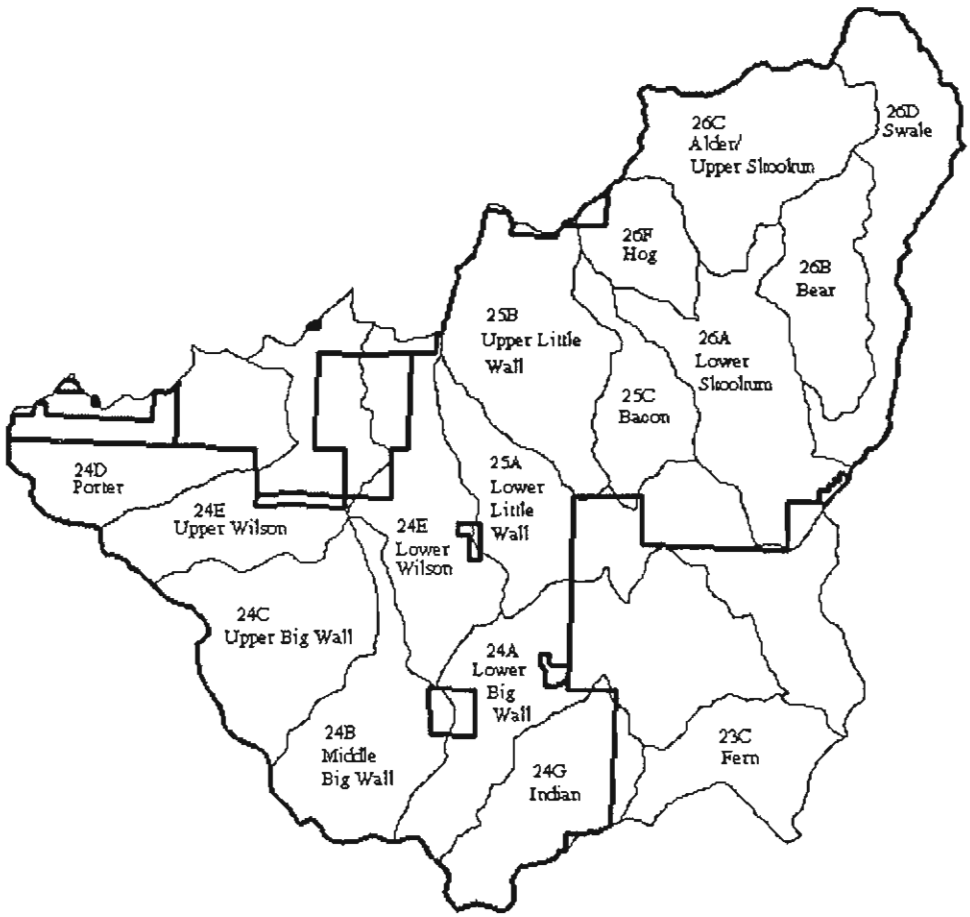
Wall Ecosystem Analysis

Skookum, Big Wall & Little Wall Watersheds

Heppner Ranger District
Umatilla National Forest



September 1995

Executive Summary

Ecosystem Analysis of the Big Wall, Little Wall, and Skookum Watersheds

Heppner Ranger District
Umatilla National Forest

Location and Description

Wall Creek watershed, located near the town of Monument, Oregon, is a 200 square mile watershed in the North Fork of the John Day River (NFJD) subbasin, and comprises approximately 8 percent of the land base in the North Fork John Day River system. The watershed is located in the north-central portion of the basin, between Madison Butte, on the divide with Willow Creek to the north, and the town of Monument, Oregon, on the North Fork of the John Day River, to the south. The confluence of Wall Creek is 22.5 stream miles upstream from the confluence of the North Fork with the main John Day River. (Figure 1a & 1b)

The National Forest acreage within the Wall Ecosystem Analysis Area is approximately 95,190 acres, which is 45 percent of the Heppner Ranger District and 7 percent of the Umatilla National Forest.

Issue I - Water Quality and Fish Habitat

One of the principal issues in the Wall watershed analysis is not at optimum levels. Low summer flows, loss of riparian vegetation, water storage and withdrawal, and changes in channel structure cause elevated stream temperatures in many tributary streams and in main Wall Creek. High stream temperatures, low dissolved oxygen, and channel changes have degraded the aquatic habitat and may be affecting resident and anadromous fish populations. These conditions also exist in the North Fork John Day River both above and below the confluence with Wall Creek.

Water quality monitoring and stream inventories in the Wall watershed indicate that important habitat parameters are in unsatisfactory condition, to the point of rendering many streams incapable of sustaining viable populations of resident and anadromous fish. High water temperatures in July and August, sediment concerns, insufficient pools, shortage of large wood for habitat complexity, and low stream flows are all concerns in the Wall Analysis Area streams. Riparian shrub cover and streambank stability are believed to be below their ranges of natural variability in most of the river basins in the Blue Mountains, particularly in the central and southern portions of the North Fork John Day subbasin which includes Wall Creek and tributaries. Upland and watershed condition and function also influence stream conditions and fish habitat. Existing management facilities (roads, trails, ponds, recreation sites) and past and present management practices such as livestock grazing, timber harvest, road use and maintenance have detrimental effects to water quality, riparian habitat, and fish populations.

Issue II - Forest Vegetation Sustainability

Elements and processes within ecosystems are naturally dynamic and the composition and structures of plant communities shift over time. The shift of elements and processes occurs within a range of variability. The combined effects of past timber management practices (primarily extensive harvest of large ponderosa pine, followed by substantial increases in white fir forests), the suppression of

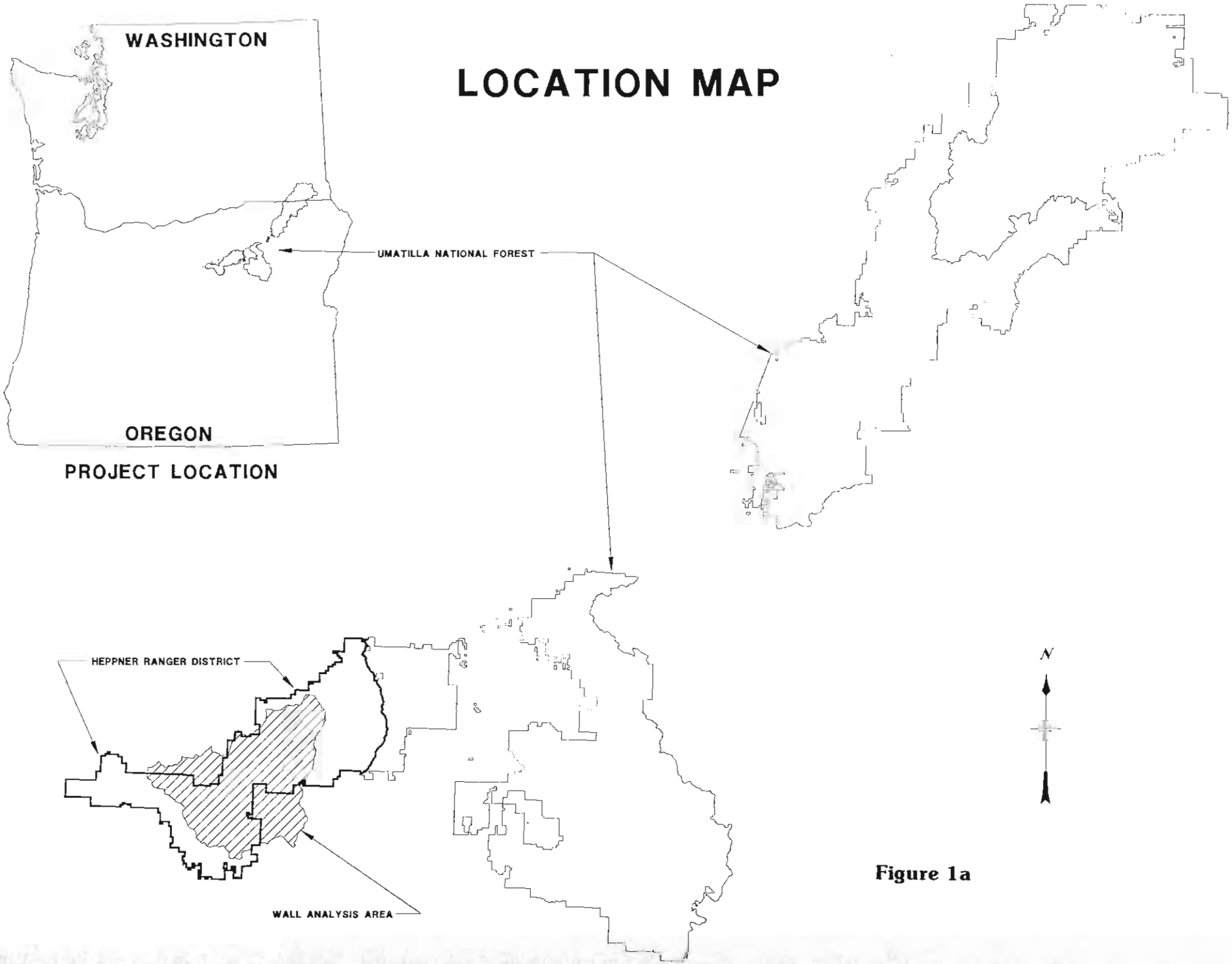

LOCATION MAP
WASHINGTON
OREGON
PROJECT LOCATION
UMATILLA NATIONAL FOREST
HEPPNER RANGER DISTRICT
WALL ANALYSIS AREA
N

Figure 1a

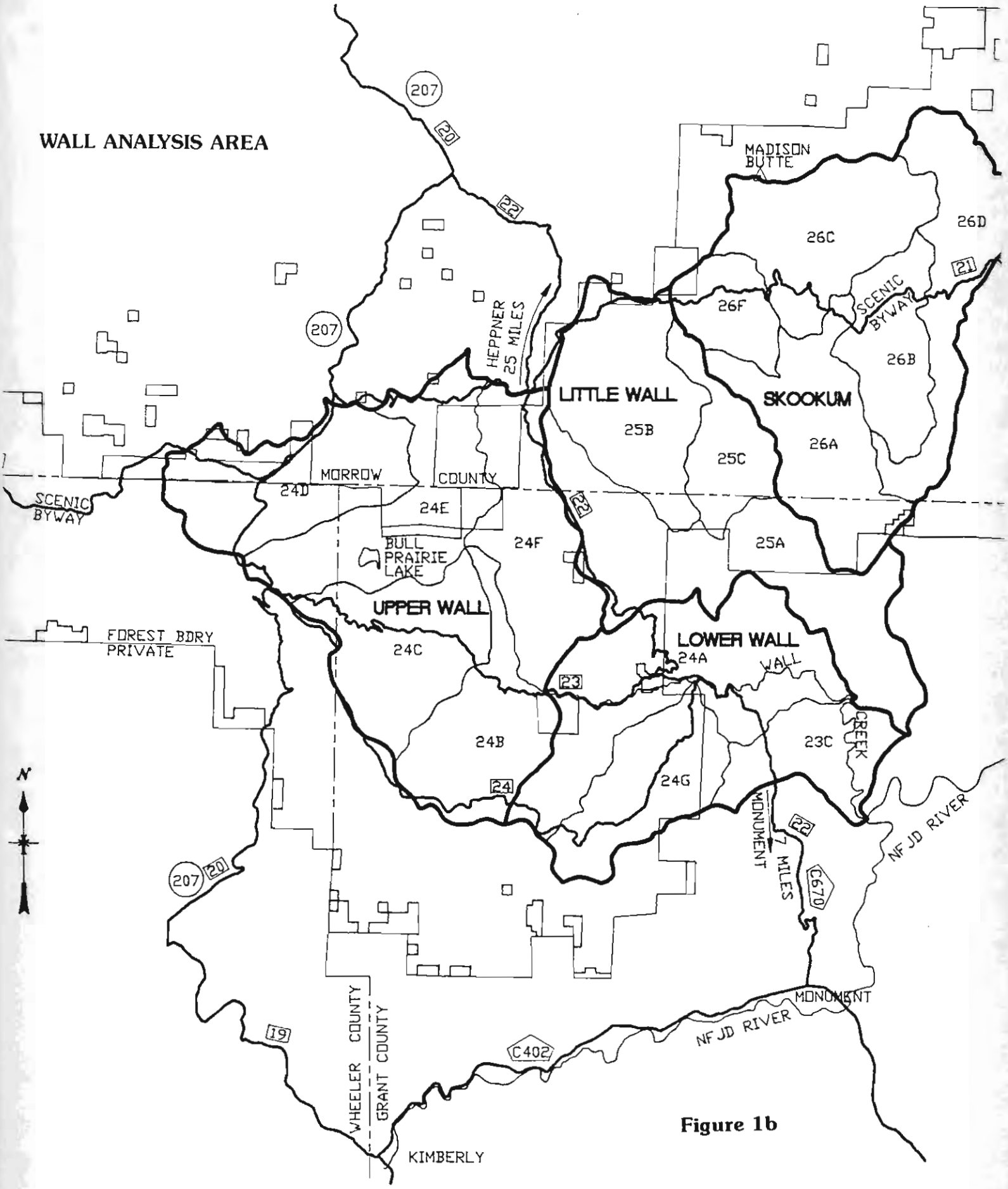

WALL ANALYSIS AREA
207
20
22
MADISON BUTTE
26C
26D
21
SCENIC BYWAY
26F
26B
HEPPNER 25 MILES
LITTLE WALL
SKOOKUM
25B
26A
25C
MORROW
COUNTY
24D
24E
SCENIC BYWAY
BULL PRAIRIE LAKE
24F
25A
UPPER WALL
FOREST BDRY PRIVATE
24C
LOWER WALL
24A
WALL
23
CREEK
24B
23C
24
24G
MONUMENT
7 MILES
C670
NF JD RIVER
19
WHEELER COUNTY
GRANT COUNTY
C402
MONUMENT
NF JD RIVER
KIMBERLY
N

Figure 1b

fire, and heavy grazing prior to 1930's has been to move these elements and processes outside their Historic Range of Variability (HRV). In the Wall Analysis Area, additional concerns regarding forest vegetation sustainability include soil compaction, erosion, insect damage in the northeast portion of the area, and encroachment of juniper.

Issue III - Botanical and Vertebrate Biodiversity

Historically, the rate and scale of landscape change allowed native plant and animal species to gradually adapt to new conditions. Over the past 100-150 years, environmental change has accelerated greatly in response to man's activities. Biological diversity (the diversity of native life forms and ecological processes) in the Blue Mountains and, specifically, in the Wall Analysis Area, has changed as a result. A number of species have been lost from their former range; some species are listed as "sensitive." Recent research indicates that existing management strategies for some species may be inadequate to assure viability of local populations. Replacement of native plant species with introduced and/or noxious species has reduced biodiversity and reduced resiliency of some ecosystems. Protection and restoration of biodiversity was identified as an important issue for this analysis.

CURRENT CONDITION

Soil Attributes

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.

Water Quality and Flow

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.

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. It is likely that the NFJD River temperature is lower than Wall Creek. 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.

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.

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 are consistently below 64°F.

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, 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.

Stream Condition, includes general riparian information

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. 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.

Fish and Aquatic Habitat

The Wall Creek watersheds contain approximately 730 miles of streams. 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.

Table 1. 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.

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.

Forest Vegetation

Timber Harvest

Table 2. 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

The 1937 data shows a landscape predominantly dominated by late/old structure (75%) with a very moderate component of middle structure (7%) as compared to the existing late/old structure of 25 percent and middle structure at 45 percent. Early/middle and early structures are not represented on the 1937 map.

Floristic Biodiversity

The 614 vascular plant species of the Wall Creek Ecosystem Analysis Area represent 71.6 percent of the species of plants known to occur on the Heppner Ranger District and 49.8 percent of the species of plants known to occur on the Umatilla National Forest.

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 would adversely affect any of those species and translate to a "trend toward Federal listing."

165 native plant species received low Floristic Biodiversity scores. Of these, 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.

Of great concern to Native Americans at the present time is the diminished habitat of food plants. 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.

Fire and Fuels, Insects and Disease

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. 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.

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.

Vertebrate Biodiversity

Table 3. 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.

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.

An estimated 24,000 acres of forest having late/old structure 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.

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.

Neotropical Migrant Birds (NTMB):

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.

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."

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.

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.

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.

Botanical Diversity

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.

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.

Vertebrate Biodiversity

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.

INTERPRETATION

Fish and Aquatic Habitat

It may be important to note that Bull trout have been reported from the North Fork of the John Day River at the mouth of Wall Creek. It is conceivable that were water temperatures in Wall Creek cooler, it might be used by Bull Trout.

High stream temperature in Wall Creek and its tributaries is likely the factor most limiting for fish production. It may be that soil, geological and precipitation conditions in the Wall Creek system have always been such that summer flows have always been low. If so, late summer temperatures in these streams have probably always been relatively warm. On the other hand, it also seems clear that past livestock grazing, road construction, and logging have reduced stream side shade and increased the wetted width/depth ratios. Stream reaches with low flow, low shade and a high wetted width/depth ratio are especially vulnerable to temperature increases. Trapping of headwater springs in stock ponds may also have contributed to lowered late season stream flows which tend to increase water temperatures.

Logging, roads and livestock grazing might also have altered timing and volumes of stream flows. This is impossible to substantiate because of lack of flow data, but if true, it would have most likely have produced higher early spring and lower late summer stream flows, tending to increase late summer water temperatures even more.

Historic and Current Condition Comparison

Existing and historic structural stage and species composition within the Wall Analysis Area were compared for four major subdrainages (Lower Wall, Upper Wall, Little Wall, and Skookum).

Lower Wall: Overall, the structural component of this drainage is predominantly in the middle and late/old structure. Existing condition for the late/old, middle, and early structural stages are outside HRV, with late/old and early having less acres than historically and middle having more. An overall low priority for examination for silvicultural treatment exists in this drainage and indicates that species composition is generally appropriate for the plant association groups in this area.

Upper Wall: This drainage has the largest component of warm grand fir PAG in the analysis area, with moderate portions of ponderosa pine and cool grand fir PAG's. Both the middle and early structural stages are outside of HRV with the middle structure having considerably more acres than historically and the early structure having considerably less. Many of these stands are of high and moderate priority for treatment, especially in the late/old and middle structures.

Little Wall: The two PAG's in this drainage are warm grand fir and ponderosa pine. Overall, this drainage is outside HRV in every structural stage except early/mid. Late/old and early have less acres than historically, and middle and very early have more than historically.

Skookum: The Skookum drainage is predominantly composed of warm grand fir with moderate components of lodgepole, cool grand fir, and ponderosa pine PAG's. The late/old, middle, and early structural stages are outside of HRV, with the middle structure being well beyond historic acres at over 15,800 acres. The late/old and early structures are well below the historical ranges. An overall high priority for examination for silvicultural treatment exists in this drainage indicating that species composition is generally of an inappropriate mix to reach the desired condition for theses stands.

Integration Process

For the purpose of integrating and comparing resource conditions across the 15 subwatershed landscape of the Wall Analysis Area, a "Resource Attribute Integration Matrix" was developed. The objective was to develop a means of tracking and comparing various resource attributes and conditions by major analysis issue in order to identify and prioritize ecosystem restoration recommendations.

Old Growth/RHCA Network

The Federal Guide for Watershed Analysis includes guidance for the delineation and management of old growth and riparian habitat "reserves". PACFISH includes general standards for protection of aquatic/riparian resources in eastern Oregon. Conservation of old growth and riparian habitats was addressed at the "landscape" scale for the entire Wall drainage, including all 15 subwatersheds. At this scale, we sought to integrate amended Forest Plan, including the intent of the 5/95 timber sale screens and 3/95 PACFISH Forest Plan Amendments, and Regional direction with current understanding of ecosystem function and the habitat needs of riparian and old growth-associated animals and plants.

The objective of this effort was to identify, map, and draft management proposals for a combined network of Riparian Habitat Conservation Areas (RHCAs) and old growth forest habitats. The ultimate products of this exercise include spatially-displayed management opportunity areas within the network blocks, along with suggested management strategies. Restoration needs are prioritized, and in some cases area-specific management prescriptions are offered.

Recommendations

The following concerns and recommendations are a synthesis of information from individual specialist reports and the resource attribute matrix. The recommended restoration treatment priority order by SWS is: 26c, 26b, 26d, 25c, 26f, 25b, 24b, 26a, 24a, 24f, 24d, 24g, 24c, 25a, 24e. Note that SWS 26c, 26f, 26a, 24a, 25a, and 24e (in that order) are also highest concern for protection of high value water quality and vertebrate biodiversity values.

Table 4. Synthesis ranking of subwatershed level of concern by major resource category.

Resources Category	SWSs w/Low Concern	SWSs w/Moderate Concern	SWSs w/High Concern Poor Condition	SWS w/High Concern Good Condition
Hydrologic Functions and Processes		25a; 24e	24a, b, c, d, f, g; 25b, c; 26b, d	26a, c, f
Fish Habitat	24e	24f; 25a, c; 26a, b, c, d, f	24a, b, c, d, g; 25b	
Forest Vegetation Sustain	25a; 24c, e	26a; 24a, b, d, f, g	26b, c, d, f; 25b, c	
Fire Hazard Reduction	24g, d, f; 25a, c	24a, c, e; 25b; 26a, b, f	24b; 26c, d	
Juniper Encroachment	24e; 26c, d	24 b, c, d, g; 26b	24a, f; 25a, b, c; 26a, f	
Botanical Biodiversity	24d; 25a, b; 26b, c, d, e, f	24b, c, e, g; 25c	24a, f; 26a	

Resources Category	SWSs w/Low Concern	SWSs w/Moderate Concern	SWSs w/High Concern Poor Condition	SWS w/High Concern Good Condition
Vertebrate Biodiversity	24b, c	24d, e, g; 26d	24f; 25b, c; 26a, b, c, f	24a; 25a
Old Growth Habitat	24b, c	24d, e, g; 26d	24a, f; 25a, b, c; 26a, b, c, f	

Table 5. Summary of SWS Concern Levels by Major Issue

Issue	SWS w/Low Concern	SWS w/Mod Concern	SWS w/High Concern
Veg Sustainability	24c, e; 25a	24a, b, d, f, g; 26a	25c; 26b, c, d, f; 25b
Fish/Water	24e	24e; 25a; 26a, b	24a, b, c, d, f, g; 25b, c; 26a, c, d, f
Terrestrial Biodiversity	24b, c	24d, e, g; 26d	24a, f; 25a, b, c; 26a, b, c, f

In addition to the integrated, prioritized recommendations made for each subwatershed, specific restoration recommendations were also enumerated for each of the primary resource areas related to the three main issues.

WALL ECOSYSTEM ANALYSIS

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