the analysis were the Culturally-Significant Plants Database, the Noxious Weed Database, and the Native and Introduced Species Database. These are all relational databases that can be extracted easily from UMA95, a current checklist of plant species found on the Umatilla National Forest.

Question III. F1: What vascular plant species presently occur in the Wall Creek Ecosystem Analysis Area?

Additional appendices (B, C, D, E, F, and G) to Section VII U. provide checklists of the native species of each of the plant association groups. These species list provide guidelines for restoration opportunities with desirable native species according to their placement in the six plant association groups.

Question III. F2: What is the floristic richness of the Wall Creek Ecosystem Analysis Area in comparison with the rest of the Heppner Ranger District, with the Umatilla National Forest, and with the Pacific Northwest Region?

The 614 vascular plant species of the Wall Creek Ecosystem Analysis Area represent 71.6 percent of the 854 species of plants known to occur on the Heppner Ranger District and 49.8 percent of the 1,232 species of plants known to occur on the Umatilla National Forest. The aquatic vegetation in the Bull Prairie reservoir contributes significantly to the floristic biodiversity of the analysis area.

Question III. F3: What are the ecological distributions and habitat affinities of these species within the seven plant association groups selected for this analysis?

This portion of the analysis indicates that the greatest floristic richness in the Wall Creek Ecosystem Analysis Area is within the non-forested plant association groups, and specifically within the Steppe Plant Association Groups.

Question III. F4: What are the floristic similarities between the plants of one plant association group and the other plant association groups?

The greatest similarity in floristic composition occurs between the Ponderosa Pine and the Warm Grand Fir Plant Association Groups. The coefficient of floristic similarity between these two groups in the Analysis Area is 92.3 percent. This compares with a Forest-wide coefficient of floristic similarity for PIPO:WARM of 89 percent. Other coefficients of similarity having relatively high values include COOL:RIV = 84.4 percent. This indicates that the Grand Fir (*Abies grandis*) is an important component of the riparian communities in the Wall Creek Ecosystem.

The conclusion here is that there is a tremendous similarity between the floristic composition of the Warm Grand Fir Plant Association Group and the Ponderosa Pine Plant Association Group within the Wall Creek Ecosystem Analysis Area. The major difference is that *Pinus ponderosa* as a plant association dominant is essentially missing from the tree synusium (layer) in the *Abies grandis* (Warm) Plant Association Group.

Question III. F5: What are the occurrences of historically-listed or presently-listed sensitive plant species within the Wall Creek Ecosystem?

Sixty-five populations of Washington Monkey Flower, *mimulus washingtonensis*, have been documented within the watershed. This sensitive species is well-known from the Heppner Ranger District where its distribution is limited to sites below 4,000 feet that have volcanic ash soils derived from the John Day Formation. Thirteen historically listed sensitive plant species also occur in the watershed.

Question III. F6: How might management activities occurring in the Analysis Area adversely impact plant species with an historic track of sensitivity?

Within the context of the floristic composition of the Umatilla National Forest, it is unlikely that small-scale impacts to the habitats of the 13 species discussed in question F5 (above) would adversely affect any of those species and translate to a "trend toward Federal listing." The plants of the Wall Creek Ecosystem Analysis Area and the Umatilla National Forest, including those on the historically sensitive "tracking" list, have evolved under a natural cycle of periodic fire. Under natural conditions, the fire cycle begins in the late summer or autumn of each year. By that time, most plant species have entered a state of dormancy or have dispersed their propagules for the year. The species on this "historic track" list are, for the most part, abundant both within the Wall Creek Ecosystem Analysis Area and on the Umatilla National Forest.

Question III. F7: What other plant species might be "at risk" in the Analysis Area and which of the Plant Association Groups support these potentially "at risk" species?

It has been determined that 23 of the 189 species in the low category are introduced, rather than native, species.

The "native species potentially at risk" species list for the Wall Creek Watershed Analysis area contains 165 entries. Forty of these species have problematic combined distributional and abundance indexes.

Further analysis of the species on the "limited abundance and limited distribution" list indicates that the 25 species that received an "MA" (moderately abundant) or "VA" (very abundant) ranking are not "at risk" in the Wall Creek Ecosystem. Fifteen species are in the "LA" (limited abundance) category. Nineteen of the forty species in this final list occur on a single ranger district of the Umatilla National Forest. Six species have a distributional score of 1 (occur on a single district of the Forest) and an abundance ranking of "LA."

On-the-ground experience enables further refinement of the list of plant species that are truly at risk. For example, three species of willow (*Salix*) were determined to be of moderate distribution and limited abundance. However, because of the Heppner Ranger District's efforts to protect riparian corridors, these riparian species are presently making a comeback which is attributable to exclusion by fencing or "rest" periods in the grazing rotation system.

One willow species, *Salix lasiolepis*, is of limited distribution and limited abundance. This species is infrequent in the Wilson Creek subwatershed. However, it is making a dramatic comeback since the Wilson riparian fence was completed. The other species in the final "at risk" category are *Cardamine breweri, Eriogonum caespitosum, Helianthus nuttallii,* and *Pyrola elliptica*. Because of its prolific seed production, *Cardamine breweri* is expected to increase in the riparian zones of the Wall Creek Ecosystem.

The microhabitats of both *Eriogonum caespitosum* and *Helianthus nuttallii* are extremely limited in the Wall Creek Ecosystem. The White Wintergreen, *Pyrola elliptica*, is extremely limited on the most mesic riparian fir forests of the north-facing slopes in the Indian Creek subwatershed. Responses of these final "at risk" species are addressed in the Integration section (Section VII. U.).

Thus, nine species mentioned above remain on the list of plant species for further consideration in management decisions. With the exception of the willow species, most of these species occupy a unique microhabitat that is not well represented on the Umatilla National Forest.

In summary, 165 native plant species received low Floristic Biodiversity scores. Of these, 40 have Distributional Indices of ≤ 2 (occur on one or two districts of the Umatilla National Forest). Of these 40 species, 19 have a limited distributional value. Of these 19 species, 6 are of limited abundance. Additionally, three species of willows fall into the final "at risk" category on the basis of limited abundance determined by on-the-ground analysis.

Question III. F8: What is the ratio of native to introduced species in the Analysis Area? Is this ratio an accurate indicator of Historic Variability in Floristic Biodiversity?

Among the 614 plant species presently found in the Wall Creek Ecosystem Analysis Area, 79 or 12.8 percent are introduced (non-North American) species and 535 (87.2%) are "native". This figure indicates that the Watershed Analysis Area probably is floristically more diverse today than it was historically. This conclusion does not consider the quality of the vegetation. **The non-native species—whether aggressive noxious weeds or species introduced for management purposes—have diminished the habitat available for native species.**

The Plant Association Group supporting the largest number of non-native species is the Steppe Plant Association Group which has been historically altered through grazing activities and range improvement projects. Interestingly, the non-native species appear to have "broad spectrum" affinities for virtually all of the plant association groups. Many of the non-native plant species in the Wall Creek Watershed are grass species that historically have been included in seeding prescriptions as part of management activities. The present goal of the Forest Service to revegetate exclusively with "native" species should reverse the trend of diminished habitat occupied by native plant species.

Question III. F9: What noxious weeds occur in the Analysis Area and what are their affinities for Plant Association Groups?

Eight species presently placed on the Noxious Weed List for the Umatilla National Forest are found on the USFS-administered lands of the Wall Creek Ecosystem Analysis Area. Two additional species are known from adjacent private land. An additional three species which are not presently "tracked" by the Forest's Noxious Weed program are known to occur in the Wall Creek Ecosystem. An historic population of Tansy Ragwort at Bull Prairie Reservoir was apparently successfully eradicated following its discovery in 1988. Only the Common Burdock does not occur in all of the groups. Of these noxious weeds, Canada Thistle has the greatest potential for spreading and is the most widespread at the present time. Additionally, one undesirable native species, Cocklebur (*Xanthium strumarium*) poses a threat as a "new invader" near the Forest Boundary on mainstem Wall Creek.

Two of the three "untracked" noxious weeds of the Wall Creek system are "new invaders." These species are Purple Field Mustard (*Chorispora tenella*) and Sulfur Cinquefoil (*Potentilla recta*). The third "untracked" noxious weed occupies significant habitat in the Wall Creek Watershed. Cheatgrass (*Bromus tectorum*) is so widespread in the Pacific Northwest that it is impossible to eradicate.

Question III. F10: What are the culturally-significant plant species of the Analysis Area? Are any of them "at risk" because of management activities? Are any of these species so limited in abundance and/or geographical amplitude that they may become major issues in the future?

Of great concern to Native Americans at the present time is the diminished habitat of food plants. Although a relational query of the Wall Creek Watershed Floristic Biodiversity Database and the Culturally-significant Species Database of the Forest indicates the occurrence of at least 51 culturally-significant edible plant species, nine of these species are of greatest importance. None of these nine species have been determined to be "at risk" from ongoing or proposed management practices.

III. B. 4. Fire and Fuels, Insects and Disease

Question II. B. 4b.: How do existing vegetation conditions relate to historic fire, insect, and disease conditions?

Heavy spruce budworm damaged stands.

In subwatersheds 26c (Upper Alder/Skookum) and 26d (Swale) where spruce budworm has had a significant impact, it is assumed that the fuel loading and risk of fire has increased significantly or is increasing. Historic descriptions of this area noted substantial amounts of dead trees and dense forest cover, apparently in lodgepole and cool grand fir stands (see Section VII. X., p.12). Fire spread rates are significantly higher in these stands than they were when the stand had a closed canopy. These stands are also more prone to spread by spotting.

Moderate spruce budworm damaged stands.

These stands show a considerable amount of damage but still contain green trees, and the canopy is still somewhat closed. Fuel loads have not reached critical levels nor are they as dry. In a wildfire situation, torching of the remaining trees is likely. Spread would be dominated by spotting or a surface fire rather than a sustained crown fire.

Light spruce budworm damaged stands. (Level 1 rating)

These stands vary little from a healthy stand based on fire behavior potential. Fires spread primarily by ground or low intensity surface fires but, under extreme conditions, sustained crown fires are likely especially on steep slopes. Spotting is also a mechanism for spread but less likely as the closed canopy helps keep surfaces fuels moist.

Juniper stands.

These stands, once established, are fairly fire resistant except under extreme conditions where fire spread is from tree to tree by torching or more generally spotting from tree to tree. Juniper stands tend to have lesser amounts of fine fuels to carry the fire, especially near the trees themselves.

Ponderosa stands.

These stands traditionally supported frequent light underburns. Fire intensity and spread was low. Fire generally provided the seed bed for the next generation. Fire would later provide a mechanism by which the trees were thinned out. Over time, very resistant stands would develop dominated by older mature pine with scattered areas of poles and seedlings. Many of these stands are now becoming more flammable as firs, shrubs, and fuel loadings increase in the absence of frequent fire. Prescribed fire has been used in several of the subwatersheds in the Wall watershed to help maintain the pine and reduce fire hazard.

Fire Risk by Plant Association Groupings (current situation)

Question III. B. 4c: What are the implications of current vegetation composition on potential future fire, insect, and disease events?

Lodgepole pine stands.

The lodgepole stands are generally of two categories, those that were logged following beetle attacks where fuels were treated and those harvested stands where fuels were not treated or in natural stands where no fuel treat has occurred.

The treated stands are not likely to be a fire problem, as they rarely carry fire to any extent. Fuel loads are generally light. Fire generally behaves as a ground or low intensity surface fire. These stands are generally fire proof. Only under extreme weather conditions is a crown fire likely to occur.

In the harvested but non-fuel treated stands or in the natural stands, the fire potential is much higher. Where the dead trees litter the surface and where fuels left from harvest occur, the potential for large destructive fires is great. Fires will spread by high intensity surface fires and by torching. Generally the canopy is broken up enough that sustained crowning is rare.

Ponderosa Pine stands.

In areas where prescribed fire or some type of harvest activity coupled with fuel treatment has not been used, fir and other fire intolerant species have invaded thus increasing the potential for a large destructive fire. These mixed conifer stands now have the potential for high intensity surface fires with torching and crowning in the closed stands. Mortality in all the species will be considerable once the stands develop multiple layers and tight spacing.

Risk rating analysis was conducted on seven forest insects and seven diseases. Three diseases (Western dwarf mistletoe for ponderosa pine, Douglas-fir dwarf mistletoe, and mixed conifer root disease) showed substantial acreage at high risk across the Wall Analysis Area. The risk-rating model for western spruce budworm identifies 77 percent of the forested portion of the analysis area at risk of sustaining high rates of defoliation. See Section VII. T. for detailed discussion.

Warm grand fir stands.

Fuel loading is much higher due to higher stocking levels than occur in the ponderosa pine stands. The fir component has added ladder fuels and have increased crown closure that will allow for fire to carry from the surface into the crowns. Fire spread is primarily by surface fire with a high potential to sustain a crown fire. This is typical of much of the stands that the Tyee Fire burned on the Wenatchee National Forest in 1994.

Cool grand fir stands.

These stands are a true mixed conifer stand. Fuels tend to build up slowly. As a young stand with fairly closed canopy, fire spread is mostly by smoldering ground fire and low intensity surface fire. Fires are generally small in size. As the stand ages, fuels build up and a multi-layered canopy develops. This layering lends itself to carry fire from the surface into the crowns. Due to a higher moisture regime, significant fires are rare except under extremely dry weather when fire generally spread by crown fire. These fires tend to be large in size with high tree and surface vegetation mortality. Rarely are stands completely removed. Generally there will be strips or pockets left undamaged.

Juniper stands.

Historically, juniper was only found on drier sites that were rarely visited by fire. This was generally restricted to very rocky areas where there was little or no fine fuel to carry the fire to the individual trees. Once juniper becomes established on a site, it is very competitive for water and generally reduces other vegetation except for some annuals like cheat grass. As a stand ages, it becomes almost fire resistant due to the lack of fine fuel on the site. When fire does occur, it is generally carried by spotting from tree to tree.

Riparian areas (buffers).

Fire generally avoids these areas because of the moist nature of the fuels. Under normal fire season conditions, fires will spread into these areas in a mosaic fashion with little or no overall impact on the stream or vegetation. Under extreme conditions when fuels are dry, fire can kill all of the live vegetation and consume most of the down and dead material. Riparian zones can also provide a network for fire to move from the lower watershed to the upper watershed. All types of fire spread is possible but it is generally limited to ground or surface fires except under extreme conditions when crowning can occur. When duff and soil moisture are also low, mortality can occur even with low intensity fires (less than 2 to 4-foot flame length).

III. B. 5. Vertebrate Biodiversity

Question III. T.V.1a: How have types and proportions of habitats for terrestrial vertebrate species changed over the last century?

Table 10. Changes in Habitat Availability, Wall Analysis Area: 1937-1994 (National Forest lands only)

Species	1937 Acres	1994 Acres	Change Ac. (%)
Pileated Woodpecker	70,721	21,438	-49,283 (67%)
American Marten	8,261	6,978	-1,283 (16%)
Northern Three-toed Woodpecker	7,589	664	-6,925 (91%)
Primary Cavity Excavators	77,502	66,747	-10,755 (14%)
Rocky Mountain Elk: -cover * -primary forage** -bull security cover	 8,371 89 Data not avail.	 14,767 1,175 11,506	 +6,396 (43%) +1,086 (92%)
Bald Eagle -reproduction -wintering	 34,542 18,519	 8,573 4,856	 -25,969 (75%) -13,663 (73%)
Wolverine -forage -reproduction	 41,020 983	 10,546 1,035	 -30,474 (74%) +52 (5%)
Northern Goshawk	70,754	21,686	-49,068 (69%)
White-headed woodpecker	73,371	7,360	-66,011 (90%)

* "Cover" includes both "satisfactory" and "marginal" cover (see Umatilla Forest Plan for definitions)
** "primary forage" = non-forest habitat (meadow or grassland) within 600' of a forested edge.

Results of this analysis should not be viewed as having statistical significance. The intent of this approach with the understanding that correspondence between 1937 and existing condition stratification was imperfect, was to display the most obvious changes in habitat availability over the last half decade.

Question III. T.V.1b: Have these changes resulted in changes in species occurrence or populations?

This question could not be answered due to the lack of quantitative population data (current or reference) for terrestrial species except mule deer and elk.

Question III. T.V. 2: Are there specific components of diversity in the Wall drainage that are "at risk" ? Examples include:

a. severely reduced acreages of specific habitats

b. Threatened, Endangered or sensitive species

c. loss of ecosystem "function"

d. species having low "versatility", i.e., species that are least able to successfully adapt to changing habitat conditions

T.V.2a. Reduction of habitat:

Old growth ponderosa pine forests, riparian hardwood shrub corridors, and aspen stands have suffered substantial declines in area and quality since the 1930s. The analysis shows that 75 percent of the old growth ponderosa pine mapped in 1937 has been lost, mostly as a result of wide-spread selective harvest in this century. An estimated 24,000 acres of Forest with late/old structure currently was mapped in the Wall Analysis Area accounting for 31 percent of the currently forested acreage. However, much of this remaining old growth is highly fragmented and of poor quality due to open condition, much of which is from previous selection harvesting.

Snags, Down Logs: Snags and down logs were inventoried in 1994 on 44 plots within the Wall analysis area (Table 11). Based on the data compiled from those plots, snag densities currently exceed both Forest Plan standards and guidelines, and the eastside timber sale screens Forest Plan amendment. Averaged across all size classes, both snags and down logs also meet current recommendations for pileated woodpecker management. Where spruce budworm mortality is high, snags are currently at very high levels, but the opposite may be true within a decade as existing snags begin to fall and few live trees remain to provide future replacement snags.

Table 11. Snag and down log characteristics, Wall Analysis Area.

SNAGS	Avg. DBH	Avg. HEIGHT	Avg. SNAGS/AC
10"-20.9"DBH	15"	23'	9
≥ 21" Diameter	27"	30'	4
Overall	18"	26'	8
DOWN LOGS	**Avg. DIAMETER**	**Avg. LENGTH**	**Avg. PIECES/AC**
12"-20.9" Diameter	14"	43'	168
≥ 21" Diameter	26"	40'	53
Overall	17"	42'	130

Aspen and riparian hardwood habitats are much less abundant today than historically, however, it is very difficult to assess these losses quantitatively, as our sources of historic information were focused on timber lands.

Beaver colonies were often critical in maintaining the integrity of wet meadow systems such as those that occur in the Alder/Upper Skookum and Swale subwatersheds. Willows, aspen, and other vegetation provided food and dam-building resources. In return, water stored behind beavers' dams maintained saturated soils, which then slowly released their cold water through the dry summer and fall months. Beaver are gone from many of these meadows today, having been trapped out for their pelts or killed by government agents in response to "damage" complaints (i.e., daming streams and flooding meadows). Loss of beaver populations, along with grazing and road construction, has often resulted in lowered water tables and changes in plant communities. The 1907 Heppner Reserve report states that springs were often used as sheep and cow camps around the turn of the century. This resulted in serious trampling of the spring itself and surrounding vegetation. In many cases, the meadow's capacity for water storage has been diminished or lost. It may be that changes in timing of water yield resulting from the loss of storage capacities of wet meadows, rather than total water yield, is the causal agent in some of these streams having only intermittent flow today. Thus, the presence of beaver can be an important indicator of riparian habitat diversity, as well as an indicator of the potential of a stream to recover naturally to a more complex and sustainable state.

T.V.2b. Threatened, Endangered, Sensitive Species

Additional information regarding current habitat conditions for T/E/S and vertebrate species of concern can be found in Section VII V., p.15.

T.V.2c. Changes in ecological function: fragmentation, loss of predators

Fragmentation: Addressed in question 4a.

Predators:

Cougar, wolves, grizzly and black bear, wolverine, bobcat, coyote and marten historically comprised a diverse assemblage of predators which presumably existed in some dynamic balance with their prey. Grizzly bears and wolves are long absent from the Wall drainage; wolverine may or may not persist in the upper reaches of the drainage. Marten numbers are unknown, however, on-going studies in the Blue Mountains suggest that the density of this species is quite low. Black bear and cougar appear to be making a comeback after many decades of low densities.

T.V.2d. Low Versatility Species:

Twenty-eight species of birds and one mammal were identified as vertebrate species of low versatility (see list in Section VII. V., p. 21).

T.V.2e. Neotropical Migrant Birds (NTMB):

This group includes bird species which nest in North America and migrate to the neotropics for the winter. Over the past two decades, declines in many of these species, including many songbirds, have been noted. Causes for the declines include habitat degradation in North America, compounded by both habitat destruction and continued use of toxic chemicals in Central and South America (Sharp 1992).

Neotropical migrants account for a significant portion of the avian biological diversity in the Wall Creek watershed. Of the 164 species of birds known or suspected to occur in the Wall Analysis Area, 83 species, or approximately half, are NTMBs. Neotropical migrants occupy a variety of habitats within the area: 48 species are associated with riparian habitats, while 34 species use old growth. The importance of aspen groves is confirmed by the 32 species of NTMBs known to nest or forage in this scarce habitat. Twenty-nine species use sapling pole stands for either nesting or foraging. Only 19 of the 83 Wall species use clearcut/shrub-seedling habitats: many of these are generalist or edge-associated species. Two migrant raptors, the Swainson's hawk and peregrine falcon, are occasionally observed in the drainage. Section VII. V. Table 5 lists all NTMB species in the analysis area with their habitat associations.

Question III. T.V.3: What species of animals are closely associated with old growth habitats in the Wall watershed?

In addition to the old growth-associated species mentioned in the Forest Plan (FP 4-56), several other vertebrate species that either depend on, or that use old growth disproportionately to other habitats, occupy the Wall Analysis Area. The following species use old growth forests in one or more Plant Association Groups for reproduction, foraging, or both (Thomas et al. 1979):

northern goshawk	silver-haired bat	little brown myotis
pileated woodpecker	long-legged myotis	big brown bat
Vaux's swift	California myotis	American marten
Townsend's warbler	bald eagle	brown creeper
northern saw-whet owl	sharp-shinned hawk	Cooper's hawk
hermit thrush	red crossbill	white-headed woodpecker
white-breasted nuthatch		

Question III. T.V.4a. Where are the remaining old growth patches? How large are they, and how much interior habitat do they provide (connectivity)? Are they large enough to provide for successfully reproducing pairs of dependent species?

b. Are there places where we might be able to speed development of "future" old growth? Is this desirable?

An estimated 24,000 acres of forest having late/old structure (see definition, Section VII. V.) remain in the Wall drainage, accounting for approximately 31 percent of the currently forested acres within the analysis area. Much of this remaining old growth is highly fragmented. While some degree of fragmentation is a natural feature of Blue Mountain forests, today's highly fragmented old growth is as much a function of human manipulation (through harvest, roading, and altered plant community/insect infestation) as of natural processes.

Twenty C1 and one C2 dedicated old growth areas are located within the analysis area. Of the C1s, five (25%) contain no functional old growth habitat. Only two of the C1s are comprised totally of old growth structure. Old growth stands occupy approximately 46 percent of the current C1 network. These protected stands account for only 7 percent of the total old growth acres in the Wall Analysis Area.

Qualitative assessment of 1) old growth area size, 2) structural characteristics and insect mortality levels and 3) structural characteristics of stands immediately adjacent to old growth stands support the conclusion that "interior" old growth habitat is extremely limited in the Wall drainage. For most stands of 100 acres or smaller, interior habitat simply does not exist. Connectivity between old growth patches in the existing network is limited, particularly between the eastern and western portions of the analysis area.

Existing old growth resources in the Wall drainage are well below historic levels, of variable quality, and highly fragmented, but are still providing critical habitat for associated terrestrial vertebrate species, thus contributing to the continued biological diversity of the drainage. A proposed "managed" old growth/riparian network developed as a part of this analysis, is an attempt to protect, maintain and increase both the quantity and quality of old growth habitat in the drainage. Used with care, silvicultural manipulation to accelerate the establishment of old growth structure can be a legitimate tool in the restoration of both terrestrial and aquatic biodiversity. Design and rationale for the proposed network is discussed in detail in Section V. D.

Question III. T.V.5: What are current population and herd structures for wild ungulates in the Wall watershed? How does the current distribution and condition of habitat contrast with historic conditions? If changes in habitat have occurred, what are they, and how do those changes affect deer and elk populations in the watershed?

Information on current herd numbers and composition was obtained from ODFW reports for the Heppner Management Unit (which includes the entire analysis area). Section VII. V., Table 29 lists estimated late-winter elk numbers for the Heppner management units. Approximately 600-800 elk summer in the Wall drainage, primarily in the Alder/Upper Skookum (26c) and Swale (26d) subwatersheds. An estimated 900-1200 elk use the lower elevations of the drainage in winter. Current total herd numbers for the management unit are slightly above the 1994 Management Objective (MO) of 2,800 animals.

Two Forest Plan roadless areas, Texas Butte (in the Alder/Upper Skookum SWS) and Skookum (in the Swale, Bear and Lower Skookum SWS), provide important summer and winter range habitat for local elk and deer populations. Studies conducted by ODFW indicate that elk preferentially use these unroaded and relatively little-used areas for calving, solitude and hunting-season security cover (ODFW 1992). The Texas Butte area was found to be of particular importance for calving and rearing of young, summer thermal cover, and escapement during hunting season. Recommendations for management of these important areas are included with other resource recommendations for subwatersheds 26A, B, C and D (see Section VI.B).

While total numbers of elk appear to be "on-track" with ODFW Management Objectives, herd composition in the Heppner unit is a continuing problem for managers. Current Management Objectives for herd structure on the unit are 10 bulls per 100 cows, and 45 calves per 100 cows. The most recent estimates for bulls and calves are 3-5 bulls/100 cows and 40 calves/100 cows (R. Krein, ODFW, pers. comm. 7/95).

III B. 6. Upland Range Condition and Trend

There are currently four grazing allotments which are all or partially within the Wall Analysis Area; Hardman, Tamarack/Monument, Swale, and Little Wall. Swale Allotment has been in cattle use since the 1960s and sheep only before that. The Little Wall Allotment was used for sheep only until the early 1970s. Overall, for the Wall Analysis Area, 81 percent of the lands with upland range condition rating, were rated "fair" (74,870 ac.). Additionally, 13 percent were rated "poor" and only 6 percent rated "good." Less than 1 percent were rated "very poor" or "excellent." Range condition was mapped into GIS from field sampled information.

Analysis of upland range conditions has been conducted in recent years for the Tamarack/Monument (approximately 48% of which lies in the Big Creek Watershed) and Hardman (mostly within the Wall Analysis Area) allotments. As a result of riparian area conditions and the distribution patterns of livestock, considerable analysis has been conducted on the riparian areas within the Hardman and Tamarack/Monument Allotments. Adjustments to Tamarack/Monument and Hardman Allotment Management Plans are ongoing.

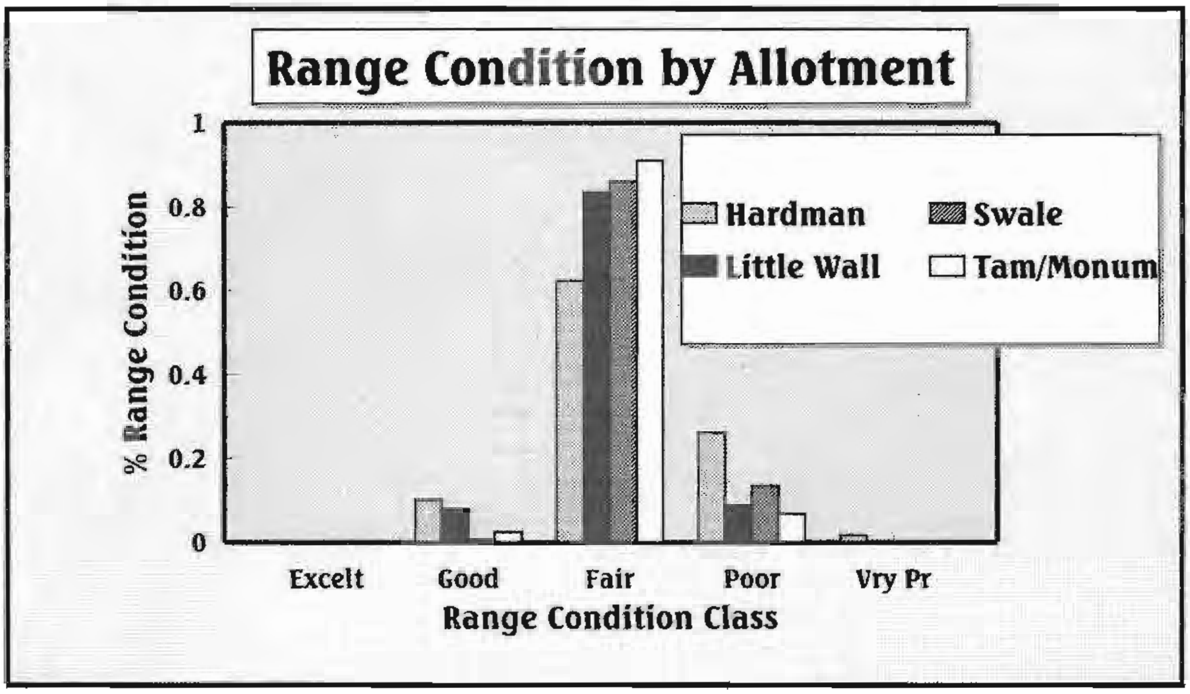
Upland range trend was not analyzed as data was not available for the Little Wall and Swale Allotments, which cover 58 percent of the Wall Analysis Area. The apparent trend of uplands in the Hardman Allotment (22% of Wall Analysis Area) is considered to be improving slightly. The apparent upland range trend for the Tamarack/Monument (T/M) Allotment is considered to be stable or slightly improving. This information is not specific to the portion of the T/M Allotment that lies within the Wall Analysis Area.

WALL ANALYSIS AREA- Range Condition by Allotment

(Acres)

Allotment	Excelt	Good	Fair	Poor	Vry Pr	NF Acres
Hardman	0	2067	12735	5337	340	20479
Little Wall	7	2594	27335	2826		32762
Swale	0	124	17737	2770		20631
Tam/Monum	0	459	16862	1242		18563

Allotment	Excelt	Good	Fair	Poor	Vry Pr	NF Acres
Hardman	0.0%	10.1%	62.2%	26.1%	1.7%	
Little Wall	0.0%	7.9%	83.4%	8.6%	0.0%	
Swale	0.0%	0.6%	86.0%	13.4%	0.0%	
Tam/Monum	0.0%	2.5%	90.8%	6.7%	0.0%	



WALL ANALYSIS AREA

Range Condition by Subwatershed					(Acres)			% NF ac.	
Subwatershed	**SWS #**	**Rating**	**Excelt**	**Good**	**Fair**	**Poor**	**Vry Pr**	**Rated**	**NF Acres**
Lwr Big Wall	24a	2		658	4061	1264		78.8%	5988
Mid Big Wall	24b	2		232	6054	791		88.8%	7082
Upr Big Wall	24c	2		96	6798	1283		84.2%	8186
Porter	24d	2			1567	251		39.9%	3928
Upr Wilson	24e	2		1108	2482	553		80.9%	4439
Lwr Wilson	24f	3		561	3821	1667	340	73.8%	6396
Lwr Wilson	24g	2			5013	674		88.0%	5695
Lwr Little Wall	25a	2		371	6312	308		95.6%	6987
Upr Little Wall	25b	3		664	6231	1816		78.8%	8746
Bacon	25c	3	7	177	3298	556		86.3%	4036
Lwr Skookum	26a	2		1121	6613	874		89.8%	8612
Bear	26b	3			4813	563		89.4%	5381
Alder/Up Skook	26c	3		18	8550	216		97.7%	8770
Swale	26d	3		124	6353	1270		83.7%	7734
Hog	26f	2		121	2906	90		97.1%	3119
Wall AreaTotl			7	5251	74872	12176	340	84.6%	95099
% of Ratd SWS			0.0%	5.5%	78.7%	12.8%	0.4%		

Rating of 2=Fair Condition, 3=Poor Condition