

## NORTH FORK MALHEUR RIVER WATERSHED ASSESSMENT



MALHEUR NATIONAL FOREST  
PRAIRIE CITY RANGER DISTRICT  
PRAIRIE CITY, OREGON

NORTH FORK MALHEUR RIVER  
WATERSHED ASSESSMENT  
SUBWATERSHEDS 07D, 07G, 07H, 07I, 07K

Prairie City Ranger District  
337 West Front Street  
Prairie City, Oregon  
97869  
(503)820-3311

Malheur National Forest  
John Day, Oregon

September, 1995

I hereby acknowledge the completion of the watershed analysis covering the southeast portion of the North Fork Malheur River Watershed. I would like to thank the Interdisciplinary Team members for exceeding my expectations in the quality of the document and timeliness in which the document was completed. I would also thank the District for supporting the team's efforts.



Richard Haines  
District Ranger

Date 9-25-95

#### CORE INTERDISCIPLINARY TEAM MEMBERS

Joan Kittrell	Team Leader
Brad Cownover	Maps, Visuals
Lance Delgado	Fire/Fuels
Frank Guzman	Range
Tim Holden	Wildlife
Carole Holly	Recreation
Ken Kittrell	Geology/Hydrology
Alan Mauer	Fisheries
Jane Rondthaler	Writer/Editor
Marc Strong	GIS, Maps
Greg Whipple	Silviculturist
Gene Yates	Botanist

## Table of Contents

Introduction	1
North Fork Malheur River Watershed Map	
Characterization	3
Analysis Area Map (Subwatersheds 07D, 07G, 07H, 07I, 07K)	
Issues and Key Questions	7
Current Conditions	10
Severe Soil and Past Harvest Map	
Fish Habitat Map	
Bioenvironments Map	
Vegetation Structure Map	
Sustainable Canopy Closure and Juniper Bioenvironment Map	
Range Classification Map	
Fuel Loads Map	
Designated Old Growth and LOS Map	
Management Area Map	
Reference Conditions	34
Interpretation	41
Recommendations	50
Executive Summary	54
Fuel Hazards Map	
Vegetation at Risk	
Appendices	
References Cited	
Glossary	
Addendum(s)	
1. Ecologist's Report	
Maps:	
Cover	
Late and Old Structure	



## INTRODUCTION

The Regional Forester, in a memo dated October 20, 1993, directed each Forest to conduct watershed assessments to address ecosystem management and riparian health. The assessments would consist of a broad scale analysis of information to identify needs and management opportunities in the selected watersheds.

Watershed analysis is not a decision-making process but an information processing tool.

The Interdisciplinary Team used the March 24, 1995 Draft Guide for watershed analysis, following the steps described in the guide and amending details to suit the characteristics of the watershed. Regional Forester's Amendment #2, signed June 5, 1995, with new structural stage definitions, was utilized in the classification of vegetative structure.

The process began with gathering all existing data together, and soliciting information from the public. A letter and map were sent to a wide variety of publics with questions about changes users have seen over time, causal factors, and issues they feel are relevant in the area under consideration. Along with our usual mailing list, the District requested a list of hunters in the Beulah Unit from Oregon Department of Fish and Wildlife. Nearly 2000 letters were mailed. Over 110 responses were received, with many thoughtful comments. Some people have been regularly visiting this area for 40 or 50 years.

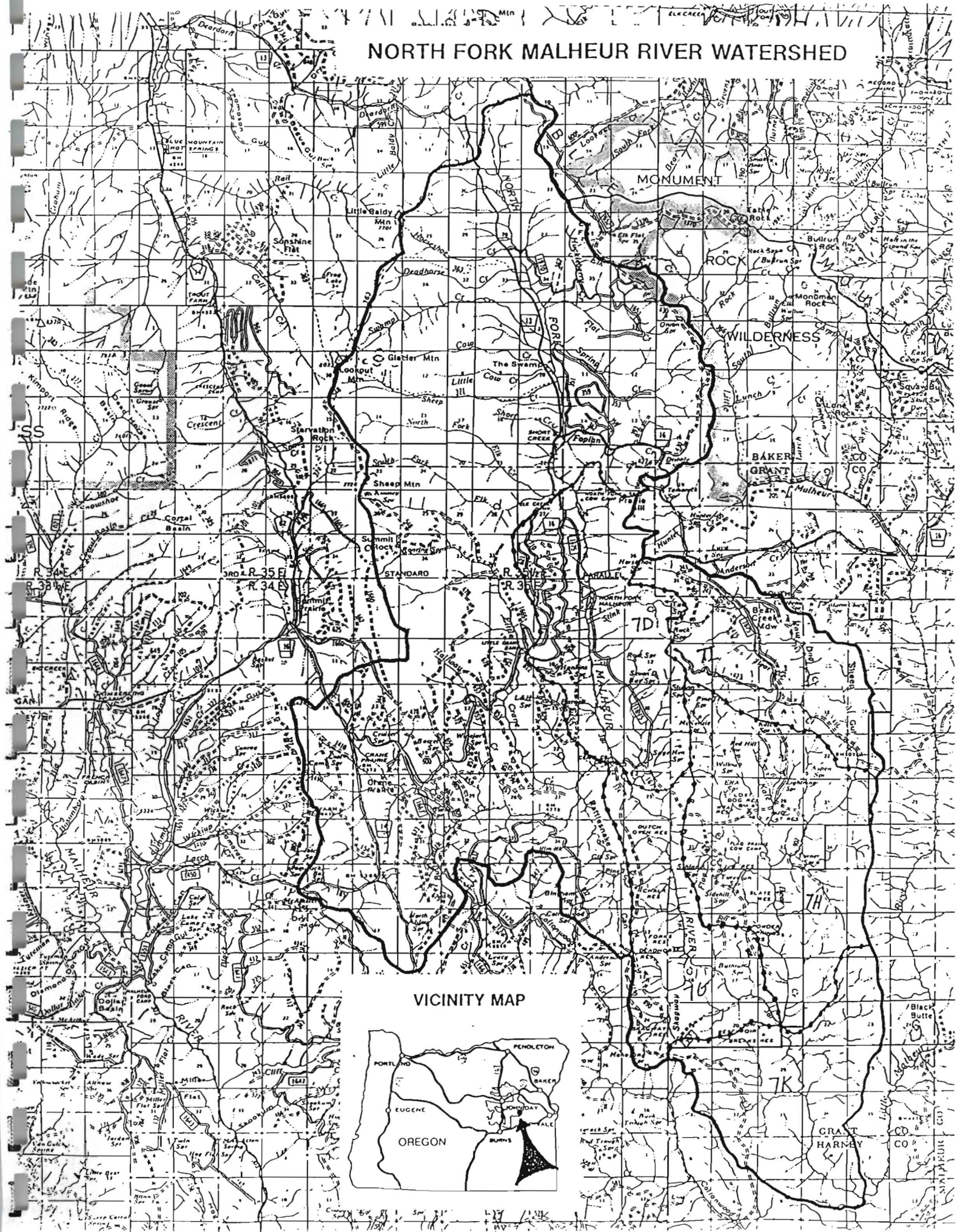
Issues that arose from individual comments focused in five areas: protection and restoration of riparian areas and fish habitat; improvement in forest health and changes in vegetative species; concern for soil compaction and its influence on productivity and hydrologic functions; and protection and enhancement of habitat for wildlife. The fifth issue, that of access management as it relates to road closures and to increases in all-terrain-vehicle use, would be addressed in site-specific projects that may arise from this analysis.

The team's focus was narrowed by determining the key questions that were most relevant to resource use in the area, as defined by these issues.

This watershed assessment will document information to establish what currently exists in the southern portion of North Fork Malheur Watershed, what processes and activities historically took place, interpretations of causal factors, and recommendations of possible management practices. The analysis area consists of subwatersheds 07D, 07G, 07H, 07I, and 07K.



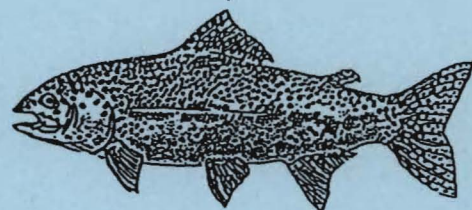
# NORTH FORK MALHEUR RIVER WATERSHED







# CHARACTERIZATION



## I. CHARACTERIZATION

The North Fork of the Malheur River Watershed begins at the headwaters of the river in T14S, R 35.5E and continues southward to the confluence of the North Fork Malheur with the Little Malheur River in T18S, R36E, Sec 11. It includes about 23 miles (7034 acres) of designated Scenic River, and totals approximately 113,000 acres; about 6700 acres in the southernmost subwatershed are managed by the USDI Bureau of Land Management, and approximately 6400 acres are private land outside the Forest Boundary. Within the Forest boundary, Flag Prairie, 320 acres, is private land.

The North Fork Malheur Watershed is part of the Snake River system, which in turn is part of the Columbia River Basin.

This report analyzes the five southern and eastern subwatersheds of this system: 07I (Upper Bear Creek), 07H (Lower Bear Creek), 07D (Stink Creek), 07G (Dutch Oven), and the small part of 07K that lies inside the Forest boundary. Total for this analysis area is 50,050 acres. The northern end of this portion is located very nearly on the Baker-Grant County line in T15S, R35.5E, Section 23, continues east and south to the Forest boundary (and beyond), and its western edge lies not far from the Scenic River boundary west of the North Fork Malheur River.

North Fork Malheur watershed varies from glacial valley to steep canyon valley that has cut down through layers of Strawberry Formation volcanic material along the river. The remainder of the analysis area grades into rolling upland to the north and east, with Bear Creek being the principal sub-drainage.

The aquatic system forms important habitat for fish species including bull trout and redband trout (sensitive species), rainbow trout, and sculpin. In the past, Chinook salmon and steelhead were found here, but with the construction of the Agency Dam in 1935, upstream migration of these species was blocked. Water quality is high, but there have been impacts to the watershed. Streambank stability and vegetation have been affected by grazing and recreation use. Water temperatures have not met state water quality standards, probably because of loss of streamside vegetation. Even with limited to no harvest within riparian areas, woody debris associated with large rearing pools is not present, perhaps because of the major flooding in 1964. There is a high level of recreational fishing around North Fork campground.

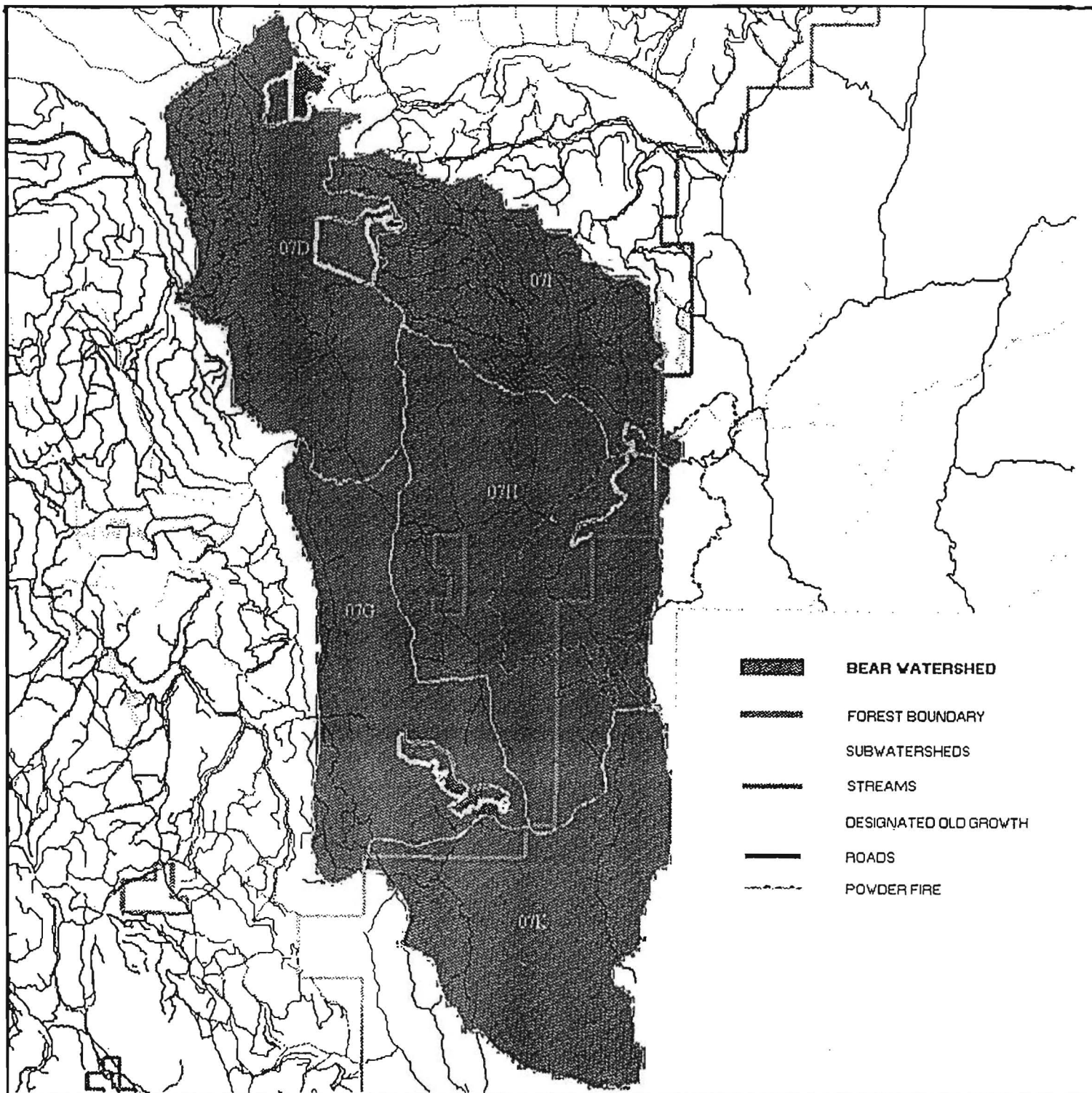
Vegetative cover varies from mixed conifer and ponderosa pine types dominating the north and transitioning to grass and shrublands in the southern half. The vegetation in this area is highly susceptible to fluctuations in temperatures and precipitation. Grass and shrubs have dominated much of the potential forest land in the past. Past management activities have allowed an increase in forested canopy cover at the expense of shrub and grassland. Stands of trees, rock outcrops, areas of open sage and grass, riparian areas and wetlands contribute to a considerable diversity of habitat. Much of this analysis area is relatively undisturbed and unroaded.

Wildlife diversity is extensive. Over 195 species of birds, 70 species of mammals, and 20 species of amphibians and reptiles are known or suspected in the designated Wild and Scenic River corridor alone. Among these are Rocky Mountain elk, mule deer, antelope, cougar, coyote, marten, badger, osprey, black bear, pileated woodpecker, western sage grouse, ferruginous hawk, goshawk, spade-foot toad, salamander, rattlesnake, and gopher snake.

Page left intentionally blank for map, Analysis area



# Bear Watershed



MAPS IN COLOR ARE AVAILABLE FOR EXAMINATION AT THE RANGER STATION AND AT THE SUPERVISOR'S OFFICE



The river corridor and areas of uplands have been used since the late 1800's and early 1900's for livestock, primarily sheep and cattle. Currently, four allotments cover these subwatersheds. Present use is 2087 cow/calf pairs between June and October.

Timber harvest has occurred within 19% of the analysis area. Most harvest activities have been located in subwatershed 071, the Bear Creek drainage.

Fire has played a significant role in the ecosystems of the Blue Mountains. Most of the analysis area is classified in Hot Dry and Warm Dry bioenvironments which correlates with a "natural" fire disturbance interval for ponderosa pine ecosystems of low intensity frequent fires. Studies conducted within the Dugout Creek portion of the analysis area by Emily Heyerdahl of the Pacific Northwest Research Station indicate that fire regularly entered the area. Her study shows a regular fire return interval of 7 to 15 years, with fire returning during some decades as often as 3 to 5 years. Data collection using dendrochronology to identify fire scars provided information from the mid 1600's through the early 1900's.

Gerald W. Williams in his paper *References On The American Indian Use Of Fire In Ecosystems* describes the purposeful use of fire by almost every American Indian tribe. He states, "There are at least 13 documented reasons for American Indian ecosystem burning". Among these are included hunting, crop management, fireproofing areas, insect collection, pest management, clearing areas for travel, felling trees, and clearing riparian areas.

Archaeological data from numerous sites in the watershed indicate that humans have used the area for at least the last 10,000 years. People have made cultural and technological adaptations to changing environmental conditions over time in the area, but in general the watershed provided a cornucopia of subsistence resources consisting of a wide variety of plant foods, large and small game animals and significant anadromous fish runs. These would have been harvested based on seasonal availability as part of an annual cycle of visits to favored procurement locales. Ethnographic evidence indicates that the area was used by numerous Native American groups, including Paiute, Bannock-Shoshone, Umatilla, Nez Perce, Cayuse and possibly Wasco, Tenino and Warm Springs.

A few historic sites have been located; North Fork Cow Camp has been in use since early in the century. The Douglas-Howell Toll Road was constructed in the 1860's across the North Fork of the Malheur at Crane Creek Crossing. The Fort Boise to Canyon City portion of the Dalles Military Road utilized this road at its ford, continuing on up Crane Creek, where it trended north along a route now occupied by County Road 62, to Prairie City and westward. While this road was intended to facilitate military troop movements as part of the effort to pacify Native American tribes in eastern Oregon, it was also a major supply and travel route to and from gold fields in Oregon and Idaho.

Some historic "sheepherder beacons" are located on ridges in these subwatersheds; these rock cairns were used as directional aids for the many bands of sheep moving through the area.

Year-round recreation use takes place along the river (fishing, dispersed camping) and throughout the watershed (hunting, firewood gathering). North Fork Malheur Campground and sites at Crane Creek Crossing are popular, in the summer for fishing and hiking, and in fall for hunting. North Fork Malheur Trail leads south from near the campground to the Forest boundary. Roads 13 and 16 are popular designated snowmobile routes that link Unity, Prairie City, and Bear Valley.

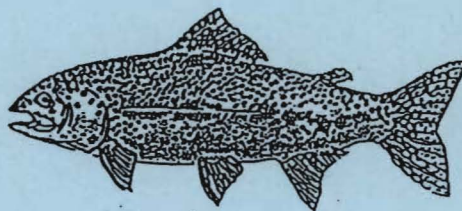
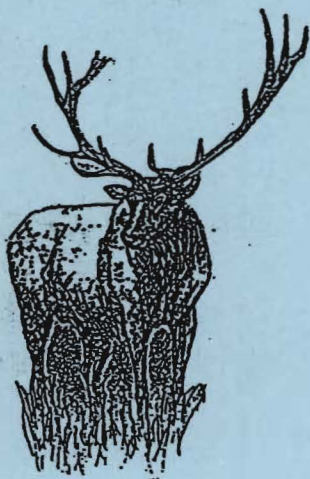
The lower segment of the North Fork of the Malheur Wild and Scenic River corridor is located within the watershed. Visual quality within this area varies relative to prior management activities and other conditions which affect vegetation. In some areas, past harvest units appear prominent. Vegetative

character differs dramatically between corridor areas which have been thinned and those which have not. Also, recent wildfires in or near the watershed provide a dramatic view of the effects of natural processes on forest health.





## ISSUES AND KEY QUESTIONS



## II. IDENTIFICATION OF ISSUES AND KEY QUESTIONS

**ISSUE 1:    ≈    Portions of inland fish habitat are currently below Forest Plan desired condition. While the long term trend may be improving, there are a number of immediate concerns including present levels of large woody material and riparian vegetation, water temperature, channel morphology, and sedimentation. The limited root structure of existing vegetation has led to a decrease in bank and channel stability.**

### *KEY QUESTIONS:*

- 1-What is the historic and current habitat for Bull trout and Redband trout?
- 2-What management recommendations could restore or improve the range of these species?
- 3-What streams or portions of streams are in unsatisfactory condition, which are in satisfactory/ desired condition and what has led to these conditions?
- 4-What management recommendations could improve stream and riparian condition?

**ISSUE 2:    Δ    Vegetative health and sustainability are at risk in portions of the area. Portions of the area are currently overstocked, leading to a stressed condition making those areas susceptible to insect and disease. High natural fuel loadings have made some areas vulnerable to stand replacement fires. Increased undesirable nonnative species have invaded disturbed sites. Ecological changes due to reduced regular fire disturbance, drought, long-term weather patterns, past timber harvest and grazing of domestic livestock and wildlife ungulates have caused changes in vegetative composition and structure.**

### *KEY QUESTIONS:*

- 1-What are the possible results of current ecological changes?
- 2-What areas are at risk for loss of vegetative health and sustainability?
- 3-What changes in dominance of vegetative species need to be altered?
- 4-What is the current status of existing vegetation in relationship to Historic Range of Variability?
- 5-What management recommendations could move the area toward historical reference conditions and wildlife species across the landscape?
- 6-How much Late and Old structure exists across the landscape? Where, what block size, what type?
- 7-Are LOS habitat elements (such as snags, down wood, connectivity, absence of fragmentation) present?



8-What are the changes in Late and Old structure and habitat?

9-Is there LOS habitat in "new forest" and is it sustainable?  
("New forest" -- woodland or forest that historically was grass or shrubland.)

10-Has there been a change in wildlife species composition within the LOS and if so what?

**ISSUE 3: ■ Soil compaction and loss of soil horizons due to roading, tractor logging, and sheep grazing over time have influenced soil productivity and upland hydrologic functions such as infiltration and overland flow.**

**KEY QUESTIONS:**

1-What are the changes?

2-What is the extent of the changes?

3-What management recommendations could restore soil productivity and hydrofunction?

**ISSUE 4: Ū Big Game habitat varies in this area, including both winter and summer range. Research on the Starkey project indicates that elk associate strongly with dense cover of trees. Deer numbers appear to have decreased in contrast to an increase in numbers of elk.**

**KEY QUESTIONS:**

1-What is the distribution and type of big game cover across the landscape?

2-Which acres are better to manage for elk and which for deer?

3-At what level can sustainable cover be managed across the landscape?

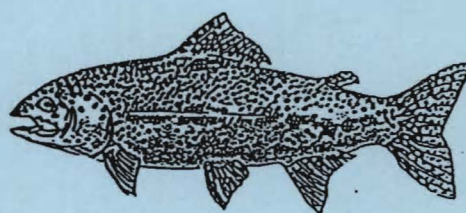
4-What is the condition of deciduous species and browse species?

The key questions are answered throughout the document. The following table lists the page numbers where information on a key question is found.

SYM-BOL	ABBREVIATED KEY QUESTION	PAGES WHERE FOUND
≈	ISSUE 1:	
	1. Historical and current habitat for bull and redband trout?	13, 14, 35
	2. Recommendations to restore or improve range of trout?	50
	3. Satisfactory/unsatisfactory streams and causal agents?	12-17, 41,42
	4. Recommendations to improve stream and riparian?	50
Δ	ISSUE 2:	
	1. Results of ecological changes?	21, 22, 34, 37, 43-47
	2. Areas at risk?	21, 22, 27, 44-47
	3. Changes in dominance of vegetation needed?	22-24, 36, 44
	4. Existing vegetation vs HRV?	18-20, 24, 25, 36
	5. Recommendations to move toward HRV vegetation and wildlife?	51, 52
	6. LOS across the landscape?	20, 21, 28, 29, 44
	7. LOS habitat elements?	29, index maps
	8. Changes in LOS structure and habitat?	44, 45, 48
	9. Is "new forest" LOS and is it sustainable?	44, 45
	10. Change of wildlife species composition within LOS?	48
■	ISSUE 3:	
	1. Changes in soil and hydrofunction?	10, 12, 34, 35, 41
	2. Extent of changes?	10-12, 41
	3. Recommendations to restore soil and hydrofunction?	50
Ū	ISSUE 4:	
	1. Distribution and type of big game cover?	22, 23, 28-30
	2. Manage for deer over elk?	30, 47
	3. Sustainable cover managed across the landscape?	43, 44
	4. Condition of deciduous and browse species?	45, 47



CURRENT CONDITIONS





### III. CURRENT CONDITIONS

#### The Geologic Dimension

The bedrock within the assessment area is predominantly basalts and andesites of the Strawberry Volcanics Formation formed from multiple lava flows produced by shield volcanos and vents in the vicinity of Strawberry and Lookout Mountains. The result is multiple layers separated by thin interflow layers composed of scorched soils, volcanic ash, and rock materials (Lysne, 1989). The Strawberry Formation is highly stable and results in stable landforms that display virtually no tendency to mass failure.

Soils are of two general types. The majority of the analysis area consists of gravelly to cobbly loam surface soils and subsoils derived from the underlying bedrock of basalt, andesite and interflow material. The other notable soil is a sandy loam derived from geologically-recent volcanic ash overlaying gravelly to cobbly bedrock-derived loams. This latter soil is found in the headwaters of Bear Creek, along the upper west slope above the North Fork Malheur River in subwatersheds 07D and 07G. Soil hazard ratings for the four subwatersheds are as follows:

SUBWA- TERSHED	LOW	MEDI- UM	SEVERE
07D	47%	38%	15%
07G	8%	43%	49%
07H	3%	55%	42%
07I	50%	24%	26%

Detrimental compaction as a result of tractor yarding and tractor slash piling has been shown to occur after entry into previously unharvested stands of timber. Davis (1992) found that density of cobbly loams in just such a first entry increased by 23%. Post-harvest soil compaction monitoring on the Malheur N.F. revealed that the majority of monitored harvest units on non-ash loams exceeded Malheur LRMP standards for detrimental compaction. The existence of current detrimental compaction is of concern in the southern portion of subwatershed 07I and the northern portion of 07H; between 1974 and 1992 this area has been the location of 4 timber sales with tractor-based yarding systems - Flag Prairie (1974), Cold 1 (1982), Iris (1987), and Siri (1992). The distribution of harvest units has resulted in at least two entries on the majority of the area, in some stands three entries, with all entries except Siri T.S. employing machine slash piling.




In order to assess the potential risk of storm event sediment and changes to channel morphology resulting from past activities, a cumulative watershed effects model was employed. The Equivalent Roaded Area model, developed by USDA-FS in California and subsequently modified to apply to the drier, more stable conditions of Northeastern Oregon, expresses past activities in terms of acreage occupied by roads. This is accomplished by applying equivalency factors to acreage of each activity in a given year. A threshold value has been established for each subwatershed that is intended to

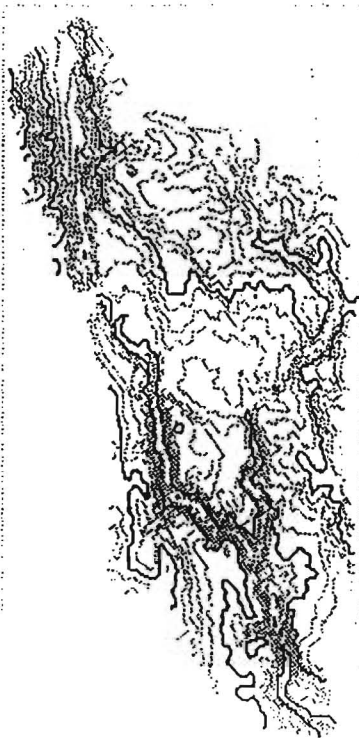
Page left intentionally blank for map, Severe Soil and Past Harvest



Severe Soil and Past Harvest

LEGEND

	Area (ha)	%	
	323	1.59	TIMBER UNIT IN SEVERE SOIL
	2343	11.56	TIMBER SALE UNITS
	5233	25.83	SEVERE SOILS



VIEW

serve as a "red flag" with regard to proposed future activities. Current, future, and threshold values are shown below.

Subwatershed	1995 ERA	1997 ERA	2005 ERA	Threshold ERA
07D	8.33	7.99	6.63	16
07G	4.04	3.95	3.58	12
07H	6.16	5.90	4.89	10
07I	13.14	12.54	8.96	14

Soil compaction and absence of trees have been noted in swales in otherwise forested land in the headwaters of Station Creek (Kretzing, 1994); in the absence of compaction these sites would have been expected to support conifers as well as the less suitable, rockier surrounding soil. Since the area has never been logged, concentrated livestock use from early in the century is thought to have been a causal factor in the compaction. Other atypically vegetatively challenged areas have been observed along Road 1675 north of Flag Prairie, which is in the vicinity of a cattle and sheep driveway that was used during the early part of the century. Such sites represent a loss in vegetative productivity and, though usually covered with a pavement of gravel, pose a potential risk for further erosion should the pavement be disturbed. It is difficult to determine the extent of these sites across Bear analysis area, because detailed surveys have not been conducted to identify and map areas.

#### The Aquatic Dimension

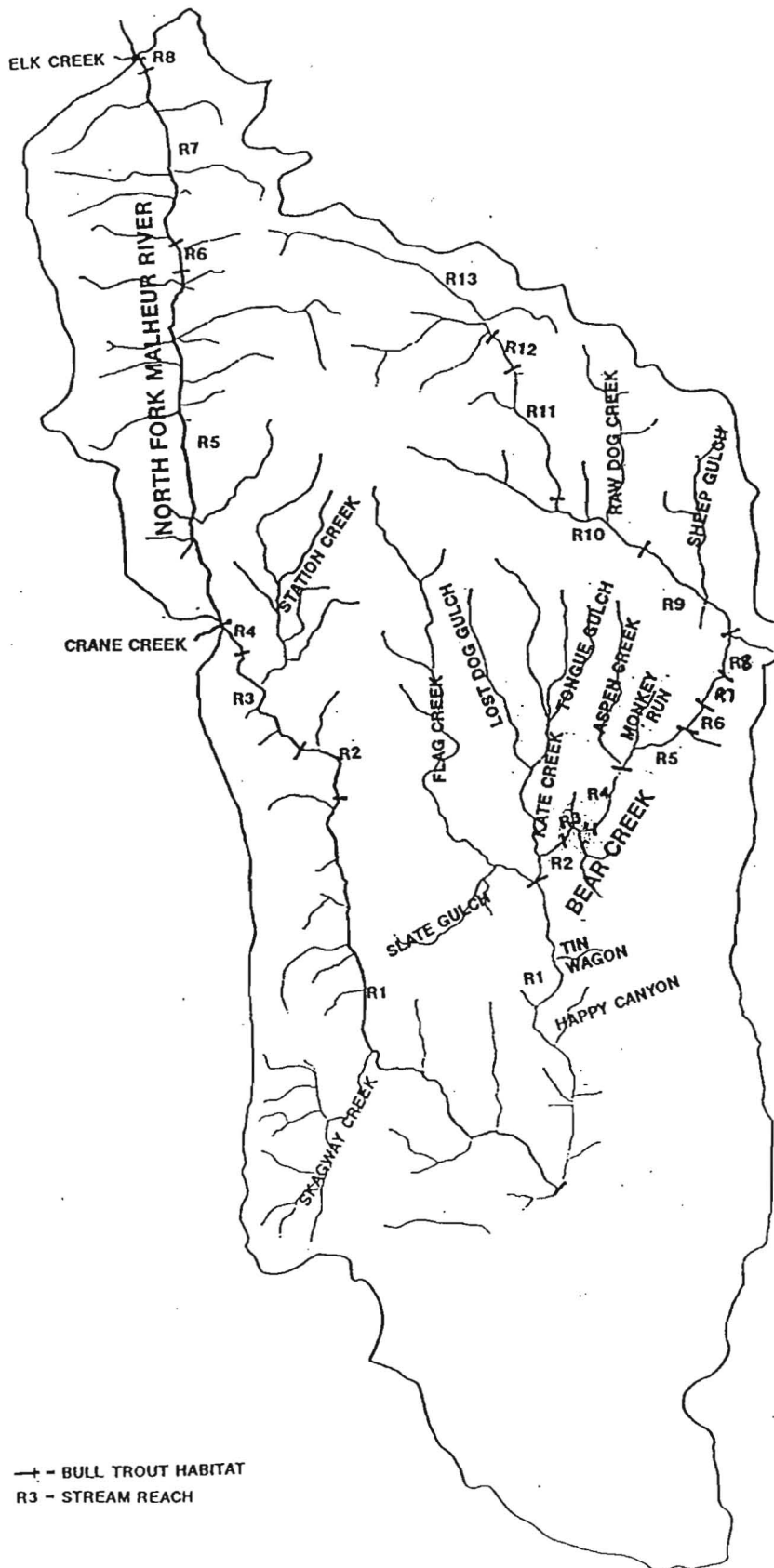
The North Fork occupies a glacial valley in the northern-most portion of subwatershed 07D. Soils in this valley are generally more than 10 feet in depth and primarily consist of loam soils derived from volcanic ash. Owing to the high infiltration rates of these soils and to their depth, they are able to store large quantities of water. Wetlands abound adjacent to the river that manifest this capacity to store early-season runoff for later release as part of late season flow.

Water quality in the streams in the watershed is generally high. Tributaries and several large springs provide cool, clean water to the system. Warm summer temperatures cause stream temperatures to become excessive for parts of the summer, especially in the lower North Fork Malheur and Bear Creek, limiting the available habitat for cold water fish species. Despite the excessive stream temperatures, the presence of bull trout and redband trout reflect the exceptional habitat conditions which exist in portions of the stream systems.

The valley form changes dramatically south from Road 1675 crossing to the North Fork Malheur campground. The river enters a narrow canyon that confines it and limits floodplain development. Width/depth ratio is relatively high, especially in the canyon portion of the river, and a result of this wide shallow nature is an elevation of water temperatures during mid- to late-summer flow. In 1994, which was both a year of high ambient summer temperatures and low stream flow, water temperature monitoring approximately 2.5 miles below Crane Crossing campground revealed many days in which peak water temperature exceeded the state water quality standard of 68° F., including a period of 32 consecutive days beginning on July 7 and ending on August 7. During the latter portion of this period, the low water temperature (usually encountered between 4:00 and 6:00 a.m.) seldom dropped below 55°. The highest water temperature recorded during this period was 74° on July 22, which was eight degrees warmer than was recorded on the same day several miles upstream at a recording station located at the point where the North Fork enters the analysis area.



# FISH HABITAT



—+— BULL TROUT HABITAT  
R3 - STREAM REACH

SCALE 1:100,000

Bank stability is relatively high in the upper portion of the river and has been rated as somewhat less, but still moderately, stable in the canyon segment. Stable undercut banks and overhanging stream bank vegetation are not at full potential. Shrubs are not common on some reaches and in areas where they have been more prevalent they experienced mortality from a foliage disease, from which they are just now beginning to recover. As a result of the existing morphology of the river, the width of the stream tends to limit the effectiveness of stream-side vegetation as shade. Compared to other undeveloped river corridors, the North Fork Malheur is limited in large rearing pools associated with log jams or other large woody material (LWM).

The North Fork Malheur River is a valuable habitat for two sensitive fish species; redband trout and bull trout. Redband trout are more prevalent in the North Fork Malheur River than bull trout. Redband are found throughout the North Fork and its tributaries. The only tributary stream within the assessment area where redband have been positively identified is Bear Creek. Bull trout were not detected during the surveys conducted in Bear Creek in 1989. Few Bull trout were identified during surveys conducted in the North Fork Malheur in 1989 from the mouth of Crane Creek to river mile 56 (Hanson, M.L. et.al. ODF&W 1990). In addition to redband trout and bull trout, there are also mountain whitefish, five species of minnows, two sucker species, and one sculpin species that have been identified as being present within the subwatershed.

Long-time residents of the area have noted that the 1964 flood had a significant effect on the morphology in the canyon segment, resulting in the rather wide shallow conditions that currently exist as opposed to a narrower, more sinuous stream with a pool-riffle morphology. Point bars on curves are developing and revegetating, which indicates that the stream may be moving back toward this pool-riffle state. It is possible that the lower portion of the North Fork is subject to periodic whole-sale changes in morphology; the confined canyon within which it resides and the lack of flood plains would focus a tremendous amount of energy on the stream channel during a major runoff event. The 1964 flood discharge measured above Beulah Reservoir is rated as a 100-year event, having a 1% chance of annual occurrence. It is likely that similar events have occurred over time that have resulted in a cycle of morphological changes between a relatively wide, shallow, non-sinuous channel and a more sinuous, pool/riffle channel.

Bear Creek, which is the major stream in subwatersheds 07H and 07I, has a variety of valley forms along its length. The upper reaches are characterized by a meadow-type valley with floodplains of varying widths, while the lower section lies within a narrow deep canyon similar to that in which the North Fork runs. This lower portion approaches satisfactory condition as defined by the Malheur National Forest Land and Resource Management Plan, but the remainder of the stream is unsatisfactory. On the majority of the stream, bank stability is moderate; the stream is generally wide and shallow, and lacks overhead shading cover. Bank erosion and evidence of past downcutting can be found in several areas; check dams were constructed along a gullied reach just above the confluence with Sheep Gulch in the early 1990's to raise stream surface elevation. Water temperatures recorded in 1993 exceeded 68°F. on 62 consecutive days, with the maximum on several days reaching into the upper 70-degree range. Stream temperature was identified in a 1981 fisheries report to the Iris planning area environmental analysis (Bear Creek subwatershed) as being the cause of an outbreak of *ichthyophthirius multifiliis* (Ich), which is a ciliated protozoan that infects fish in crowded hatchery or aquarium settings but is rarely encountered in the wild.

In late August of 1994, the Powder fire burned along approximately 4 miles of Bear Creek. High mortality in the conifers within the drainage produced an immediate change in groundwater levels adjacent to the stream; wet areas and springs appeared adjacent to the floodplain within days of the fire. This is a probable indicator of a long-term increase in groundwater supply resulting from reduction in evapotranspiration water loss. Trees and shrubs experienced a high level of mortality

from the fire, but grasses have grown back in high density on the floodplain and adjacent to the stream. In order to aid in recovery of the riparian area, livestock grazing will be eliminated from the fire area for three years, beginning in 1995.

As noted earlier, the remainder of the streams within the assessment area are small perennial or intermittent streams contributing little flow to either Bear Creek or the North Fork and having few fish or none. As a group they have generally moderate bank stability with fair to low vegetative protection. The least stable conditions are found on Station Creek, which has experienced significant past gullyng. The stream appears to have developed vertical stability but still exhibits bank erosion as it reforms morphologically. Bank stability and vegetative cover are both low.

Stream surveys of North Fork Malheur and Bear Creek were conducted by the Forest Service in 1989. The following tables summarize the results of the surveys:



NORTH FORK MALHEUR, SEPT 1989

WATER TEMP F	BANK STABILITY	WIDTH:DEPTH RATIO	35% COBBLE EM- BEDDEDNESS	% OF STREAM- BANK VEGETAT- ED	SHADE/CANOPY CLOSURE	SHRUB COVER	POOLS/MILE	LARGE <sup>1</sup> WOOD/MILE
R1 54	80	23.5	N	50	35	60	N/A	0.0
R2 58	80	20	N	80	20	<10	0.53	20.6
R3 56	80	30	N	80	50	25	N/A	10.8
R4 60	50	38.5	N/A	50	20	10	N/A	12.4
R5 58	85	20.8	N	60	25	25	N/A	8.8
R6 66	80	25	N	75	20	5	0.38	17.7
R7 56	80	25	Y - 1 glide	75	15	20	N/A	8.8
R8 38	85	19.2	N	80	20	10	N/A	44.7
R9 42	80	19.2	N	75	20	15	N/A	43.0
AVG 54	78	24.6	N/A	70	25	N/A	N/A	38.4
R11							0.29	8.3
R12							N/A	35.5
R13							N/A	27.1
R14							2.43	43.4
R15							2.99	53.4
R16							3.44	32.9
R17							4.30	12.1
AVG							1.17	24.6

LOWER BEAR CREEK, SEPT 1989

R1 53	100	12	N	30	80	70	3.76	27.3
R2 54	80	8.1	N	80	30	<5	N/A	8.0
R3 58	70	7	N	70	25	<2	N/A	0.0
R4 51	50	7.1	N	50	10	<2	N/A	7.2
R5 46	60	22.5	N	60	30	<5	3.24	22.6
R6 51	N/A	N/A	N	N/A	N/A	N/A	8.78	29.3
R7 62	N/A	N/A	Y	N/A	N/A	N/A	N/A	2.8
R8 63	N/A	N/A	N	N/A	N/A	<5	2.75	2.7
R9 58	N/A	N/A	Y	N/A	N/A	N/A	21.19	5.3
R10 46	N/A	N/A	N	N/A	N/A	5	3.46	15.5
R11 46	N/A	N/A	Y	N/A	N/A	<5	2.62	5.2
R12 46	80	1.7	Y	80	15	0	7.26	14.5
R13 52	90	.8	Y	90	0	0	7.97	0.0
AVG 53	76	8.5	N/A	66	27	N/A	5.36	10.8

<sup>1</sup>>12 in. Diameter, >35 ft. Length

Codes for fish cover:

- 1 = 0 to 5% total cover
- 2 = 6 to 20% total cover
- 3 = 21 to 40% total cover
- 4 = > 40% total cover

- U = Undercut banks
- S = Substrate
- D = Depth > 3 feet
- H = Overhanging vegetation within 10" above the water surface
- W = Wood Material
- T = Turbulance
- A = Aquatic/Emergent Veg.

The number of pools per mile shown in the survey is low. Large woody material (LWM) is sufficient in some reaches of some of the streams, but very low or absent in other reaches. Bank stability was generally rated at about 80 percent on reaches measured in the 1989 survey. There were several reaches where the bank stability was substandard and several where bank stability was not measured. Although the temperatures taken in the survey were cool, they were taken in September when water temperatures would be expected to be lower. Problem temperatures typically occur during July and August.

## The Vegetative Dimension

### The Forested Domain

The forested plant associations in this analysis area can be grouped into four bioenvironment groups: Cool Moist, Lodgepole, Warm Dry, and Hot Dry. This grouping is based upon a temperature/moisture gradient. The plant association typing was done in 1992 by both Timber Stand Examination and Range Survey contracts. A fifth group, Juniper, could also be considered forested. The acres of each of these groups and their percentage of the area are listed below:

BIOENVIRON- MENT	ACRES	% OF AREA
<b>Forested</b>		
Cool Moist	21	<1%
Lodgepole	101	<1%
Warm Dry	8,089	16%
Hot Dry	15,343	31%
<b>Subtotal:</b>	<b>23,554</b>	<b>47%</b>
Juniper	7,723	15%
<b>Subtotal:</b>	<b>31,277</b>	<b>62%</b>
<b>Non-Forested</b>		
Non-forest Ripari- an	324	<1%
Shrubland	17,600	35%
Grassland	422	<1%
Non-vegetated	426	<1%
<b>Total:</b>	<b>50,050</b>	<b>100%</b>

Forested stand structures have been determined for each of the forested bioenvironments except Juniper. These are based upon the concepts of Dr. Chadwick Oliver and adapted to the dry, fire disturbed environments as set out in the ecosystem screening direction in Forest Plan Amendment 2. These structures are Stand Initiation (SI), Stem Exclusion Open Canopy (SEOC), Stem Exclusion Closed Canopy (SECC), Understory Reinitiation (UR), Multi-stratum Without Large (MSWOL), Multi-












stratum With Large (MSWL), and Single Stratum With Large (SSWL). These last two groups, MSWL and SSWL, are commonly referred to as Late and Old Structures (LOS). The existing acres of each structure for each bioenvironment are displayed below:

Land outside the National Forest boundary was analyzed using aerial photos. The majority of this land is considered Shrubland and Juniper bioenvironments.

# Bioenvironments

## LEGEND

	Area (ha)	%	
	6157	30.39	HOT DRY
	3246	16.02	WARM DRY
	11	0.06	COOL MOIST
	3138	15.49	JUNIPER
	139	0.69	RIPARIAN
	44	0.22	LODGEPOLE
	7102	35.06	SHRUBLAND
	195	0.96	GRASSLAND
	172	0.85	NON VEG



VIEW

NF MALHEUR WATERSHED (BEAR) HISTORICAL RANGE OF VARIABILITY SUMMARY

BIOENVIRON- MENT	STAND INITIATION	STEM EXCLU- SION OPEN CANOPY	STEM EXCLU- SION CLOSED CANOPY	UNDERSTORY REINITIATION	MULTISTRATUM WITHOUT LARGE	MULTISTRATUM WITH LARGE	SINGLE STRATUM WITH LARGE
COOL MOIST Existing 21 A. Historical	0 1-5%	0 N/A	0 5-25%	21 Acres 100% 5-25%	0 50-70%	0 5-25%	0 N/A
LODGEPOLE Existing 101 A. Historical	0 ?	0 ?	? ?	101 Acres 100% ?	0 ?	0 ?	0 ?
WARM DRY Existing 8089 A. Historical	787 Acres 10% 1-15%	75 Acres 1% 5-20%	0 1-10%	5644 Acres 70% 1-10%	0 5-25%	1559 Acres 19% 5-20% 404-1618A	0 15-55%
HOT DRY Existing 15,249 A. Historical	836 Acres 5% 5-15%	121 Acres 1% 5-20%	0 N/A	11,327 Acres 74% N/A	50 Acres <1% 5-10%	2990 Acres 20% 2-15% 304-2287A	20 Acres <1% 20-70% 3050-10674A








Analysis Area Total: 50,050 Acres



Page left intentionally blank for map, Vegetation Structure

# Vegetation Structure

## LEGEND

	Area (ha)	%	
	677	3.34	STAND INITIATION
	8	0.04	SINGLE WITH LARGE
	1845	9.11	MULTI WITH LARGE
	18	0.09	MULTI WITHOUT LARGE
	75	0.37	STEM EXCLUSION OPEN CANOPY
	6876	33.93	UNDERSTORY REINITIATION
	3138	15.49	JUNIPER



VIEW

The existing canopy closure condition for the Cool Moist, Lodgepole, Warm Dry, and Hot Dry bioenvironments is as follows. The figures include the juniper that exist within these bioenvironments but does not include the juniper bioenvironment:

Tree Canopy Closure Range	Acres	% of Forest Bioenvironment
11-25%	2,652	11%
26-40%	9,341	40%
41-55%	6,978	30%
56-70%	4,028	17%
71-100%	554	2%

The plant association guides developed for the Blue Mountains provide a potential canopy closure for each of the forested plant associations, including juniper within associations. Comparison of the data against these potentials indicates approximately 9,952 acres or 42% of the forested bioenvironment as having current canopy closures above the mean site potential.

The Juniper bioenvironment is not often considered part of the forested area. The 15% of this landscape dominated by juniper trees is significant enough to be considered as forest. Many of the juniper are pole size or larger and present at fairly high densities. The canopy closure for trees within the Juniper bioenvironment is as follows:

Tree Canopy Closure Range	Acres	% of Juniper Bioenvironment
11-25%	4,482	58%
26-40%	2,951	38%
41-55%	240	3%
56-70%	34	<1%

An analysis of the canopy closure and stand structure data also displays the following summary of potential marginal & satisfactory big game cover habitat:

Tree Canopy Closure Range	Acres	% of Analysis Area	% of Forest Area (Cool Moist, LPP, Warm Dry, Hot Dry, and Juniper Bioenvironment)
41-55%	7,884	16%	25%
56-70%	4,147	8%	13%
71-100%	555	1%	2%



Page left intentionally blank for map, Sustainable Canopy Closure and Juniper Bioenvironment

# Sustainable Canopy Closure and Juniper

## LEGEND

Area  
ha

3138 15.49 JUNIPER BIOENVIRONMENT

SUSTAINABLE CANOPY CLOSURE



VIEW

### The Non-Forest Domain

The vegetation is variable. The overstory is mainly ponderosa pine and/or grand fir. The understory is elk sedge and pinegrass. In the open areas the vegetation consists of sagebrush, Idaho fescue and bluebunch wheatgrass. No noxious weeds were found.

Tree species have encroached on the non-forested bioenvironments to a varying degree. Both ponderosa pine and juniper have increased their canopy closure over the Shrubland and Grassland bioenvironments. A summary of this tree canopy closure is as follows:

Tree Canopy Closure Range	Acres	% of Non-Forest Bioenvironment
11-25%	14,477	77%
26-40%	3,057	16%
41-55%	537	3%
56-70%	74	<1%

This species encroachment is also evident in the Grassland bioenvironment. 305 acres or 69% of the Grassland bioenvironment has a shrub canopy closure ranging from 26-40%.

Range analysis data was gathered and compiled during the 1992 grazing season. The following figures were gathered through the range analysis process.

#### Primary Range

Suitable	36,334 acres
Unsuitable	4,232 acres
Transitory	6,464 acres

#### Secondary Range

Suitable	4,232 acres
Unsuitable	14,334 acres

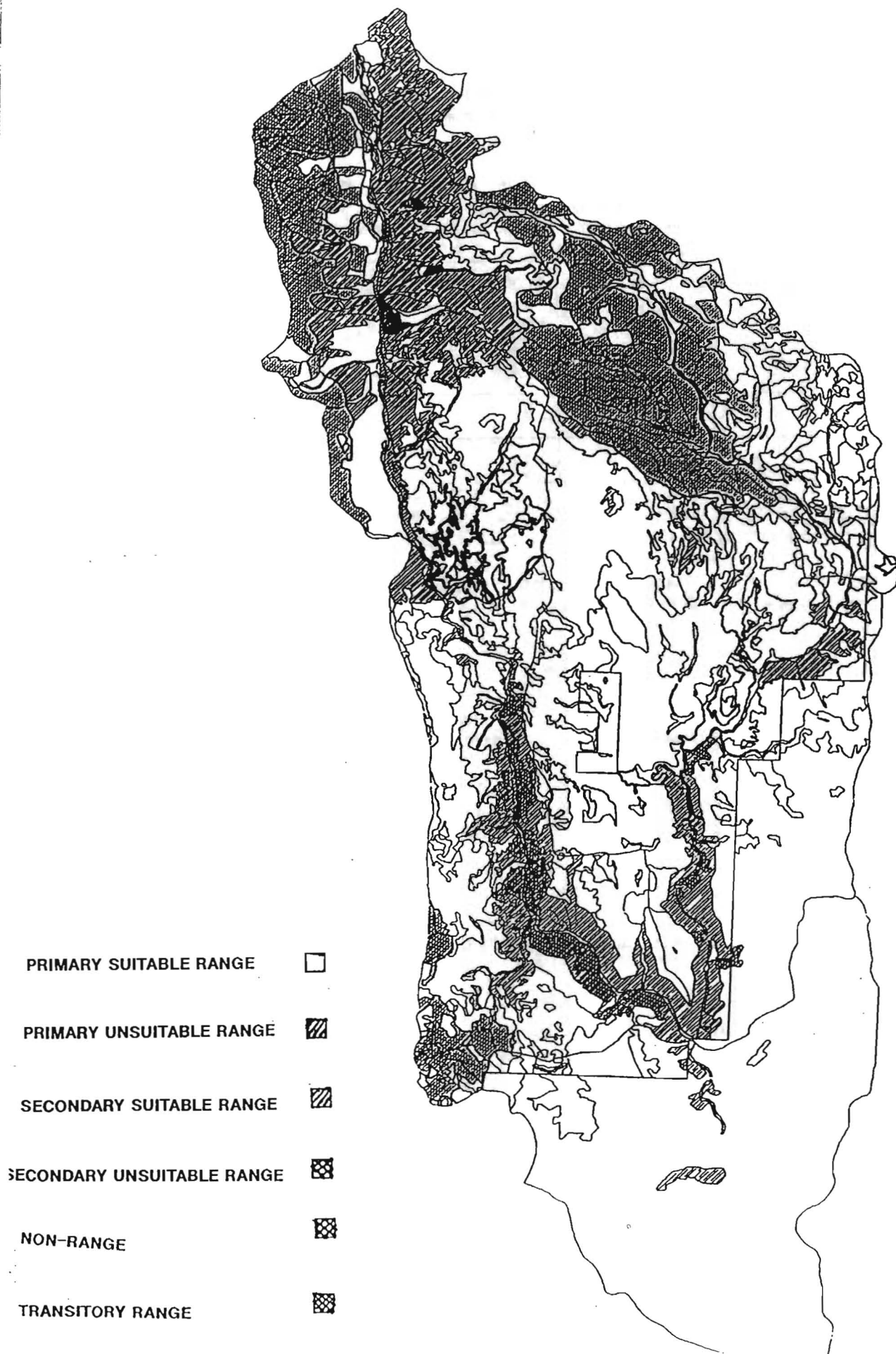
Non-Range	1,514 acres
-----------	-------------

#### Condition of only those acres surveyed in 1992:

	Poor	Fair	Good
Primary Range		857	11,753 acres
Secondary Range		13	1,689 acres
Transitory Range	6	108	14,226 acres
Non-Range		34	1,480 acres



# BEAR WATERSHED ANALYSIS AREA RANGE CLASSIFICATION



### The Pyric Dimension

Within the analysis area, 41 fires occurred between 1984 and 1994, an average of 3.7 fires per year. However, due to fire suppression policy none of these fires grew beyond 15 acres in size, with the exception of the Powder Fire which burned 2643 acres within subwatersheds 07H (Lower Bear) and 07I (Upper Bear); most were contained at less than 1 acre. The Powder Fire resulted in a wind-driven stand replacement fire which removed most of the ground cover and killed most of the live vegetation.

Using the fires that occurred within a topographically defined boundary, as the independent variable to determine the probability of a fire start, and based on proximity to the area, there is a 15.5 percent chance that a fire will occur within the area in a given year.

Within the analysis area, 18,036 acres have had formal stand exams. In conjunction with the stand exams, fuels inventory data was collected on 15,353 acres in the Hot Dry, Warm Dry, Lodgepole, Juniper, and Shrubland bioenvironments, using the planar intersect methods described in the *Handbook for Inventorying Downed Woody Material* (James K. Brown, 1974).

BIOENVIRON- MENT	ANALYSIS AREA	INVENTORIED
Hot Dry	15,343 ac.	10,549 ac.
Warm Dry	8,089 ac.	4,131 ac.
Juniper	7,723 ac.	629 ac.
Lodgepole	101 ac.	24 ac.
Shrubland	17,600 ac.	20 ac.
Cool Moist	21 ac.	0 ac.
Grassland	422 ac.	0 ac.
Nonvegetated	426 ac.	0 ac.
Riparian	324 ac.	0 ac.

Fuels analysis and the description of the existing condition is based on the acres that have been inventoried for downed woody fuels.

Harvest activity has occurred within the area being analyzed on 1,661 acres within the Hot Dry bioenvironment and 1,171 acres within the Warm Dry bioenvironment. All fuels treatments have been completed primarily by mechanical methods such as machine piling, crushing, and rotary head masticator. Fuels treatments have modified both vertical and horizontal arrangement; however, fuel loading has been minimally reduced.












Fuel loading within the bioenvironments can be described by three conditions; those with a high loading in both the fine fuel and large fuel size classes, a low loading in both the fine fuel and large fuel size classes, and a high load in the fine fuel size classes and a low load in the large fuel size

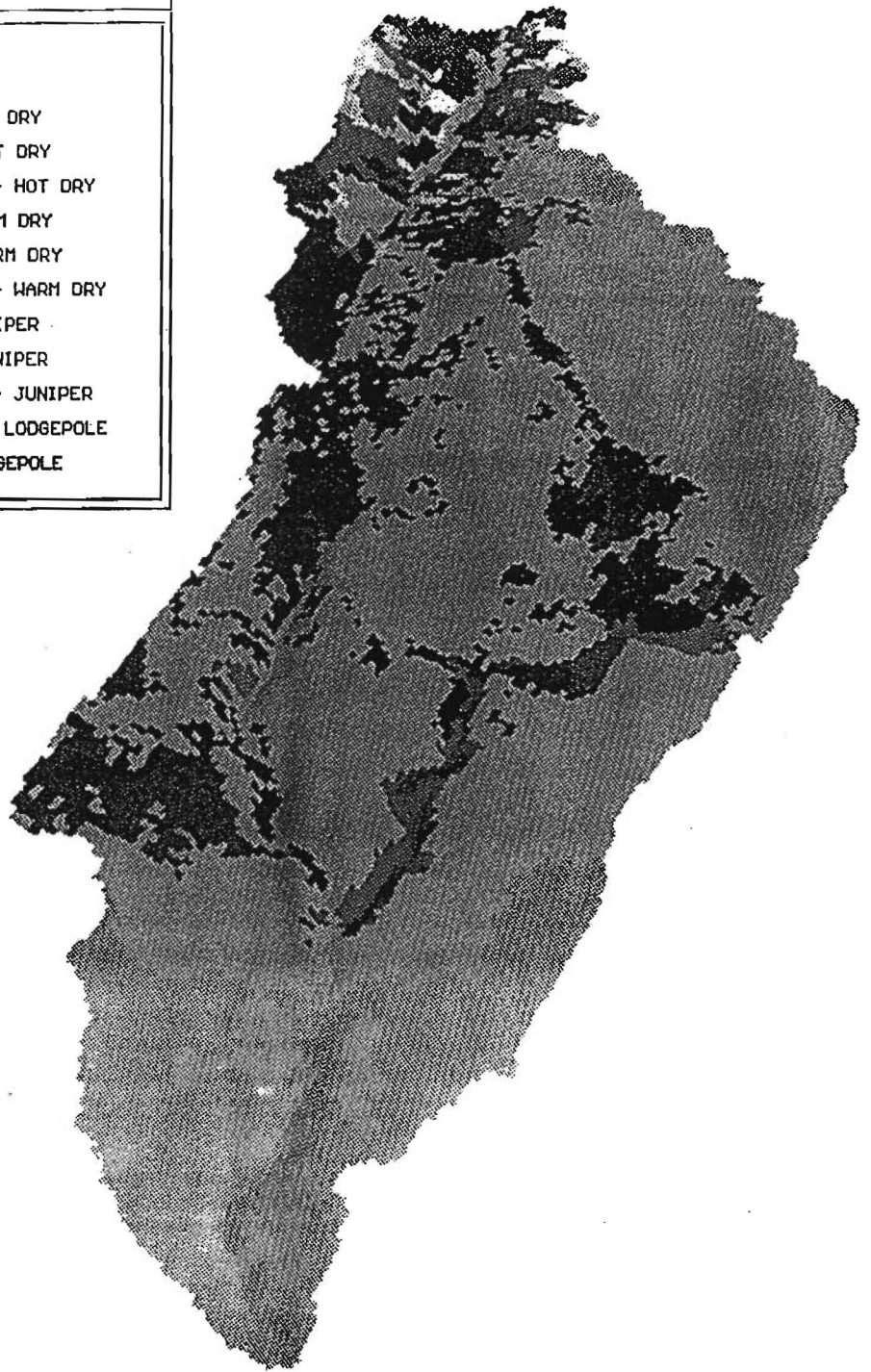
Page left intentionally blank for map, Fuel Loads



# Fuel Loads

## LEGEND

	Area (ha)	%	
	873	14.16	LOW FUELS - HOT DRY
	144	2.34	HIGH FUELS - HOT DRY
	3234	52.42	HIGH FINE FUEL - HOT DRY
	18	0.29	LOW FUELS - WARM DRY
	464	7.51	HIGH FUELS - WARM DRY
	1165	18.88	HIGH FINE FUEL - WARM DRY
	234	3.80	LOW FUELS - JUNIPER
	8	0.13	HIGH FUELS - JUNIPER
	10	0.16	HIGH FINE FUEL - JUNIPER
	5	0.08	LOW FINE FUEL - LODGEPOLE
	5	0.08	LOW FUELS - LODGEPOLE



VIEW

classes. With the exception of the Lodgepole bioenvironment the data does not indicate that conditions exist where fine fuel loading is low and large fuel loading is high. The following table describes acres by fuel conditions by bioenvironment.

BIOENVIRON- MENT	FUEL CONDITION <sup>1</sup>	ACRES
Hot Dry	High	349
	Low	2,212
	High Fine Fuel	7,988
Warm Dry	High	1,205
	Low	55
	High Fine Fuel	2,870
Juniper	High	21
	Low	578
	High Fine Fuel	29
Lodgepole	High Fine Fuel	7
	Low	17

<sup>1</sup>High-Indicates 0 to 3 inch diameter size classes above .75 tons per acre in Hot Dry and Warm Dry bioenvironments, above .9 tons per acre in the Juniper bioenvironment and 3 inch and greater diameter size classes above 25 tons per acre in Hot Dry and Warm Dry bioenvironments, above .2 tons in the Juniper bioenvironment.

Low-Indicates 0 to 3 inch diameter size classes below .75 tons per acre in Hot Dry and Warm Dry bioenvironments, below .9 tons per acre in the Juniper bioenvironment and 3 inch and greater diameter size classes below 25 tons per acre in Hot Dry and Warm Dry bioenvironments, below .2 tons in the Juniper bioenvironment.

High Fine Fuel-Indicates 0 to 3 inch diameter size classes above .75 tons per acre in Hot Dry and Warm Dry bioenvironments, above .9 tons per acre in the Juniper bioenvironment, above 3 tons per acre in the Lodgepole bioenvironment and 3 inch and greater diameter size classes below 25 tons per acre in Hot Dry and Warm Dry bioenvironments, below .2 tons in the Juniper bioenvironment, below 17 tons per acre in the Lodgepole bioenvironment.

### The Wildlife Dimension






There are many primary cavity excavators (PCE's) in the analysis area. Two of the Management Indicator Species (MIS) of interest in this area are the whiteheaded woodpecker and pileated woodpecker. The whiteheaded woodpecker can be associated with SSWL ponderosa pine (PP) late and old (LOS) habitat and pileated woodpecker with MSWL respectively. There is currently 20 acres of SSWL and 4549 acres of MSWL. There are numerous sightings of pileated woodpeckers and one probable nest location. We have two documented sightings of whiteheaded woodpeckers as well. Official surveys were conducted for pileated woodpeckers in 1993 and 1994 covering the majority of the watershed. The analysis area contains 4 designated old growth areas (DOG's) most of which are being used by pileated woodpeckers and other PCE's.

Page left intentionally blank for map, Designated Old Growth and LOS



Designated Old Growth and LOS

LEGEND

	Area (ha)	%	
	8	0.04	SSHJL
	1561	7.71	MSHJL
	0	0.00	SSHJL IN DOG
	283	1.40	MSHJL IN DOG
	519	2.56	DESIGNATED OLD GROWTH (DOG)



VIEW

Marten are also an MIS for old growth habitat and are relatively dependent on the MSWL, more specifically high densities of large woody material, which are components of MSWL and decadent lodgepole pine stands. Marten have been documented in the watershed during the winter of 1994/1995. A portion of the watershed was surveyed for forest carnivores using the DRAFT "Survey Methods for the Detection of Lynx, Wolverines, Fishers, and Martens". There are several DOG's specifically for marten in the watershed; however, there are none in the analysis area.

Northern goshawks inhabit the area. They are not on the Regional Forester's Sensitive Species list (R6 List) or the MIS list for the Forest, but are also an indicator species of LOS habitat. There have been several sightings and at least one known active nest location was documented in 1993.

For this analysis, areas providing cover for big game were assumed to provide suitable connective habitat between LOS and DOGs. There is adequate connectivity between the LOS and DOGs except where islands of LOS are surrounded by shrubland. See late and old structure map and cover map.

The southern shrubland portion contains Western sage grouse habitat (R6 sensitive species). No known surveys have been conducted in this area; however, there are a couple of sightings from 1988 and 1991.

There are no known sightings of ferruginous hawks (R6 sensitive species) in the analysis area or anywhere surrounding it. The Shrubland and Juniper bioenvironments do contain suitable habitat.

In 1993 surveys were conducted for Preble's shrews (R6 sensitive species) throughout the southern portions of the area. The surveys did not show the existence of Preble's shrews. Considerable amounts of "typical" Preble's shrew habitat does exist.

Rocky Mountain elk inhabit most of the area. Currently there are approximately 11,536 acres of cover in blocks over 30 acres in size. This figure includes marginal and satisfactory cover. A gross approximation of satisfactory cover is estimated at 4072 acres or 9% of the area and marginal cover is estimated at 7884 acres or 16% of the area. The remainder of the area is considered forage with some hiding cover mixed in. ODF&W estimates that there are approximately 2.5 elk per square mile throughout the entire Beulah Unit. There are no population estimates for the analysis area separately. The herd has been increasing in numbers since 1905. It is currently at or near the management objective (MO) for the unit, which is 1300. Bull to cow ratios were last reported at 29:100 for the Beulah area, which is higher than the MO recommendation of 15:100.

Mule deer also inhabit most of the area. The current population has been declining for the last decade or more. There is no specific information available from ODF&W at this time. Antelope are found in portions of the area, primarily the south-east section. There are several small herds inhabiting the area. No specific information is available at this time.

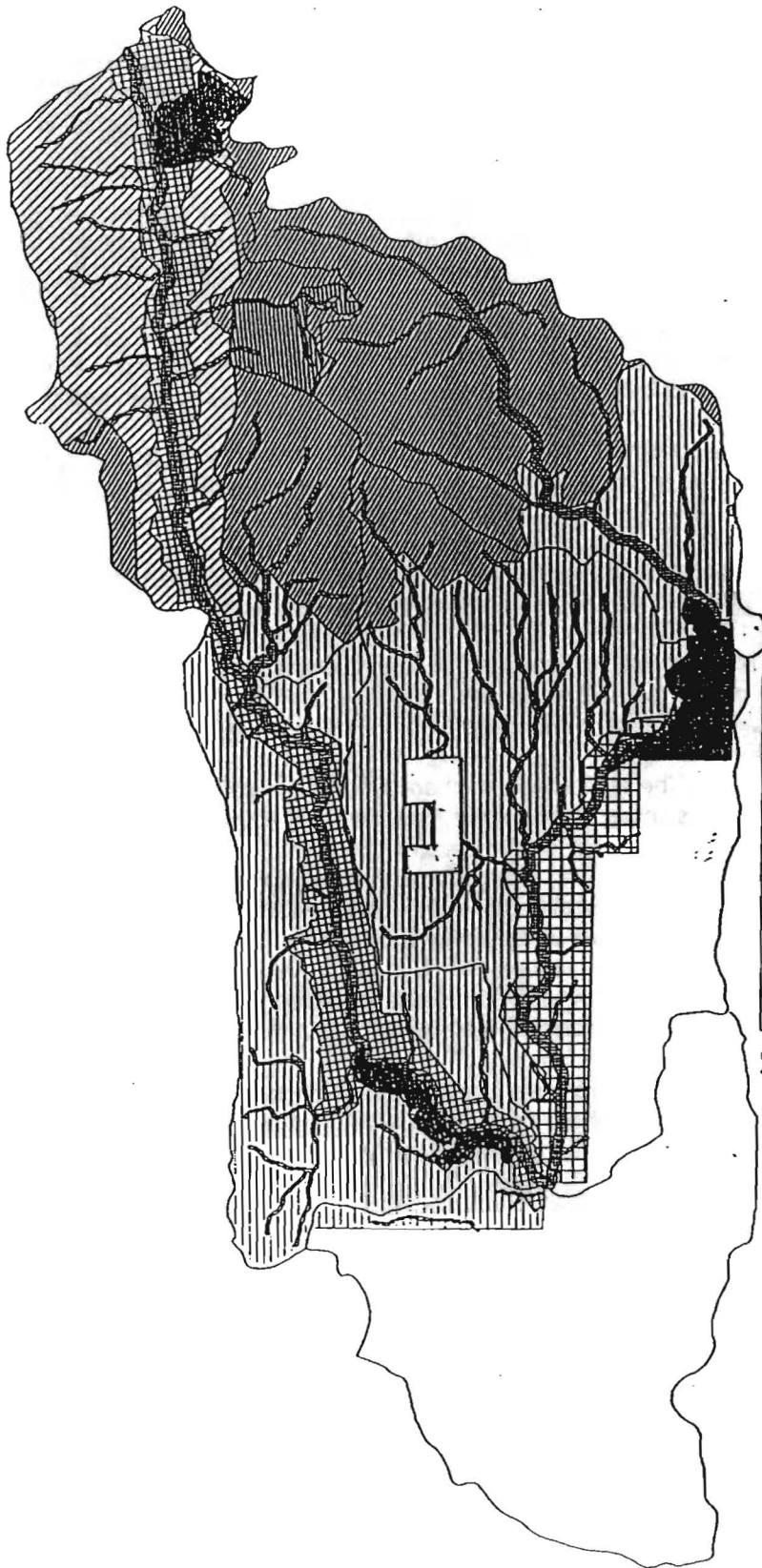
## The Human Dimension

### Land Allocation

The Bear Creek Semi-primitive area (2,710 acres) was originally part of the North Fork Malheur River Roadless Area Review Assessment (RARE), released in 1987. A smaller special allocation is the Dugout Creek Research Natural Area (RNA) candidate site at approximately 540 acres. The RNA was originally part of the Flag RARE area, also released in 1987.



# MANAGEMENT AREAS



LEGEND	
1_2	GENERAL FOREST_RANGELAND
3A	NON-ANADROMOUS RIPARIAN AREA
4A	BIG GAME WINTER RANGE
9	RESEARCH NATURAL AREA
10	SEMPRIMITIVE NONMOTORIZED RECREATION
13	DEDICATED OLD GROWTH
14	VISUAL CORRIDORS
22	WILD AND SCENIC RIVER
PVT	PRIVATE

Management areas are approximate. MA 14 is currently being updated in the system. Unable to calculate acres because of the overlap and hierarchy.



The Forest Plan has allocated this analysis area to 8 Management Areas, General Forest-Rangeland (1-2), Non-anadromous Riparian Area (3A), Big Game Winter Range (4A), Research Natural Area (9), Semi-Primitive Non-Motorized Recreation (10), Old Growth (13), Visual Corridors (14), Wild and Scenic River (22). See Management Area map.

#### Timber Harvest by Subwatersheds:

07D	2613 Acres
07G	623
07H	20
07I	3036
07K	0
Total	6272 Acres

#### Grazing Allotments

This area consists of four allotments. The Flag Prairie allotment is the primary allotment with 18,651 acres within the analysis area. 320 acres of private land are within the boundaries but were not surveyed. Flag Prairie has three permittees, with a total of 617 cow/calf pairs to graze from early June to mid-October.

The Spring Creek allotment has 8,784 acres in the analysis area. The allotment has three permittees, with a total of 600 cow/calf pairs grazing from early June to mid-October.

The North Fork allotment has 5,608 acres in the analysis area. The permittee has a term permit for 450 cow/calf pairs to graze from mid-June to mid-October.

The Ott allotment has 4,134 acres in the analysis area, with 430 cow/calf pairs permitted from early June to late September.

#### Recreation

The majority of the recreation use occurs adjacent to the North Fork Malheur River, with a lesser amount concentrating around Bear Creek and other water sources such as springs. Two developed campgrounds, Elk Creek and North Fork Malheur Campgrounds, and one undesignated campground, Crane Crossing Forest Camp, provide a more developed camping experience, while 50 inventoried dispersed sites provide a more primitive camping experience. There are currently 21 inventoried dispersed camping sites within the river corridor and 29 sites within the surrounding area, including those located next to Bear Creek. The majority of the camp sites have experienced substantial modification due to human occupancy and are characterized by primitive user-built structures, such as toilets and benches, meat poles, and rock fire rings, and areas of barren ground where vegetation has been eliminated. The majority of the sites are within 100 feet of the river or other water source with numerous footpaths which provide access to the water. Camping is associated with angling and with hunting seasons, starting mid-August and running through middle to late November, depending on weather conditions.

Other recreational developments within this area include trails, both hiking and snowmobile. The North Fork Malheur Trail #381 starts 1 mile south of the North Fork Campground and runs approxi-

mately 12 miles down the corridor to the southern trailhead. There are 3 trailheads for this trail, with the most heavily used trailhead at Crane Crossing Forest Camp.

FR 13 and FR 16, groomed, designated snowmobile trails, provide winter links to the communities of Prairie City, Unity and Bear Valley, depending on snow depth. Winter recreation rental cabins located at Short Creek Guard Station and Crane Prairie Guard Station can be accessed by these trails and others.

A literature and mining claim record search found no evidence or history of mining claim location, exploration, or mining in the the area of the North Fork Malheur River.

The North Fork Cow Camp (also known as the Butler Cow Camp) is currently authorized under the Term Grazing Permit - North Fork Grazing Allotment - for the facilities located at T.15S., R.35 1/2E., Section 26.

### Cultural Heritage

There are many prehistoric and historic sites within the analysis area. The majority of the prehistoric sites are evaluated to be eligible for the National Register of Historic Places. These cultural resource properties have a rich and vital story to tell about the lifeways and movements of the people who inhabited the area in prehistory.

Bear has been analyzed by Heritage Resource specialists during prefield research and field inventory of the Phink and Awake Analysis Areas. Assuring compliance with the relevants Acts and regulations, a stratified cultural resource inventory survey was developed for the the 5 subwatersheds.

High, moderate and low probability zones for locating cultural resource sites were designed according to the inventory plan and generally correlate human behavior with environmental variables, ethnographic data and previous site location. Only Malheur National Forest property was considered for survey, or approximately 32,803 acres.

To date, survey of subwatersheds 07D, 07G, 07H, and 07K has yielded 98 sites (73 prehistoric, 16 historic, and 9 with both prehistoric and historic components). This figure does not include six sites which were ground verified and require documentation. 80 isolates were also noted. The majority of the prehistoric sites are evaluated as eligible to the National Register of Historic Places (NRHP). Historic site types include can dumps, stock driveways and stock troughs.

Sixteen sites of a prehistoric nature and one historic site lie within 07I. The prehistoric sites are potentially eligible to the National Register of Historic Places.