Section VII. V.

Terrestrial Vertebrate Biodiversity

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Methods:

Descriptions of historic wildlife populations were derived from varied and often anecdotal sources. Quantitative data for the period before the influx of Euro-Americans, on which to build scenarios of probable species densities or distribution do not exist. Sources of information used in the following discussion include oral histories from tribal elders and early white settlers, National Forest records, conversations with Oregon Department of Fish and Wildlife staff, and old reports from ODF&W files.

Historic habitat conditions used in comparative analyses were based primarily on the 1937 vegetation map of Oregon forest lands. Analysis of "Existing Conditions" for terrestrial vertebrates involved the combined use of several tools. Description of basic habitat types was based on dominant overstory tree species, and structural stage assignments described earlier (Section VII. R.). Information on each mapped polygon within the drainage, including dominant tree species, stand size, structural stage and UTM location, was compiled in a Paradox database. Data from the 1937 forest vegetation map was similarly structured in a parallel database. Using Paradox "scripts" adapted from Mellen's habitat relational database (Mt. Hood NF, 1994), total acres of suitable habitat available for "Special Management Species" (L. Norris, Reg. Biologists Meeting, June 1995) were determined and compared between 1937 and the present. These species included Management Indicator Species, Threatened, Endangered, and Sensitive species (including State of Oregon sensitive species), and species of local concern known to occur in the Wall drainage (see Section VI. W. for habitat requirements and sample queries). Once the gross number of available habitat acres was determined, UTOOLS was used (A. Ager, Umatilla NF, 1992) to map the spatial distribution of habitats at both points in time, and to display the changes. The use of UTOOLS also allowed determination of changes in habitat connectivity and, conversely, habitat fragmentation.

Existing condition of old growth habitat was field verified by Audubon Society volunteers during the summers of 1991 and 1992. An old growth scorecard, developed on the Walla Walla District, was used to document vegetative conditions. Observations of terrestrial wildlife and sign were documented, however, no formal wildlife surveys were conducted.

HISTORIC CONDITION OF WILDLIFE AND HABITATS

Although year-to-year weather conditions in the Blue Mountains can fluctuate dramatically, a general climatic pattern of long, often very cold winters, followed by hot dry summers is characteristic of the Blue Mountains. This pattern of ambient extremes, punctuated by frequent, lighting-caused fires in summer, shaped the composition of both the plant and animal communities that historically inhabited the area. Today, a diverse community of 61 species of mammals and 161 species of birds are known or suspected to occur within the drainage. As in most of the Blue Mountains, amphibians and reptiles are poorly represented, with only 6 and 7 species, respectively, known to occur (Appendix VII. V. A).

Big Game:

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

By the 1880s, big game populations in the Blue Mountains were beginning to collapse under the combined pressures of market and subsistence hunting, competition with domestic livestock, and habitat alteration (Irwin et al. 1994, Langston 1994). In the early 1900's hunting seasons were closed to prevent total extinction of elk in the Blue Mountains. With hunting banned, the State Game Commission set about re-establishing elk populations. Between 1910 and 1920, transplants of Rocky Mountain elk from Yellowstone National Park occurred in various areas of the Blue and Wallowa Mountains.

By 1933, elk numbers were rebounding, and a 3-day hunting season was opened in Wallowa County. Population trends continued upwards for both elk and mule deer in the Blue Mountains through the 40s, 50s and 60s. In the Wall drainage, located at the western end of the Blues, elk numbers recovered more slowly. Sightings of elk and deer on the Heppner Management Unit (ODFW) were not common until the 1960s. Populations continued to increase through the 1970s and early 1980s (R. Krien, ODFW, pers. comm., July 1995).

Other Big Game Species, Furbearers and Predators:

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

A review of census summaries from this report shows low numbers for the Umatilla National Forest of many species known to occur in the Wall drainage. Beaver, marten, otter and mink are mentioned as species whose numbers had substantially declined by 1936. All of these species historically occupied the Wall area, and still do, although numbers, distribution and population health are largely unknown. Evidence of past and present beaver activity is found along Wall, Little Wall and Skookum Creeks (1963 Stream Survey notes, Heppner Ranger District).

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

Grizzly bears hung on in northeastern Oregon until 1937, when the last confirmed grizzly shooting occurred in Wallowa County (C. Puchy, ODFW, pers. comm., Jan. 1995). Grizzlies and wolves probably also have occurred in low numbers in the western Blues. The Oregon Department of Fish and Wildlife has considered the wolf extirpated from the Blue Mountains since the early 1900s

(one bounty was paid for a wolf reportedly taken from Grant Co. in 1914).

The 1936 state report included records of predators taken on and adjacent to the National Forests for the years 1933-1935. On the Umatilla National Forest, 4,781 coyote, 31 bobcat, 138 black bear, and 2,196 porcupine were killed by government hunters, Forest Service personnel, and private landowners. Curiously, no mountain lions were reported taken on the Umatilla National Forest during that period (5 were reported taken on the Malheur, 1 on the Whitman) compared to more than 200 taken on Forests west of the Cascades during the same period.

Small Mammals, Birds, Reptiles and Amphibians:

Market hunting in the late 1800s and early 1900s was responsible for enormous losses in upland gamebird populations in many parts of the US, and no doubt impacted species in the Blue Mountains (Gabrielson and Jewett 1970). As late as 1907, the bag limit for upland birds was 10/day (Heppner Reserve Report). The sharptailed grouse was almost extinct by 1936 (State Planning Board 1936) and has since been extirpated from the Blue Mountains. Re-introductions were begun in the 1990s.

Immigrant journals from the mid 1800s often mention blue and ruffed grouse as dinner fare for settlers traversing the Blues, suggesting that these species were fairly common. Today, both species occur in the Wall drainage in low numbers, and along with the mountain quail, may be experiencing depressed reproduction due to poor habitat conditions (J. VanWinkle, Heppner R.D., pers. comm., July, 1995).

Several transplants of wild turkeys, a non-native game bird, have occurred in the Wall drainage over the last 30 years. These introductions met with varying degrees of success. An estimated 100 turkeys currently inhabit the drainage at some time during the year (R. Krien, ODFW, pers. Comm., July, 1995).

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

Historic information for other non-hunted birds, small mammals, reptiles and amphibians is almost totally anecdotal. As noted in the Ochoco NF Viable Ecosystems Management Guide (Ochoco NF, 1994), higher water tables, more extensive riparian vegetation and aspen groves, and more beaver activity no doubt provided more suitable habitat for amphibians, waterbirds, songbirds, and riparian-associated small mammals such as shrews and mink, than do current conditions. Reports on the Heppner Reserve (1903, 1907), mention numerous wet areas and swamps in the headwaters areas of Skookum, Alder, and upper Little Wall Creeks.

TERRESTRIAL BIODIVERSITY AND WILDLIFE COMMUNITIES:

Response to Key Questions

1. How have the types and proportions of habitats for terrestrial vertebrate species changed over the last century? Have these changes resulted in changes in species occurrence or populations?

Ideally we would have information on the distribution and status of all wildlife species using the Wall drainage. In reality, limited data on a few species are available, and prospects for collecting additional information are slim in light of declining budgets and staff. Given these limitations, analysis of habitat availability and change was completed for a selected group of species, including our Management Indicator Species, Threatened, Endangered and Sensitive Species, and species of local and Regional concern (collectively labeled "Special Management Species"). Table 1 lists these species along with their habitat requirements. Due to the lack of field-verified information on any terrestrial species other than mule deer and elk, no attempt was made to estimate either current populations or changes in populations since the 1937.

Table 1. Habitat Requirements and Status of Special Management Species, Wall Ecosystem Analysis Area.

SPECIES	STATUS	IMPORTANT HABITAT
Pileated Woodpecker (Dryocopus pileatus)	SS, MIS, Draft RS	Old growth coniferous forests with abundant large diameter snags and down logs.
Flammulated owl (Otus flammeolus)	SS, Draft RS	Mature/old growth forests with ponderosa pine component for nesting. Also may require patches of dense, younger conifers for day-time roosting. As a secondary cavity-nester, species is dependent on the abandoned cavities of large woodpecker cavities for nesting habitat.
Pygmy owl (Asio otus)	SS	Coniferous forest with snags having either natural or woodpecker-created cavities.
Great gray owl (Strix nebulosa)	SS, Draft RS	Coniferous forest, often mature or old growth lodgepole or mixed lodgepole/fir, adjacent to meadows (which supply small mammal prey). Nests in broken-top snags or the abandoned stick nests of large raptors.
Black-backed woodpecker (Picoides arcticus)	SS, Draft RS	Mature/old growth forests of mixed lodgepole pine, Douglas-fir and/or true firs. Requires snags or live trees with heart-rot for nesting. Avoids young stands and partial-harvest areas. In NE Oregon, may use ponderosa pine or western larch for nesting.
Western bluebird (Sialia mexicana)	SS	Secondary cavity nester, requires natural or woodpecker-created cavities in snags or stumps in open habitats. Often found in clearcuts where snags have been retained. Aspen groves are favored habitat.
Pygmy nuthatch (Sitta pygmaea)	SS	Mature/old growth ponderosa pine stsnds with canopy closure less than 70%. Often nests in abandoned woodpecker cavities, but is capable of excavating its own nest cavity. Often communal in use of roost cavities, and commonly observed in large foraging groups.
Swainson's Hawk (Buteo swainsoni)	RS	Open grasslands that support small mammal populations (primary prey). Generally nest in trees: juniper, cottonwood, aspen at edges of grasslands are common nest sites.
Grasshopper sparrow (Ammondramus savannarum)	SS	Grasslands with shrub component. Population numbers very low.

SPECIES	STATUS	IMPORTANT HABITAT
Northern Bald Eagle (Haliaeetus lucocephalus)	FT, ST	Large dominant or codominant trees in heterogeneous stands of mature or old growth coniferous trees near water. Roosting sites in view of water.
Ferriginous Hawk (Buteo regalis)	RS, SC	Open country with good prey base and low human disturbance.
Upland Sandpiper (Bartramia longicauda)	RS, SC	Montain, wet to mesic meadows with forested edge. Expanses of open grassland, elevation 3400-5200 ft.
Long-billed Curlew (Numenius americanus)	RS	Moist meadows to very dry prairies. Elevation <3,500 ft.
Northern Goshawk (Accipiter gentilis)	SS, Draft RS	Dense, mature or old-growth conifer forests with high degree of canopy closure for nesting.
3 Toed Woodpecker (Picoides tridactylus)	MIS, SS	Older lodgepole and lodgepole/Douglas-fir forests with snags and/or live trees with heart rot.
Primary Cavity Excavators	MIS	Variety of forest types, most require dead trees for cavity creation.
White-headed Woodpecker (Picoides albolarvatus)	LC, Draft RS	Open, parklike mature to old growth ponderosa pine, with low canopy closure. Cavity excavator
Turkey (Meleagris gallopavo)	LC	Introduced game species. Mixed conifer stands with low cover and abundant seed and insect food resources.
California Wolverine (Gulo gulo luteus)	RS, ST	Large tracts of relatively undisturbed diverse areas with an abundance of quality food (ungulates and carrion primarily).
Townsend's Big-eared Bat (Plecotus townsendii townsendii)	RS, SC	Live and dead trees with loose bark, caves, mineshafts, bridges, and old buildings for roosting. Nursery roosts must be intrinsically warm.
Preble's Shrew (Sorex preblei)	RS	Willow fringed creeks or marshlands riparian habitats.
Marten (Martes americana)	SS	Dense coniferous forests with large amounts dead wood. Large territories, may prefer riparian habitats.
Rocky Mountain Elk (Cervis elaphis)	MIS	Mixture of forested and grassland habitats provides cover and forage. Low road densities contribute to optimal habitat.

KEY to STATUS column:
FT = Federally Threatened
RS = Regional Forester's Sensitive Species List
Draft RS = 1994 Draft updated Regional Forester's Sensitive Species List
SS = Sate Sensitive
SC = State Sensitive "Critical"
ST = State Threatened
MIS= Management Indicator Species
LC = Species of local concern

a. Changes in Habitat Availability, 1937--Present:

Changes in the relative availability of habitats from 1937 to the present are shown in Table 2 and Figure 1. Less old growth habitat is currently available for closely-associated species such as the pileated woodpecker, marten, bald eagle and goshawk than was available in 1937. For example, suitable habitat for pileated woodpeckers (Figure 2a, b) and goshawks has declined as much as 67 percent in less than 60 years. In 1937, large blocks of contiguous suitable habitat were available for goshawks. Today, goshawk habitat is extremely fragmented, with an almost total loss of available nesting habitat in the central portion of the analysis area (Figure 3a, b). Loss of old growth lodgepole to insects, fire and harvest has accounted for a 90 percent reduction in the availability of habitat suitable for northern three toed woodpeckers. Habitat preferred by marten, which includes

dense canopied, middle to late/old mixed conifer forests, has not been significantly reduced, although distribution has changed (Figure 4a, b). In fact, the encroachment of fir into stands once dominated by ponderosa pine has probably increased the availability of marten habitat in some parts of the drainage. Habitat criteria used in developing Paradox queries for this analysis are found in Table 3.

Table 2. 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 *	8,371	14,767	+6,396 (43%)
-primary forage**	89	1,175	+1,086 (92%)
-bull security cover	Data not avail.	11,506	
Bald Eagle			
-reproduction	34,542	8,573	-25,969 (75%)
-wintering	18,519	4,856	-13,663 (73%)
Wolverine			
-forage	41,020	10,546	-30,474 (74%)
-reproduction	983	1,035	+52 (5%)
Northern Goshawk	70,754	21,686	-49,068 (69%)
White-headed woodpecker	73,371	7,360	-66,011 (90%)

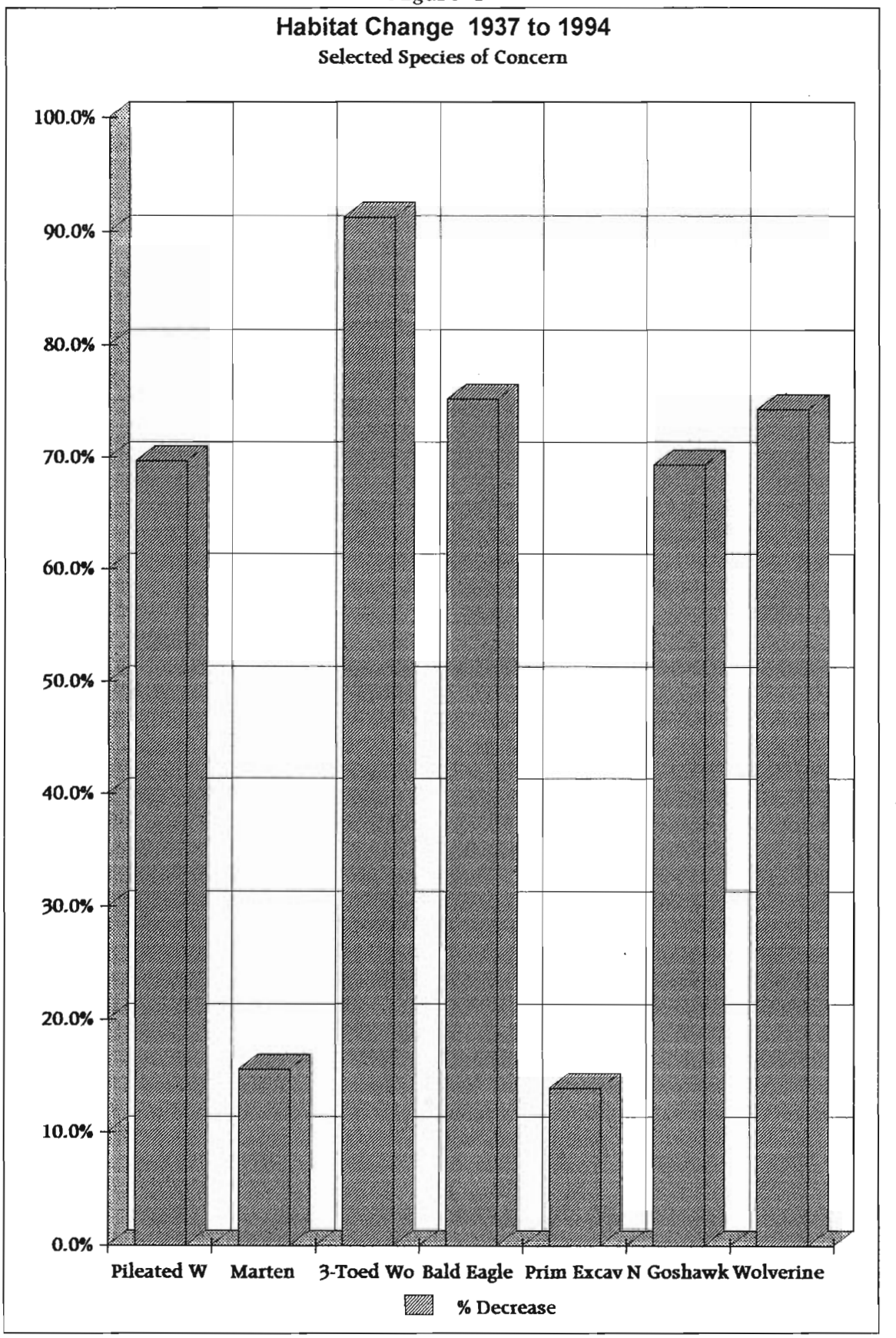
* "Cover" includes both "satisfactory" and "marginal" cover (see Umatilla Forest Plan for definitions)
** "primary forage" = non-forest habitat (meadow or grassland) within 600' of a forested edge.

Primary Cavity-Excavators: Changes in habitat availability for larger woodpeckers such as the pileated and the white-headed have direct effects on the availability of nesting habitat for secondary cavity users. Open park-like stands of mature and old growth pine, the preferred habitat of the white-headed woodpecker has declined by as much as 90 percent since the 1930s. Smaller primary cavity excavators, including sapsuckers, nuthatches and chickadees, may find a superabundance of suitable nest trees in the northern portion of the analysis area over the next few years, owing to spruce budworm mortality. Overall habitat quality in this area, however, will continue to decline for both primary and secondary cavity-users. Aspen groves, a highly preferred habitat for the sapsucker, is extremely limited within the drainage, and has declined dramatically in both quantity and quality over the last century (also see response to question 2).

Rocky Mountain Elk: Elk populations and habitats are addressed under question 5, below.

Threatened, Endangered and Sensitive Species: Habitat changes for these species are addressed under question 2, below.

Figure 1



Reproductive Habitat for Bald Eagle & Wolverine

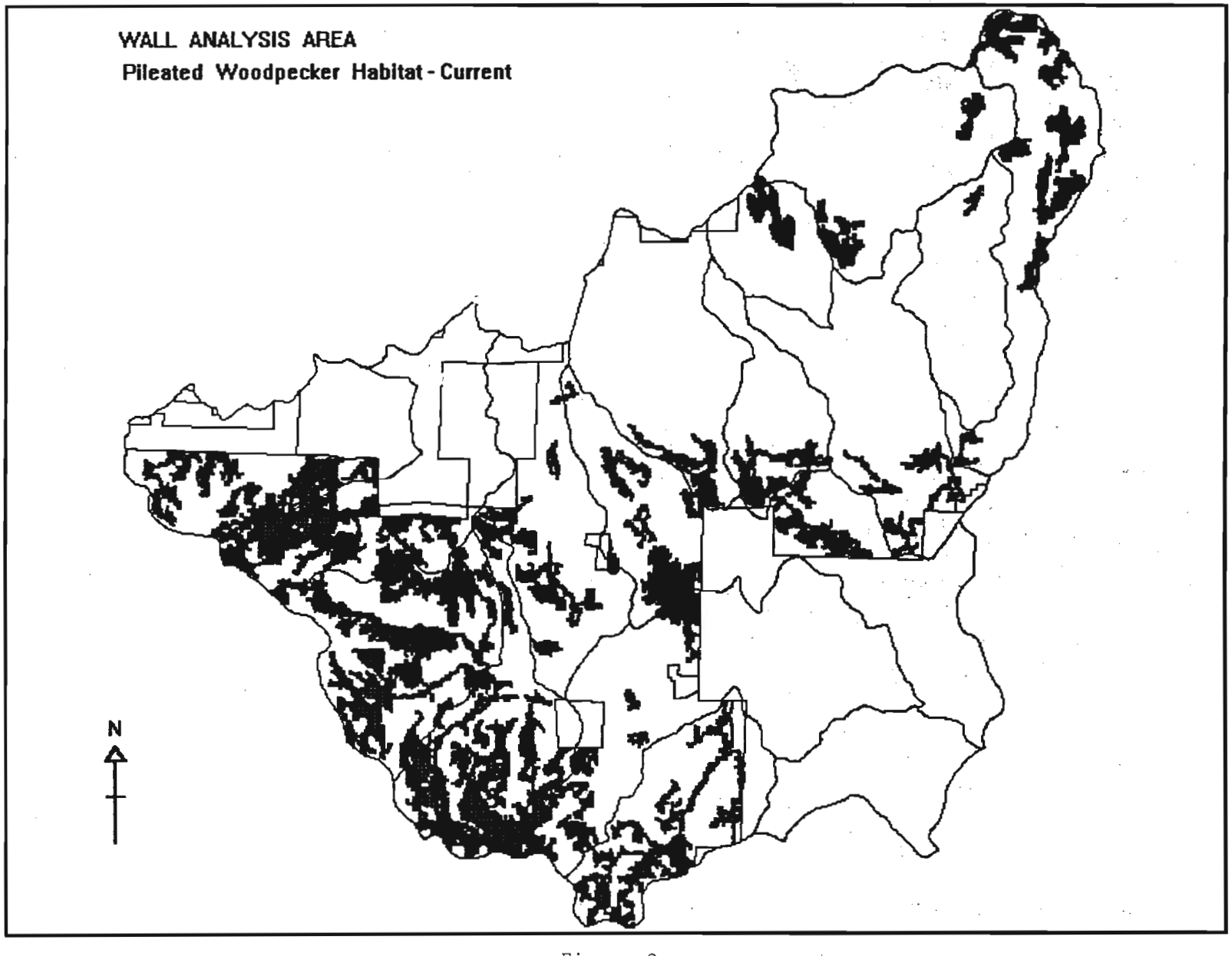


Figure 2a

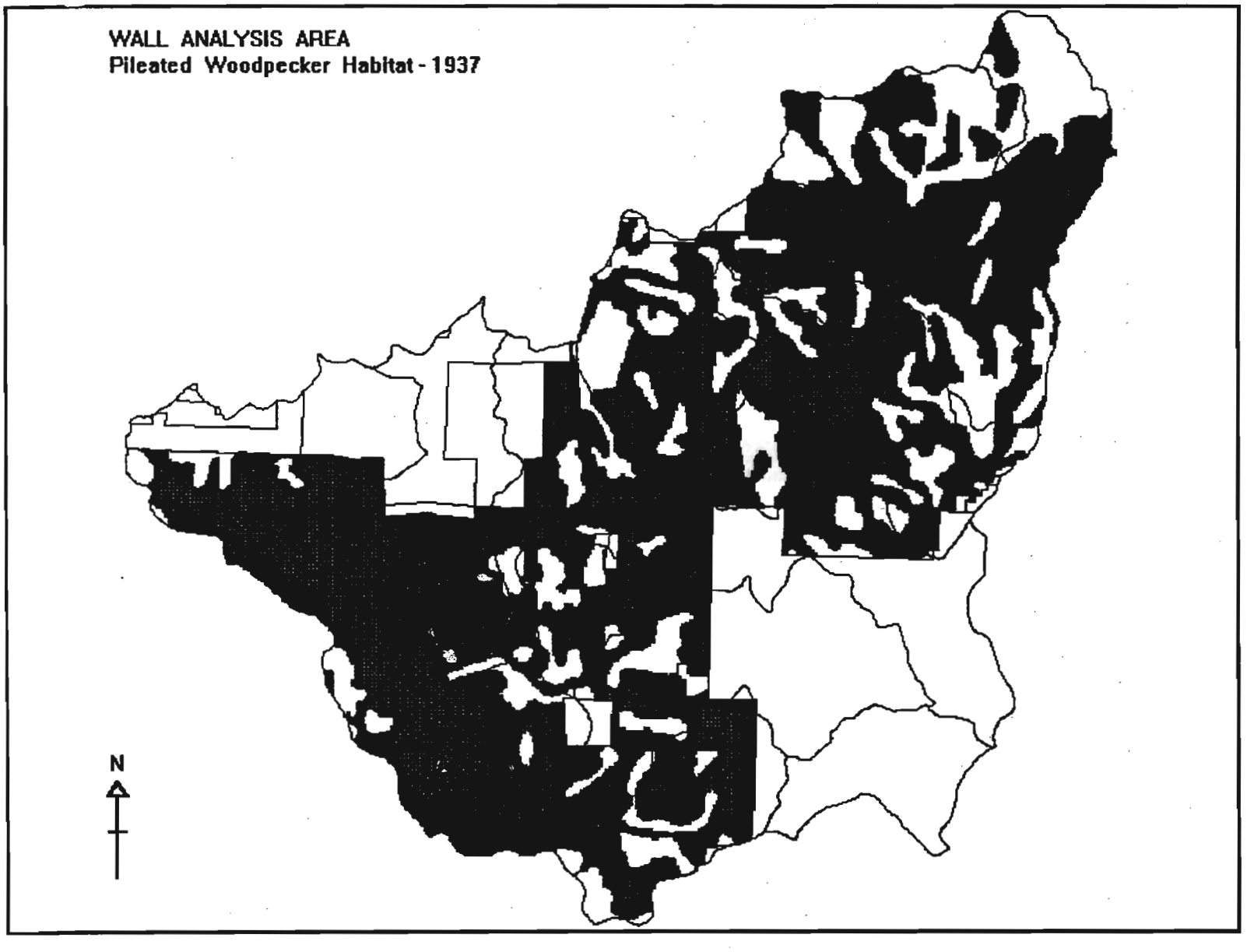


Figure 2b

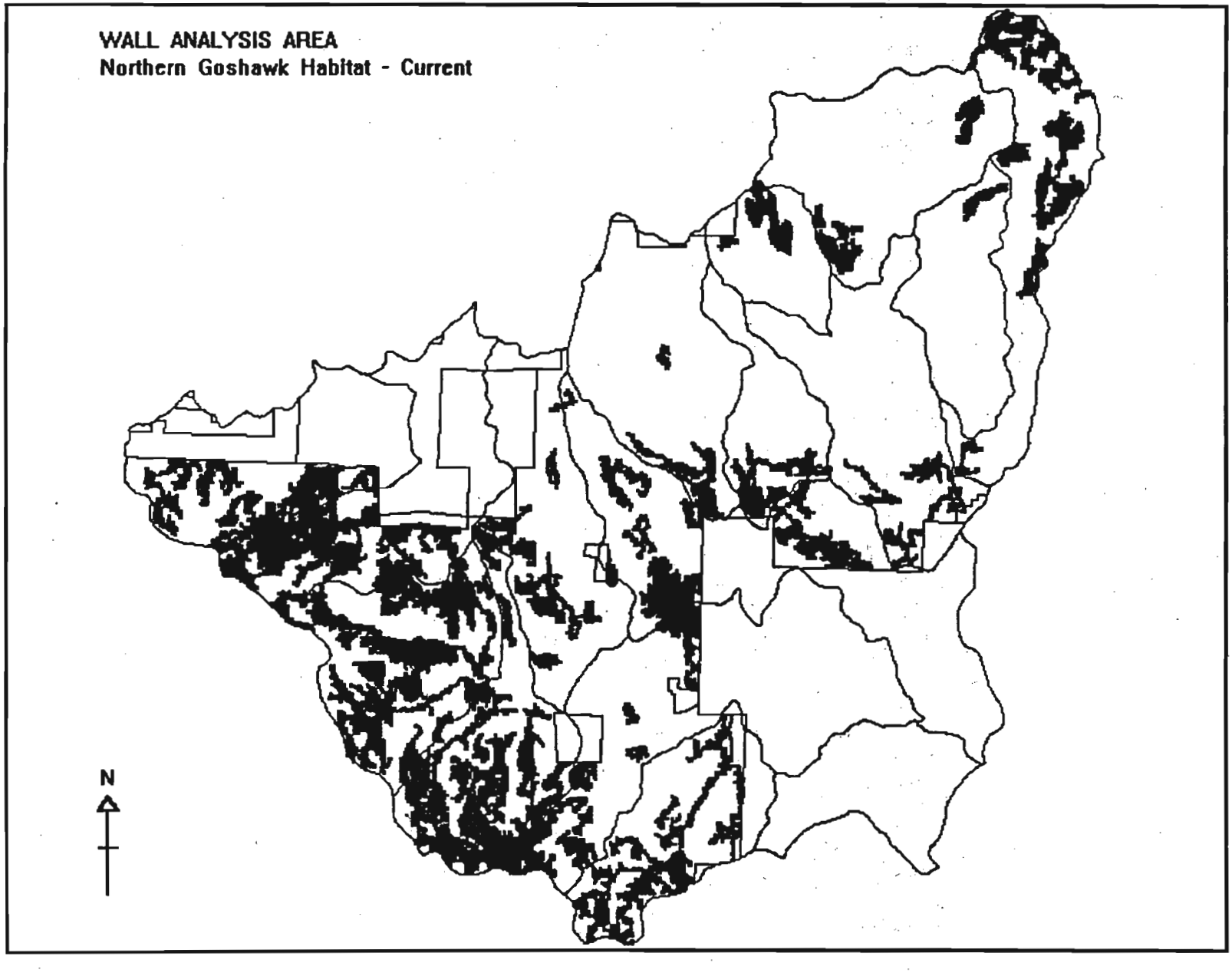


Figure 3a

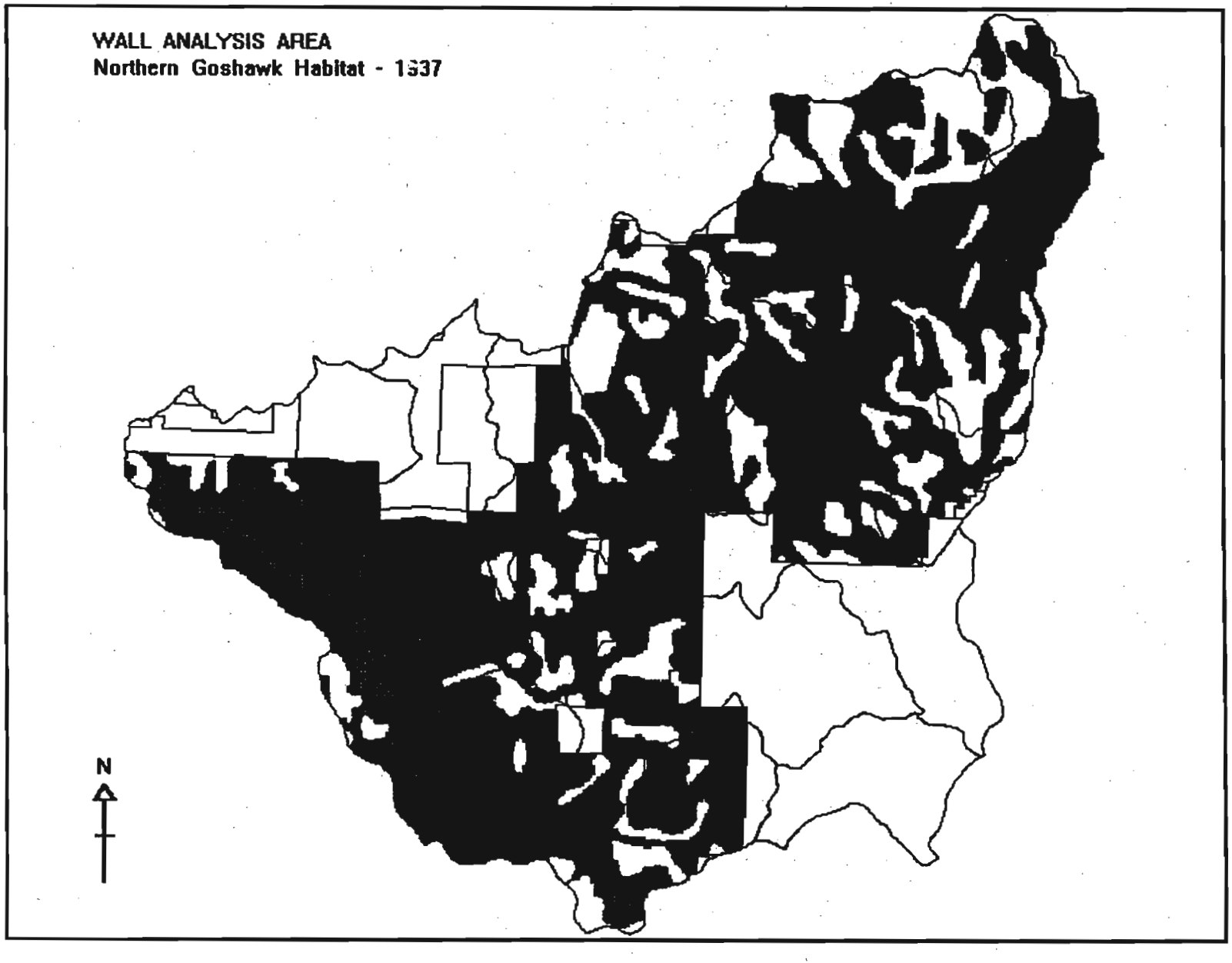


Figure 3b

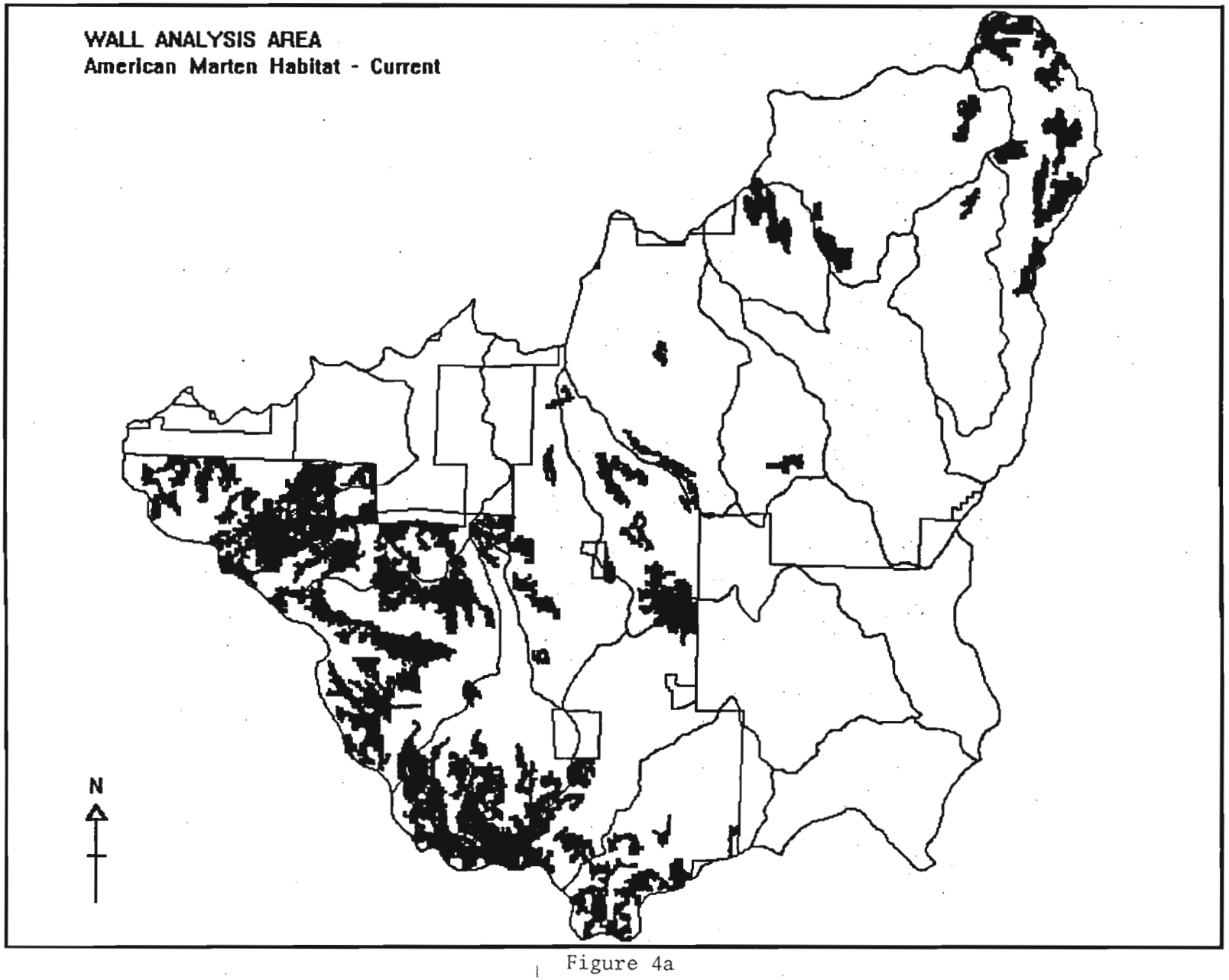


Figure 4a

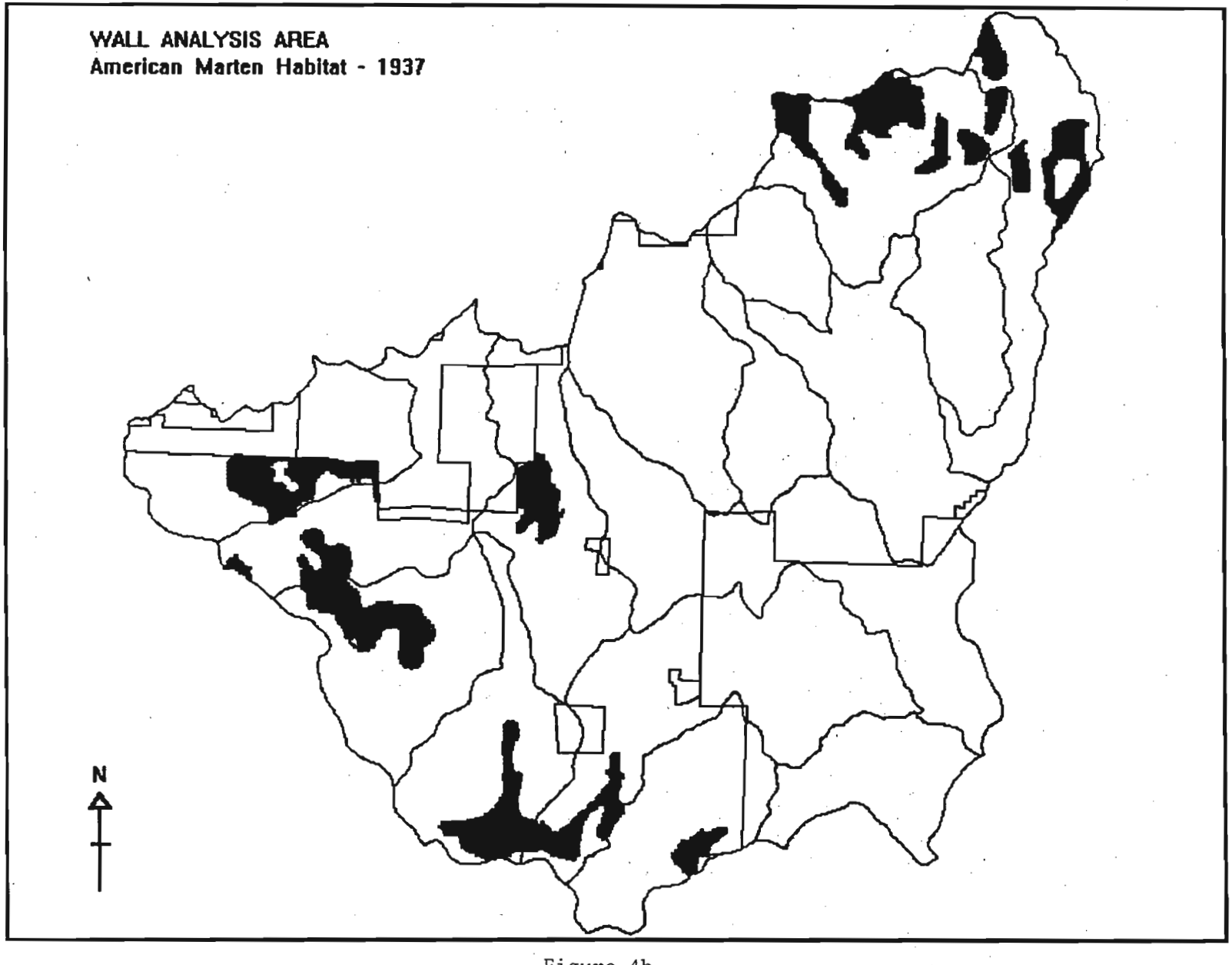


Figure 4b

Table 3. Habitat criteria used in Paradox analysis of habitat change, Wall Analysis Area.*

Species	Time [1]	Hab. Comp. [2]	EC Diversity Tree Spp.	Struct. Stage	'37 Timber Type	Min. Patch Size	Road Density Limit	Elev. Limit	SBW Limit [3]	Dist. To Edge/ Water [4]	Dist. To Road
Pileated woodpecker	EC, 1937	R	ABGR, LAOC PIPO, PSME	L/O	7, 13, 14	40 ac.	NA	NA	No 3 [3]	NA	NA
American marten	EC, 1937	R	ABGR, ALBA	L/O	6, 7, 13, 20	30 ac.	NA	>3,500'	No 3	NA	NA
Northern goshawk	EC, 1937	R	PICO, PSME ALBA	L/O	7, 13, 14	30 ac.	NA	NA	No 3	NA	NA
Northern 3-toed woodpecker	EC, 1937	R	PICO, PSME ALBA	L/O	4, 7, 13, 17, 19	20 ac.	NA	>4,500'	NA	NA	NA
Primary cavity excavators	EC, 1937	R	ABGR, PIPO PICO, ALBA	L/O, M	4, 6, 7, 8, 13, 14, 15, 17, 19, 20	5 ac.	NA	NA	NA	NA	NA
White-headed woodpecker	EC, 1937	R	PIPO, LAOC	L/O, M		NA	NA	NA	No 3	NA	NA
Rocky Mountain elk	EC, 1937	C	ABGR, PIPO PSME	E, EM, M, L/O	4, 7, 8, 15, 16, 17, 18, 19, 20	40 ac.	NA	NA	No 3	NA	$\geq$ ½ mi.
	EC	F	ABGR, PIPO PICO, ALBA	VE, E	--	NA	NA	NA	NA	$\leq$ 600' to EM, M, or L/O	NA
	1937	F			1	NA	NA	NA	NA	$\leq$ 600' to plant comm. Type 4, 7, 8, 15, 16, 17, 18, 19 or 20	NA
	EC	SC	ABGR, PIPO PICO, ALBA	E, EM, M, L/O	--	250 ac.	NA	NA	No 3	NA	$\geq$ ½ mi.

Species	Time [1]	Hab. Comp.[2]	EC Diversity Tree Spp.	Struct. Stage	'37 Timber Type	Min. Patch Size	Road Density Limit	Elev. Limit	SBW Limit [3]	Dist. To Edge/ Water [4]	Dist. To Road
Bald Eagle	EC, 1937	R	PIPO, ABGR	L/O	6, 7, 13, 14, 17	NA	NA	NA	NA	≤ ½ mi.	NA
	EC, 1937	W	PIPO, ABGR	L/O	6, 7, 13, 14, 17	NA	NA	NA	NA	≤ 1/4 mi.	NA
Wolverine	EC, 1937	R	ABGR, ALBA PSME, PICO	M, L/O	3, 4, 6, 7, 8, 13, 14, 15, 17, 19	NA	<1 mi/mi.^{2}	>5,000'	NA	NA	NA
	EC, 1937	F	ABGR, PICO, PIPO, ALBA	All	3, 4, 6, 7, 8, 13, 14, 15, 17, 19	NA	<1 mi./mi.^{2}	>4,000'	NA	NA	NA

* "Habitat", as used in this analysis, refers to high quality reproductive habitat, except where otherwise noted

1 EC = Existing Condition, 1937 = 1937 map

2 R = Reproductive
W = Wintering
F = Forage
C = Cover
SC = Security Cover

3 Spruce budworm ratings (1-3). See Section VII. R. for definitions of ratings.

4 "Distance to Water" applies to Class I and II streams, lakes, for Bald Eagle only.

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

- **severely reduced acreages of specific habitats, loss of habitat components**
- **Threatened, Endangered or sensitive species**
- **loss of ecosystem "function"**
- **species having low "versatility", i.e., species that are least able to successfully adapt to changing habitat conditions**
- **Neotropical Migrant Birds**

a. 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. Our analysis suggests that more than 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. A detailed discussion of old growth forest resources in found in response to question 4.

An estimated 24,000 acres of forest having late/old structure (see definition, Section VII. R) 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.

Snags, Down Logs: Snags and down logs were inventoried in 1994 on 44 plots within the Wall Analysis Area (Table 4). Based on the data compiled from those plots, snag densities currently exceed both Forest Plan standards and guidelines and the eastside screens. Averaged across all size classes, both snags and down logs also meet current recommendations for pileated woodpecker management (Bull and Holthausen 1993). 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 replacements.

Table 4. Characteristics of snag and down log habitat, Wall Analysis Area.

SNAGS	Avg. DBH	Avg. HEIGHT	Avg. SNAGS/AC
10"-20.9"DBH	15"	23'	9
$\geq$ 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
$\geq$ 21" Diameter	26"	40'	53
Overall	17"	42'	130

Aspen and riparian hardwood habitats are much less abundant today than historically, however, it is difficult to assess these losses quantitatively, as our sources of historic information were focused on timber lands. The impacts of these changes on the local vertebrate population can be obvious, as in the outright loss of overstory aspen and cottonwoods, or very subtle. For example, over-grazing of shrubs and herbaceous plants, if severe, can lead to reductions in the insect populations which in turn depletes the food supply of insectivorous bird species such as the flycatchers. Predation and nest parasitism may also increase, with increasing fragmentation of riparian forests, as was noted in a recent study of neotropical birds on the Heppner district. Because the remaining pockets of aspen are so small and decadent, it will be decades before aspen groves could approach their historic status in the drainage, and then only if current restoration efforts are substantially increased, and restoration projects maintained.

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, resulting 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. Beaver are still found in the Big Wall, Little Wall and Skookum drainages.

b. Threatened, Endangered, Sensitive Species

Wolverine:

Figure 5a, b reflects changes in wolverine habitat between 1937 and today. The amount of truly useable wolverine habitat is constrained by the availability of big game carrion, and the level of human disturbance. Thus, suitable wolverine habitat is at least partially defined by suitable habitat (particularly winter habitat) for elk and mule deer, density of open roads, and level of human activity (Banci 1994). If the existing condition map of elk security habitat and cover are superimposed on the map of suitable wolverine habitat, the Swale (26D) and Alder/Upper Skookum (26C) subwatersheds appear to provide the best remaining available habitat for wolverine in the Wall drainage.

Winter-time surveys for wolverine have been conducted in the northeastern and western portions of the analysis area. Although there have been no recorded sightings of wolverine within the Wall drainage, a set of tracks thought to be that of a wolverine was found in 1994 in the Potomas Creek drainage, approximately 6 miles east of the Wall Analysis Area.

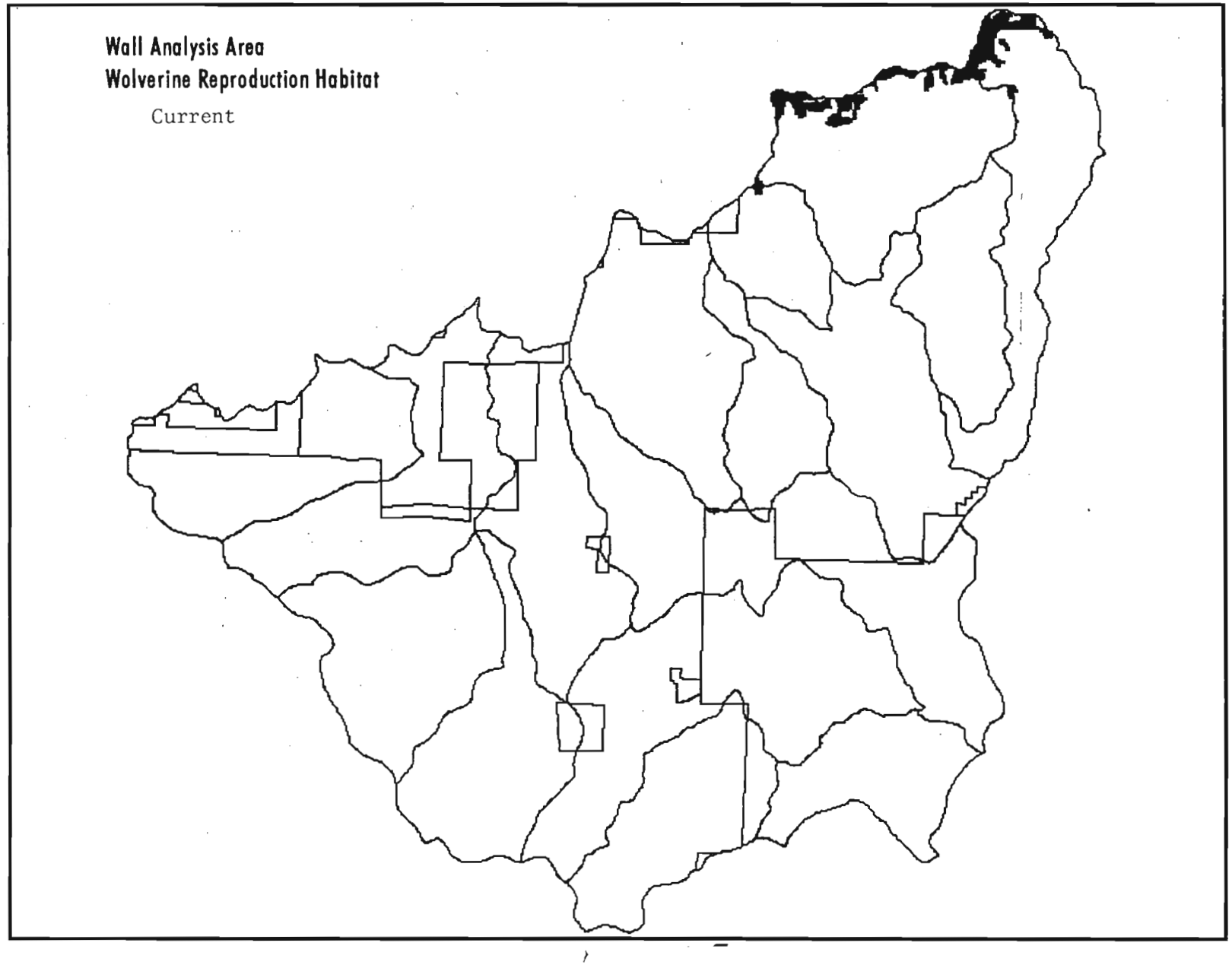

Wall Analysis Area
Wolverine Reproduction Habitat
Current
N

FIGURE 5a

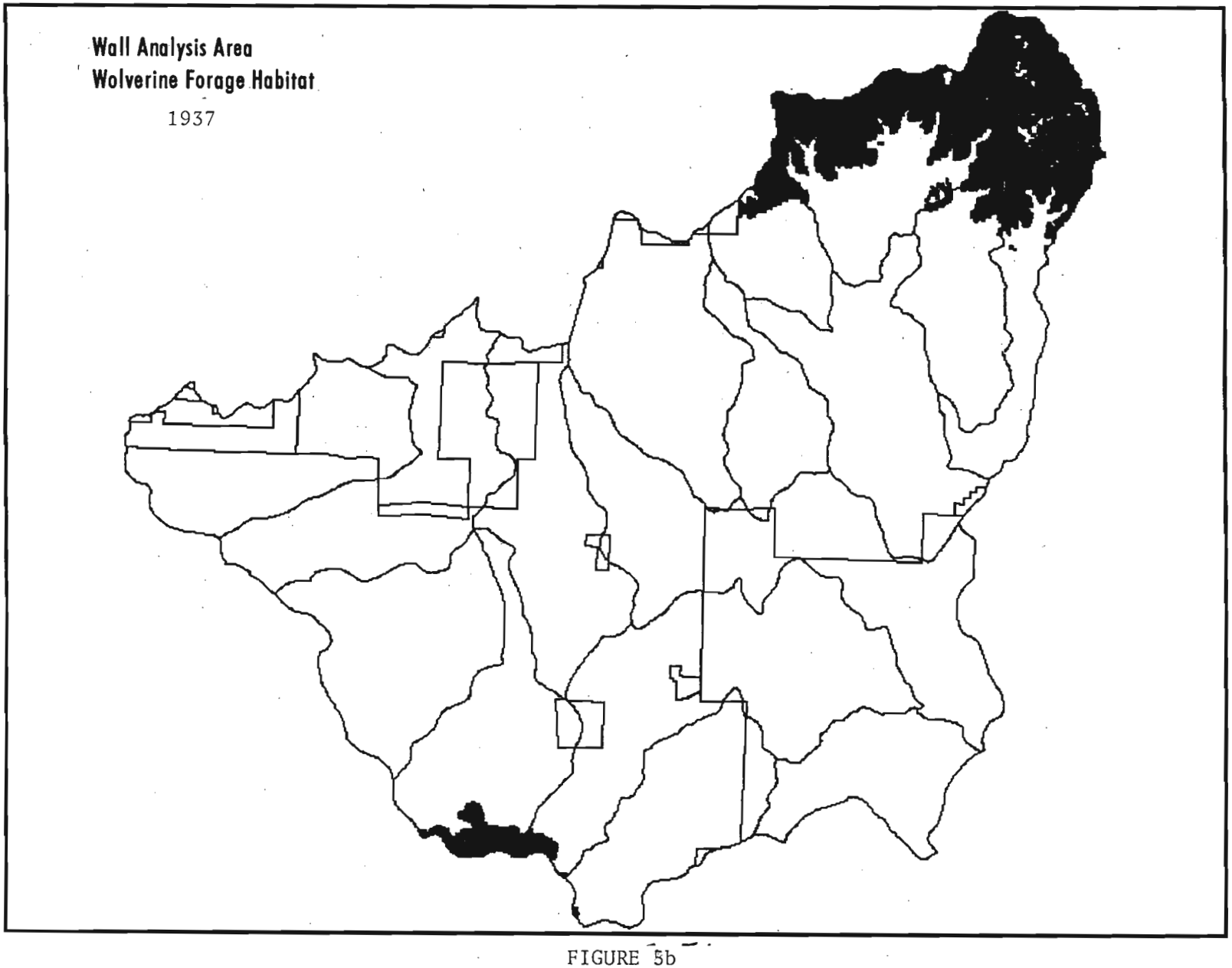


FIGURE 5b

Bald Eagle:

The bald eagle is the only Federally-listed terrestrial vertebrate species that is commonly observed on the Heppner Ranger District (Peregrine falcons are occasionally observed locally during migration, but there are no records of nesting activity on the District). Winter roost habitat occurs along Wall, Swale, Little Wall and Wilson Creeks; in 1937, winter roost habitat occurred along most of the Class I and II streams within the drainage. Suitable nesting habitat for bald eagles (forests dominated by large, old trees, close to fish-bearing waters) was once fairly abundant along the larger, fish-bearing streams in the drainage. Small areas of suitable nesting habitat still exists along Wall and Wilson Creeks (Figure 6a, b). A recently discovered bald eagle nest just south of the Wall drainage, and a suspected nest on the Grande Ronde River to the east, along with known nest sites on the Ochoco National Forest to the west, suggest that there were probably bald eagles nesting in the western Blue Mountains in the past when fish populations were high. With bald eagle populations recovering state-wide, it is possible that there could again be bald eagles nesting in the Wall drainage sometime in the future, however, the continuing decline of salmonid populations, the eagle's primary prey, reduce the chances for re-establishment of nesting populations.

Swainson's and Ferruginous Hawks:

Swainson's and Ferruginous hawks using the Wall area are at the upper end of their elevational range for nesting. Some foraging habitat does occur. There have been sightings of Swainson's hawks, and at least one Ferruginous hawk nest has been located within the area.
No habitat analysis was attempted for these species.

Long-billed Curlew, Upland Sandpiper:

The upland sandpiper and long-billed curlew are increasingly rare in the Blue Mountains. Habitat of the upland sandpiper is similar to that used by curlews (open meadows and grasslands), but extends farther upslope into moist mountain meadows. ODFW conducted surveys for the upland sandpiper in the Blue Mountains in the early 1990s (ODFW 1993). Upland sandpipers have been observed in the Wall drainage, but no nesting attempts have been recorded. No habitat analysis was attempted for these species.

Townsend's Big Eared Bat:

This nocturnal species is seldom observed and thought to be uncommon in the Blue Mountains. It's preferred habitat includes trees with loose bark, caves, and dark man-made structures, including mine shafts and old buildings. Loss of bat habitat is attributable to large tree losses, either through harvest or insect mortality. Direct human disturbance may comprise an additional source decline in habitat quality. Habitat loss for this species does not appear to have been significant in the Wall Analysis Area, however, no surveys have been conducted, and no habitat analysis was attempted for the species as part of this analysis.

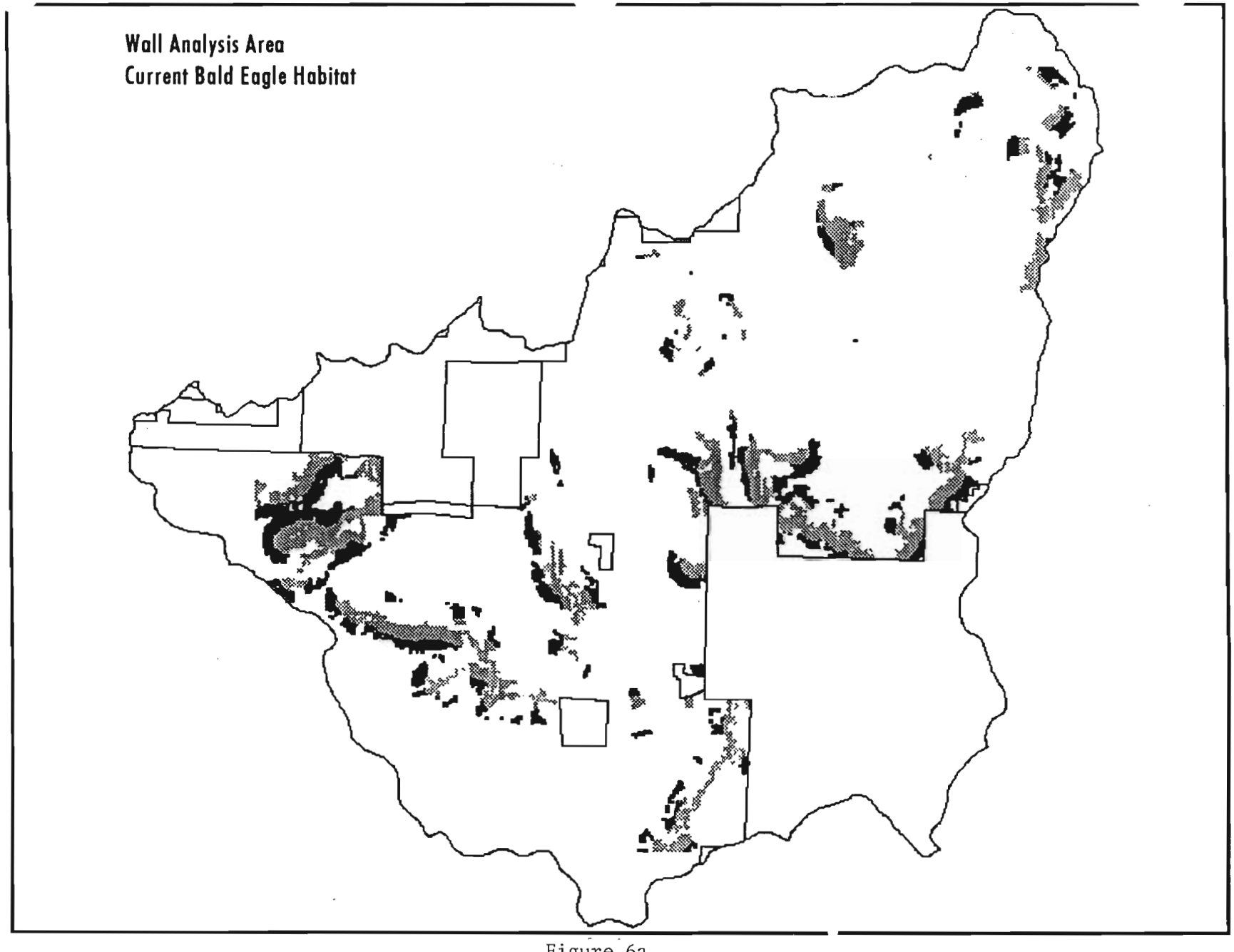

Wall Analysis Area
Current Bald Eagle Habitat
N
Reproduction and wintering
Wintering

Figure 6a

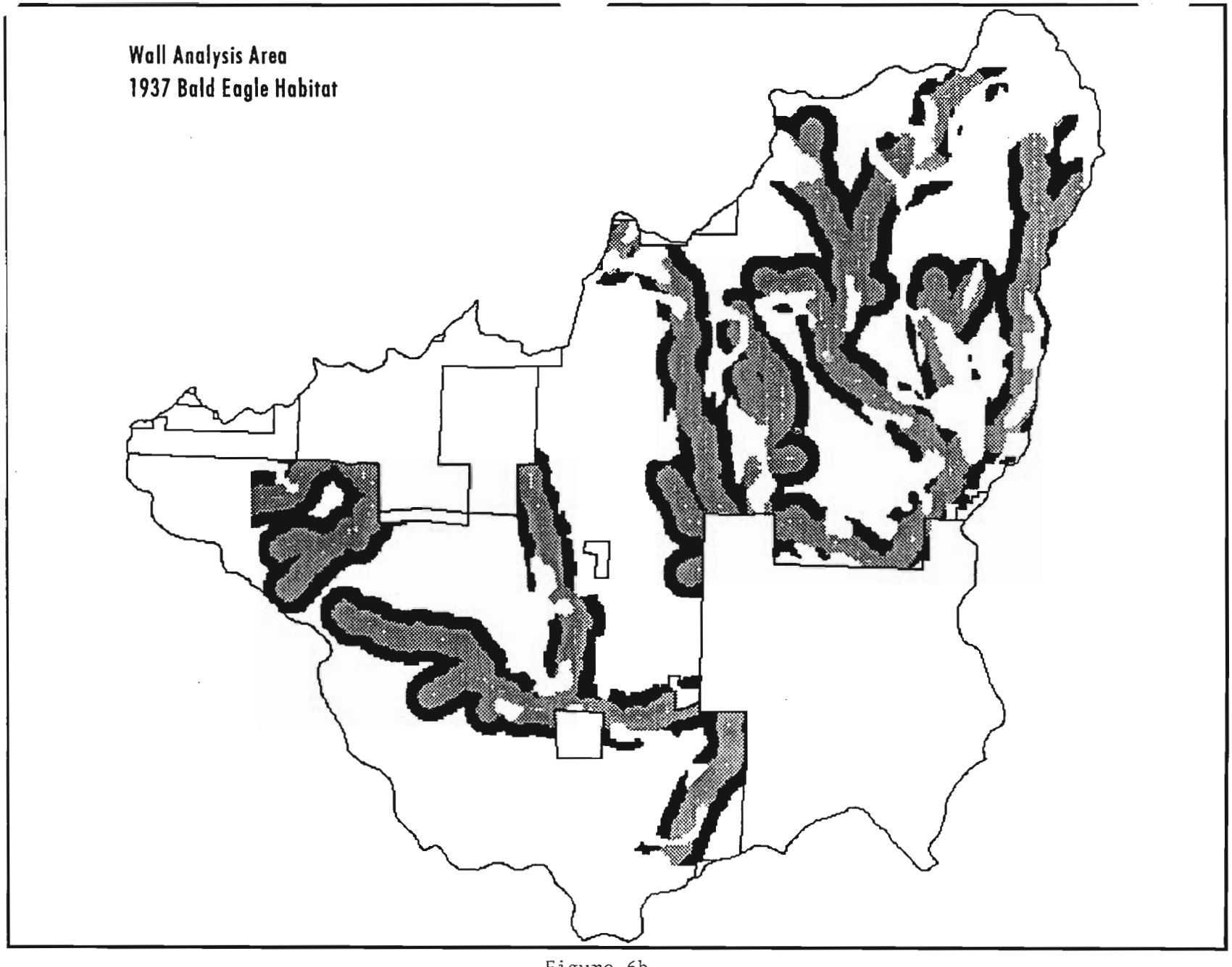

Wall Analysis Area
1937 Bald Eagle Habitat
N
Reproduction and wintering
Wintering

Figure 6b

c. 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 (E. Bull, pers. comm., Jan. 1995). Black bear and cougar appear to be making a comeback after many decades of low densities.

Low Versatility Species:

Terrestrial species listed below are considered to have "low versatility", i.e., have limited abilities to adapt to changes in habitat condition and/or availability. Low versatility plant species are discussed in the Floristic Biodiversity section. Although some of these species are common and/or widely distributed, they may still be vulnerable to habitat alteration within the Wall drainage. As a group, "low versatility" animal and plant species should be carefully considered during project planning.

Clark's nutcracker
red crossbill
gray jay
great gray owl
pygmy nuthatch
white-headed woodpecker
northern 3-toed woodpecker
red-breasted nuthatch
red-naped sapsucker
Lewis' woodpecker
brown creeper
Vaux's swift
mountain chickadee
marten
house wren
Townsend's warbler
warbling vireo
northern goshawk
northern saw-whet owl
white-breasted nuthatch
downy woodpecker
pileated woodpecker
Williamson's sapsucker
black-backed woodpecker
hairy woodpecker
flammulated owl
black-capped chickadee
violet-green swallow
tree swallow

(Sources: Thomas et al. 1979, Ochoco NF 1994)

Neotropical Migrant Birds:

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. Table 5 lists all NTMB species in the analysis area with their habitat associations.

Table 5. Neotropical Migratory Birds, known or suspected to occur in the Wall Analysis Area

Species	Late/Old	Early/Middle	Very Early/Early	Riparian	Meadow	Aspen
Vaux's swift	X					
Hammond's flycatcher	X					
Flammulated owl	X					
Townsend's warbler	X					
Chipping sparrow	X	X				
Olive-sided flycatcher	X	X				
Hermit thrush	X	X				
Solitary vireo	X	X				
Ruby-crowned kinglet	X	X				
Pine siskin	X	X	X			
Townsend's solitaire	X	X	X			
American Robin	X	X	X	X	X	X
Turkey vulture	X	X	X	X	X	X
Red-tailed hawk	X	X	X	X	X	X
American kestrel	X	X	X	X	X	X
Northern flicker	X	X	X			X
Western bluebird	X	X	X			X
Dark-eyed junco	X	X	X	X		X
Red-naped sapsucker	X	X		X		X
Sharp-shinned hawk	X	X		X		X
Cooper's hawk	X	X		X		X

Species	Late/Old	Early/Middle	Very Early/Early	Riparian	Meadow	Aspen
House wren	X	X		X		X
Northern goshawk	X	X				X
Mountain bluebird	X	X				X
Yellow-rumped warbler	X	X		X		
Western tanager	X	X		X		
Red crossbill	X	X		X		
Cassin's finch	X	X				X
Violet-green swallow	X	X				X
Long-eared owl	X			X		X
Lewis's woodpecker	X			X		
Williamson's sapsucker	X			X		
Golden eagle	X		X	X	X	X
Mourning dove		X	X	X		X
Nashville warbler		X	X	X		
McGillivray's warbler		X	X	X		X
Western wood-peewee		X		X		X
Common nighthawk			X	X	X	X
Calliope hummingbird			X	X	X	X
Fox sparrow			X	X		
Common poorwill			X		X	X
Dusky flycatcher			X			X
Gray flycatcher			X			
Brown-headed cowbird			X			

Species	Late/Old	Early/Middle	Very Early/Early	Riparian	Meadow	Aspen
Osprey				X		
Belted kingfisher				X		
Willow flycatcher				X		
Western kingbird				X		
Bank swallow				X		
Barn swallow				X		
Cedar waxwing				X		
Red-eyed vireo				X		
Orange-crowned warbler				X		
Yellow warbler				X		
Wilson's warbler				X		
Yellow-breasted chat				X		
Song sparrow				X		
Northern oriole				X		
American goldfinch				X		
Brewer's blackbird				X	X	
Eastern kingbird				X	X	
Killdeer				X	X	
Cliff swallow				X	X	
Rufous hummingbird				X	X	X
White-crowned sparrow				X	X	X
Swainson's hawk				X		X
Tree swallow				X		X

Species	Late/Old	Early/Middle	Very Early/Early	Riparian	Meadow	Aspen
Swainson's thrush				X		X
Warbling vireo				X		X
Lazuli bunting				X		X
Vesper sparrow					X	
Common yellowthroat					X	
Lincoln's sparrow					X	
Savannah sparrow					X	
Western meadowlark					X	
American pipit					X	
Upland sandpiper					X	
Long-billed curlew					X	
Northern harrier					X	
Short-eared owl					X	
Prairie falcon					X	
Ferruginous hawk						X
Rock wren						
Peregrine falcon						

Source: "Management, Research and Monitoring Priorities for Conservation of Neotropical Migratory Landbirds that Breed in Oregon and Washington. Oregon/Washington Partners in Flight, August, 1994.

The status of several Wall area NTMBs is of concern (Table 6). Of the 14 "east-side" NTMB species listed as "currently declining in R6", 12 occur in the Wall Analysis Area. Breeding Bird Survey trends for six species that occur in the drainage (of nine total) are significantly negative.

Table 6. Neotropical bird species of local concern, Wall Ecosystem Analysis Area.

Species	Concern	
	Currently Declining in R6	Significantly Negative Breeding Bird Survey Trends
Hammond's flycatcher	X	
Chipping sparrow	X	
Olive-sided flycatcher	X	
American kestrel	X	
Cooper's hawk	X	
Mountain bluebird	X	
Mourning dove	X	
Western wood peewee	X	
Northern oriole	X	
American goldfinch	X	
Eastern kingbird	X	
Swainson's trush	X	
Ruby-crowned kinglet		X
Turkey vulture		X
Calliope hummingbird		X
Red-eyed vireo		X
Tree swallow		X
Short-eared owl		X

An increasing number of studies indicate that fragmentation of forested habitats, and overgrazing of grassland habitats can have serious detrimental impacts on NTMBs (Dobkin 1994). Both fragmentation and overgrazing are concerns within the Wall watershed, and may be affecting the ability of NTMBs to successfully reproduce in the area.

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

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?

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 2 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.

Results of the 1991-1992 field review of Forest Plan-designated old growth (C1 and C2 land allocations) and "inventoried old growth" (old growth patches identified on aerial photos that are not included in the Forest Plan Old Growth network) indicate a high degree of variability in the quality of old growth habitats within the drainage. In the Upper Alder/Skookum subwatershed, many stands dominated by grand and Douglas-firs are either dead, or severely defoliated and likely to die within 10 years, as a result of spruce budworm infestation. In the rest of the analysis area, insect and disease problems appear to be minor. However, decades of harvest and roading have resulted in a high degree of fragmentation and isolation of old growth habitats. Canopy closure, number of canopy layers, and down woody material, all important characteristics of old growth habitats, vary from stand to stand (Table 7).

Table 7. Old Growth Habitat Characteristics

LIVE TREES >21"		SNAGS >21"		DOWN LOGS/AC	AVG. CANOPY CLOSURE	AVG. OLD GROWTH SCORE
Min. Avg. (#/ac.)	Max. Avg (#/ac)	Min. Avg. (#/ac)	Max. Avg. (#/ac)			
2.3	4.2	.3	2.3	1-3	59%	6

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.

Despite fragmentation and often low quality of old growth habitats in the drainage, woodpeckers still occupy these areas. Fourteen of 28 C1 and inventoried OG units surveyed had evidence of foraging by pileated woodpeckers. Northern three-toed and Black-backed woodpeckers were observed in several stands. White-headed woodpeckers are infrequently observed in the drainage.

The C1 and inventoried old growth areas in Wall include a large portion of the remaining suitable habitat in the drainage for northern goshawks. No goshawks were observed in any of the old growth units during the 1991 or 1992 surveys, although there have been several observations of the species within the analysis area over the last few years. An adult goshawk with young was observed on upper Wilson Creek, above Bull Prairie Lake, in 1991. The nest site was re-visited by District personnel in 1995; no evidence of an active nest was found.

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. Current Forest Plan management standards are based on outdated and incomplete information, and as currently implemented, allow for continued loss of this important component of diversity, reducing the ability of managers to maintain viable populations of associated species over the long-term. 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 VII. W.

5. What are current population levels 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). Table 8 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 900-1,200 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.

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, see Figure 7).

Table 8. Elk Populations in the Heppner Big Game Management Unit

Year	Bulls per 100 Cows	Calves per 100 cows	Total Population
1965	9	48	500
1966	9	43	450
1967	10	61	1,050
1968	9	46	1,500
1969	7	48	2,300
1970	7	46	1,900
1971	12	47	1,900
1972	8	47	3,600
1973	6	50	1,950
1974	5	55	2,400
1975	11	49	3,400
1976	4	54	3,600
1977	8	50	4,000
1978	6	45	3,500
1979	8	37	4,000
1980	5	34	3,300
ODFW's MO (est. 1981)	10	45	2,850
1981	5	42	2,900
1982	5	47	2,850
1983	4	41	2,850
1984	7	56	3,150
1985	7	41	3,280
1986	3	55	3,705
1987	5	43	2,850
1988	5	47	3,300
1989	5	36	3,150
1990	4	41	3,300

Year	Bulls per 100 Cows	Calves per 100 cows	Total Population
1991	5	47	3,150
1992	4	38	2,993
1993	3	36	3,560
1994	5	40	3,150

Table 9. Elk Populations in the Heppner Big Game Management Unit

YEAR	ELK NUMBERS	YEAR	ELK NUMBERS
1965	3,350	1980	5,800
1966	1,300	1981	5,200
1967	2,600	1982	4,100
1968	1,150	1983	3,400
1969	2,600	1084	7,300
1970	2,650	1985	7,400
1971	2,850	1986	6,700
1972	4,300	1987	4,800
1973	3,600	1988	5,900
1974	5,500	1989	5,000
1975	5,700	1990	4,500
1976	6,050	1991	5,300
1977	5,750	1992	5,200
1978	4,000	1993	5,300
1979	5,100		

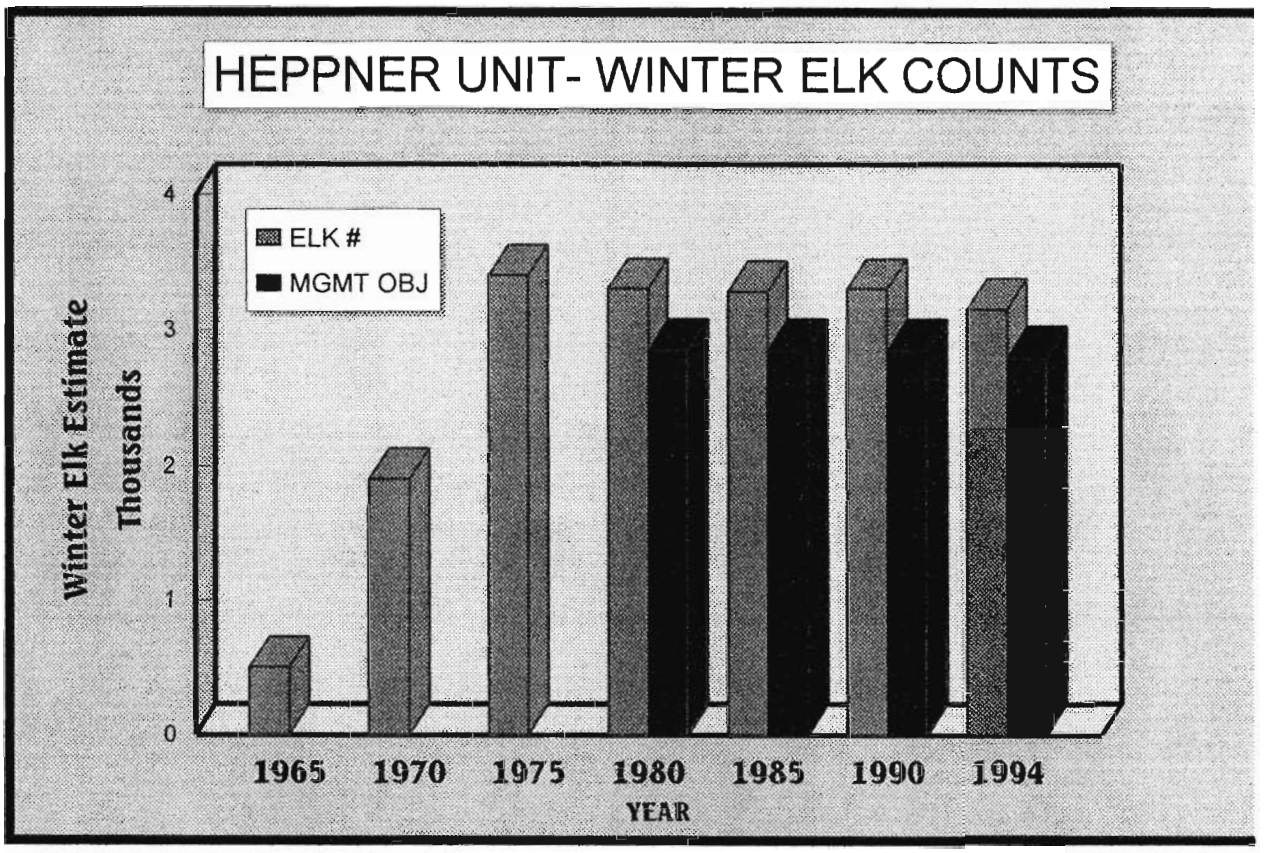

HEPPNER UNIT- WINTER ELK COUNTS
Winter Elk Estimate
Thousands
0
1
2
3
4
ELK #
MGMT OBJ
1965
1970
1975
1980
1985
1990
1994
YEAR

Figure 7

Timber sale assessments prepared in the late 1980s documented Habitat Effectiveness Index (HEI) scores below Forest Plan Standards and Guidelines (Wilson and Tupper sales). Likewise, the 1992 Forest Health Restoration team found the availability of satisfactory cover for big game to be below Forest standards and guidelines in 7 of 15 (47%) of the subdrainages included in the Wall Analysis Area. However, based on spatial analysis of habitat structure and disturbance factors, there appear to have been fairly substantial, positive changes in the amounts of suitable habitat available to elk in the Wall drainage. Unlike the Camas drainage to the east, where elk habitat loss has been substantial, suitable elk habitat in the Wall drainage appears to have **increased** since 1937. Changes in habitat suitability for elk since 1937 are illustrated in Figures 8a and b. Primary foraging habitat (non-forested openings within 600 feet of a forested edge) has increased, primarily as a result of created openings (clearcuts) in the northeastern portion of the watershed. Cover has also increased, primarily in the Skookum and Swale drainages, and within riparian corridors. Most elk security cover is found in Upper Swale Creek, the Skookum drainage, and in the essentially unroaded area between Little Wall and Happy Jack Creeks. Important migration corridors occur along Swale, Bear, Little Bear, Alder and Skookum Creeks.

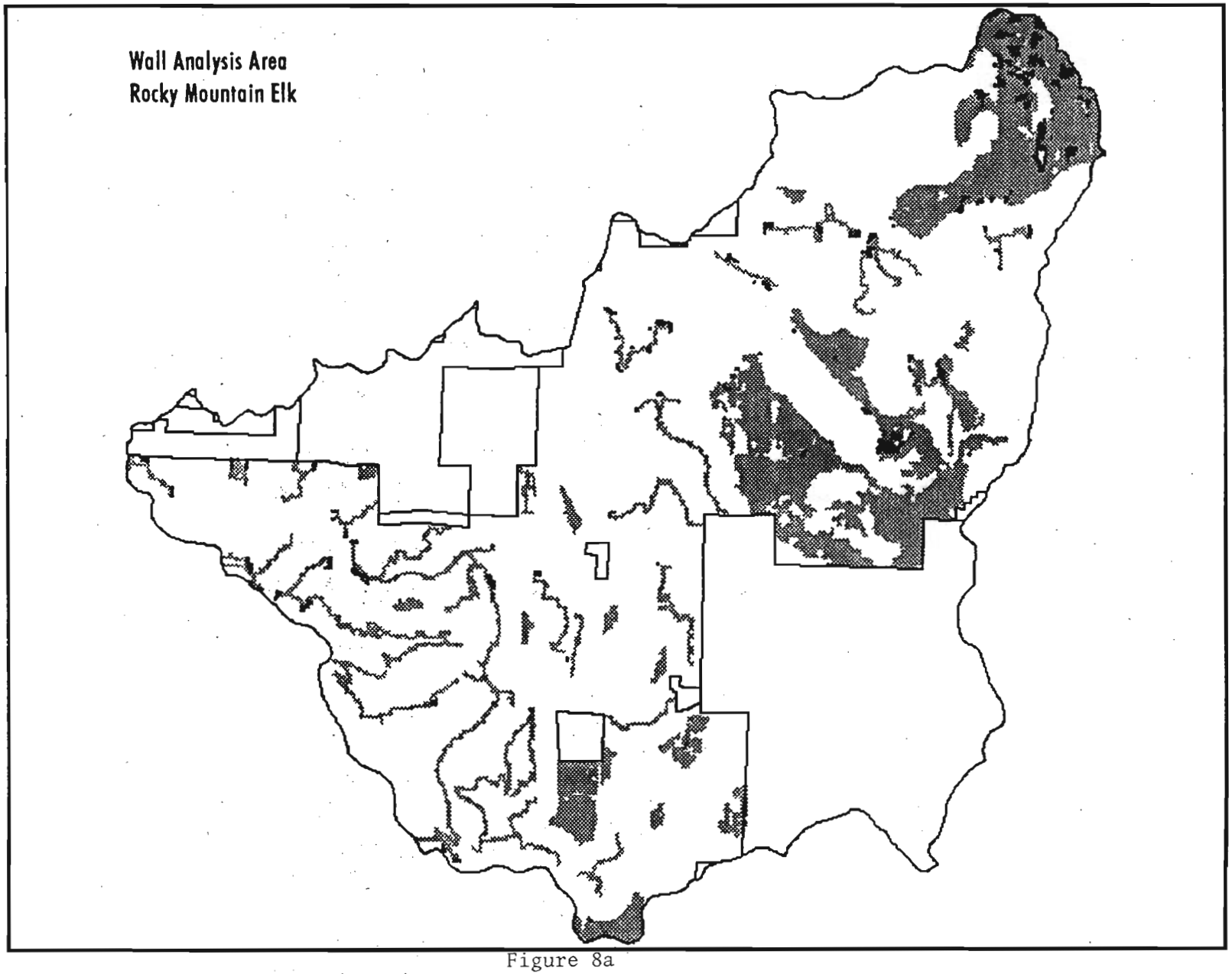

Wall Analysis Area
Rocky Mountain Elk
N
Prime Cover
Forage within 600 ft. of prime cover

Figure 8a

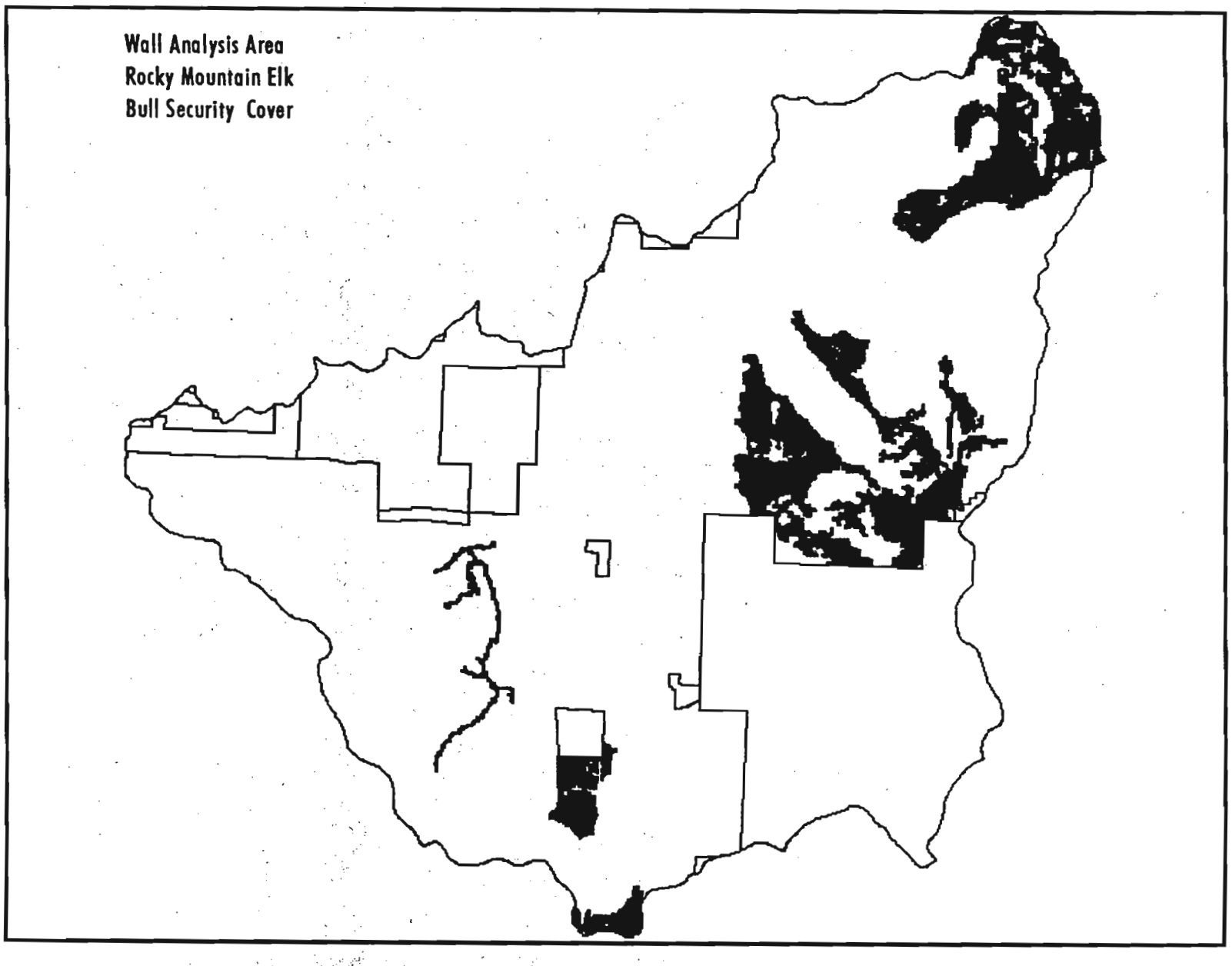

Wall Analysis Area
Rocky Mountain Elk
Bull Security Cover
N

Figure 8b

APPENDIX VII. V. A.

Table 1. Vertebrate Species Occurring in the Wall Creek Watershed*

AMPHIBIANS 6 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
long-toed salamander	*Ambystoma macrodactylum*	PR	C
western toad	*Bufo boreas*	PR	C
Pacific treefrog (chorus)	*Hyla regilla*	PR	C
bullfrog	*Rana catesbeiana*	PR	C
spotted frog	*Rana pretiosa*	PR	U
Great Basin spadefoot toad	*Scaphiopus intermontanus*	PR	U

REPTILES 7 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
western rattlesnake	*Crotalus viridis oreganus*	PR	O
western skink	*Eumeces skiltonianus*	PR	O
short-horned lizard	*Phrynosoma douglassi*	PR	C
gopher snake	*Pituophis melanoleucus*	PR	C
western fence lizard	*Sceloporus occidentalis*	PR	C
western terrestrial garter snake	*Thamnophis elegans*	PR	O
common garter snake	*Thamnophis sirtalis*	PR	C

PR - permanent resident
SR - summer resident
WR - winter resident
MI - migration periods only

C - common
U - uncommon
O - occassional
R - rare

*** List includes documented species as well as those suspected of occurring.**

BIRDS 161 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
Cooper's hawk	*Accipiter cooperii*	PR	U
goshawk	*Acciptier gentilis*	PR	U
spotted sandpiper	*Actitis macularia*	SR	U
sharp-shinned hawk	*Accipiter striatus*	PR	U
northern saw-whet owl	*Aegolius acadicus*	PR	U
red-winged blackbird	*Agelaius phoeniceus*	SR	C
chukar	*Alectoris chukar*	IN	O
sage sparrow	*Amphispize belli*	SR	C
grasshopper sparrow	*Ammondramus savannarum*	SR	U
northern pintail	*Anas acuta*	MI	U
northern shoveler	*Anas clypeata*	MI	C
green-winged teal	*Anas crecca*	MI	C
cinnamon teal	*Anas cyanoptera*	SR	C
blue-winged teal	*Anas discors*	SR	R
mallard	*Anas platyrhynchos*	SR	C
American pipit	*Anthus rubescens*	SR	R
golden eagle	*Aquila chrysaetos*	PR	O
great blue heron	*Ardea herodias*	SR	O
short-eared owl	*Asio flammeus*	PR	R
long-eared owl	*Asio otus*	PR	R
Lewis' woodpecker	*Asyndesmus lewis*	PR	U
burrowing owl	*Athene cunicularia*	SR	R
redhead	*Aythya americana*	MI	U
ring-necked duck	*Aythya collaris*	MI	O
cedar waxwing	*Bombycilla cedrorum*	PR	U
Bohemian waxwing	*Bombycilla garrulus*	MI	O
ruffed grouse	*Bonasa umbellus*	PR	C

BIRDS 161 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
Canada goose	*Branta candensis*	PR	C
red-tailed hawk	*Buteo jamaicensis*	PR	C
rough-legged hawk	*Buteo lagopus*	WR	U
ferruginous hawk	*Buteo regalis*	SR	R
Swainson's hawk	*Buteo swainsoni*	SR	R
great horned owl	*Bubo virginianus*	PR	C
California quail	*Callipepla californicus*	IN	U
Cassin's finch	*Carpodacus cassinii*	PR	U
common redpoll	*Carduelis flammea*	MI	U
hermit thrush	*Catharus guttatus*	PR	C
house finch	*Carpodacus mexicanus*	PR	C
purple finch	*Carpodacus purpureus*	PR	U
turkey vulture	*Cathartes aura*	SR	C
canyon wren	*Catherpes mexicanus*	PR	O
Swainson's thrush	*Catharus ustulatus*	SR	U
belted kingfisher	*Ceryle alcyon*	PR	U
brown creeper	*Certhia familiaris*	PR	C
lark sparrow	*Chondestes grammacus*	SR	R
common nighthawk	*Chordeiles minor*	SR	C
Vaux's swift	*Chaetura vauxi*	SR	U
killdeer	*Charadrius vociferus*	SR	C
northern Harrier	*Circus cyaneus*	SR	U
dipper	*Cinclus mexicanus*	PR	U
northern flicker	*Colaptes auratus*	PR	O
American crow	*Corvus brachyrhynchos*	PR	O
rock dove	*Columba livia*	IN	U
common raven	*Corvus corax*	PR	C

BIRDS 161 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
western wood pewee	*Contopus sordidulus*	SR	O
Steller's jay	*Cyanocitta stelleri*	PR	C
blue grouse	*Dendragapus obscurus*	PR	C
white-headed woodpecker	*Dendrocopos albolarvatus*	PR	R
downy woodpecker	*Dendrocopos pubescens*	PR	C
hairy woodpecker	*Dendrocopos villosus*	PR	C
yellow-rumped warbler	*Dendroica coronata*	SR	C
yellow warbler	*Dendroica petechia*	SR	U
Townsend's warbler	*Dendroica townsendi*	SR	U
pileated woodpecker	*Dryocopus pileatus*	PR	C
Hammond's flycatcher	*Empidonax hammondii*	SR	U
dusky flycatcher	*Empidonax oberholseri*	SR	O
willow flycatcher	*Empidonax traillii*	SR	U
gray flycatcher	*Empidonax wrightii*	SR	U
horned lark	*Eremophila alpestris*	SR	C
Brewer's blackbird	*Euphagus cyanocephalus*	PR	C
merlin	*Falco columbarius*	MI	R
prairie falcon	*Falco mexicanus*	PR	U
peregrine falcon	*Falco peregrinus*	O	R
American kestrel	*Falco sparverius*	PR	C
common snipe	*Gallinago gallinago*	SR	C
common yellowthroat	*Geothlypis trichas*	SR	U
northern pygmy owl	*Glaucidium gnoma*	PR	U
sandhill crane	*Grus canadensis*	SR	U
bald eagle	*Haliaeetus leucocephalus*	WR	U
evening grosbeak	*Hesperiphona vespertina*	PR	U
cliff swallow	*Hirundo pyrrhonota*	SR	O

BIRDS 161 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
barn swallow	*Hirundo rustica*	SR	O
northern oriole	*Icterus galbula*	SR	C
yellow-breasted chat	*Icteria virens*	SR	R
varied thrush	*Ixoreus naevius*	PR	U
dark-eyed junco	*Junco hyemalis*	PR	C
northern shrike	*Lanius excubitor*	WR	R
loggerhead shrike	*Lanius ludovicianus*	SR	R
gray-crowned rosy finch	*Leucosticte tephrocotis*	MI	U
red crossbill	*Loxia curvirostra*	PR	C
turkey	*Meleagris gallopavo*	IN	O
Lincoln's sparrow	*Melospiza lincolnii*	SR	C
song sparrow	*Melospiza melodia*	PR	C
common merganser	*Mergus merganser*	PR	C
brown-headed cowbird	*Molothrus ater*	SR	C
Townsend's solitaire	*Myadestes townsendi*	PR	C
long-billed curlew	*Numenius americanus*	SR	U
Clark's nutcracker	*Nucifraga columbiana*	PR	U
olive-sided flycatcher	*Nuttallornis borealis*	SR	O
MacGillivray's warbler	*Oporornis tolmiei*	SR	O
sage thrasher	*Oregoscoptes montanus*	SR	O
mountain quail	*Oreortyx pictus*	PR	R
flammulated owl	*Otus flammeolus*	SR	U
western screech owl	*Otus kennicotti*	PR	U
black-capped chickadee	*Parus atricapillus*	PR	C
house sparrow	*Passer domesticus*	IN	U
osprey	*Pandion haliaetus*	SR	U
fox sparrow	*Passerella iliaca*	SR	U

BIRDS 161 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
mountain chickadee	*Parus gambeli*	PR	C
savannah sparrow	*Passerculus sandwichensis*	SR	O
lazuli bunting	*Passerina amoena*	SR	U
gray jay	*Perisoreus canadensis*	PR	C
gray partridge	*Perdix perdix*	IN	U
poorwill	*Phalaenoptilus nuttallii*	SR	R
ring-neck pheasant	*Phasianus colchicus*	IN	R
black-backed woodpecker	*Picoides arcticus*	PR	U
pine grosbeak	*Pinicola enucleator*	WR	O
rufous-sided towhee	*Pipilo erythrophthalmus*	PR	C
western tanager	*Piranga ludoviciana*	SR	U
black-billed magpie	*Pica pica*	PR	C
three-toed woodpecker	*Picoides tridactylus*	PR	U
vesper sparrow	*Pooecetes gramineus*	SR	C
ruby-crowned kinglet	*Regulus calendula*	PR	C
golden-crowned kinglet	*Regulus satrapa*	PR	C
bank swallow	*Riparia riparia*	SR	U
rock wren	*Salpinctes obsoletus*	SR	U
Say's phoebe	*Sayornis saya*	SR	U
rufous hummingbird	*Selasphorus rufus*	SR	C
mountain bluebird	*Sialia currucoides*	SR	C
western bluebird	*Sialia mexicana*	SR	C
red-breasted nuthatch	*Sitta canadensis*	PR	C
white-breasted nuthatch	*Sitta carolinensis*	PR	U
pygmy nuthatch	*Sitta pygmaea*	PR	C
pine siskin	*Spinus pinus*	PR	C
American goldfinch	*Spinus tristis*	PR	C

BIRDS 161 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
Brewer's sparrow	*Spizella breweri*	SR	C
Williamson's sapsucker	*Sphyrapicus thyroideus*	PR	C
chipping sparrow	*Spizella passerina*	SR	U
red-naped sapsucker	*Sphyrapicus nuchalis*	PR	U
calliope hummingbird	*Stellula calliope*	SR	U
great gray owl	*Strix nebulosa*	PR	U
western meadowlark	*Sturnella neglecta*	SR	C
barred owl	*Strix varia*	PR	R
Eurasian starling	*Sturnus vularis*	IN	C
tree swallow	*Tachycincta bicolor*	SR	C
violet-green swallow	*Tachycineta thalassina*	SR	C
house wren	*Troglodytes aedon*	SR	C
winter wren	*Troglodytes troglodytes*	PR	C
American robin	*Turdus migratorius*	PR	C
barn owl	*Tyto alba*	SR	R
eastern kingbird	*Tyrannus tyrannus*	SR	R
western kingbird	*Tyrannus verticalis*	SR	C
orange-crowned warbler	*Vermivora celata*	SR	O
Nashville warbler	*Vermivora ruficapilla*	SR	R
warbling vireo	*Vireo gilvus*	SR	O
red-eyed vireo	*Vireo olivaceus*	SR	U
solitary vireo	*Vireo solitarius*	SR	U
Wilson's warbler	*Wilsonia pusilla*	SR	C
yellow-headed blackbird	*Xanthocephalus Xanthocephalus*	SR	U
mourning dove	*Zenaida macroura*	PR	C
white-crowned sparrow	*Zonotrichia leucophrys*	SR	C

MAMMALS 61 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
pallid bat	*Antrozous pallidus*	PR	U
pronghorn	*Antilocapra americana*	PR	U
coyote	*Canis lantrans*	PR	C
beaver	*Castor canadensis*	PR	R
elk	*Cervus elaphus*	PR	C
Ord's kangaroo rat	*Dipodomys ordii*	PR	U
big brown bat	*Eptesicus fuscus*	PR	C
porcupine	*Erethizon dorsatum*	PR	C
cougar (mountain lion)	*Felis concolor*	PR	O
bobcat	*Lynx rufus*	PR	C
northern flying squirrel	*Glaucomys sabrinus*	PR	U
wolverine	*Gulo gulo*	PR	R
silver-haired bat	*Lasionycteris noctivangans*	PR	U
snowshoe hare	*Lepus americanus*	PR	C
black-tailed jackrabbit	*Lepus californicus*	PR	C
sagebrush vole	*Lagurus curtatus*	PR	U
river otter	*Lutra canadensis*	PR	U
yellow-bellied marmot	*Marmota flaviventris*	PR	O
striped skunk	*Mephitis mephitis*	PR	C
long-tailed vole	*Microtus longicaudus*	PR	U
Montane vole	*Microtus montanus*	PR	C
water vole	*Microtus richardsoni*	PR	R
short-tailed weasel	*Mustela erminea*	PR	C
long-tailed weasel	*Mustela frenata*	PR	C
house mouse	*Mus musculus*	IN	C
mink	*Mustela vison*	PR	O

MAMMALS 61 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
long-eared myotis	*Myotis evotis*	PR	R
little brown bat	*Myotis lucifugus*	PR	C
California myotis	*Myotis californicus*	PR	U
western small-footed bat	*Myotis cilolabrium*	PR	C
fringed myotis	*Myotis thysanodes*	PR	C
long-legged myotis	*Myotis volans*	PR	C
Yuma myotis	*Myotis yumanensis*	PR	C
bushy-tailed woodrat	*Neotoma cinerea*	PR	C
mule deer	*Odocoileus hemionus*	PR	C
white-tailed deer	*Odocoileus virginianus*	PR	U
northern grasshopper mouse	*Onychomys leucogaster*	PR	U
muskrat	*Ondatra zibethicus*	PR	O
deer mouse	*Peromyscus maniculatus*	PR	C
western pipistrelle	*Pipistrellus hesperus*	PR	U
Townsend's big-eared bat	*Plecotus townsendii*	PR	R
raccoon	*Procyon lotor*	PR	C
coast mole	*Scapanus orarius*	PR	C
Merriam shrew	*Sorex merriami*	PR	R
Montane shrew	*Sorex monticolus*	PR	C
northern water shrew	*Sorex palustris*	PR	U
vagrant shrew	*Sorex vagrans*	PR	C
Belding's ground squirrel	*Spermophilus beldingi*	PR	C
Columbian ground squirrel	*Spermophilus columbianus*	PR	C
spotted skunk	*Spilogale putorius*	PR	U
golden-mantled ground squirrel	*Spermophilus lateralis*	PR	C
Townsend's ground squirrel	*Spermophilus townsendii*	PR	O
Nuttall's cottontail	*Sylvilagus nuttalli*	PR	O

MAMMALS 61 species			
Common Name	**Scientific Name**	**Residence Status**	**Abundance**
yellow-pine chipmunk	*Tamias amonenus*	PR	C
red squirrel	*Tamiasciurus hudsonicus*	PR	C
least chipmunk	*Tamias minimus*	PR	C
badger	*Taxidea taxus*	PR	C
northern pocket gopher	*Thomomys talpoides*	PR	C
black bear	*Ursus americana*	PR	O
red fox	*Vulpes vulpes*	PR	R
western jumping mouse	*Zapus princeps*	PR	O

LITERATURE CITED

Banci, V. 1994. Wolverine. Chptr 5 in American marten, fisher, lynx and wolverine in the western United States. USDA Forest Service, Rocky Mtn. Forest and Range Exp. Sta. Gen. Tech. Rept. RM-254.

Bull, E. And R. Holthausen. 1993. Habitat use and management of pileated woodpeckers in northeastern Oregon. J. Wildl. Manage. 57(2):335-345.

Dolokin, D.S. 1994. Conservation and management of neotropical migrant landbirds in the Northern Rockies and Great Plains. Univ. Of Idaho Press. Moscow, ID.

Gabrielson, I. And S. Jewett. 1970. Birds of the Pacific Northwest. Re-publication of 1940 original. Dover Press. 650 pp.

Gildemeister, J. 1992. Bull trout, walking grous and buffalo bones: oral histories of northeast Oregon fish and wildlife. Oregon Dept. Fish and Wildlife publication. 64 pp.

Irwin, L., J.G. Cook, R.A. Riggs, and J. Skovlin. 1994. Effects of long-term grazing by big game and livestock in the Blue Mountains forest ecosystems. USDA Forest Serv. PNW Research Sta., Gen. Tech. Rept. PNW-GTR-325.

Langston, N. 1994. The general riot of the forest landscape: environmental change in the Blue Mountains. PhD Dissertation, Univ. Of Washington. Seattle. 241 pp.

Ochoco National Forest. 1993. Viable Ecosystems Management Guide.

Oregon Dept. Of Fish and Wildlife - Upl. sp. Report

Oregon, State of. 1936. Report to State Game Commission.

Sharp, B. 1992. Status report of neotropical migrants in the Pacific Northwest. USDA Forest Service, Pacific Northwest Region.

Thomas, J. W. And others. 1979. Wildlife habitats in managed landscapes, the Blue Mountains of Oregon and Washington. USDA Forest Serv., Agric. Handbook no. 553.