Chapter 3
Affected Environment

INTRODUCTION

This chapter describes the physical, biological, and social components of the environment that would be affected by the selected alternatives. Discussion of the affected environment is divided into ten environmental components. Most components are discussed from three viewpoints: the desired condition of the resource, the current condition, and past events that have affected the current condition.

National Forest lands provide habitat for many forms of plant, wildlife and aquatic species. Analysis of the existing conditions and environmental consequences of the impacts for all existing or potential forms of these species within a planning area is impossible to address. Therefore, in accordance with 36 CFR219.19(a)(1), individual Forest Plans have identified specific species that would be analyzed as representative samples to show the condition of and effects on ecosystems. These are identified as Management Indicator Species (MIS). In addition to the MIS discussed in the appropriate sections, the Endangered Species Act requires an analysis of the existing condition and environmental consequences to species either listed or proposed for listing under this act. Forest Service policy includes the requirement to look at species listed as "sensitive" by the Regional Forester. While species that fell into these categories during the development of the Forest Plan are included as MIS, species added to these lists after approval of the Forest Plan(s) are also analyzed. This document will use these species as the representative samples to analyze the impact to all species within the planning area.

FIRE REGIMES

Current vs. Historical Fire Regimes

The Salmon River Ecosystem has an impressive fire history, likely unparalleled in the Northern Rocky Mountains. Before 1900, very frequent lightning- and human caused fires shaped plant community evolution for thousands of years (Mehringer et al. 1977, Barrett and Arno 1982, Gruell 1985, Barrett et al. 1997). Although large wildland fires still occur in the planning area, fire and vegetation patterns have been substantially altered because of fire suppression, grazing, timber harvesting and other settlement activities (Quigley et al. 1996).

Numerous fire history data have been gathered in and near the planning area (Barrett 1987, 1988a, 1988b, 1994a, 1994b, 1998) (Map 3 - 1, *Fire History Study Locations, Salmon River Ecosystem)* Results suggest that most lower elevation forests and grasslands occur in the nonlethal (NL) fire regime. For the purposes of this assessment, the term non-lethal fire regimes refers to regimes in which light surface fires burn through stands on the ground, without substantially killing the overstory trees. Stand Replacement (SR) fire regimes are those in which fires burn with characteristically high intensities and kill the majority of trees in a given stand. Data from 76 ponderosa pine stands suggest that site fire intervals usually

ranged from 10 to 30 years long, and the overall mean fire interval (MFI) was about 15 years. However, because light surface fires often fail to scar trees, these estimates are likely conservative (Arno 1976, Arno and Sneck 1977, Arno and Peterson 1983, Barrett 1998a, Barrett and Arno 1988). On average, the current fire interval in these same stands is 84 years - at least five times longer than the presettlement MFI. Nonlethal fires produced very open stands of uneven age ponderosa pine (Agee 1993), and regularly recycled grassland vegetation. Lack of repeated underburns in this century has promoted variable amounts of stand infilling (Gruell 1983, Skovlin and Thomas 1995) and increased litter and duff at the bases of individual trees. Consequently, the fuel buildups have promoted a shift toward more severe fires. (Agee 1993).

Mixed Severity (MS) fire regimes are those regimes that exhibit a combination of the two characteristics. Two mixed severity fire regimes (Barrett et al. 1991, Agee 1993) occur in the planning area. On relatively productive lower elevation sites, moderately high frequency/ moderately low severity fires (i.e., MS-1 regime) occurred in warm, moist ponderosa pine-Douglas-fir stands, and in cool, dry Douglas-fir stands. Data from 41 plots suggest that fire intervals ranged from about 15 to 60 years long and the overall MFI was about 35 years (Refer to project record). However, the current fire interval averages about 105 years, three times longer than the presettlement MFI. Pre- 1900 fires produced largely uneven age regeneration interspersed with small even age groups. Fire exclusion has promoted insect and disease outbreaks, and an increased buildup of litter and duff. Consequently, a shift toward higher severity fires has occurred, including large stand replacing runs unprecedented over the last 500 years of tree ring record.

Mixed severity fires typically were less frequent and more severe on moderately moist sites in mid- to upper elevation terrain, (i.e. MS II fire regime). Such fires produced largely even aged stands containing from one to three seral age classes (for example, western larch/lodgepole pine and Douglas-fir/ lodgepole pine stands). Fire intervals were more variable than in the MS I regime, especially on relatively open subalpine sites occupied by scattered Douglas-fir or whitebark pine. Data from 21 sample stands suggest that intervals ranged from about 10 to 40 years long, and the overall MFI was 75 years. The current fire interval averages about 100 years long, about 50 percent longer than the presettlement MFI. Although most fire intervals are still within the historical range of variability, many are approaching the upper limits. The lack of fire in many drainages has increased the likelihood of large stand replacing fires, especially where such stands adjoin heavily impacted lower elevation forests.

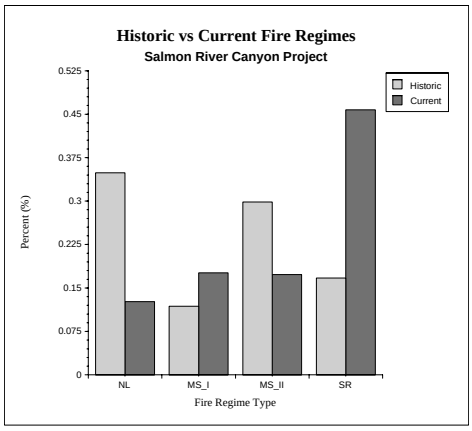
The fire history studies yield few data for the stand replacement (SR) regime in the planning area. Therefore, data from the adjacent Selway-Bitterroot Wilderness were used (Brown et al. 1994). This fire regime generally affects densely forested subalpine terrain, and presettlement fire intervals ranged from 100 to 200 years long (overall MFI: -150 yr.). Most trees were killed during a given fire, and extensive even-aged stands of lodgepole pine often resulted. Because presettlement fire intervals in the SR regime were inherently longer than the fire exclusion period to date, most stands in this regime are still on a natural fire cycle (Brown et al. 1994).

SALMON RIVER CANYON PROJECT
COVERTYPE & FIRE REGIME DATA
09/29/98

TOTAL PROJECT AREA

COVERTYPES	(acres)	(%)
forested terrain	1,394,921.02	76%
grass	148,126.16	8%
altered grass/agric	21,493.24	1%
dry shrub	64,906.35	4%
mesic shrub	72,816.45	4%
rock/water/snow/ clouds	122,609.50	7%
TOTAL	**1,824,872.72**	**100%**

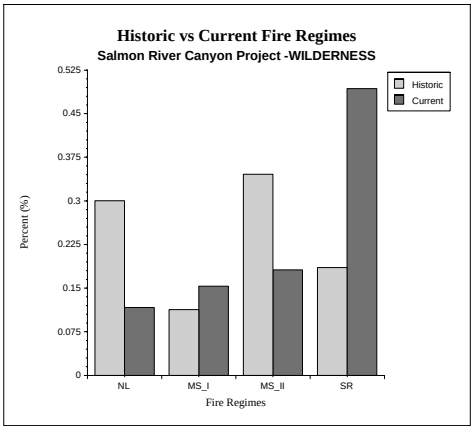
FIRE REGIMES	HISTORIC (acres)	(%)	CURRENT (acres)	(%)
NL	636,506.98	34.9%	230,745.68	12.6%
MS_I	216,248.91	11.9%	321,080.31	17.6%
MS_II	544,416.68	29.8%	315,787.39	17.3%
SR	305,090.65	16.7%	834,649.75	45.7%
water	5,344.15	0.3%	5,344.15	0.3%
snow	14,626.38	0.8%	14,626.38	0.8%
clouds	32,014.98	1.8%	32,014.98	1.8%
rock	70,623.99	3.9%	70,623.99	3.9%
TOTAL	**1,824,872.72**	**100.0%**	**1,824,872.63**	**100.0%**



WILDERNESS

COVERTYPES	(acres)	(%)
forested terrain	546,261.07	**79%**
grass	58,430.10	**8%**
altered grass/agric	7,203.94	**1%**
dry shrub	16,109.15	**2%**
mesic shrub	23,663.77	**3%**
rock/water/snow/ clouds	38,456.24	**6%**
TOTAL	**690,124.27**	**100%**

FIRE REGIMES	HISTORIC (acres)	(%)	CURRENT (acres)	(%)
NL	207,127.97	**30.0%**	80,609.79	**11.7%**
MS_I	78,036.16	**11.3%**	105,750.56	**15.3%**
MS_II	238,577.58	**34.6%**	125,163.35	**18.1%**
SR	127,926.32	**18.5%**	340,144.33	**49.3%**
water	830.72	**0.1%**	830.72	**0.1%**
snow	3,968.41	**0.6%**	3,968.41	**0.6%**
clouds	0	**0.0%**	0	**0.0%**
rock	33,657.11	**4.9%**	33,657.11	**4.9%**
TOTAL	**690,124.27**	**100.0%**	**690,124.27**	**100.0%**



NON-WILDERNESS

COVERTYPES	(acres)	(%)
forested terrain	849,568.45	**75%**
grass	75,886.81	**7%**
altered grass/agric	27,190.05	**2%**
dry shrub	48,797.20	**4%**
mesic shrub	49,152.68	**4%**
rock/water/snow/ clouds	84,153.26	**7%**
TOTAL	**1,134,748.45**	**100%**

FIRE REGIMES	HISTORIC (acres)	(%)	CURRENT (acres)	(%)
NL	429,379.01	**37.8%**	150,135.98	**13.2%**
MS_I	138,212.75	**12.2%**	215,329.75	**19.0%**
MS_II	305,839.1	**27.0%**	190,624.04	**16.8%**
SR	177,164.33	**15.6%**	494,505.42	**43.6%**
water	4,513.43	**0.4%**	4,513.43	**0.4%**
snow	10,657.97	**0.9%**	10,657.97	**0.9%**
clouds	32,014.98	**2.8%**	32,014.98	**2.8%**
rock	36,966.88	**3.3%**	36,966.88	**3.3%**
TOTAL	**1,134,748.45**	**100.0%**	**1,134,748.45**	**100.0%**

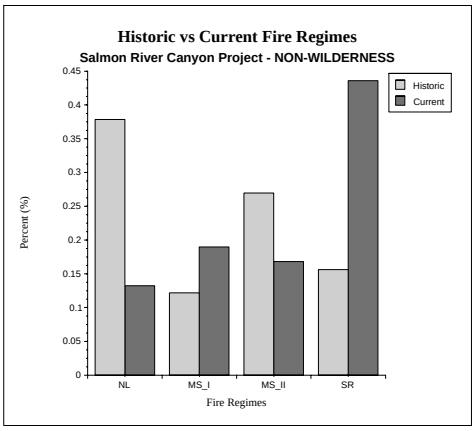


Figure 3 - 2. Historic vrs. Current Fire Regimes

A Geographic Information System (GIS) was used to model the occurrence of pre- and post 1900 fire regimes in the planning area, based on fire history data and satellite imagery. When area specific data were unavailable, such as for grass or shrub cover types, historical fire regimes were derived from other studies (Brown et al. 1994, Morgan et al. 1996). Current fire potential (i.e., post 1900 regimes) was modeled for each stand polygon based on potential vegetation type (a method of classifying potential habitats for certain plant types; see page 3 - 6), cover type, canopy coverage, and fuel model (Anderson 1982). Results support the interpretation that effective fire exclusion has promoted major landscape changes (Fig. 3-1, *Historical vs. Current Fire Regimes, Salmon River Ecosystem).* Historically, the nonlethal fire regime occupied an estimated 37 percent of the vegetated portion of the planning area, versus just 14 percent at present. Most grass-dominated communities likely remain in the nonlethal fire regime, but most ponderosa pine stands apparently have shifted into the MS I or MS II regimes. Nonlethal underburning occurred in some stands during a prescribed natural fire in 1999 - but during low risk burning conditions, and where sites had underburned within the past 15 years. Although uncommon, such factors greatly increase the potential for restoring nonlethal fire to dry plant community types. Fire severity potential has increased dramatically in the area's relatively productive stands.

Many stands previously in the MS I and MS ll regimes currently have long fire intervals and heavy fuel buildups. Consequently, the fire regime model suggests that acreage within the Stand Replacement regime has increased from 17 to 46 percent. Recent wildland fires support this interpretation, because stand replacement burning has occurred even in the lowest elevations of the Salmon River Canyon. Mixed severity burning also occurred during recent wilderness prescribed fires, but usually during low-risk conditions. However, the full ramifications of mixed severity burning after long fire-free intervals may not be apparent for several decades. That is, potentially heavy fuels from scorching and fire-induced insect attacks might promote unnaturally severe burning during the next fires.

Fire cycles (Romme 1980) also help illustrate changing fire frequency. Presettlement fire cycles are calculated by dividing the number of acres in each fire regime type by the associated MFI. On average, fires burned about 53,000 acres (3 percent) per year in the 1.8 million acre planning area, At that rate, acreage equal to the entire planning area would have burned every 32 years. Between 1970 and 1998, fires burned an average of just 14,000 acres per year (less than 1 percent), largely in wilderness. Today's fire cycle is thus 125 years, a fourfold reduction in acres burned *(*Fig. 3 - 1*).* By comparison, the adjacent Selway-Bitterroot Wilderness has experienced a twofold reduction (Brown et al. 1994). However, the planning area has three times more terrain in the NL regime, which has been the most heavily impacted by fire exclusion. Also, about two-thirds of the planning area is non-wilderness under full fire suppression management. Further, the Salmon River Ecosystem has been heavily influenced by settlement activities other than fire suppression, such as livestock grazing and timber harvesting.

Data on fire cycles are useful for monitoring the amount of vegetation burned by modern-day fires, and can help establish prescribed fire quotas (Fig. 3 - 2, *Mean Annual Burned Acres, Salmon River ecosystem).* Historically, an average of 44,000 acres burned per year in the relatively low severity fire regime types (i.e., NL, MS I) The annual average between 1970 and 1998 was 8300 acres, just 19 percent of the historical mean. In the high severity fire regimes (i.e., MS II, SR), presettlement fires burned an average of about 9300 acres per year,

as opposed to 5400 acres since 1970 (i.e., 58 percent). Most of the recent fires have occurred in Wilderness, causing a skewed geographic distribution in the planning area. And many of the fires have burned in mid- to upper elevation terrain - bypassing vegetation dependent on frequent disturbance.

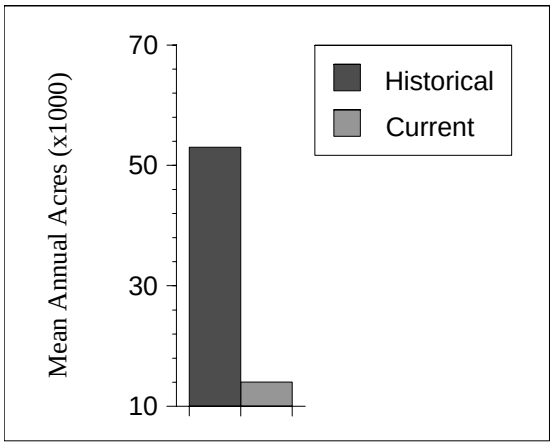


Figure 3 - 2. Mean Annual Burned Acres, Salmon River Canyon Project Area

Note that fire atlases (see project file) show fire acreages, not severities. Site-specific data generally are unavailable, but severities often have exceeded the historical range of variability.

For example, the 1988 Ladder/Hida Point Fire (50,000 ac.) and the 1994 Chicken Fire (128,000 ac.) often burned in a stand replacement pattern from canyon bottom to ridgetop. Field observations and several plots previously sampled in these burned areas (Barrett 1988a) verify the destruction of intricate forest mosaics that were shaped by recurrent sublethal fires.

In summary, fire history studies, fire regimes modeling, and the fire atlas indicate that effective fire exclusion has promoted unnatural ecosystem changes in much of the planning area. Without successful reintroduction of fire during low-risk conditions, severe wildland fires will continue to reduce biodiversity and threaten human safety and property.

VEGETATION

POTENTIAL VEGETATION TYPES

To help predict the effects of the proposed action on the vegetation in the Salmon River Canyon planning area, a classification of Potential Vegetation Types (PVTs) was developed. Each PVT is a group of habitat types which share common responses to fire and fire exclusion, and occur on certain slopes, aspects, and elevations. These PVTs provide an additional information layer for the purposes of assigning fuel models, assessing susceptibility to noxious weed invasion in the proposed burn units, and analyzing potential habitat for threatened, endangered, and sensitive plant species. The PVTs were derived from satellite imagery and were checked for accuracy against existing vegetation cover types and local knowledge of the planning area (Map 3 - 5) .

There are 14 Potential Vegetation Type classes for the planning area. They include eleven vegetation classes, plus agricultural lands, water, and barren/rock areas. Following is a brief description of each vegetation PVT. PVTs 10 (agriculture), 11 (barren/rock), and 12 (water) need no description. They are presented here for reference information only, and will not be analyzed for project effects. More detailed information, including a crosswalk table for habitat types, fire groups, and fire regimes, is located in the project file. Table 3-1 presents the total acres and percent of each PVT in the planning area.

Table 3 - 1. Acres of each PVT in the Planning Area.

PVT No.	PVT Name	Acres	Percent of Planning Area
1.	High Elevation Forest	390,209	21
2.	Cool Douglas-fir Forest	243,352	13
3.	Warm Forest with Ponderosa Pine	522,688	29
5.	Grand Fir Forest	193,268	11
6.	Conifer/Grassland	180,312	10
7.	Dry Shrubland	48,892	3
8.	Dry Grassland	123,612	7
9.	Riparian	12,406	0.7
10.	Agriculture	2,680	0.1
11.	Barren/Rock	70,798	4
12.	Water	5,405	0.3
13.	Mesic Shrubland	19,603	1
14.	Fescue Grassland	11,879	0.7

PVT 1 - High Elevation Forest

This PVT includes all of the high elevation subalpine fir and whitebark pine habitat types (HTs) which occur in the planning area. Lodgepole pine is a major seral component, maintained by recurrent fires of varying severities and interval lengths. These areas could include a full range of size classes for trees, forest structural stages, and a wide range in cover types. Undergrowth species include dwarf huckleberry, grouse whortleberry, Labrador tea, beargrass, elk sedge, and pinegrass, among others. This PVT may be bordered by alpine ecosystems on its upper elevation and by Douglas-fir and grand fir types on its lower elevation. In cold air drainage situations, this PVT can border the Warm Forest with Ponderosa Pine PVT.

PVT 2 - Cool Douglas-fir Forest

This PVT includes mid elevation Douglas-fir HTs that may have ponderosa pine or lodgepole pine as the major seral species. This PVT borders the High Elevation Forest PVT, at a slightly lower elevation. Undergrowth species include snowberry, mountain maple, spirea, elk sedge, and pinegrass, among others. Seedling establishment may be slow, but if conditions are favorable there will be high seedling survival, resulting in even aged stand structure.

PVT 3 - Warm Forest with Ponderosa Pine

This PVT includes those low to mid elevation, warm, dry Douglas-fir HTs, and those low elevation, warm, dry grand fir HTs in which ponderosa pine is the major seral species.

Within the grand fir HTs, both ponderosa pine and Douglas-fir are the major seral species. Undergrowth species include mountain maple, spirea, snowberry, ninebark, and pinegrass, among others. Stand structure and canopy closure varies depending on fire frequency and severity. These types historically have been open stands with widely spaced older trees and few young trees in the undergrowth. Frequent fires have maintained this open stand structure. Fire exclusion has resulted in more dense understories of young Douglas-fir.

PVT 4 - *Dry Cool Forest*

These habitat types were included in our aspect/slope/elevation model because they are present in central Idaho. However, this PVT did not occur within the planning area.

PVT 5 - Grand Fir Forest

This PVT includes those mid elevation, typically north facing moist grand fir HTs that burn less frequently than the warm grand fir HTs (included in the Warm Forest with ponderosa pine PVT). Lodgepole pine and Engelmann spruce are the dominant seral species. Ponderosa pine, if present, is a minor component. Undergrowth species include serviceberry, rose, grouse whortleberry, and beargrass, among others. On the Payette and Nez Perce National Forest portions of the planning area, western larch is a seral species within the grand fir/queencup beadlily HT.

PVT 6 - Conifer/Grassland

This PVT has very low cover (10-15 percent) of ponderosa pine and Douglas-fir. Low moisture and high temperature limit tree establishment and growth. This PVT occupies very hot and dry sites, typically low elevation, south and west facing slopes. It borders the Dry Grassland PVT; the boundaries between the two PVTs are sometimes unclear, and tend to fluctuate in elevation. The Conifer/Grassland PVT is a drought- and fire-maintained open savannah in which the understory is dominated by dry grasses, such as bluebunch wheatgrass and needle-and-thread. Idaho fescue and Sandberg bluegrass are present in varying amounts. Curl-leaf mountain mahogany also occurs as scattered individuals, or in bands confined to rock outcrops within the river breaklands.

PVT 7 - Dry Shrubland

This PVT occupies those low elevation, hot and dry sites that are typically transitional between the Dry Grassland PVT and the Conifer/Grassland PVT. This incidental type includes Wyoming, mountain, and basin big sagebrush, rabbitbrush, and curl-leaf mountain mahogany. Netleaf hackberry may be present in varying amounts. Undergrowth species include dry grasses and forbs, such as bluebunch wheatgrass, needle-and-thread, Sandberg bluegrass, Idaho fescue, buckwheat, yarrow, and arrowleaf balsamroot, among others.

PVT 8 - Dry Grassland

This PVT occupies hot and dry, low elevation sites, on moderate and steep south and west facing slopes. It occurs below the lower limits of tree growth (i.e., lower treeline). It is maintained by both drought and frequent fires, which, along with high temperature, preclude the

establishment of conifers. It is dominated by bluebunch wheatgrass, with Idaho fescue, needle-and-thread, Sandberg bluegrass, sand dropseed, red three-awn, and non-native grasses (e.g., cheatgrass, Japanese brome) also present. Curl-leaf mountain mahogany occurs in small amounts, as scattered individuals within the grassland setting, or in bands on rock outcrops or exposed soils. Netleaf hackberry may also be present, typically on talus slopes or draws. These sites are the hottest and driest in the planning area.

PVT 9 - Riparian

This PVT occupies valley bottoms typically associated with perennial or ephemeral streams, and also the main Salmon River. Valley widths and gradients of the tributary streams vary, but typically they are narrow (50 to 150 feet) and relatively steep (greater than 4 percent slope). The riparian PVT includes conifer, deciduous hardwood (e.g., cottonwood), shrub, and herbaceous communities. The dominant types appear to be riparian shrub at the low to mid elevations, and conifer/riparian shrub at the mid to upper elevations, throughout the planning area. Meadows dominated by sedges and mesic grasses are a minor riparian type; they are present throughout the planning area, but are too small and scattered to locate at the scale of this analysis. Scattered individuals or patches of black cottonwood may also be present, typically on the wider valley bottom stream reaches and near the mouths of the tributaries. Along the main Salmon, the valley bottom is relatively wide and flat (compared to the tributary valleys). Cottonwood communities are common on stream bars. Dominant conifers include ponderosa pine, Douglas-fir, Engelmann spruce, and grand fir. Subalpine fir and spruce are more prevalent at higher elevations. Young shade tolerant grand fir and Douglas-fir may be present due to fire exclusion. Shrub species include: Sitka, mountain and white alders, water birch, dogwood, hawthorn, willow, serviceberry, fool's huckleberry, honeysuckle, twinberry, spirea, huckleberry, thimbleberry, syringa, cascara, elderberry, and rose, along with other shrubs. Understory species include various mesic forbs, grasses, sedges and rushes.

PVT 13 - Mesic Shrubland

This broadly defined PVT typically occurs in patches of varying size. It includes shrubs that occupy moist, cool, productive sites, such as alder, currant, mountain maple, ninebark, and ceanothus shrublands. For this project, we expanded this type to include drier types dominated by snowberry, oceanspray, syringa, cascara, poison ivy, serviceberry, chokecherry, and white clematis. The drier species occupy talus slopes, terraces, toe and midslopes and draws. This type is commonly maintained by frequent to infrequent mixed severity fires, which create persistent shrubfields, typically dominated by the moister site species such as alder and mountain maple. Within the non-wilderness portion of the planning area, timber harvest units also can be dominated by this PVT.

PVT 14 - Fescue Grassland

Although this PVT is present in minor amounts throughout the planning area, it only occurs with significant cover on the Nez Perce National Forest (from Riggins north to Whitebird). This true grassland type is maintained by both site characteristics and frequent nonlethal or mixed severity (MS I) fires, which preclude the establishment of conifers. It is most extensive on steep southeast to southwest slopes, at elevations of 6000 feet. However, it also

occurs on other aspects, including northerly, at lower elevations. The dominant grass is Idaho fescue, but bluebunch wheatgrass may also be present. These sites are moist, cool and productive. Associated species include other mesic grasses (e.g., junegrass), some upland sedges, and numerous mesic forbs (e.g., lupine, sticky geranium, cinquefoil).

THREATENED AND ENDANGERED PLANT SPECIES

Introduction

Since the arrival of European settlers, native plant communities have been affected by such activities as agriculture, grazing, mining, logging, road building and fire suppression. In particular, grasslands, prairies, and riparian areas have been greatly reduced in size, contributing to the increased rarity of many plant species. In addition, the introduction and spread of invasive exotic plant species, including noxious weeds, has further reduced habitat for these species, especially in dry grasslands and open forests and shrublands. Native species often cannot compete successfully with invasive exotics in certain habitats, such as dry grasslands. With the increase of exotic species comes increased herbicide use, which can also be a threat to certain native species. Ground disturbance and canopy opening from logging, road building, and mining alters native habitat and changes plant community composition, structure, and function, as does over-grazing. Fire exclusion has changed native species composition, in part by reducing habitat for early seral species which depend on disturbance to provide bare mineral soil for establishment.

Under provisions of the Endangered Species Act, federal agencies are directed to seek to conserve endangered and threatened species, and to ensure that actions authorized, funded, or carried out by these agencies are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of their critical habitats.

According to US Fish and Wildlife Service list #1-4-99-SP-341 (dated Sept. 1, 1999), three plant species designated as federally listed or threatened are suspected to occur in the planning area.

Macfarlane's four o'clock *(Mirabilis macfarlanei)*

Macfarlane's four o'clock is a perennial with showy magenta flowers, which blooms in late May through June. It has a stout, deep taproot, and can withstand hot summer fires during its dormant period, from mid-summer through winter. Its range is extremely restricted, being confined to an area 29 miles wide by 18 miles long in the canyons of the lower Snake, Salmon, and Imnaha Rivers. Within this area, it is found in open dry grasslands at low elevations of 1000 to 3000 feet (USFWS 1999).

There are five known populations of Macfarlane's four o'clock in the planning area, between Riggins and Slate Creek on BLM and private ground. Two of these are within Research Natural Areas and Areas of Critical Environmental Concern. The habitat here is grassland communities dominated by bluebunch wheatgrass, with sand dropseed and Sandberg's bluegrass. There are 20,293 acres of potential habitat in Dry Grassland PVTs in the proposed action areas. In particular, the grassland habitats in the vicinity of Mackey Bar, Painter Bar,

and from Spring Bar downstream (Nez Perce and Payette National Forests) could be considered potential habitat, according to habitat modeling (Nez Perce NF 1999). However, no Macfarlane's four o'clock was found during surveys throughout these habitats in June 1996, 1997, and 1998.

Water howellia *(Howellia aquatilis)*

This is a diminutive aquatic species with tiny white flowers, which is restricted to vernal pools, glacial potholes, and abandoned river oxbows. The species at one time was known from California to northwestern Oregon and eastward to Montana, but because of loss of habitat from agriculture, it is currently known from nine sites in Montana, one in California, three in Washington and one in northern Idaho (USDA 1997). Although there are a few abandoned oxbows along the Salmon River between Slate Creek and White Bird, there are no known occurrences of this species. The Nez Perce National Forest has a few areas of potential habitat, but none are in the planning area, according to habitat modeling (Nez Perce NF 1999).

Ute ladies-tresses *(Spiranthes diluvialis)*

This perennial orchid grows in mesic riparian meadows in active floodplains in scattered locations throughout the intermountain west. Closest to the planning area, it is known from one location in central Montana, several locations in southeast Idaho, and one location in Okanogan County, Washington. This orchid has small white flowers which twist along the stem, and is similar to two other orchid species which are found throughout the northern Rocky Mountains. Identification is best made while it is flowering, from late July to September (USFWS 1998).

There are no active floodplains in the planning area, but there are deposits of alluvial material, i.e. sand and gravel bars, in a few areas along the mainstem Salmon River. These areas were identified through habitat modeling (Nez Perce NF 1999) and field reconnaissance. There are also some large wet meadows near the confluence of Panther and Clear Creeks which could be considered suitable habitat. Potential habitat in the grassland riparian cover type throughout the planning area totals 111 acres. In most of the proposed action areas, above the river itself, gradients are generally very steep, and streambanks are rocky, with an abrupt transition to upland vegetation. Surveys were conducted in August and September 1998 in grassland riparian and alluvial areas along the mainstem river and in the lower Panther Creek and South Fork drainages, emphasizing the proposed action units. No occurrences were found.

US FOREST SERVICE AND BLM SENSITIVE SPECIES

Forest Service Manual 2670.5 defines Sensitive species as "those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species/existing distribution." In FSM 2670.22, management direction for Sensitive species is, in part, to ensure that species do not become threatened or endangered because of Forest Service actions, and to maintain viable populations of all native species.

BLM Manual 6840 defines Sensitive species as those species: (1) under status review by USFWS/NMFS; (2) whose number are declining so rapidly that Federal listing may become necessary; (3) with typically small and widely dispersed populations; (4) ambient ecological refugia or other specialized or unique habitats. Former USFWS Candidate species for Federal listing are now covered under this direction. BLM Sensitive species are managed in accordance with BLM Manual 6840.06D.

According to lists of Sensitive plant species produced by Regions One and Four and the BLM, there are 24 plant species designated as Sensitive in Idaho which have known occurrences or potential habitat within the Salmon River Canyon planning area. These species and their geographic distribution, phenology, and seral stage are displayed in Table 3 -2. This table also highlights the 19 species which have known occurrences or potential habitat in the proposed action area. These are the species for which project effects will be analyzed. Species which have no occurrences or potential habitat in the proposed action units will not be analyzed. NOTE: five species on the Bitterroot National Forest list are designated Sensitive in Montana only, because they are widespread in Idaho. They will not be analyzed for this project.

The following species information is from the 1999 Idaho Native Plant Conference proceedings and Idaho Conservation Data Center (ICDC) database Element Occurrence records, 1998.

Candystick *(Allotropa virgata)*

Candystick is a coastal disjunct which is restricted to central Idaho and adjacent Montana in its inland range. Its preferred habitat is lodgepole pine forest, most often with beargrass, grouse whortleberry, and blue huckleberry. This species lacks chlorophyll and has a red and white striped stem and flowers. It is dependent on a symbiotic relationship between a conifer tree and a mycorrhizal fungus (which grows on the tree's roots) for survival. Ground disturbance destroys candystick's shallow roots, and removal of the host tree breaks the symbiotic balance, resulting in loss of the plant. Candystick is known from 15 occurrences in the planning area, on the Nez Perce National Forest. However, none of these is in any proposed action areas. There are approximately 7000 acres of lodgepole pine cover type forest in the proposed action units. This cover type is included in the cool Douglas-fir and high elevation forest PVTs, which are not the focus of this project.

Payson's milkvetch *(Astragalus paysonii)*

This species is a regional endemic known only from central and southeastern Idaho and southern Wyoming. The milkvetch is a perennial which has small white flowers in July. It is a seral species which requires mineral soil (from disturbances such as fire or landslides) for establishment. Fire suppression (which contributes to plant succession and canopy closure) may be decreasing the potential habitat for this species (Lorain 1990). The habitat for Payson's milkvetch is openings within coniferous forests of ponderosa pine, Douglas-fir, and sometimes lodgepole pine. It is known from one location in the planning area (Nez Perce National Forest), in proposed action unit 5 (Whitewater). There are 140,847 acres of

potential habitat (Conifer/Grassland and Warm Forest with Ponderosa pine PVTs) in the proposed action units.

Broadfruit mariposa *(Calochortus nitidus)*

Broadfruit mariposa is a regional endemic in southeast Washington and adjacent western Idaho. It is a perennial lily that produces a single flat basal leaf and one to four lavender flowers, which appear from mid June to early July. The flowers are terminal on a single stem from a deep seated bulb, which helps it withstand seasonal fire. Much of its historic habitat has been converted to agricultural lands. The existing habitat is the canyonlands of the Snake, Salmon, and Clearwater rivers along grassy ridges, canyon rims and small grassland openings, on soils derived from basalt. There are 26 occurrences in the planning area (Nez Perce National Forest), with six known in proposed action unit 2 (Lower Salmon River West). There are 2664 acres of suitable habitat in PVT 8 (dry grassland) and PVT 14 (fescue grassland) on volcanic (basalt) parent material in the proposed action areas, although this species is only known from western Idaho.

Green Bug-on-a-Stick *(Buxbaumia viridis)*

This is a rare, inconspicuous moss which is sparsely distributed throughout northwestern North America, Europe, and China. Its habitat is restricted to old growth areas in moist grand fir forests, where it grows on large diameter decayed logs. It is known from one location in the planning area, in No Business Creek Research Natural Area on the Nez Perce National Forest. There are as many as 30,274 acres of potential habitat in moist grand fir forest (PVT 5) in the proposed action areas, although actual habitat in old growth areas will be less.

Buxbaum's sedge *(Carex buxbaumii)*

This sedge is a circumboreal species which is uncommon in North America. It is known from one location on the Nez Perce National Forest, but has not been found in the planning area. Its habitat is peat bogs and wet meadows, at elevations from 2000 to 6500 feet. Like most wet site sedges, this species would probably only be top-killed by fire, since the rhizomes would be protected in wet soil (Elzinga and Rosentreter, 1998). Potential habitat totals 111 acres of grassland riparian cover type in the proposed action area.

Henderson's sedge *(Carex hendersonii)*

This large vigorous sedge species is a coastal disjunct, found inland only in north-central Idaho. The habitat is moist shaded western red cedar and grand fir forests, generally on streamside alluvial benches in low elevation river canyons. There are two known occurrences in the planning area, in the Slate Creek watershed (Nez Perce National Forest). Associated species include grand fir, Pacific yew, red-osier dogwood, and wild ginger. Fire effects to this sedge species would be similar to Buxbaum's sedge, above. There are 783 acres of conifer riparian cover type potential habitat in the proposed action areas.

Dwarf gray rabbitbrush *(Chrysothamnus nauseosus spp. nanus)*

Dwarf gray rabbitbrush is a regional endemic found in northeastern Oregon, southeastern Washington, and two locations in west-central Idaho. Its habitat is dry, rocky ridges and outcrops of basalt, on shallow soils, in low elevation canyon grasslands. There are no known occurrences in the planning area. Rabbitbrush typically resprouts vigorously (from the stem, not from roots) after cool fires dormant season fires, but may not survive very hot fires. There are 2664 acres of potential habitat in the proposed action areas, although this species is restricted to basalt parent material and has not been found east of Riggins.

Clustered ladyslipper *(Cypripedium fasciculatum)*

This locally rare orchid species is distributed throughout the Rocky Mountains. It is typically found in mid to late seral plant communities, in habitat ranging from cool moist western red cedar to warm, dry grand fir and Douglas-fir, often in old growth. Flowering occurs in April through July. Canopy removal leads to reduced numbers, or in some cases loss of the population (Greenlee 1997). It is found on the Nez Perce National Forest, but there are no known occurrences in the planning area. There are 105,962 acres of potential habitat in PVT 4 (warm forest with ponderosa pine, which includes dry grand fir and Douglas-fir forests) in the proposed action areas.

Giant helleborine *(Epipactis gigantea)*

This orchid is restricted to riparian habitats with mineral-rich waters throughout the intermountain west. It is often found near hot springs, and in some cases is threatened by heavy recreational use. In the planning area, giant helleborine occurs in red alder *(Alnus rubra)* communities, with species such as poison ivy *(Rhus radicans),* mountain sweetroot *(Osmorhiza chilensis),* monkeyflower species *(Mimulus washingtonensis* and *M. guttatus),* Dewey's sedge *(Carex deweyana),* and sometimes Canada thistle *(Cirsium arvense)*. This species is known from six locations in the planning area (all four National Forests and the Bureau of Land Management), near thermal or mineral-rich springs. Of these, one is in the proposed action area, in unit 22 (East Fork Owl Creek). There are 137 acres of broadleaf riparian cover type potential habitat in the proposed action areas**.**

Puzzling halimolobos *(Halimolobos perplexa)*

Puzzling halimilobos is another regional endemic. There are two varieties: *perplexa,* known only from the Salmon River watershed in west-central Idaho, and *lemhiensis,* which has populations in east-central Idaho and adjacent Montana. Like Payson's milkvetch, it is a seral species requiring disturbance and bare soil to become established. Its habitat is gravelly, sandy, or grassy slopes adjacent to rock outcrops in open ponderosa pine and Douglas-fir forests. There are 21 known locations of variety *perplexa* in the Region One portion of the planning area, on the Nez Perce and Payette National Forests, with eight in proposed action units four (Lower Salmon River East) and 12 (Carey Creek).

Table 3 - 2. THREATENED, ENDANGERED AND SENSITIVE PLANTS AND HABITATS
SALMON RIVER CANYON PROJECT
NEZ PERCE, PAYETTE, BITTERROOT*,AND SALMON/CHALLIS NF'S AND COTTONWOOD RESOURCE AREA, BLM

NOTE: This list incorporates all Listed plant species for FS and BLM lands, and those FS/BLM Sensitive (in Idaho) species known or suspected to occur within the planning area (see note below). A separate column is provided for habitat and plants in the proposed action units.

THREATENED PLANT SPECIES

SPECIES NAME	HABITAT OR PLANTS *IN PROPOSED ACTION*	Geographic Distribution	Habitat or Community Type	Elevation Range (ft.)	Successional Stage	Phenology
Mirabilis macfarlanei Macfarlane's four o'clock	YES (habitat only - Nez Perce NF)	Local Endemic	Terraces/toe slopes of bluebunch grasslands.	1,000-3,000	Mid-late	Flowers May-June
Howellia aquatilis Water howellia	NO (no habitat in proposed action areas)	Regional Endemic	Seasonal pools, ponds, and old river oxbows.	Sea level to 4500 ft.	Early	Flowers July-August
Spiranthes diluvialis Ute ladies-tresses	YES (habitat only - all Forests)	Sparse distribution in Rocky Mts.	Grass/forb mesic meadows and floodplains in low gradient valley-bottoms.	3,000-7,000	Early-Mid	Flowers August-Sept.

SENSITIVE PLANT SPECIES

SPECIES NAME	HABITAT OR PLANTS *IN PROPOSED ACTION*	Geographic Distribution	Habitat or Community Type	Elevation Range (ft)	Successional Stage	Phenology
Allotropa virgata Candystick	YES (habitat only - all Forests)	Coastal Disjunct	Lodgepole pine, beargrass. Well drained, infertile soils.	4,000-7,000	Mid to late	Flowers June-July
Astragalus paysonii Payson's milkvetch	YES (plants & habitat - Nez Perce & Payette NFs)	Regional Endemic	Openings/gaps in mixed conifer forests.	4,000-7,000	Early-mid	Flowers June-August
Buxbaumii viridis (moss) Green bug-on-a-stick	YES (habitat only - Nez Perce NF)	Sparsely distributed	Openings in moist coniferous forest on large decayed logs	1,500-5,000	Late	Sporophyte: June-September
Calamagrostis tweedyi Cascade reedgrass	NO (high elevation)	Regional endemic	Opening/meadows in sub-alpine fir/beargrass	7,000-8,000	Early-mid	Flowers June-July
Calochortus nitidus Broad-fruit mariposa	YES (plants & habitat - Nez Perce NF & BLM)	Regional Endemic	Bluebunch grasslands: ridgecrests, shallow basalt soils.	2,500-5,000	Mid to late	Flowers June-July
Carex buxbaumii Buxbaum's sedge	YES (habitat only - Nez Perce NF)	Circumboreal, but uncommon	Peat bogs and wet meadows	2,000-6,500	Early to mid	Flowers August
Carex hendersonii Henderson's sedge	YES (habitat only - Nez Perce NF)	Coastal Disjunct	Shaded understory of western red cedar, or shaded toeslopes of valley-bottoms.	2,000-4,000	Mid-late	Flowers: May-June
Cetraria subalpinum Cetraria (lichen)	NO (high elevation)	Sparsely Distributed	Subalpine zone on ericaceous shrubs	Above 6,000	Late	Surveys: July-October
Chrysothamnus nauseosus spp. *nanus* Dwarf gray rabbitbrush	YES (habitat only - BLM)	Regional Endemic	Canyon grasslands and dry rocky ridges	1,000-3,000	Early-late	Early-Late

Cypripedium fasciculatum Clustered ladyslipper	YES (habitat only - Nez Perce NF)	Sparsely distributed	Partial shade under moist cedar, grand fir, or dry Douglas-fir	1,600-4.800	Mid-late	Flowers May-June
Douglasia idahoensis Idaho douglasia	NO (subalpine species)	Local Endemic	Open, broad, subalpine ridges; unstable granitic substrate.	7,000-8,000	Late	Flowers July
Epipactis gigantea Giant helleborine	YES (plants & habitat - Nez Perce & Bitterroot NFs)	Sparsely Distributed	Minerotrophic seeps and springs; thermal waters	1,800-5,000	Mid-late	Flowers June-July
Halimolobos perplexa var. *perplexa* and *lemhiensis* Puzzling halimolobos	YES (plants & habitat - Nez Perce & Bitterroot NFs)	Local Endemic	Ponderosa pine-grassland zone adjacent to rock outcrops, in shallow soils	3,000-7,300	Early-late	Flowers May-June
Leptodactylon pungens ssp. *hazeliae* Hazel's prickly phlox	YES (habitat only - BLM)	Disjunct from east Cascades	Volcanic rocky outcrops in dry canyon grasslands (Snake & Salmon R.'s)	1500-4500	Mid-late	Flowers June-early July
Lomatium dissectum var. *dissectum* Fern-leaved desert parsley	YES (plants & habitat - BLM)	Disjunct from east Cascades	Mid-elevation canyon grasslands: bluebunch & Idaho fescue	2000-4,000	Mid-late	Flowers late April-May
Mimulus ampliatus Spacious monkeyflower	YES (habitat only - Payette NF)	Local endemic	Seepy areas in open habitat, often on basalt	1,000-3,000	Mid-late	Flowers late May-June
Pediocactus simpsonii var. *robustior* Simpson's hedgehog cactus	YES (habitat only - BLM)	Locally rare in WA, ID, to NV	Open sagebrush and grasslands on rocky ridges and benches	1000-5000	All	Flowers May
Pentagramma triangularis spp. *triangularis* Gold-back fern	YES (habitat only - Nez Perce NF)	Peripheral	Rock outcrops within low elevation grasslands.	1,500-2,000	Late	Leaves: May
Penstemon lemhiensis Lemhi penstemon	YES (plants & habitat -- all Forests)	Local Endemic	Grasslands and open ponderosa pine stands	3,200-8,100	Early-mid	Flowers June
Sedum rupicolum Rock stonecrop	NO (rocks and gravels, higher elevations)	Regional Endemic	Dry, open areas, mostly on rocks and gravels	5000+	Mid-late	Flowers June - July
Sphagnum mendocinum Mendocino sphagnum (moss)	NO (high elevation bogs)	Coastal Disjunct	Sphagnum wetlands in montane-subalpine zone	Above 5,500	Late	Surveys: July-October
Trifolium plumosum var. *amplifolium* Plumed clover	YES (habitat only - BLM)	Regional Endemic	Prairie grasslands, bluebunch, Idaho fescue, open ponderosa pine	3,000-5,000	Mid-late	Flowers June - July
Waldsteinia idahoensis Idaho barren strawberry	YES (habitat only - Nez Perce NF)	Local Endemic	Open forests of grand fir, subalpine fir, and western red cedar	3,000-5,000	Early-mid	Flowers June-July

Compiled by Alexia Cochrane, May 1999.

* Species designated Sensitive on the Bitterroot NF in Montana which may have habitat in the planning area, *but* which are (1) more common in Idaho, and (2) have no special status in Idaho NF's or BLM, include: *Glossopetalon nevadense* (spiny greenbush), *Happlopappus aberrans* (Idaho goldenweed), *Orogenia fusiformis (*turkeypeas), *Penstemon payettensis (*Payette penstemon*)*, and *Trifolium gymnocarpon* (hollyleaf clover)

Puzzling halimolobos is also present in the Colson Creek RNA (Salmon National Forest), but is not considered Sensitive in Region Four. Potential habitat for this species is 31,275 acres of Conifer/Grassland PVT 6 in the proposed action units.

Hazel's prickly phlox *(Leptodactylon pungens spp. hazeliae)*

Hazel's prickly phlox is endemic to the East Cascades with disjunct populations in west-central Idaho. This is a small aromatic shrub with flowers which vary in color from white to pink or lavender, and short rigid leaves which "prickle". The habitat is volcanic rock outc-rops and rocky soils within canyon grasslands in bluebunch wheatgrass communities. Aspects tend to be south and west. There are four known occurrences in the planning area, on BLM lands in the lower Little Salmon, Hammer-Sharkey, and Race Creek watersheds. No occurrences are known from the proposed action units. There are 2664 acres of upland grassland cover type on volcanic parent material in the proposed action area; however, there is no way to estimate volcanic rock outcrops at this scale.

Fern-leaved desert parsley *(Lomatium dissectum var. dissectum)*

This plant is disjunct in northern Idaho from its main range in the east Cascades, from Canada to northern California. These perennial species is two to four feet tall, with yellow flowers and a large, woody root. It is found in mid-elevation Idaho fescue grasslands, often extending into adjacent open conifer forests. There is one occurrence in the planning area, on BLM lands in the Wet-Sherwin watershed, with no known occurrence in the proposed action units. There are 2743 acres of potential habitat in PVT 14 (fescue grasslands) in the proposed action.

Spacious monkeyflower *(Mimulus ampliatus)*

Spacious monkeyflower was reclassified as a new species from a subspecies of *Mimulus washingtonensis* in 1997. It is endemic to west-central Idaho, with only seven occurrences known in the state. It is a small annual which has a yellow flower dotted with red; flowering is late May to June. The habitat is wet seepy areas and grassland riparian zones in low-elevation canyon grasslands, primarily in the Snake River Canyon, most often on basalt parent material. There are no known occurrences in the planning area. Potential habitat for this species is 111 acres of grassland riparian cover type in the proposed action areas.

Bank monkeyflower *(Mimulus clivicola)*

This species is a regional endemic known from north and west-central Idaho and extreme northeastern Oregon. It is a diminutive annual with a showy pink flower, which blooms from late May through mid-July. The general habitat is open ponderosa pine stands within a mesic macroclimate (such as a moist drainage). The specific habitat requirements are very restricted: south aspects between 1500 and 4100 feet, in moist pockets of open mineral soil (such as depressions in a big-game trail). There are two known occurrences in the planning area, in the Deer Creek (Nez Perce National Forest) and Upper Boulder (Payette National Forest) watersheds, but no locations in proposed action units. There are potentially as many as 31,275 acres of suitable habitat in the conifer/grassland PVT in the proposed action units,

although there is no way to know how much actual habitat meets the specific microsite requirements for this species.

Lemhi penstemon *(Penstemon lemhiensis)*

This plant is a tall perennial regional endemic, known from east-central Idaho and adjacent Montana. Its blue flowers appear in June to July. Lemhi penstemon is an early seral species which requires bare soil to become established. It occurs in a variety of habitats, including dry grasslands, big sagebrush/Idaho fescue communities, and open conifer/grasslands of ponderosa pine and Douglas-fir. Elevations range from 3200 to 8100 feet. There are 17 known occurrences in the planning area (Salmon-Challis National Forest), with 9 occurrences known in proposed action units 21 (Corn/Colson), 24 (Spring Creek), 36 (Pine Creek), and 37 (Panther Creek). There are possibly as many as 59,049 acres of potential habitat in PVT 8 (Dry Grasslands), PVT 7 (Dry Shrublands), and PVT 6 (Conifer/Grassland) in the proposed action units.

Goldback fern *(Pentagramma triangularis spp. triangularis)*

This fern is found chiefly west of the Cascades, from southern British Columbia to southern California, with a few disjunct populations in southeast Washington and extreme western Idaho. This small fern has a distinctive gold "cast" to its leaves. The habitat is rocky crevices and open, rocky slopes in valleys and foothills. The closest occurrence to the planning area is a few miles west, in the Snake River Canyon, in a dry bunchgrass community. The three other Idaho populations are in ponderosa pine and western red cedar forest types. Because cover type appears to have little influence on microsite habitat requirements, it is extremely difficult to estimate the amount of potential habitat for this species. As a starting point, there are 51,568 acres of possible potential habitat in PVTs 6 (Conifer/Grassland) and 8 (Dry Grassland) in the proposed action units.

Simpson’s hedgehog cactus *(Pediocactus simpsonii var. robustior)*

This cactus is found inland in portions of the Pacific Northwest, from eastern Washington south to Nevada, with populations in southern Idaho and extreme west-central Idaho. It is a small barrel cactus up to six inches across, with various-colored flowers which bloom in May. Simpson’s hedgehog cactus is associated with a variety of sagebrush, juniper, and grassland communities in open, rocky places at low to mid elevations. Heavy grazing and hot fires can be harmful to cacti species. There are no known occurrences in the planning area, but there are 27,774 acres of potential habitat in the proposed action units, in PVTs 7 and 8 (Dry Shrubland and Dry Grassland).

Plumed clover *(Trifolium plumosum var. amplifolium)*

Plumed clover is a regional endemic known from northeast Oregon, southeast Washington, and west-central Idaho. The habitat is prairie grasslands and meadows, with Idaho fescue, bluebunch wheatgrass, and ponderosa pine. Flowers are white, tinged with pink; the species is perennial and blooms in June and July. Late spring fire and grazing may be threats. There are four occurrences in the planning area, on BLM lands in the Lower White Bird and Hammer-Sharkey watersheds, but there are no occurrences known from the proposed action

units. There are 54,311 acres of potential habitat in PVTs 6, 8, and 14, in the proposed action areas.

Idaho Barren Strawberry *(Waldsteinia idahoensis)*

This species is endemic to north-central Idaho. The strawberry-like leaves are a distinctive shiny dark green, and the flowers are yellow. Its habitat is moist grand fir forests, under closed canopies and in forest openings. Canopy opening may increase reproduction in the short-term, and low-intensity fire will not affect the species (Crawford 1980). There are several populations on the Nez Perce National Forest, but none are within the planning area. There are 30,274 acres of potential habitat in PVT 5 (grand fir forest) in the proposed action areas.

Five other Forest Service Sensitive species may have habitat in the planning area. However, they are considered Sensitive by Region One only in Montana, but not in Idaho, and are not tracked by the Idaho Conservation Data Center. These are spiny greenbush *(Glossopetalon nevadense)*, Idaho goldenweed (*Happlopappus aberrans)*, holly leaf clover *(Trifolium gymnocarpon)*, and turkeypeas *(Orogenia fusiformis)*, and Payette penstemon *(Penstemon payettensis)*. They will not be analyzed for this project.

There are twelve other rare vascular and non-vascular plant species which are tracked by the Idaho Native Plant Society and Idaho Conservation Data Center, but which have no status with federal agencies and therefore will not be analyzed for this project. These include: *Trifolium longipes* var. *multipedunculatum, Hackelia davisii, Lobaria scrobiculata* (lichen), *Erigeron salmonensis, Sedum borschii, Eburophyton austiniae, Collomia debilis* var. *camporum, Coryphantha vivipara, Buxbaumia piperi* (moss), *Calochortus macrocarpus* var. *maculosus, Bouteloua gracilis*, and *Platanthera obtustata*. Cryptobiotic soil crusts (composed of cyanobacteria and lichens) are also present in the drier habitat types in the Salmon River Canyon ecosystem, but because they are not tracked by ICDC and have no status with Federal agencies at this time, they will not be analyzed for this project.

NOXIOUS WEEDS AND OTHER EXOTIC PLANT SPECIES

Background and exotic species ecology

According to the *Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins*, a comprehensive report compiled by the USFS Pacific Northwest Research Station (1997), the Upper Columbia Basin has experienced numerous exotic plant invasions in the last 100 years. Because all of these species have been introduced to North America, and did not evolve on this continent, they do not have natural predators and pathogens. Without these to keep them in balance, the exotic species have continued to expand. In many places noxious weeds and exotics are now the dominant species of the existing plant community. They usually germinate under a wide variety of conditions, establish quickly, exhibit fast seedling growth, and out-compete native species for water and nutrients.

These species can ultimately have great effects on ecosystem structure and function. As exotic or weedy species invade and establish, the number and cover of native species can be

reduced, erosion rates can increase, wildlife forage and bird habitat is reduced, ecological processes may be altered (such as fire behavior), and rare plants and their habitats threatened. Invasive exotic plants can expand following natural as well as human-caused disturbance, and can invade intact as well as degraded habitats (see susceptibility below) (USDA-PNW 1997). In wilderness and other recreational areas, noxious weeds and other exotic plant species are an unsightly reminder of human intervention in the ecosystem.

The beginning of agriculture and homesteading in the 1880s permitted the introduction of exotic species' seeds into low-elevation grasslands in the Salmon River Canyon. Many exotic species are pioneering "colonizer" species, i.e. they readily colonize areas that have experienced soil surface disturbance or areas that lack plant cover. Weed establishment is further enhanced by livestock grazing and high-intensity soil disturbance from road-building, mining, and logging. In addition, these species often have numerous seeds which can be transported long distances by vehicles, wind, wildlife, livestock, humans and water. Other species can also be categorized as "invaders", and can establish within relatively intact vegetation cover and displace native species without soil disturbance (USDA-PNW1997).

Management

Throughout most of the planning area, weed management is coordinated by each Forest or District. Official Forest Service direction requires Integrated Weed Management (IWM) to control noxious weed invasions. Integrated weed management is the management of noxious weed populations at desired levels, through the planned use of various methods and practices that are economically efficient and socially acceptable. This is defined in Forest Service Pest Management as "a decision-making and action process incorporating biological, economic, and environmental evaluation of pest-host systems to manage pest populations" (FSH 3409.11). Control methods are primarily mechanical (handpulling and grubbing), chemical (herbicides), and biological control agents (i.e., insects which help kill the weeds by eating seedheads, roots, etc.). In the planning area, inventory and mapping, early detection, education, and monitoring are being implemented at various scales and in various administrative units, such as the Frank Church River-of-No-Return Wilderness and the Salmon Wild and Scenic River Corridor.

The Salmon River Weed Management Area (SRWMA) is located in the Salmon River Canyon planning area, from the western boundary of the Gospel-Hump wilderness downstream to Riggins and then north to White Bird. This is a cooperative effort to manage over 35,000 acres of noxious weeds in 544,824 acres of federal, state, and private land. The cooperators are the Nez Perce National Forest, BLM, National Park Service, Idaho County, private landowners, and state agencies. All aspects of IWM are being implemented, including extensive monitoring of various treatment methods. Treatment is integrated as well, combining the more "traditional" controls such as pulling, biocontrol, and herbicides with cultural treatments such as grazing, burning, seeding, and fertilizing, which are designed to enhance and maintain desired vegetation. Proposed action units 2, 3, 4 (USFS), and 25-35 (BLM) are within the SRWMA.

Present situation

Based on existing inventories (current as of October 1999), there are a total of 31,960 acres of mapped infestations of noxious weed species in the SRC planning area. This figure includes private land. Cheatgrass has not been mapped. The majority of the identified noxious weed infestations occur along roads, trails, within the Wild and Scenic River Corridor and on private lands. Even in the wilderness portions of the planning area, all of the most severe infestations are adjacent to private inholdings and old homesteads (some of which are now on public land). Inventories are reasonably complete in the Salmon River Weed Management Area and in the Wild and Scenic River Corridor. Elsewhere in the planning area, inventories have been sporadic and primarily confined to roads and trails.

The known infestations have been incorporated into a GIS file specific to this project. The file shows the location, species, size in acres, and habitat type of each infestation. There are large areas where no information exists in GIS format, for example, the Salmon and Payette National Forests outside of the Wild and Scenic River Corridor.

Certain invasive exotic plant species have been designated as Noxious by the Idaho Department of Agriculture (Idaho Noxious Weed Law, 1994). There are at least 12 known noxious weed species in the planning area. These are described below. Desired future condition for noxious weed management on all four National Forests is to control noxious weeds to protect resources values, in compliance with Idaho State law.

There are at least 40 other exotic plant species documented in the planning area which have escaped from private to public lands. These include species introduced for cultivation (e.g. timothy, orchardgrass, oxeye daisy, redtop, and alfalfa); species introduced to control erosion (e.g. reed canarygrass, *Phalaris arundinacea*); species introduced as wildlife and bird forage (e.g. small burnet, *Sanguisorba minor*); and species which follow disturbance, such as yellow and white sweetclover (*Melilotus* spp.) and common mullein (*Verbascum thapsis*). Most of these species have spread from their points of introduction into surrounding grasslands, forests, and riparian areas. Another species, cheatgrass, is particularly insidious: although it is not designated as Noxious, its threat to native grasslands and proliferation after disturbance is well documented (USDA-PNW 1997).

Species (including noxious) of most concern in the planning area

The following species can be both colonizers in disturbed habitats and invaders in intact habitats in the Pacific Northwest. They are also abundant in the planning area, and have the most potential to spread into susceptible habitat. Acreages are current as of 1998 (please remember that inventories are not complete). Ecology and historical information is from USDA-PNW 1997. Potential Vegetation Type (PVT) information for the planning area is explained in the next section below, and is summarized in Table 3 - 3, which is a habitat susceptibility index.

Rush skeletonweed *(Chondrilla juncea)*

This is an annual species which was introduced from Asia Minor into Washington in 1938. It is present in the SRWMA, in several locations in the FCRONR Wilderness, and along the Mackey Bar Road. It is being aggressively managed in all locations. All infestations are

presently less than 10 acres in size, with a total of 38 acres as of October 98. Highly susceptible PVTs are Dry Grasslands and Fescue Grasslands.

Yellow starthistle *(Centaurea solstitialis)*

Yellow starthistle is an annual introduced from the Mediterranean into Washington in 1900. There are approximately 29,000 acres in the planning area, entirely in the SRWMA, mainly in the vicinity of White Bird, in dry grasslands on public and private land. Dry Grassland is the most susceptible PVT.

Spotted knapweed *(Centaurea maculosa)*

This biennial species was introduced from Eastern Europe into western Montana in 1920. It is found in PVTs 6, 7, 8, and in 3 (with disturbance). There are 800 acres in the SRWMA, mostly on federal land. Elsewhere in the planning area, the heaviest concentrations are in the Salmon River Corridor, especially on private land and along roads. There has been some inventory along the Salmon River below Corn Creek, but no data has been recorded from the remainder of the Salmon-Challis National Forest.

Sulfur cinquefoil *(Potentilla recta)*

Sulphur cinquefoil is a rhizomatous perennial species introduced into northern Idaho from Eurasia in 1934. It was not designated Noxious in Idaho because of the perceived difficulty of distinguishing it from native cinquefoils; it is, however, Noxious in Montana and Washington. This species has the reputation of being more difficult to eradicate than knapweed, because it spreads by rhizomes as well as seed. It is well established in the Salmon River Corridor, especially on private land and in the Whitewater Ranch, Campbell's Ferry, and Mackey Bar areas. Highly susceptible PVTs are Dry Grassland, Conifer/Grassland, Dry Shrubland, Fescue Grassland and Warm Forest with ponderosa pine. Current inventoried infested acres total 409.

Cheatgrass *(Bromus tectorum)*

This is an annual grass introduced from Europe into the Columbia River Basin in the late 1880s. It is now ubiquitous throughout dry grasslands and open forests in the Basin. Cheatgrass cures earlier than native species and produces extremely flammable litter. In fact, its presence has altered fire regimes in southern Idaho sagebrush communities, where the fire return interval has changed from 32-70 years to 5 years or less. Cheatgrass has not been inventoried on Federal lands in the planning area, although its presence has been formally noted in several RNAs and informally noted by resource specialists in the Dry Grassland and Conifer/Grassland PVTs. Highly susceptible PVTs are 3, 4, 6, 7, and 8.

Other species

The following Noxious and invasive exotic species of concern in the Columbia River Basin are present in the planning area, but either have (1) limited distribution at this time, and/or (2) a relatively small amount of susceptible habitat.

Canada thistle *(Cirsium arvense)*

Common and widespread in disturbed moist and riparian habitats throughout the planning area, Canada thistle has not been systematically inventoried. The Riparian PVT 14 becomes susceptible after disturbance.

Scotch thistle *(Onopurdum acanthium)*

This thistle has infested approximately 1000 acres in the SRWMA, on private and public land. There is also one small infestation being managed at the mouth of Sheep Creek, in the Salmon River Corridor. The Riparian PVT is highly susceptible, especially in disturbed areas such as former corrals and feedlots.

Bull thistle *(Cirsium vulgare)*

Bull thistle has not been systematically inventoried in the planning area. The Riparian PVT is highly susceptible, although mid-elevation forested PVTs become susceptible after ground disturbance and canopy opening, especially after road building, timber harvest, and fire (Cochrane, pers. observation).

Leafy spurge *(Euphorbia esula)*

Leafy spurge is present only on private land in the SRWMA (100 acres). Highly susceptible habitats are riparian and Moist/Mesic grasslands (PVTs 9 and 14).

Dyer's woad *(Isatis tinctoria)*

Dyer's woad is known on five acres in the Salmon River Weed Management Area and less than one acre in the Salmon River Corridor, at the mouth of Sheep Creek. Both infestations are being managed. Dry Shrubland and Dry Grassland PVTs are highly susceptible.

Diffuse knapweed *(Centaurea diffusa)*

This plant is known from four acres in the SRWMA, on state and private lands. Highly susceptible PVTs are 3 (Warm Forest with ponderosa pine) and 6 (Conifer/Grassland).

Russian knapweed *(Acroptilon [ex Centaurea] repens)*

Russian knapweed infests 100 acres of private and three acres of federal lands in the SRWMA. Highly susceptible PVTs are 3 and 14.

Dalmatian toadflax *(Linaria dalmatica)*

Dalmatian toadflax infests approximately 500 acres in the SRWMA, mainly on state and private lands. Highly susceptible PVTs are Dry Shrublands, Dry Grasslands, and Fescue Grasslands.

St. John's wort *(aka goatweed, Hypericum perforatum)*

This species is not considered Noxious in Idaho and was not analyzed in the USDA-PNW. Although it appears to be widespread, it does not colonize dense areas in the planning area (Cochrane, pers. obs.). It will not be analyzed further for this project.

Acres at Risk to Noxious Weed Expansion

Certain species of non-native and noxious plants can colonize and dominate certain habitat types without natural or human-caused disturbances. In other words, these habitat types are inherently susceptible to weed invasion. Other habitat types may be susceptible to invasion only following disturbance which opens the vegetation canopy (forest, shrub, or grass) or disturbs the soil. This can be human-caused, such as a timber sale, road building, or prescribed fire, or natural, such as wildland fire or landslides. The lack of a canopy and/or exposed mineral soil permit the establishment of early seral species, which includes both native species and invasive exotics, including most noxious weeds. Furthermore, if a seedbed is present, from adjacent infestations or from seed transported by vectors such as wind, water, humans, wildlife, livestock, etc., then following disturbance, weeds will germinate and grow where there were previously none.

Table 3 -3 shows the susceptibility of each Potential Vegetation Type (PVT) in the planning area to noxious weed and cheatgrass invasion, based on an evaluation of each PVT and each weed species (adapted to the SRC Project from ICBEMP, p. 788-789). The susceptibility classes for the PVTs are Low (a low susceptibility to invasion, meaning the species typically does not establish because the PVT does not provide suitable habitat); Moderate (a moderate susceptibility to invasion, meaning the species is a "colonizer" and can invade the PVT successfully after disturbance removes the normal canopy cover or impacts the soil surface); and High (a high susceptibility to invasion, meaning the species is an invader and can invade the PVT even in the absence of intense or frequent disturbance). This means the PVT is inherently susceptible to invasion by that particular species.

Each PVT was rated as Low, Moderate, or High for each weed species. Differences in the habitat requirements for each species and in the ecological characteristics for each PVT determine the susceptibility to invasion. Certain species share general habitat requirements, such as spotted knapweed, cheatgrass, and sulfur cinquefoil. For example, conifer/grassland (PVT 6), Dry Grassland (PVT 8), and Warm Dry Forest with ponderosa pine (PVT 3) are all rated as High for these species (inherently susceptible to invasion, even in the absence of disturbance). In contrast, for Canada thistle, only the riparian PVT (9) was rated as High.

Table 3 - 3. Index Of Habitat Susceptibility* For 13 Noxious/Exotic Species in Potential Vegetation Types of the Salmon River Canyon Project
(Adapted From ICBEMP Scientific Assessment)

POTENTIAL VEG TYPE	Total acres	Cheat-grass	Sulfur cinquefoil	Spotted knapweed	Yellow starthistle	Rush skel-etonweed	Diffuse knapweed	Russian knapweed	Canada thistle	Bull thistle	Leafy spurge	Dyer's woad	Dalmatian toadflax	Scotch thistle
High elevation forest	390,209	Low	Low	Low	Low	Low	Low	Low	Moderate	Moderate	Low	Low	Moderate	Low
Cool Douglas-fir forest	243,352	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Moderate
Warm forest w/ p. pine	522,688	High	High	High	Moderate	Moderate	High	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Cold Doug-fir (not present in planning area)	0	High	High	High	Low	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Grand fir forest (moist)	193,268	Low	Moderate	Moderate	Low	Low	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Moderate
Conifer/grassland	180,312	High	High	High	Moderate	Moderate	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Dry shrubland	48,892	High	High	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	High	High	Moderate
Dry grassland	123,612	High	High	High	High	High	Moderate	Moderate	Moderate	Moderate	Moderate	High	High	Moderate
Riparian	12,406	Moderate	Moderate	High	Moderate	Low	Moderate	Moderate	High	High	High	Moderate	Moderate	High
Agriculture	2,683	Moderate	Moderate	High	High	High	Moderate	Moderate	Moderate	Moderate	High	High	Moderate	Moderate
Mesic shrubland	19,603	Low	Moderate	Low	Low	Low	Low	Low	Moderate	Low	Low	Low	Low	Low
Fescue Grassland	11,879	Moderate	High	High	Moderate	High	Moderate	High	Moderate	Moderate	High	Moderate	High	Moderate
	1,748,904													
TOTAL ACRES High		875,504	887,383	853,580	126,295	138,174	703,000	534,567	12,406	12,406	26,968	175,187	184,383	12,406
TOTAL ACRES Moderate		270,320	471,312	485,512	776,177	995,244	636,092	804,525	1,736,498	1,716,895	1,068,772	970,637	1,544,918	1,326,686
TOTAL ACRES Low		603,080	390,209	409,812	846,432	615,486	409,812	409,812	0	19,603	653,164	603,080	19,603	409,812

HIGH = High susceptibility to invasion --species is an "invader" and invades the PVT even in the absence of intense or frequent disturbance (inherently susceptible)

MODERATE = Moderate susceptiblity to invasion -- species is a "colonizer" and invades the PVT successfully because disturbance removes the normal canopy cover or creates bare mineral soil

LOW = Low susceptbility to invasion -- species typically does not establish because the PVT does not provide suitable habitat

* The above susceptibility ratings for each species are based on personal observations by Alexia Cochrane, Bruce Anderson, and Leonard Lake in the Salmon River Canyon Ecosystem

Potential Vegetation Types at Risk

To simplify discussion of project effects in chapter 4 (Environmental Consequences), each PVT was rated for general susceptibility to the five noxious/exotic species of concern. This rating is the total of the majority rating for each species in each category. For example, because Dry Shrubland PVT was rated Moderate for three species, and High for two, the general rating is Moderate.

Table 3 - 4. Potential Vegetation Type Susceptibility Ratings.

PVT	General Susceptibility to Species of Concern	Acres in Planning Area	Acres in Proposed Action
1. High elevation forest	Low	390,209	13,543
2. Cool Douglas-fir forest	Moderate	243,352	11,291
3. Warm forest with ponderosa	High	522,688	109,572
4. Cold Douglas-fir forest	Not present in planning area	0	0
5. Grand fir forest (moist)	Low	193,268	30,273
6. Conifer/grassland	High	180,312	31,275
7. Dry shrubland	Moderate	48,892	7,481
8. Dry grassland	High	123,612	20,293
9. Riparian	Moderate	12,406	1,453
10. Agriculture	High	2,683	43
13. Mesic shrubland	Low	19,603	3,029
14. Fescue grassland	High	11,879	2,743
	Total Acres High	841,174	163,926

(Water and Barren Rock PVTs are omitted.)

Table 3 - 4 displays the general High, Moderate, and Low susceptibility for the entire planning area, plus the proposed action units. Map 3- 7 also displays the general susceptibility for the planning area, and shows the noxious weed infestations which have been mapped to date in the planning area (Note: Map 3-7 is in preparation and will appear in the final EIS).

Extreme Risk of Noxious Weed Spread

An additional category was assigned to reflect the importance of vectors of spread, such as roads, trails, the Salmon River, and private land, especially following disturbance. This category exists in the PVTs rated as High (inherently susceptible), where any of these vectors are present. Extreme risk of spread means that the spread of noxious weeds and other invasive exotics will be exacerbated by disturbance which opens the overstory or understory canopy or creates bare mineral soil.

To create the model for the Extreme Risk of Spread, "buffers" were created for each of the vectors. The values for these are 100 m. adjacent to private land boundaries, 80 m. on each side of road centerlines, and the banks of the Salmon River, and 50 m. from trail centerlines. These buffers were then applied to the PVTs rated as High for each species. For the purposes of this project, Extreme Risk of Spread was only applied to the proposed action units.

However, using GIS, this model could easily be applied to the entire planning area for other projects.

Table 3 - 5. The proposed action units with acres of Extreme Risk of Noxious Weed Spread.

Proposed Unit #	Total Unit Acres	Acres of Extreme Risk	Percent Extreme Risk
2	33,070	11,560	34.96%
3	101	33	32.62%
4	52,305	10,966	20.97%
5	5,001	477	9.54%
6	5,996	425	7.09%
8	4,073	770	18.90%
9	2,159	131	6.07%
10	2,113	85	4.02%
11	12,304	817	6.64%
12	2,118	332	15.67%
13	8,460	162	1.91%
14	3,780	108	2.86%
15	3,132	173	5.52%
16	3,079	92	2.99%
17	6,333	331	5.23%
18	2,734	117	4.28%
19	2,431	251	10.32%
20	4,049	546	13.48%
21	19,238	1,834	9.53%
22	2,219	613	27.63%
23	5,235	1,055	20.15%
24	12,221	2,547	20.84%
25	78	58	74.38%
26	1,222	535	43.77%
27	201	71	35.33%
28	3,280	918	27.99%
29	41	18	43.96%
30	79	32	40.70%
31	77	35	45.54%
32	36	27	75.99%
33	83	38	45.89%
34	121	66	54.74%
35	147	34	23.09%
36	6,681	1,115	16.69%
37	20,941	2,188	10.45%
38	12,693	822	6.48%

Existing infestations also greatly increase the extreme risk of spread. Seeds and vegetative reproduction may spread into adjacent susceptible habitat without disturbance, especially when vectors of spread are also present. Disturbance will allow the germination of seed in the seed beds, although no weeds were present before. However, known infestations were not included in the model for Extreme Risk of Spread for two reasons: 1) the inventory is incomplete throughout the planning area, and 2) a map of the infestations known at this time

is merely a "snapshot." Over time, infestation size will increase, certain infestations may be reduced in size from treatment, and new locations will be found. Therefore, basing the model on this would render it inaccurate in a very short time. It is hoped that the individual units will continue to inventory and update the GIS files as appropriate, especially prior to project implementation.

Total Extreme Risk for the Proposed Action = 39,382 acres (16 percent of the total proposed action, 2 percent of the total planning area). There is no correlation between unit size and acres of Extreme Risk. The acreages and percentages range from 6 percent (822 acres) in unit 38 (a large unit in Indian Creek/Crooked Creek) to 74 percent (78 acres) in unit 25 (a very small low-elevation unit on the BLM in the Wet-Sherwin watershed). The most acres of Extreme Risk -- 11,560 -- are located in unit 2 (33,070 acres), which spans five watersheds on the western edge of the planning area. Unit 2 is also within the Salmon River Weed Management Area.

Table 3 - 5 shows the proposed action units and Extreme Risk of Noxious Weed Spread. Maps of each unit showing the risk of invasion, including areas of extreme risk, are located in Appendix G.

RESEARCH NATURAL AREAS

Research Natural Areas (RNAs) are designated areas representing different types of vegetation across the country on federal lands. They provide areas for study of natural processes, baseline areas for determining long-term ecological changes, and monitoring comparison areas for assessing effects of resource management techniques applied to similar ecosystems. There are eleven RNAs within the planning area: three are on BLM lands and are also designated Areas of Critical Environmental Concern (ACECs). The remaining eight are on Forest Service lands, within three National Forests. Only one RNA, Colson Creek, is located within the proposed action area, in unit 21.

Colson Creek RNA is 280 acres in size, and is within the Colson Creek subwatershed on the North Fork District of the Salmon National Forest. This RNA was established to represent the transition zone between grasslands to the north and west and sagebrush/grass habitats which are common further south. The grassland types in the RNA include Idaho fescue and bluebunch wheatgrass; the shrub habitat types are green-bush, curl-leaf mountain mahogany, threetip sagebrush, and basin big sagebrush. One forb species, puzzling halimolobos (*Halimolobos perplexa* var. *perplexa*) is designated Sensitive in Region One, and has habitat for another Region One/Four Sensitive species, Lemhi penstemon (*Penstemon lemhiensis*). These species are discussed further in the TES Plants section. Despite the RNA's proximity to adjacent Forest Service Roads, there are currently almost no exotic plant species present. There is a very minor amount of cheatgrass, and some spotted knapweed along the southern boundary of the RNA (adjacent to the Salmon River Road). The Colson Creek RNA contains areas classified as having an Extreme Risk of Spread for noxious weeds, as described in the previous section on Noxious Weeds.

The Management Prescription in the Establishme3-27nt Record for the Colson Creek RNA states that "management and protection of the Colson Creek RNA will be directed toward maintaining natural ecological processes." The Vegetation Management objective of the

RNA is "to maintain high representative quality of the affected plant communities. Fire plays an important functional role in forest and shrubland communities represented in the Natural Area....Vegetation management activities are needed to maintain ecological processes related to fire disturbance in Douglas-fir and ponderosa pine forest communities."

The management prescription also states that "wildfire will be actively suppressed unless plans approved by the Intermountain Research Station Director provide for letting natural fires burn. . . .Prescribed burning will be used only as specified in approved research projects or when needed to meet RNA management goals." Prior to execution, a plan detailing the objectives of prescribed fire use, proposed fire prescriptions, operation precautions, and criteria for evaluation of the attainment of prescribed fire objectives will be submitted for approval to appropriate agency staff. The management prescription further states that special precautions will be necessary to prevent the spread of spotted knapweed as a result of prescribed fire.

Table 3 - 6. Salmon River Canyon Project Area RNAs.

RNA Name	Agency
No Business Creek	Nez Perce NF
Elk Creek	Nez Perce NF
Pony Creek	Payette NF
Patrick Butte	Payette NF
Lava Butte	Payette NF
Gunbarrel Creek	Salmon-Challis NF
Colson Creek	Salmon-Challis NF
Dome Lake	Salmon-Challis NF
Lucile Caves	Cottonwood BLM
Long Gulch	Cottonwood BLM
Skookumchuck	Cottonwood BLM

WILDLIFE

SCOPE OF THE ANALYSIS

The Salmon River Canyon Project Area provides a wide diversity of plant communities which provide yearlong or seasonal habitats for nearly 400 different wildlife species. This discussion of wildlife species and general biodiversity concepts will address individual species from a wide array of niches based on their management status (i.e. federally listed or proposed, Regional Forester sensitive, and Forest Plan Management Indicators).

FEDERALLY LISTED OR PROPOSED SPECIES

Gray Wolf - *Endangered; Status - Experimental/Nonessential*

Wolves were historically present in Idaho but by the 1930s (USFWS 1994) had been nearly extirpated from Idaho and the western continental U.S. In 1995 and 1996, gray wolves were reintroduced into central Idaho and now occupy areas within and adjacent to the Salmon River Canyon area. With reintroduction, the status of the species was changed from

endangered to an endangered Section 10 (j) "experimental/nonessential" population throughout most of Idaho, including the entire Salmon River Canyon Project Area. The analysis area is occupied by at least two resident wolf packs (Selway pack- pair B5/B10, Chamberlain pack B16/B9) and is intermittently used by other transient individuals.

The Rocky Mountain Wolf Recovery Plan (USDI Fish and Wildlife Service 1987) outlines the recovery goals and tasks for the gray wolf. This plan identifies central Idaho as a key recovery area, which includes all of the Salmon River Canyon Project Area. A variety of habitats may be used to meet their needs for food, cover, reproduction, and space. The Northern Rocky Mountain Wolf Recovery Plan (USDI Fish and Wildlife Service 1987) identifies the key components of wolf habitat as habitat capable of providing:

a. A sufficient year-round prey base of ungulates and alternate prey.

b. Suitable and semi-secluded denning and rendezvous sites.

c. Sufficient space with minimal exposure to humans.

Prey Base

Wolves prey primarily on elk, deer, and moose, with alternate prey consisting of smaller mammals such as beaver. Habitat management for wolves coincides with habitat management for ungulates.

Denning/Rendezvous Sites

Dens are usually located on low relief slopes with southerly aspects and well-drained soils usually within close proximity to surface water and at an elevation overlooking surrounding low-lying areas (USDI Fish and Wildlife Service 1987). One active wolf den has been documented within the planning area.

Wolves use natural openings in dense timber or other riparian areas if meadows are not available. These sites (rendezvous areas) are used as resting and social gathering areas during summer and early fall, after the natal den is abandoned (USDI Fish and Wildlife Service 1987).

Human Disturbance/Mortality Risk

Wolves require forested cover to provide security from human disturbance. Although minimal exposure to humans is not as important to wolf habitat as originally thought (USDI Fish and Wildlife Service 1993), it is a factor in maintaining high quality big game habitat and reducing the risk of incidental wolf mortality. However, wolves are known to be sensitive to human disturbance near den sites and may abandon dens if disturbed.

The Selway pack (animals B5/B10 and offspring) range widely at the northeastern end of the analysis area within the Magruder corridor on the Bitterroot and Nez Perce National Forests. The den location (undisclosed) is not located within any watershed proposed for action. The

Chamberlain pack primarily resides south of the Salmon River in the central portion of the analysis area but is known to cross the river, especially during winter.

Bald Eagle - *Threatened*

The bald eagle is the only North American representative of the fish or sea eagles and is endemic to North America (U.S. Fish & Wildlife Service 1986). Bald eagles occur throughout the seven-state Pacific recovery area, but nesting distribution is more restricted than wintering distribution. Within the Salmon River Project Analysis Area portions of the Pacific recovery area only one documented nest is known, but bald eagles commonly utilize the major riverine corridors and lower elevation big game winter ranges as wintering habitat. Within the analysis area, bald eagle winter populations have been monitored since 1984. Since that time, total numbers of bald eagles have remained relatively stable or slightly increased (Nez Perce National Forest 1996).

Winter Habitat Requirements

Wintering eagles in the analysis area utilize dead and occasionally live trees as perch sites. Perches are used for both resting and viewing potential food sources from. In the Salmon River corridor, wintering eagles most often use large, riverside snags and occasionally live trees as night roosts. Unlike some areas within the seven-state recovery zone, Salmon River eagles are not known to use communal roosts in side drainages and dense old-growth timber as they do in other major drainages of the region.

Adequate food resources are the most critical components of both breeding as well as wintering habitat. Eagles often depend on prey that are dead, dying, or otherwise vulnerable. Although fish, waterfowl, jackrabbits and carrion are used throughout the Pacific Recovery Zone, in Idaho and particularly in the analysis area, eagles use big game carrion (U.S. Fish & Wildlife Service 1986). Other food sources may be used in the project area but they are generally incidental to large ungulate carrion (primarily deer and elk).

Threats to Bald Eagles

Habitat loss continues to be the most significant long-term threat to all bald eagle populations in the recovery area (U.S. Fish & Wildlife Service 1986). Activities that may adversely affect the suitability and productivity of breeding, wintering and foraging areas include urban developments, logging, mineral exploration, and a variety of other forms of human activities which cumulatively affect the recovery areas. Maintenance and protection of productive big game winter ranges and summer ranges are important in maintaining sufficient numbers of big game as a winter food source within the Salmon River Canyon Project Area. The Pacific Bald Eagle Recovery Plan (1986) cites among other actions, that aggressive habitat management and protection along with land planning and public education are important to stemming the threat of habitat destruction.

Secondary causes of mortality and population problems in bald eagles of the region include shooting, pesticide contamination, lead poisoning, power pole electrocutions and a variety of other environmental contaminants (U.S. Fish & Wildlife Service 1986).

Peregrine Falcon - *Endangered*

Peregrine falcons are medium-sized hawk-like birds with long, pointed wings and long tail. The peregrine falcon is endemic to the Salmon River Canyon Project Area and have been federally protected since 1969. Its endangered classification resulted from long-term population declines due principally to organochlorine pesticides applied in the U.S. and Canada (U.S. Fish & Wildlife Service 1997). Recognized population declines began in the 1950s and culminated in the early 1970s with the complete extirpation of the species in the eastern U.S. and an estimated 60 percent reduction in breeding pairs across the western portion of its former U.S. range (Bechard and Howard 1989). Throughout the species' range, a cliff is the usual nesting setting of the species. Favored cliffs are often high, frequently overlook water, and permit an extensive view of the surrounding territory. Eyries (nest sites) are usually located at elevations below 9,500 feet, and have an adequate source of food (primarily small to medium-sized terrestrial birds, shorebirds and waterfowl) within 10 miles of the nesting cliff (U.S. Fish & Wildlife Service 1997).

Three active or intermittently active nest sites are known at the far west end of the Salmon River Canyon Project Analysis Area (U.S. Fish & Wildlife Service 1997) and a fourth (Hell's Canyon nest) lies within 6 miles of the western edge of the analysis area (C. Johnson pers. comm.) All four nests are within 10 miles of proposed treatment areas. In addition, spring-summer observations of peregrines have recently been made in the Rapid River area which may indicate an as yet undiscovered nesting site (U.S. Fish & Wildlife Service 1997).

Threats to Peregrine Falcons

Potential threats to peregrine falcons today involve impacts to nesting habitat, direct disturbance at active nest sites, and potential impacts on habitat of their prey species. Protection and recovery of peregrine falcons within Idaho and the Salmon River Canyon Project Area focuses primarily on protection of active nest sites from human harassment or other environmental threats during the nesting season, and protection and maintenance of habitats of birds used by peregrines for prey.

Grizzly Bear - *Threatened*

Grizzly bears were listed as a threatened species in the 48 contiguous States in 1975. Habitat loss and excessive human-caused mortality have significantly reduced numbers of this species in the lower 48 states. Grizzly bears were once widespread inhabitants of the Bitterroot Mountains in central Idaho and western Montana, however the last verified death of a grizzly bear in the Bitterroot Ecosystem (which includes most of the Salmon River Canyon Project Analysis Area) occurred in 1932 and the last tracks were observed in 1946. No verified tracks or sightings have been documented in more than 50 years, and the best scientific evidence available indicates there are no grizzly bears in the Bitterroot Ecosystem at this time (U.S. Fish & Wildlife Service 1997b). Suitable habitats within the Bitterroot Ecosystem boundaries including areas within the Salmon River Canyon Project analysis area are not considered "occupied" at this time (U.S. Fish & Wildlife Service letter, Nov. 6, 1995).

Grizzly Bear Habitat Suitability

Grizzly bear foods include a wide range of plant and animal sources. Butterfield and Almack (1985), and Davis and Butterfield (1991) (U.S. Fish & Wildlife Service 1997b) evaluated suitability of habitats in the Bitterroot Ecosystem based on the essential grizzly bear habitat criteria of space, isolation, sanitation, food, denning, vegetation types and safety. These authors concluded that the area meets many of the habitat criteria and would support a population of grizzly bears. The major obstacles to successful grizzly bear recovery in the Bitterroot Ecosystem are thought to be related to potential human-caused mortality. An EIS has been completed and a decision is currently pending on reintroduction of grizzly bears into the Bitterroot Ecosystem. For this reason, the implications and effects of prescription burning on potential grizzly habitats will be addressed although the analysis area currently has no known grizzly bear occupation.

Food Requirements

Although the digestive system of grizzly bears is essentially that of a carnivore, grizzlies are successful omnivores, and in some areas may be almost entirely omnivorous (U.S. Fish & Wildlife Service 1993). Grizzlies are opportunistic feeders preying or scavenging on almost any available food including ground squirrels, ungulates, carrion and garbage, but in areas where animal matter is less available, roots, bulbs, tubers, fungi and tree cambium may be used to meet protein requirements (U.S. Fish & Wildlife Service 1993). The importance of herbaceous forage for grizzlies and the role of fire in creating and rehabilitating forage species preferred by grizzly bears locally, has been recognized (Davis, D. et al. 1986). Grizzly bears feed on animal matter or vegetable matter which is highly digestible and high in starch, sugars, protein and stored fat. The search for food has a prime influence on grizzly bear movements. Results of habitat evaluations in the proposed Bitterroot Recovery Area indicate the area will support a recoverable population of grizzlies.

Cover Requirements

Forest cover is important to grizzly bears and is evidenced by several radio-telemetry studies (U.S. Fish & Wildlife Service 1993). The importance of an interspersion of open parks or small openings created by tree removal, riparian management or prescribed burning to increase bear foods (forbs, berries, grasses), should not be overlooked when maintaining forest cover for grizzly bears. In a four year study in the Yellowstone Ecosystem (Blanchard 1978), only 1 percent of the grizzly relocations were in dense forest more than a kilometer from an opening.

Denning

Grizzly bears excavate dens starting as early as September. Dens are usually dug at higher elevations well away from human developments on steep slopes where wind and topography cause an accumulation of deep snow and where the snow is unlikely to melt during warm periods of the winter (U.S. Fish & Wildlife Service 1993). In the Salmon River Canyon Project Analysis Area, few if any sites would likely meet denning criteria because of elevations.

Lynx - *Proposed*

The Canadian lynx is a medium-sized carnivore of the cat family with relatively long hind legs. Although hares are the lynx's primary prey, they will also feed on mice, squirrels, and grouse, especially during summer months. Western montane lynx populations including those within the analysis area occupy marginally suitable habitats that decrease in quality and availability as one moves southward (Roloff 1995). Although Alaskan and Canadian populations of lynx are generally considered relatively stable, lynx are considered more rare in Idaho and have for several years been designated as sensitive species by both Region 1 and Region 4 Regional Foresters. Because recruitment is low, trapping and forest management activities may pose significant threats to the persistence of populations. In June, 1998 the lynx was officially proposed for federal listing in the western United States.

Habitat Use

Lynx have a high potential for population growth but their recruitment is influenced by the abundance of its principal prey, the snowshoe hare. Increasing lynx densities have been tied to increased prey abundance (Ruggiero, L.F. et al. 1994). In southern latitudes, young aged stands (15-30 years old) appear to provide the best habitat for hares (Ruggiero, L.F. et al. 1994). Lynx may also be threatened by low quality, quantity and poor interspersion of denning and travel habitats (Roloff 1995). Lynx require a mosaic of vegetation structures distributed across the landscape (Koehler and Aubry 1994, In: Roloff, 1995). Lynx have been confirmed to occur on the Nez Perce National Forest, have been reported near Warren on the Payette National Forest and likely occupy the upper elevations (greater than 4000' elevation) within the analysis area, but the overall conditions for lynx recovery within the analysis area are still being evaluated at this time.

US FOREST SERVICE SENSITIVE SPECIES

Forest Service Manual 2670.5 defines Sensitive species as "those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species/existing distribution." In FSM 2670.22, management direction for Sensitive species is, in part, to ensure that species do not become threatened or endangered because of Forest Service actions, and to maintain viable populations of all native species.

Western Big-eared bat

The Western Big-eared bat, also called Townsend's big-eared bat is considered sensitive in US Forest Service Regions 1 and 4. This species is a medium-sized bat with very large ears and has been found in a wide variety of habitats, from arid juniper/pine forests to high-elevation mixed conifer forests (Reel, et al. 1989). They forage after dark, principally on moths, and roost communally in caves or abandoned mine tunnels. Western Big-eared bats are extremely sensitive to human activities, particularly at communal roost sites and have been known to permanently abandon them in response to cave exploration disturbances (Reel, et al. 1989). Western big-eared bats have been confirmed to have occupied at least

one cave at the western end and one mine and at the eastern end of the Salmon River Canyon Analysis Area.

Feeding /Day Roost Habitats

Western Big-eared bats commonly feed along forest edges, roads or open areas within the forest (Christy and West 1993). For this reason, large scale vegetative conversions of forested habitats should be avoided. Only one report of this species roosting in the hollow of a large tree is known which suggests that the bat may occasionally make use of suitable hollows in large trees or snags as day roosts (Idaho Dept. of Fish & Game et al. 1995a).

Spotted Bat

The spotted bat is considered sensitive in USFS Region 4. Spotted bats are more closely associated with drier valleys, plains and foothill environments than most other bats of the Columbia River Basin (Marcot, B.G. 1995). It tends to prefer more arid habitats and may roost in buildings, cliffs or caves. The Salmon River Canyon Analysis Area lies at the very northern edge of this species' range which extends from central Idaho and western Wyoming into Utah, Nevada, Arizona, southern California and the extreme western edges of Colorado and New Mexico. Its presence within the Salmon River Canyon Analysis Area is uncertain and relatively little information is available. However, it has been confirmed in the Middle Fork of the Salmon, immediately adjacent to the analysis area and in similar habitats. Relatively little is known of the status or specific habitat preferences of this rarely seen bat but habitat changes from historic conditions for this and at least 14 other bats of the Columbia River Basin have been recognized throughout the Upper Columbia River Basin (Marcot, B. 1995).

Harlequin Duck

The Harlequin duck is a USFS Region 1 sensitive species. It is a sea duck that migrates to mountain streams to breed during the spring-summer period. It prefers swift flowing, low gradient, high quality mountain streams with ample bank vegetation usually adjacent to mature to old-growth western red cedar, western hemlock or spruce-fir overstories (Cassirer, E.F., et al. 1996). Potential threats to harlequin ducks in the Rocky Mountains of the U.S. include activities that affect riparian habitats, water yield, water quality, or increased human disturbance on nesting areas during the breeding season (Cassirer, et al. 1996). General conservation strategy guidelines include establishing stream buffers, maintaining instream flows, water quality and reducing human disturbance along breeding areas. Breeding habitats for the Harlequin duck have been documented principally north of the Salmon River drainage. Although Harlequin ducks have been observed resting along the main Salmon River and streams that feed the Salmon River, including Rapid River, Bargamin Creek, Camas Creek, North Fork Salmon River and Hayden Creek/Bear Valley Creek, nesting has never been documented anywhere within the Salmon River Canyon Project Area (Cassirer, et al. 1996).

Northern Goshawk

The Northern Goshawk is a sensitive species in USFS Region 4 and Region 1. In the western United States, goshawks are generally associated with mature and old-growth forest habitat during the breeding season.

Nesting habitat

Nests are placed in mature trees usually against the trunk or in a crotch near or just below the bottom layer of live canopy (Idaho Dept. of Fish & Game 1995b). Nests are usually in stands of mature trees with dense either multi- or single-layered canopies and low ground cover, on moderate slopes, often within a few hundred meters of water. Goshawks have been found to use the same nesting areas for decades but commonly change specific nest locations from year to year, alternating use between as few as two and as many as nine alternate nests in a given territory (Idaho Dept. of Fish & Game 1995b).

Prey Species

Goshawks prey mainly on medium-sized forest birds and mammals including grouse, snowshoe hares, red squirrels, and may hunt in many forest types. The location of mature forest stands near natural openings and riparian areas may be important to foraging goshawks due to higher prey densities afforded by such habitat mosaics.

Goshawks are relatively common within the Salmon River Canyon Project Analysis Area as evidenced by incidental nest sightings (Payette, Bitterroot, Salmon-Challis National Forests) and results of habitat and nest survey work within the western and northwestern portions of the analysis area within the Payette and Nez Perce National Forests (Gordon, F. pers. comm.; Blair, G.S. 1995;). In Idaho and surrounding areas, concerns for goshawks and their habitats are aimed at nesting and foraging habitat, particularly habitat quality reduction, fragmentation and deterioration of mature conifer forest habitat (Idaho Dept. of Fish & Game 1995b). Suppression of wildland fires can result in vegetation structural changes that lead to reductions in goshawk prey numbers and foraging opportunities (Idaho Dept. of Fish & Game 1995b).

Flammulated owl *(neotropical migrant)*

The flammulated owl is a sensitive species in USFS Regions 1 and 4 and occur mostly in lower and mid-elevation conifer forests and are closely associated with extensive stands of old-growth ponderosa pine and mixed old-growth ponderosa pine/Douglas fir, or grand fir (Dobkin, 1994). The species has disappeared from portions of its previous breeding range where such habitats have been highly fragmented and much diminished in extent. Flammulated owls avoid cut over areas and forests younger than 100 years old (Dobkin, 1994). This small forest owl winters mainly south of the U.S. border and migrates north to breed. Flammulated owls nest in dead standing trees (snags) in cavities excavated by pileated woodpeckers.

Habitat Threats

Flammulated owls occur within the Salmon River Project Analysis Area. Recent surveys and other studies of flammulated owl habitat relationships cited in Hayward and Verner (1994) suggest that elimination and replacement of ponderosa pine and mixed conifer forests by Europeans have reduced the overall abundance of flammulated owls across their historic range. Among these actions, selective logging and past fire suppression are considered potential causes for habitat-induced population changes. Reductions in dispersion and abundance of grass/forb understories due to long term fire exclusion has contributed to reductions in habitat quality (Hayward and Verner 1994).

Boreal owl

The boreal owl is a medium-sized owl which occupies boreal and sub-alpine forest types. In the western US, they prefer high elevation forests. Surveys in Idaho and Montana found no boreal owls below 1292 meters (3800 feet) elevation and 75 percent of locations were above 1584 meters (4700 feet) elevation (Hayward & Verner 1994). Studies in and adjacent to the Salmon River Project Analysis Area (Hayward, et al. 1993) found that mixed conifer and aspen forest communities are preferred as nesting habitats while spruce-fir forests are used as summer roosts and foraging areas. In the analysis area, presence of boreal owls is assumed to be limited to areas in the upper-most elevations.

Nests

Boreal owls are obligate cavity nesters, nesting in snags, and depend on pileated woodpeckers and common flickers to excavate cavities. Larger trees or snags are preferred as nest sites which research has shown to occur principally in mixed conifer and aspen communities (Hayward, et al. 1993; IN Hayward and Verner, 1994).

Prey

Red-backed voles are an important prey species for boreal owls. Red-backed voles are often associated in part, to older forest conditions where fungi and lichen abundance are common. Dense shrub cover or high tree density will limit the access of boreal owls to small mammal. Also, conditions that promote snow crusting (large forest openings) will also reduce small mammal availability to boreal owls (Hayward and Verner 1994).

Great Gray Owl

Despite its large size, broad distribution, and relatively bold nature, the great gray owl remains poorly understood. Great gray owls are known to occupy the Salmon River Project Analysis Area but their extent and relative population size within the analysis area is relatively unknown. Within the Salmon-Challis National Forest, great gray owls occupy higher elevation habitats predominantly outside the analysis area (Wenger, D. pers. comm.).

Great gray owls have been described as both nonmigratory and nomadic. When prey becomes scarce, many great grey owls abandon their breeding range, and under such

conditions, owls that fail to disperse often die. Preferred foraging habitats have been described as relatively open, grassy habitats. Sites with 11-59 percent overstory canopy have been cited as preferred foraging habitats (Hayward and Verner 1994). Some experts maintain that timbered stands are avoided as hunting habitats, while others claim that "open forests" are preferred (Hayward & Verner 1994).

Nests

Great gray owls rely on old hawk and raven nests or natural depressions on broken-topped snags or stumps for nest sites but may also nest on natural platforms formed by dwarf mistle-toe. They may occasionally nest on the ground, rock cliffs, or haystacks and readily accept artificial nest structures. (Hayward & Verner 1994).

Mountain Quail

The mountain quail is the largest native quail of North America. Mountain quail exist in low densities and many populations complete an altitudinal migration in the spring and fall of each year, confounding efforts to study and fully understand habitat relationships. Mountain quail occur in the western end of the Salmon River Canyon Project Analysis Area and appear to be largely dependent on riparian shrub communities. In the analysis area they are found principally in narrow corridors of riparian shrub communities which may or may not have an open coniferous forest overstory (Ormiston 1966, Brennan 1989 in Vogel and Reese 1995). Open habitats such as annual grasslands or open ground are avoided by mountain quail. With respect to habitats used for nesting and migration, several researchers report that tall and dense shrubs in close proximity to water with moderate to high (average 64 percent) tree crown cover on steep slopes (greater than 20 percent) characterize quality habitats (Vogel and Reese 1995).

Habitat Threats

Reduction and fragmentation of corridors of shrubby riparian habitat into isolated islands, along with other activities such as agriculture, cattle grazing, residential development, water impoundments, and forestry practices can alter composition and structure of mountain quail habitats. Closed canopy forest without understory shrubs is generally unsuitable as habitat. The Idaho Conservation Assessment and Strategy for Mountain Quail (Vogel and Reese 1995) cites that among other factors in the Slate, John Day, Cow, Lightning , Allison, Papoose and Squaw Creeks within the analysis area, "closed canopy forest with limited shrub understories" have been encouraged by fire suppression which has resulted in habitat reductions for mountain quail. Habitat strategies that open the forest canopy and allow shrub understories to develop could be helpful to the species.

Black-backed woodpecker

Black-backed woodpeckers are residents within the analysis area which excavate nesting cavities in snags or live trees with dead heartwood (DeGraaf, et al. 1991). Black-backed woodpeckers utilize timbered areas where the presence of disturbance events (fires, insect infestations and disease) create feeding and nesting opportunities in damaged or weakened trees. Canopy fires that defoliate trees or scorch or burn the bark, but do not burn or dry out

the inner bark provide suitable host sites for beetles, a key food source for black-backed woodpeckers. Black-backed woodpeckers respond positively to fires and may use burned timber up to ten years after a fire (Sallabanks and McIver 1998; Hutto, R., pers. comm.). The species has evolved nomadic dispersal capabilities that allow it to quickly colonize post-disturbance areas. Cover types used by the bird include elevations below 6000 feet in Douglas fir, ponderosa pine, western larch, Engelmann spruce, lodgepole pine and subalpine fir. Limited surveys and incidental sighting reports within the Salmon River Canyon Project Analysis Area indicate the species is widely dispersed but very sparsely populated there.

White-headed woodpecker

White-headed woodpecker presence in western Idaho has been characterized as scarce and rather local (Burleigh 1972 In: Blair, et al. 1995). The bird is considered nonmigratory throughout its range and its distribution throughout Idaho, particularly with respect to nesting and wintering areas, is not well documented. The bird's close association with mature ponderosa pine and the historically high rate of harvest of this tree species led to the species' sensitive status in USFS Regions 1 and 4 in the early 1990s.

White-headed woodpeckers prefer open-canopied stands of mature and older ponderosa pine (Blair, et al. 1995). Overstory canopy coverage less than 26 percent or tree densities less than 165 trees per acre are commonly preferred. They are cavity-nesters and nests have been found in natural and man-made openings including dry meadows, partial cuts, and along natural forest edges (Frederick and Moore 1991; R. Dixon pers. comm. In: Blair, et al. 1995). Large trees are preferred for nesting. Unlike some cavity-nesting species, white-headed woodpeckers display a distinct preference for broken-topped trees and most snags excavated for nesting have been reported to be in moderate states of decay.

Threats

Across much of the species' range, the high commercial value of ponderosa pine coupled with intense harvest and effective fire protection have combined to reduce ponderosa pine dominance. Over much of the species' range, ponderosa pine stands and individual ponderosa pine tree components in mixed stands which have not been removed by harvest have become predisposed by effective fire exclusion to higher catastrophic fire risk due to increased shade-tolerant species invasion and ladder fuels accumulations. The result has been a cycle which prevents ponderosa pine trees and pine-dominated stands from reaching large size and decayed conditions critical to white-headed woodpeckers (Blair, et al. 1995).

Within the Salmon River Canyon Project Analysis Area, results of limited surveys and incidental sighting reports have confirmed the limited presence of white-headed woodpeckers in suitable habitats within the Payette and Nez Perce National Forest portions of the analysis area.

Three-toed woodpecker

Three-toed woodpeckers are designated as sensitive in USFS Region 4 only. Its habitat includes coniferous forests of the western US, especially where fires have left large stands of dead trees. This species' niche and habitat is similar to the black-backed woodpecker but

three-toed woodpeckers are not quite as restricted to post-fire habitat conditions (Hutto, R. 1995). The bird feeds by probing and drilling for wood-boring larvae of moths and beetles and also eats ants, caterpillars, fruits, mast and cambium (DeGraaf, et al. 1991).

Three-toed woodpeckers excavate nest cavities each year in dead cavities or in dead limbs of live trees with decayed heartwood. Nest trees include pine, aspen, spruce, and cedar.

Within the Salmon River Canyon Project Analysis Area, incidental sightings have confirmed the presence of the species at mid-elevations of the Salmon-Challis National Forest (Wenger, D pers. comm.) and although not reported, are thought likely to occur in the Payette National Forest portions of the analysis area (Gordon, F. pers. comm.).

Spotted Frog

Spotted frogs occur throughout the central and northern portions of Idaho. Across its range it occupies hilly areas near cool, permanent, quiet water in streams, rivers, lakes, pools, springs and marshes. They are highly aquatic but may disperse into forests, grasslands and brushlands. In the Northwest they prefer areas with thick algae and emergent vegetation, but may use sunken, dead, or decaying vegetation as escape cover. They feed on a variety of insects as well as some mollusks, crustaceans and arachnids.

Spotted frogs may move overland during spring and summer after breeding (Groves et al. 1997). The species is thought to be declining in parts of its range, including areas south of the Salmon River, but is otherwise widespread and abundant in the northern portions of the state.

In the Salmon River Canyon Project Analysis Area, spotted frogs are relatively common in suitable habitats north of the Salmon River, and are also relatively common on the Payette and Salmon-Challis National Forest portions of the area as well.

Northern Leopard Frog

The northern leopard was designated a sensitive species in USFS Region 1 on 3-12-99. This frog is the most widely distributed frog in North America. In Idaho it lives in marshes and wet meadows from low valleys to mountain ridges. It generally breeds in March or April in cattail marshes, sedge meadows or other waters with vegetation present. Like bullfrogs, leopard frogs eat vertebrates as well as invertebrates and hibernate in winter in the bottoms of ponds and lakes.

Current range maps (Idaho Dept. of Fish & Game - Nongame Wildlife Leaflet #7) indicate this frog is absent from the north central portions of Idaho. For this reason, no surveys have been conducted and the northern leopard frog is assumed to be absent from the planning area and will not be addressed further.

Boreal Toad

The boreal toad was designated a sensitive species in USFS Region 1 on 3-12-99. Also called the Western toad, boreal toads are generally found near some form of water, but inhabit a variety of habitat types from sagebrush desert to montane meadows. Boreal toads breed from February at lower elevations to July at higher elevations. Tadpoles of boreal

toads characteristically swarm by the thousands along lake and pond shores. Current range maps (Idaho Dept. of Fish & Game - Nongame Wildlife Leaflet #7) indicate this toad occupies the entire state. For this reason, they are assumed to be present in the analysis area. No surveys for this toad have been done within the analysis area to date.

Coeur d' Alene Salamander

The Coeur d' Alene salamander is currently sensitive in USFS Region 1 only. This salamander species maintains a disjunct distribution at elevations up to 5000 feet in northern Idaho. The North Fork of the Clearwater and The St. Joe drainages in Idaho comprise the core of the species' distribution in the state. The Selway drainage comprises the southernmost limit of the species' range in Idaho. They do not inhabit any portions of the Salmon River Canyon Project Analysis Area and have not been documented there (Idaho Dept. of Fish & Game 1994). For this reason, Coeur d' Alene salamander will not be further analyzed or discussed in this document.

Fisher

The fisher is a medium-sized forest carnivore. Between 1800 and 1940, fisher populations declined or were extirpated in most of the United States and in much of Canada due to overtrapping and habitat destruction by logging (Ruggiero, L.F. et al. 1994). The species is generally categorized as closely associated with late-successional forests. Fishers are considered by some experts to be less associated with a given tree species than characteristics of forest structure including a diversity of tree sizes and shapes, light gaps and associated understory vegetation, snags, fallen trees and limbs and limbs close to the ground (Buskirk and Powell 1994 In: Ruggiero, L.F. et al. 1994). Studies of fisher habitat use uniformly indicate that fishers prefer habitats with overhead tree cover. In the Idaho Rocky Mountains, fishers use predominantly old-growth forests of grand and subalpine fir (Jones & Garton 1994 In: Ruggiero, L.F. 1994). Areas of low canopy closure or non-forested areas are often avoided by fishers. Maintenance of late-successional forests is important for the conservation of fishers. As a result, fishers may suffer from habitat loss following fire (Brown and Bright 1995).

Within the Salmon River Canyon Project Analysis Area, fishers have been confirmed to be present by studies, surveys, and incidental sighting reports at higher elevations of the Nez Perce National Forest but their presence throughout the analysis area, particularly at lower elevations is unlikely. Fishers have not been documented to occur within the Salmon-Challis National Forest portions of the analysis area (Wenger, D. pers. comm.).

Lynx

Lynx is a sensitive species proposed for Federal listing as threatened or endangered. For description see Threatened and Endangered Species, above.

Wolverine

The wolverine is a medium-large bodied, wide-ranging forest carnivore which is usually considered a creature of northern wilderness and remote mountain ranges. It has been characterized as one of North America's rarest mammals and the least known large carnivore. Within its geographic range, the wolverine occupies a variety of habitats. A general trait of areas preferred by wolverines is remoteness from humans and human developments. Wolverines seem to have been most affected by activities that fragment or remove suitable habitat, such as human settlement, extensive logging, oil and gas development, mining, recreational developments and the accompanying human access.

Habitat Use

Researchers have generally agreed that good wolverine habitat is characterized in terms of adequate year-round food supplies in large, sparsely inhabited wilderness areas (Ruggiero, L.F. et al. 1994). Starvation has been cited as a common cause of natural mortality. Although wolverines opportunistically use a variety of foods including berries, small mammals, squirrels and insect larvae, the highest densities of wolverines typically have high habitat diversity and prey/carrion species abundance including large ungulates such as deer, elk, moose, mountain goats and bighorn sheep (Ruggiero, L.F. et al. 1994; Copeland and Hudak 1995).

Within the Salmon River Canyon Project Analysis Area, wolverines are generally assumed to occur principally in the higher elevation wilderness areas within the Frank Church River of No Return and Gospel Hump Wildernesses. Confirmed wolverine sightings have been documented from both inside and just outside the analysis area and the analysis area lies within the statewide predicted distribution map for Idaho based on potential habitat and county of occurrence (Copeland and Hudak 1995).

Species Threats

Wolverine occurrence appears to be tied to areas of low human occurrence. Wolverine populations may be threatened by habitat fragmentation which could lead to population isolation and eventual extinctions (Copeland and Hudak 1995). Experts consider wolverine habitat most useful when it reflects a natural range of fauna and floral diversity and structure (Copeland and Hudak 1995). Management practices which reduce the presence and opportunity for carrion availability may threaten wolverine foraging success (Copeland and Hudak 1995).

BUREAU OF LAND MANAGEMENT SENSITIVE WILDLIFE SPECIES

BLM Manual 6840 defines Sensitive species as those species: (1) under status review by USFWS/NMFS; (2) whose number are declining so rapidly that Federal listing may become necessary; (3) with typically small and widely dispersed populations; (4) inhabit ecological refugia or other specialized or unique habitats. Former USFWS Candidate species for Federal listing are now covered under this direction. BLM Sensitive species are managed in accordance with BLM Manual 6840.06D. The previous listed Forest Service Sensitive species are also BLM Sensitive species. The following section includes other BLM Sensitive species which occur within the general analysis area.

Myotis Bats

Bats in the myotis group are among the largest and most widely distributed group of North American bats.

Several species of Myotis bats are uniquely listed as Bureau of Land Management Sensitive Species and may potentially occur within the planning area, particularly at lower elevations. They are the small-footed myotis, long-eared myotis, fringed myotis, long-legged myotis and Yuma myotis. This group of bats are all relatively small, some shade of brown and have simple snouts. Habitats are generally caves, tunnels, rock crevices, or buildings. Species such as the long-eared myotis are known to use thinly forested areas (Burt & Grossenheider1964).

All myotis feed on insects in flight, and some species such as the small-footed myotis and Yuma myotis fly relatively low near the ground and feed low among trees or over shrubby areas.

As with most bats, disturbance of roosting individuals or colonies during roosting hours, particularly during winter may be harmful or fatal due to lost energy reserves when hibernating. Some myotis migrate to warmer climates for winter seasons.

Raptors (Northern harrier, Ferruginous hawk, Prairie Falcon)

Northern harriers are large, low-flying hawks which typically use wet meadows, fields, marshes, and plains habitats. They prey on a wide variety of small mammals, birds, amphibians, reptiles, insects and fishes (DeGraaf, R.M., et al. 1991).

Ferruginous hawks are large hawks which inhabit arid and semi-arid habitats and require open country with tall trees for nesting. They feed on rabbits, ground squirrels, but will also take mice, rats, gophers and small birds and reptiles.

Prairie Falcons are medium-sized raptors which inhabit prairies, deserts, canyons, foothills and mountainous areas where more open, tree-less terrain is suited to its low-level style of hunting. They feed on a variety of birds and small mammals. Nesting occurs on cliffs.

Other BLM Sensitive Birds

Pygmy nuthatches are generally associated with pine forests in an open, park-like conditions. They consume insects and conifer seeds. They are a cavity-nesting species and require snags or dead branches of live trees for nesting.

Neotropical Migrants

Lewis Woodpeckers inhabit open country with scattered trees rather than dense forests. They feed on insect populations partly associated with understory grass and forb vegetation, and are attracted to burned-over forest and woodland areas. Logged or burned areas with

standing snags provide suitable habitat only if a shrub understory is present (Dobkin, D.S. 1994). They require dead trees or tall stumps for nesting.

Red-naped sapsuckers feed on sap as well as tree insects and require mature coniferous forest with aspen and riparian montane woodland. They are most strongly associated with mature aspen communities (Dobkin, D.S. 1994). In the central Rockies, reduction of uncut aspen stands and conifer invasion of aspen woodland are likely to negatively impact populations of this sapsucker (Dobkin, D.S. 1994).

Vaux's swifts forage aerially on flying insects and are closely associated with old-growth Douglas fir/ponderosa pine forests that provide large-diameter, broken-topped snags (Dobkin, D.S. 1994).

Black swifts prefer montane areas associated with steep cliffs or canyons, especially near water (Dobkin, D.S. 1994). They feed on flying insects.

Olive-sided flycatchers prefer montane coniferous forest and woodlands, especially burned areas with abundant standing snags, also riparian woodland. They usually nest in conifers and feed on flying insects exclusively. They may depend heavily on early, post-fire habitats (Dobkin, D.S. 1994).

Dusky flycatchers may use a wide range of open woodland and shrub habitats, ponderosa pine or other conifers and other similar habitats. They nest in shrubs most often but may also use low trees. They are often found on brushy, cutover slopes and are common cowbird hosts.

Cordilleran flycatchers are found mainly in association with streams in montane coniferous forest, dense second-growth, aspen, and riparian woodlands. They often nest along streams in cavities of smaller tress or on cliff ledges.

Hammond's flycatchers use montane coniferous forest and woodland but favor dense stands of fir or Douglas fir. Mature or old growth stands are strongly favored and this flycatcher may be adversely affected by loss or conversion of old growth forests to younger age classes (Dobkin, D.S. 1994).

Willow flycatchers are found at all elevations in dense willow thickets and other low, dense riparian woodland. They nest in shrubs or low deciduous trees. Declines in populations of this bird in the western U.S. have been attributed to riparian habitat degradation by livestock and parasitism by cowbirds (Dobkin, D.S. 1994).

Yellow-rumped warblers use a range of open to dense montane coniferous forest. They are usually more abundant in old-growth than in rotation-age forests and significantly more abundant in unfragmented than fragmented forests. They respond positively to prescribed burning of open ponderosa pine forest and woodland sites (Dobkin, D.S. 1994).

MacGillivray's warblers prefer riparian thickets (especially willow), dense undergrowth of coniferous forests and forest edge, as well as moist brushy mountain slopes. Riparian

populations may be adversely affected by livestock grazing and occasionally are parasitized as cowbird hosts.

Wilson's warblers use dense, moist woodland and riparian thickets at higher elevations as well as edges of meadows. They nest on the ground. Riparian populations of this bird may be negatively affected by livestock and occasionally may be parasitized by cowbirds.

Solitary vireos prefer open woodlands with shrub understories, mixed coniferous-deciduous or coniferous woodland, or montane woodland and pine-dominated woodland. They favor rotation-age rather than old-growth forests but are apparently sensitive to fragmentation. They respond positively to controlled burning of ponderosa pine forest or woodland. Solitary vireos are common cowbird hosts.

Swainson's thrushes prefer mixed conifer old-growth, aspen forests with dense shrubs and riparian thickets. They are often closely associated with old-growth mixed conifer forests may be highly vulnerable to tropical deforestation in their Central American wintering habitats.

Veerys prefer moist, deciduous forest (especially aspen) with shrubby understory, also second growth, swamps, and riparian thickets. They feed on insects, spiders and fruits.

Calliope hummingbirds prefer open montane forests, meadows, burned areas, and riparian thickets. They feed on floral nectar, insects and spiders.

Rufous hummingbirds prefer open, montane coniferous forest, woodland edges, and thickets. They feed on floral nectar, insects and spiders.

Grasshopper sparrows prefer grasslands of all sorts at lower elevations. They nest on the ground and feed on insects (especially grasshoppers). They are uncommon cowbird hosts.

Brewer's sparrows prefer shrubsteppe, shortgrass prairie with scattered to abundant shrubs (especially sagebrush), montane thickets, and shrub-covered slopes. They nest in low shrubs, usually sagebrush. They uncommonly serve as cowbird hosts.

BLM Sensitive Invertebrates

Idaho banded mountainsnails occur on rather dry sage scrub sites with small-scale limestone talus (mostly west-facing) and outcrops. The current known distribution of the remnant colonies of this snail occur in protected areas in and adjacent to Twilegar Gulch (near Highway 95 at Lucile). On both sides of the Salmon River, these remnant populations once existed from the mouths of Race Creek to China Creek. Threats to the species include grazing, gold mining, limestone quarrying, and range fires. The snail is a strict local endemic with specialized habitat.

Boulder pile mountainsnails occur at low elevations in rock taluses (schist, basalt; metsediments; limestone) and boulder piles of mixed baserock origins. The species still survives along the lower Salmon River from Riggins to about RM 20, mostly in Idaho County, Idaho.

Threats to the species include grazing (sheep, horses, & cattle), road construction, talus mining, gold mining and prospecting (Frest & Johannes 1997).

Whorled mountainsnails prefer warm, dry, open sites and are restricted mostly to large-scale basalt taluses. The most common vegetation at some sites is grasses. Originally widespread in the lower Salmon River valley from Slate Creek to just north of White Bird Creek, this species now maintains just 22 isolated colonies in the most undisturbed parts of its original range. Threats to the species include heavy grazing, talus mining, highway construction including U.S. 95 and smaller roads in the vicinity of White Bird, Idaho.

Lava rock mountainsnails prefer warm, dry, open areas in sage scrub vegetation. Most commonly associated plants are grasses. Current known distribution includes 5 sites in the vicinity of Lucile and John Day Creek. Threats to the species include grazing, road construction, talus mining, and gold mining and prospecting (Frest & Johannes, 1997).

Carinated striate-banded mountainsnails are found mostly on forested outcrops (ponderosa pine forest) with base rock origins ranging from greenish schist to limestone (Frest & Johannes 1997). Commonly, sites have a partly closed canopy and diverse forb and deciduous understory. This species is known to exist in two colonies in the Salmon River Canyon; one at Race Creek and its tributaries and the second near the mouth of Lake Creek. Sites are also known from the Selway River drainage.

FOREST PLAN MANAGEMENT INDICATOR SPECIES

Rocky Mountain Elk

Elk are Nez Perce, Payette, and Salmon-Challis Forest Plan wildlife indicators of a diverse array of habitat types and forest successional stages. The relative abundance of elk in northern Idaho resulted largely from vegetation changes and availability of nutritious forage initiated by extensive wildland fires in 1910, 1919 and 1934 (Pengelly 1954, Leege 1968, and Nyquist 1973, In: Leege, T.A. 1984).

Throughout the year, elk use habitats that exhibit varying densities of overstory tree cover. Interspersion of openings and meadows are often used in conjunction with hiding cover. Throughout the spring period, elk prefer open areas where grasses and forbs develop earlier and provide nutritious forage. Often this use is confined to winter ranges in early spring but progresses upslope in elevation as the season progresses. Summer habitat use shifts to greater consumption of forbs which are found along streams and shady places where plants remain succulent and nutritious. Similar sites beneath timbered areas are sometimes preferred during this hot, dry period. In the fall, north-central Idaho elk use dense forests through October, then gradually increase their use of openings followed by movement to lower elevation winter ranges where grasses and shrubs are usually more available on southerly slopes and windblown ridges.

Elk are relatively widespread and common throughout the Salmon River Project Analysis Area. Much of the analysis area constitutes lower elevation winter range, which provide an important part of the elk's overall nutritional requirements for survival during the stressful winter season.

Successional advancement over time, perpetuated principally by the cumulative effects of fire exclusion, has encouraged increases in overall conifer densities and ground fuels in lower elevation dry and dry/moist forest types (Quigley, et al. 1996). Habitat conditions relative to vegetation in the analysis area have become unbalanced due to heavier domination by conifers now than in historical times. In some areas, unusually high densities of conifers compounded by accumulations of ladder fuel vegetation have progressively shaded out and discouraged the growth of edible, nutritious forage plants required for overall elk health and productivity.

Shira's Moose

Shira's moose is a Forest Management Indicator species on the Nez Perce National Forest and is native to central Idaho. Moose habitat in central Idaho is typically densely forested, steep terrain. Forests used by moose occur primarily in the subalpine fir and grand fir vegetative habitat types. Typically, winter ranges are the limiting factor for most ungulates, including moose. Riparian communities dominated by willow are usually considered the most common winter habitats, but Peek (1974; In: Peek, et al. 1987) reported that subalpine fir-Engelmann spruce stands at higher elevation supported low density moose populations in winter in some areas. In the South Fork Clearwater drainage to the north of the analysis area, mature forests dominated by grand fir with a secondary canopy of Pacific yew were most used by moose (Pierce and Peek 1984; In: Peek, et al. 1987). Relatively little of this moderately high elevation habitat is known within the Salmon River Canyon Project analysis area.

Shira's moose occupy the higher elevations within the analysis area and use a variety of shrubs principally as both summer and winter forage. Summer habitats require productive stands of seral browse species, however the primary habitat limiting factor for moose is winter habitat quality. Where important winter range habitats occur, actions that retain mature forest with a subcanopy of palatable coniferous species and shade-tolerant deciduous shrubs, particularly at higher elevations, is the primary aim for moose habitats (Peek, et al. 1987). In some areas, management of key moose winter habitat has conflicted with timber management, particularly clearcutting and slash burning which kills yew understories. Similarly, the management of roads and access have been recognized as important to protecting moose from increased illegal roadside harvest. Current recommendations suggest management of moose winter range should be designed to retain a 30-50 percent canopy coverage of overstory trees and 50-60 percent canopy coverage of yew subcanopy and no more than 14 percent of the winter range should be logged in any 30-year period (Peek, et al. 1987).

Mule deer

Mule deer are Forest Plan Management Indicator species of the Salmon-Challis National Forest within the analysis area. Mule deer are one of the most widely distributed species in western North America. They tend to prosper at certain stages of succession and require a mix of vegetation structures, including both cover and forage. Although cover is important to mule deer, habitat quality on forested lands is usually evaluated in terms of forage (Wallmo, O.C. 1981 p. 434). It is well documented that in forest habitat, forage supply for

ruminant grazers is inversely related to the amount of tree overstory (Ffolliott and Clary 1972 In: Wallmo, 1981 p. 435). In reality, sustainable mule deer habitat involves a balance between tree cover and understory forage which was maintained historically by insects, pathogens and fire. Such historical disturbance regimes, particularly the role played by fire, have been altered in the project analysis area. Fire exclusion has increased fuel loadings and increased fire intensity and extent, leading potentially to altered landscape vegetation patterns and plant community compositions that affect the quality of mule deer habitats. Some preferred winter browse species such as curl-leaf mountain mahogany do not resprout after burning and reproduce only by seed. Considered unique elements on portions of the Salmon River Canyon mule deer winter ranges, these shrubs are highly sensitive to fire and are usually only found on steep, rocky areas where fuels are light or where they can regenerate from seed after fire.

While both mule deer and white-tailed deer occupy the project analysis area, mule deer tend to prefer the more open, steep slopes and hillsides adjacent to the Salmon River. Mule deer are hunted within the analysis area and are used as prey by several large predators. Their predator-escape behavior make them better suited to habitats with these characteristics.

Bighorn Sheep

Bighorn sheep are medium-sized ungulates. The arrival of European settlers and the precipitous decline in Rocky Mountain bighorn sheep has been well documented. Despite restoration programs, a number of population limiting factors are common, including disease transmission, displacement by competing ungulates and habitat loss or degradation. The winter range of the species is ideally a climax shrub grass-steppe community, and its maintenance or restoration is often a significant aspect of populations maintenance necessary to avoiding local extinctions (Peek, J.M. et al. 1979, p. 430). Bighorn sheep also depend on the presence of predator escape terrain areas (Smith, T.S. et al. 1991). Escape terrain comprises slopes greater than 60 percent that have occasional rock outcroppings whereon bighorn can outmaneuver predators and find secure bedding areas. Bighorn sheep are, in fact, so specialized for leaping and climbing rather than for running on flat terrain, that they seldom venture far from their escape terrain.

Natural Barriers

Bighorns occur in small, isolated bands within suitable habitats of the Nez Perce , Bitterroot and Salmon-Challis National Forest portions of the Salmon River Project Analysis Area. Several natural and man-made barriers characteristically account for failure of bighorns to disperse into unoccupied habitats. Among these are: 1) swift and/or wide rivers or lakes, 2) continuous, non-traversable cliff complexes, and 3) dense vegetation. While the former two features can restrain bighorn sheep from exploring or expanding into more suitable terrain, dense vegetation can also form movement barriers to bighorn sheep. Numerous researchers have noted that bighorn sheep often hesitate crossing even narrow tracts of dense vegetation, particularly timber (Smith, T.S. et al. 1991 p. 209).

Forage

Bighorn sheep have been associated with stable, long-lasting climax grass communities (Peek 1979). Successional advancement unchecked by natural processes such as fire can allow conifer vegetation to dominate and shade-out productive forage grasses and forbs which are important to bighorn sheep nutritional needs. Fire is recognized as a useful tool for retarding successional advancement of seral grassland sites towards conifer climax and to improve production, palatability, and nutritive quality of important forage plants (Arnett, E.B., et al. 1998). Changes in vegetation density and structure have been documented within much of the Salmon River Canyon Analysis Area (Quigley, et al. 1996). Such changes may contribute to declines in bighorn sheep habitat quality and the isolation of populations.

Mountain Goat

Mountain goats occur in small, isolated populations within the Salmon River corridor in the Frank Church River of No Return Wilderness and adjacent areas. They are management indicators for the Salmon-Challis National Forest and inhabit the cliffs and subalpine ridge habitats. Mountain goats that inhabit the high elevations within the Salmon River Project Analysis Area occur in small subpopulations atop isolated peaks and ridgetop terrain. The most important features of mountain goat habitat are physical rather than vegetative and most, if not all of the mountain goat habitat within the analysis area is at higher in elevation than any proposed burning.

Mountain goats currently occupy portions of the Payette, Salmon-Challis and Nez Perce National Forests. Mountain goat numbers in the analysis area have experienced significant declines in recent decades. Historic accounts suggest there were approximately 115 goats in populations within the following drainages: Big Mallard Creek, Bargamin Creek, Sabe Creek, Black Creek, Big Squaw Creek and the area of Barth Hot Springs (Brandborg 1955; In: Nez Perce National Forest 1993) Estimates from more recent surveys (1982, 1986, 1987, 1993) indicate that no more than 20 goats inhabited these same successional stands of mesic conifers, especially those with complex physical structure near the ground (Buskirk and Powell 1994; In: Ruggiero, et al. 1994). While it is not known why the goat populations declined in the 19602 and 1970s, evidence suggests that declines resulted from legal and illegal hunting mortality (Nez Perce National Forest 1993).

Short growing seasons, poorly developed soils, limited conditions for plant growth and relatively low fuel accumulations at the elevations used by mountain goats often result in successionally stable plant communities (Chadwick 1977). Such environments are not commonly influenced by either short-interval or long-interval, high intensity fire regimes. For this reason, mountain goats and their habitats are likely to remain relatively unaffected by the proposed project.

Pine Marten

Pine marten are forest carnivores about the size of a small house cat. Pine marten are widely distributed within suitable habitats throughout the forests of Idaho and within the Salmon River Project Analysis Area. In various sites in the Rocky Mountains, pine marten have been found to prefer timbered stands dominated by subalpine fir, Douglas fir and lodgepole pine. They are closely associated with late-successional stands of mesic conifers, especially those with complex physical structure near the ground (Buskirk and Powell 1994; In: Ruggiero, et

al. 1994). Standing trees, logs or snags are common sources of dens, which are most often part of structures characteristic of late-successional forests.

The threat of predation by larger carnivores is thought to be strong in shaping pine marten's habitat selection behavior. They avoid open areas and heavily logged sites, likely due to risks of predation by other animals such as great-horned owls (Baker 1992; In: Ruggiero, et al. 1994).

Trapping is the most direct way in which humans affect pine marten, but logging is commonly regarded as the primary cause of distributional losses in historical times in the western US. Fire, insects and disease are other important causes of tree death in the western US, but the effects of these disturbances on pine marten have been studied little (Buskirk & Ruggiero 1994; In: Ruggiero, el al. 1994). Management considerations for pine marten habitat must include consideration of dispersal distances and the species sensitivity to loss of overhead cover. Connectivity of habitat providing overhead cover is important to population dynamics and colonization. For this reason, pine marten may suffer from habitat loss following fire (Brown and Bright 1995).

Vesper Sparrow (neotropical migrant)

The vesper sparrow is a management indicator species on the Salmon-Challis National Forest and generally inhabits lower elevations in drier grasslands with scattered shrubs, prairie edges, and margins of sparsely vegetated areas. Populations of vesper sparrows in the Western U.S. overall have exhibited a slight declining trend, as is the case continent wide (Dobkin, 1994). The bird is often associated with earliest seral stages of forested habitats (Hejl and Woods 1991: In: Dobkin, D.S. 1994). Vesper sparrows respond positively to prescribed burns in ponderosa pine forest and pine-grassland savannah (Bock and Bock 1983; In: Dobkin, D.S. 1994). They nest in a depression on the ground. Vesper sparrow diets include insects and seeds of grasses and forbs. Overall, numbers of this sparrow are modestly increasing in Idaho.

Yellow warbler (neotropical migrant)

The yellow warbler is a management indicator species of the Salmon-Challis National Forest which is primarily associated with riparian thickets (especially willows) and riparian woodlands with dense understories. Songbird monitoring studies (Hutto, R. 1995) indicate the bird is not uncommon within the analysis area. It nests in dense shrubs or in small deciduous trees.

Yellow warblers are frequently parasitized by cowbirds. Loss of riparian thickets due to a combination of drought, channelization for flood control and agriculture, and impacts from livestock grazing are thought to play the greatest roles in population downtrends (Dobkin, D.S. 1994). Populations of this bird respond well to willow restoration and regeneration that occurs when riparian areas are protected from cattle (Taylor and Littlefield 1986; In: Dobkin, D.S. 1994). Yellow warblers are relatively common within the analysis area, particularly within the Salmon-Challis National Forest and eastern portions of the analysis area wherever willow riparian zones are found, including the banks of the Salmon River.

Pileated woodpecker

Pileated woodpeckers are management indicator species on the Nez Perce and Payette National Forests. The pileated woodpecker inhabits forested areas in the northern Rockies, and is particularly characteristic of old-growth stands of ponderosa pine and western larch. Nesting most commonly occurs in large (greater than 24 inch diameter at breast height) western larch or ponderosa pine (Aney, W.C. and McClelland, R. 1985). Pileated woodpeckers almost never nest in large openings including clearcuts, fields or meadows) but prefer stands with a relatively high degree of canopy closure.

Pileated woodpeckers feed principally on carpenter ants excavated from deep within dead and decaying wood. In late summer and fall, fruits and berries are sometimes secondary components in the diet. A wide variety of cover types may be used for feeding, including mixed conifer, Douglas-fir, grand fir and western larch or ponderosa pin, hemlock, cedar-hemlock and lodgepole pine (Bull 1980; In: Aney and McClelland 1985). In general, preferred feeding habitats have high densities of snags and logs, dense canopies and tall ground cover, generally with more than 10 percent of the ground area covered by logs. Pileated woodpeckers are relatively common throughout suitable habitats within the analysis area.

Williamson's sapsucker (neotropical migrant)

Williamson's sapsuckers are management indicators of the Payette National Forest and are considered neotropical migrants (Dobkin 1994) but available information about the species is limited and somewhat conflicting. Williamson's sapsuckers are generally associated with old growth forests and are not found in smaller, fragmented forests (Dobkin 1994). They require dead or live trees infected with the heartrot fungi for nest sites and excavate cavities in various tree species including conifers and aspen.

Williamson's sapsuckers drill rows of holes in the bark of lodgepole pine, hemlock, red and white firs and aspen to consume sap and cambium, and will eat ants, wood-boring larvae, moths of spruce budworm and other insects (DeGraaf, et al. 1991). Williamson's sapsuckers are uncommon and rarely encountered, based on data from Breeding Bird Survey routes (Dobkin 1994). However, they are considered present within the analysis area (Gordon, F. pers. comm.). The few data that exist on the species indicates its numbers have significantly decreased in Montana (Dobkin 1994). The extent and distribution of their populations within the analysis area is not known or documented.

Ruby-crowned kinglet (neotropical migrant)

The ruby-crowned kinglet is a management indicator species of the Salmon-Challis National Forest. They inhabit coniferous forests during the summer breeding season but may be found in deciduous forests, open woodlands, brush and scrub vegetation during migration and winter.

Ruby-crowned kinglets occur principally in the Douglas fir and higher elevation cover types of the analysis area (Wenger, D. pers. comm.). Hutto (1995) suggests that this species probably needs an abundance of trees to attain normal population levels, since regional songbird

monitoring studies indicate that decreases in abundance of trees on managed sites correlate to decreases in birds observed. While the species may inhabit post-fire areas, densities indicate less than optimal habitat conditions (Finch, D., et al. 1997).

Goshawk

The goshawk is a management indicator species on the Nez Perce and Salmon-Challis National Forests. Refer to goshawk discussion under "USFS Sensitive Species" above.

Great Gray Owl

The great gray owl is a management indicator species on the Salmon-Challis National Forest. Refer to discussion of great gray owls under "USFS Sensitive Species" above.

Yellow-bellied sapsucker (neotropical migrant)

The yellow-bellied sapsucker is a management indicator on the Salmon-Challis Forest and breeds in deciduous and mixed deciduous-coniferous forests, particularly those with aspen. It excavates nesting cavities in live deciduous trees, favoring those infected with heartrot fungus. It prefers aspen but will nest in ponderosa pine, birch, alder, willow or fir. Yellow-bellied sapsuckers may use the same nest tree for several years, but excavates a new cavity each year.

They feed on cambium and tree sap but will also take a variety of insects attracted to the sap-wells they have drilled, with ants the dominant insect food. Fruits, mast, and seeds of some shrubs are also taken DeGraaf, et al. 1991). Yellow-bellied sapsucker occupation within the analysis area is believed to be very limited.

Pygmy Nuthatch

The pygmy nuthatch is a management indicator of old-growth ponderosa pine on the Salmon-Challis National Forest. Within the Salmon River Canyon Project Analysis Area, the bird is relatively common and is associated with ponderosa pine, preferring open, parklike forest structure.

Pygmy nuthatches search for foods by gleaning insects and taking conifer seeds. Their diet is composed predominantly of insects and spiders (DeGraaf, et al. 1991). Pygmy nuthatches occur within the analysis area and are most common at lower elevations within the ponderosa pine and to a lesser extent in the mixed pine/Douglas fir cover types.

Pine Squirrel

The pine squirrel, also called the red squirrel, is the smallest of the tree squirrels in its range. Pine squirrels prefer pine or mixed conifer forest types in the western U.S. Pine squirrels are

likely the most common mammalian management indicator throughout the analysis area. They are active throughout the year. Pine squirrels nest either in cavities of trees or outside on branches built of leaves, twigs, and shredded bark, usually near the tree trunk (Burt and Grossenheider 1964). Forest areas with higher tree densities and canopy cover, in moist and wet sites tend to support higher densities of pine squirrels. Because pine squirrels are a specialist species, they may suffer habitat loss following fire (Brown and Bright 1995).

Mountain Bluebird (neotropical migrant)

The mountain bluebird is a management indicator on the Salmon-Challis National Forest. Mountain bluebirds are summer residents of the analysis area that utilize open woodlands of all types, including forest edges. They nest in natural or woodpecker excavated cavities in standing snags. Their diet is composed primarily of insects and includes a few small fruits. Mountain bluebirds feed most frequently by swooping down from perches to capture insects on the ground.

Numbers of mountain bluebirds have declined sharply in Idaho (Dobkin, 1994). Within forested areas of the northern Rockies, nesting populations appear to depend heavily on burned areas with abundant standing snags (Dobkin, D.S. 1994; Hutto, R. 1995).

Brown Creeper (neotropical migrant)

The brown creeper is a management indicator on the Salmon-Challis National Forest. Classified generally as neotropical migrants, they likely reside as permanent residents in Idaho (Dobkin 1994). They may utilize montane ponderosa pine forest, mixed cedar/hemlock and other coniferous forests, but monitoring data indicate they are particularly tied to the cedar/hemlock forest type. The species nests predominately beneath loose bark on conifer trees, and occasionally on deciduous trees.

Brown creepers prefer larger trees as foraging sites. Brown creepers are significantly declining in Idaho. This species is considered a forest interior nesting species and appears sensitive to forest fragmentation during the breeding season (Dobkin, D.S. 1994). Hutto (1995) notes that they are nearly restricted in distribution to relatively undisturbed conifer forest types. Brown creepers are uncommon to rare and occur primarily in the Douglas fir and mixed ponderosa pine/Douglas fir cover types within the analysis area. Their local distributions are not well known and are poorly documented.

FISHERIES

SCOPE OF THE ANALYSIS

The Salmon River Canyon Project area includes the main Salmon River from Dry Bar below White Bird, Idaho to just above North Fork, Idaho. This area encompasses portions of tributaries to this section of the Salmon River. The area includes all or part of fifth level hydrologic units (HUs) 17060203, 206, 207, 208, 209, and 210. The project area did not include

the headwaters of Dump Creek, Clear Creek, Sheep Creek, Crooked Creek, Horse Creek, Chamberlain Creek, Warren Creek and French Creek. These areas are included in the fisheries analysis to assess any impacts to the entire watershed. The South Fork Salmon, Middle Fork Salmon, and North Fork Salmon Rivers are not included because they will not be affected by any of the action alternatives.

DESIRED CONDITION

Forest Plan Direction - All Forests (PACFISH)

The PACFISH Environmental Assessment amended the Nez Perce, Payette, and Salmon-Challis National Forests in 1995. PACFISH establishes riparian goals, riparian management objectives (RMOs), and riparian habitat conservation areas (RHCAs) and includes specific direction for land management activities within riparian areas adjacent to streams, lakes, wetlands, and landslide prone terrain). Riparian goals establish an expectation of the characteristics of healthy, functioning watersheds, riparian areas, and fish habitat. The goals direct the Forest to maintain or improve habitat elements such as water quality, stream channel integrity, instream flows, riparian vegetation, and several others.

RMOs for stream channel condition provide the criteria against which attainment, or progress toward attainment, of the riparian goals is measured. They include habitat attributes such as number of pools, amount of large wood in the channel, stability of the streambanks, and width to depth ratio. RHCAs, or the areas adjacent to streams and wetlands, were established in Amendment 20 to maintain the integrity of aquatic ecosystems. Healthy riparian areas are essential to maintaining or improving the quality of fish habitat in streams.

Direction in PACFISH specific to fuels/fire management include the following: Fuel treatment and fire suppression strategies, practices, and actions should be designed to provide for attainment of RMOs and minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could perpetuate or be damaging to long-term ecosystem function, listed anadromous fish, or designated critical habitat. Prescribed burn projects should be designed such that they contribute to the attainment of RMOs.

Forest Plan Direction for Each Forest in the Analysis Area

Nez Perce National Forest Plan Direction

Appendix A of the Nez Perce Forest Plan lists forest fish/water quality objectives by prescription watershed. Of the streams in the proposed burn area, the existing condition, fish/water quality objectives, and sediment yield guidelines standards are summarized in Table 3 - 7, below.

Fish/water quality objectives as displayed above provide management direction in terms of the maximum estimated increase in sediment over baseline conditions that can be approached or equalled for a specified number of years per decade, ranging from one to three times per

decade. In general, streams with sediment yield objectives of 50 percent or more are allowed an entry frequency of three times per decade, those with 45 percent are allowed a frequency of two times per decade, and those with less than 45 percent are allowed once per decade. All objectives are relative to full biological potential of 100 percent.

Table 3 - 7. Forest Fishery/Water Quality Objectives for Streams on the Nez Perce National Forest

Prescription Watershed Name	Current Fish Habitat Potential	Fish Water Quality Objective[2]	Sediment Yield Guideline[3]
Plant Creek	no fishery	70	70
Van Creek	70	70	60
Kelly Creek	70	70	60
Allison Creek	85	80	45
West Fork Allison Creek	85	80	45
East Fork John Day Cr.	70	70	60
Middle Fk. John Day Cr	70	70	60
South Fork John Day Cr	70	70	60
Van Buren Creek	70	90	30
Little Van Buren Creek	70	80	45
Bear Gulch	no fishery	70	60
No Business Creek	70	70	60
Lower Little Slate Creek	50	90	30
Main Slate Creek	100	90	30
Christie Creek	70	70	60
Sherwin Creek	70	70	60
China Creek	70	70	60
Cow Creek	70	80	45
Rhett Creek	100	80	50
Kessler Creek	70	80	45
South Fork Race Creek	50	80	45
West Fork Race Creek	70	80	45
Shingle Creek	50	80	50
Rapid Face	100	100	0
Squaw Creek	40	80	45
Papoose Creek	no fishery	70	60
Lower Big Mallard Cr.	90	90	40
Indian Creek	100	70	70
Lower Crooked Creek	100	100	0
Bargamin Creek	100	100	0
All Others	variable	70-100	0-45

1 Expressed as percent of optimal habitat
2 Fishery Water Quality Objective (% Habitat Potential)
3 Sediment Yield Guideline - Approx. Max. Sediment Yield to Meet Fish Water Quality Objective (% over baseline)

In addition, the Nez Perce Forest Plan defines standards for vegetation management in riparian areas, which were collectively defined as lakes, lakeside lands, perennial streams, seasonally flowing streams supporting riparian vegetation, and adjoining lands that are

dominated by riparian vegetation. This area includes the floodplains of streams and the wetlands associated with springs, lakes, and ponds. Guidelines include the following:

1. Consider cumulative impacts of proposed actions on the entire riparian ecosystem.

2. Manage riparian areas to maintain and enhance their value for wildlife, fishery, aquatic habitat, and water quality.

3. Maintain sufficient streamside vegetative canopy to ensure acceptable water temperatures for fish and to provide cover.

4. Management activities shall not be permitted to adversely change the composition and productivity of key riparian vegetation. Riparian areas now degraded by management should be rehabilitated before any further nondependent resource use.

5. Maintain sufficient streamside vegetative structure, composition, and diversity for travel corridors between old-growth stands.

6. Planned ignitions, when within prescription, will be allowed to burn to enhance resource values.

Payette National Forest Plan Direction

Table 3 - 8. Management Indicator Species and Fish Habitat Objectives for watersheds in the proposed action.

Stream Reach	Management Indicator Species Suitable Habitat*	Fish Habitat Objectives**
Fivemile Creek	All	1,4
Little Fivemile Creek	All	1,4
Lemhi Creek	All	1,4
Trout Creek	All	1,4
Little Trout Creek	All	1,4
Carey Creek	RBT	3
California Creek	RBT, SH	2
Cottaintail Creek	RBT	3
Rabbit Creek	RBT, SH	3
Polly Creek	?	?
Rugged Creek	?	?
Partridge Creek	RBT, SH, BTT	2
Elkhorn Creek	RBT, SH, BTT	3
French Creek	RBT, SH, BTT	3
Boulder Creek	RBT, SH, CH, BTT	5
Camp Creek	RBT, CTT, SH, CH	4
Fall Creek	RBT	3
Lockwood Creek	RBT	3
Indian Creek	?	?

*Management Indicator Species:

RBT - Redband Trout SH - Steelhead Trout
CTT - Westslope Cutthroat Trout CH - Chinook Salmon
BTT - Bull Trout ("Dolly Varden")

** Fish Habitat Objectives Key:

1 - Natural processes dominate fish habitat to such an extent that negative impacts due to human activities are perceptible only to highly trained and experiences fisheries biologists, and then those impacts are so small as to be unmeasurable without extreme expenditure. Impacts can be photographed, such as riparian damage around alpine lakes, but mitigation measures are taken to restore natural processes. This is crudely equivalent to maintaining 99 percent of the natural or inherent capability of fish habitat.

3 - Impacts of man's actions are readily perceptible to most professional observers. Measurements, utilizing commonly applied technologies, can distinguish some significant areas of habitat which are not in a natural or undisturbed condition. However, impacts are not catastrophic, extending to most areas of habitat, or a major portion of habitat within a drainage.

4 - The existing habitat is improved. The degree of improvement will depend on objectives defined for each drainage at the project level of planning. Improvement can occur due to coordination with other resources or by direct investment in fish habitat.

5 - All new sources of potential to fish habitat are planned to be fully compensated at the project level.

Payette Forest Plan: The desired condition for riparian areas includes: "Improvement will be achieved by ... reintroducing fire effects to ecosystems with short natural fire frequencies."

Chapter four of the Payette National Forest Plan lists the following objectives for the prescription watersheds within the Planning area that are proposed for burning (PNFP IV-39):

Ensure that protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment. (PNFP IV-41);

In addition to the above objectives, the Payette National Forest Plan identifies a number of standards and guidelines for fish habitat management related to vegetation management. These include:

Fish habitat will be managed to maintain viable populations of all existing native fish species ..." (PNFP IV-41);

Benefits of prescribed fire to fish habitat will be recognized during project planning where the purposes of the prescription are to reduce long term fuel accumulation and produce more natural vegetative succession. Benefits will be captured for the reduction in the probability of catastrophic fire and for nutrient cycling processes. (PNFP IV-42)

Salmon-Challis National Forest Plan Direction

Salmon-Challis National Forest Plan: "Aquatic habitats will be managed at a level sufficient to meet Sate water quality goals and maintain habitat capability to meet species production goals for both resident and anadromous species."

Chapter four of the Salmon-Challis Forest Plan lists several objectives that relate to fish habitat.

1) Manage waters capable of supporting self-sustaining trout populations to provide for those populations.

2) Manage anadromous fish habitat to supply and maintain 90 percent or more of its inherent smolt production capability.

3) Provide habitat diversity through vegetation treatments, in conjunction with other resource activities, designed to improve fisheries habitat.

4) Maintain instream flows in cooperation with State wildlife agencies to support a sustained yield of natural fisheries resources.

EXISTING CONDITION

Natural and Physical Characteristics - General

Most of the natural and physical descriptions are found above in the Watershed section or in other sections of Chapter 3. These descriptions will not be duplicated here. This section contains a brief description of the general characteristics of the area's fish habitat.

Much of the lower elevation areas consist of steep breaklands, with harsh growing sites and erodible soils. Because of small stream size and steep gradients, many small tributaries support only limited fish habitat. Many are fishless. Medium sized streams that originate in the flatter, wetter uplands usually have some sections of lower gradient and more productive fish habitat. These lower gradient areas support good spawning and rearing habitat for resident and some anadromous fish. Larger tributary streams, including Slate Creek, Warren Creek, Chamberlain Creek, and Panther Creek, have greater stream flow and offer more diverse fish habitat. They support both resident and anadromous fish. The largest tributaries (Little Salmon, Middle Fork Salmon, South Fork Salmon, and the North Fork Salmon) are large, diverse systems which support habitat for a variety of fish species, including trout, salmon, mountain whitefish, suckers, dace, sculpins, northern pike, minnows, and others. The mainstem Salmon River also supports diverse habitats and an even greater array of fish, including the above species plus sturgeon and smallmouth bass. Anadromous fish use the mainstem Salmon River mainly for migration and winter rearing, except for fall chinook salmon which spawn in the lower hundred miles.

Riparian vegetation serves many functions along streams, including: shading and thermal regulation, sediment catchment from upslope areas, bank stabilization and armoring, and woody debris recruitment. Woody debris, in general, is thought to play an important role in stream channel maintenance and fish habitat development in first to fourth order streams within the breaklands landform.

Many of the larger stream bars and benches along the main Salmon river are dominated by mature black cottonwood forests. Seasonal flooding creates fresh alluvial deposits for regeneration of cottonwood and various willow species (e.g., sandbar willow). Mixed riparian

shrubs such as netleaf hackberry, hawthorn, dogwood, currant, chokecherry, serviceberry, and syringa, along with poison ivy and white clematis occupy the low benches, terraces, and toeslopes adjacent to the river.

Riparian areas in the tributary streams typically occur in narrow and relatively steep (greater than 4 percent slope) valley bottoms. The riparian community immediately adjacent to the channel is usually dominated by shrubs such as white, sitka, and mountain alder, water birch, fool's huckleberry, black twinberry, spirea, huckleberry, dogwood, hawthorn, willow, serviceberry, thimbleberry, currant, syringa, elderberry, cascara, Labrador tea, and rose. Understory species include various mesic forbs, grasses, sedges and rushes. Cottonwood may occur as scattered individuals. In the lower elevations of some of the larger watersheds, such as Arctic, Bargamin, and Indian Creeks, conifer species such as Engelmann spruce, grand fir, and Pacific yew are present. In the mid to upper watersheds, lodgepole pine (on the south side of the river) and grand fir, subalpine fir, and Engelmann spruce (north side) are present in the riparian areas. In some of the larger tributaries, such as Panther Creek and Slate Creek, wide, flat valley bottoms support both cottonwood and riparian shrub communities, as well as herbaceous communities dominated by various sedges, rushes, grasses and forbs.

Fish habitat conditions in this large area are varied. In wilderness and other roadless areas, streams are subject to natural processes only, and fish habitat generally remains unaffected by direct human influence. In roaded areas, streams have been affected in varying degrees by human activity including timber harvest, domestic livestock grazing, mining, homestead development, agriculture, and others. Recent large fires have occurred in both wilderness and non-wilderness areas. In some areas, streams have sustained short-term impacts from large wildfires but long-term impacts are not prevalent. Flooding during 1995 and 1996-97 affected some areas, most notably the Little Salmon River. Although these flood events were essentially natural, their effects were accelerated in some streams due to channel changes from human activity, most notably road construction in the floodplains.

Some smaller drainages have been developed, and this development has altered fish habitat with adverse effects in some cases. Federal actions in the watersheds in the analysis area have been recently evaluated for effects to bull trout and steelhead trout in Biological Assessments; these assessments were completed because of the recent listing of these species under the Endangered Species Act. These evaluations were used to determine the environmental baseline for various habitat indicators. Fish distribution for the area was obtained from the Interior Columbia River Basin Ecosystem Management Project data base. This information was updated with more current data obtained from the district or forest fisheries biologist in the area. Maps and tables of fish distribution are found in the project file.

Listed, Proposed, and Sensitive Fish Species

The project area has the following listed, proposed, and sensitive fish species: spring/summer and fall chinook salmon *(Oncorhynchus tshawytscha)*; both stocks of this species are listed as threatened (April 22, 1992, 57 FR 14653). Sockeye salmon (*Oncorhynchus nerka*) are listed as endangered (November 20, 1991, 57 FR 58619). Steelhead trout (*Oncorhynchus mykiss*) were listed as threatened on October 17, 1997, while bull trout (*Salvelinus confluentus*) were listed as threatened on June 10, 1998. Westslope cutthroat trout are considered sensitive by the U.S. Forest Service, and the U.S. Fish and Wildlife Service has been petitioned

to list this species. White sturgeon are found in the main Salmon River but do not have any special status. Steelhead and resident redband trout are considered the same species for this evaluation because they are indistinguishable.

In 1995 the Forest Service adopted the Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and portions of California (PACFISH). This document has amended current Forest Plans for forests in the analysis area to provide management direction to initiate the recovery of anadromous fish habitats on federal lands.

Sockeye Salmon

Sockeye salmon were once abundant and widely distributed across the upper Snake River basin. Sockeye salmon exhibit some of the more complex life history patterns exhibited among Pacific salmon because they rely on both streams and lakes for spawning and early rearing. In the Salmon River basin, remaining sockeye salmon are associated with Redfish Lake near Stanley, Idaho, which is outside of the area affected by this project. Numbers of adult returns to the lake have declined from 335 fish in 1964 to one in 1992, eight in 1993 and none in 1995. Currently, the progeny of these salmon have been propagated in a hatchery environment, but this population is functionally extinct in the wild.

Redfish Lake sockeye salmon, if they were present in the Salmon River, would use the mainstem Salmon River as a migration corridor to and from Redfish Lake. The mainstem river and its tributaries in the analysis area did not historically support spawning and early rearing of this species. The mainstem Salmon River within all of the assessment area is listed as critical habitat for sockeye salmon, however.

Fall Chinook Salmon

Snake River fall chinook salmon were historically less well-distributed across the Snake River basin than spring chinook, although the Snake River basin was considered to support the highest production of fall chinook salmon in the entire Columbia River basin (Fulton 1968). The historic importance of the Salmon River in providing spawning and early rearing habitat is presently unclear, but it is assumed that it sustained a significant component of the entire population.

Currently, Snake River fall chinook salmon are listed as a threatened species under the Endangered Species Act. The lower 100 miles of the mainstem Salmon River provides current spawning and early rearing habitat as well as providing a migration corridor for up and downstream migrating fish. Fall chinook are large mainstem river spawners and do not use tributaries for spawning or rearing.

Counts over Lower Granite Dam over the last 20 years have ranged from 400 to 600 fish each year. The Salmon River from its mouth upstream to Fall Creek, at river mile 107, is considered critical habitat for fall chinook.

Spring/Summer Chinook Salmon

Spring/summer chinook salmon were historically abundant and well-distributed across the Salmon basin. The basin supported significant production of this species, especially in large river tributaries such as the South Fork, Middle Fork, and Little Salmon Rivers, as well in larger tributaries such as Rapid River, Slate Creek, Bargamin Creek, and Chamberlain Creek. Currently, spring/summer chinook salmon are listed as a threatened species under the Endangered Species Act.

Estimates of Snake River spring/summer chinook salmon over Lower Granite Dam averaged less than 10,000 fish from 1980 to 1990. In 1994 the estimated return of wild fish was less than 2,000. Hatchery supplementation has also occurred throughout much of the Salmon basin. All of the analysis area is critical habitat for spring/summer chinook salmon. Spawning and rearing occurs in most of the larger tributaries that are accessible. The main Salmon River is used mainly for migration and winter rearing. Juvenile rearing in summer may occur in the mixing zones at the mouths of some tributaries because of their potential as refuge areas.

Steelhead Trout

Steelhead trout are the anadromous form of rainbow/redband trout. Historically, steelhead trout were widely distributed across the Snake River basin, with spawning and early rearing occurring in most tributaries, both perennial and intermittent, that were accessible to anadromous fish. The distribution and abundance have declined from historical levels as a result of passage mortality at dams and other obstructions, habitat degradation, loss of access to historical habitat, over-harvest, and interactions with hatchery-reared and non-native fishes. Steelhead trout in the Snake River are currently listed as a threatened species under the Endangered Species Act.

Steelhead are currently broadly distributed across the Snake River basin, but despite a broad distribution, few healthy steelhead populations exist, and number of returning adults varies widely among years. Healthy steelhead populations appear to exist in wilderness tributaries in the analysis area.

Most tributaries in the analysis area support steelhead spawning and early rearing. The mainstem Salmon River functions as a migration corridor and provides winter rearing habitat. This area of the Salmon River contributes significantly to the production of steelhead in the Snake River basin.

Bull Trout

Bull trout were historically less well-distributed throughout their range than other salmonid species, and although they were found in a variety of habitats, distribution was patchy, and spawning and juvenile rearing appeared to be restricted to the coldest stream reaches. Bull trout are believed to be a glacial relict (McPhail and Lindsey 1986), and their distribution probably contracted and expanded periodically with natural climate change.

Columbia River bull trout, now listed as a threatened species under the Endangered Species Act, are found throughout the assessment area. They occupy the entire main Salmon River and most of the medium and large tributaries. Bull trout are quite mobile, using certain

tributaries for spawning and rearing, and they are generally best described as fluvial fish. The tributaries may have resident populations of smaller fish that only go short distances for spawning. The movement by these different fish is important for genetic exchange and the refounding of extinct populations. Some of the larger streams in the area are reported to not have any bull trout, but this may be due to a lack of good information in remote areas. Critical habitat for bull trout has not been defined.

Westslope Cutthroat Trout

Westslope cutthroat trout were once abundant throughout the Snake River basin. Early explorer's journals suggest that they were extremely abundant and found in many areas and in many different types of streams (Trotter and Bisson 1988). Although this subspecies is still widely distributed, remaining populations may be seriously compromised by habitat loss and genetic introgression through hybridization (McIntyre and Reiman 1995; Reiman and Apperson 1989). Although not currently listed under the Endangered Species Act, Westslope cutthroat trout are listed as a Forest Service sensitive species and a species of special concern by the State of Idaho.

Westslope cutthroat trout distribution in the assessment area is somewhat patchy. They are widespread in most of the area above Horse Creek (including the main river), and the same is true for the Little Salmon River watershed. In the rest of the area, isolated resident populations are located at the headwaters of larger tributaries and throughout smaller tributaries, especially those that are unaccessible to anadromous fish. They are widespread throughout the Middle Fork Salmon, South Fork Salmon, and North Fork Salmon Rivers and their tributaries. Their absence in the lower part of the drainage could be explained by warmer temperatures. In other areas they may be displaced by rainbow/steelhead trout. Cutthroat trout also move seasonally. They overwinter in larger waters like the main Salmon, and then spawn and spend the summer in smaller tributaries. Other resident fish move very little during their lifetime.

This section analyzes the aquatic habitat in specific watersheds within the project area and discusses the condition of that habitat in reference to specific fish species.

Specific Watershed Descriptions

STREAMS ON THE NEZ PERCE NATIONAL FOREST

Slate Creek

Slate Creek is a moderate/large tributary of the Salmon River entering the river at river mile 66.1. It is the most significant tributary from the Salmon River mouth to the Little Salmon River in terms of fish production. Tributaries to Slate Creek which could be affected by the action alternatives include Van Buren, Little Van Buren, Bear Gulch, No Business, and Little Slate Creek. The mixing zone in the Salmon River at its mouth may be important at certain times of the year for providing thermal refuge and clear water during spring runoff. Slate Creek supports spring/summer chinook salmon, steelhead trout, westslope cutthroat trout, bull trout, mountain whitefish, suckers, dace, and sculpins. In general, returns of adult salmon are low, and returns of steelhead trout, while higher, are highly variable depending on

the year. Westslope cutthroat trout are not found throughout the drainage but are located in North Fork Slate, No Business, and Boulder Creeks. Both fluvial and resident bull trout exist in the drainage, with highest densities in Van Buren Creek.

Non-native brook trout, which were stocked in Lower Slate Lake in the 1940s, have moved downstream from the lake and are established in the upper reaches of Main Slate Creek.

Habitat in Slate Creek and many of its tributaries has been affected by human activity, which includes road construction, timber harvest, instream placer mining, domestic livestock grazing, and residential development in the lower reaches of the mainstem. Degree of impact to the stream and habitat is highly variable. In general, limiting factors in Slate Creek include high levels of deposited sediment in the mainstem and many tributaries, and high summer temperature in the mainstem, especially in the lower reaches. Also, lack of large woody debris in the mainstem may have reduced the productivity of this watershed for fish.

The construction of a road up the mainstem from its mouth to the confluence of Main Slate with Little Slate Creek, in addition to numerous other roads throughout the watershed, may have resulted in chronic inputs of sediment and high levels of deposited sediment in the streams.

John Day Creek

John Day Creek is a moderate-sized tributary entering the Salmon River at about river mile 73. The John Day watershed is composed of both National Forest lands and Bureau of Land Management lands, each occupying about one third of the total area. The final third is private land. . The watershed is mostly roaded and developed. Mainstem John Day Creek supports spring/summer chinook salmon, steelhead trout, bull trout, and westslope cutthroat trout, although occurrence of all these species is sporadic, and the densities are very low. Anadromous fish are mostly located in the lower reaches of the mainstem. Chinook salmon probably do not regularly spawn in this stream. Bull trout, which are strictly resident, are located in East Fork John Day Creek. Cutthroat trout occur incidentally throughout the fish-bearing portions of the watershed.

Habitat in John Day Creek has been adversely affected by human activities such as road construction, residential development, timber harvest, and domestic livestock grazing. Habitat was also significantly affected by a large debris torrent which occurred in the spring of 1995. This debris torrent was the result of multiple road failures in the middle and upper portions of the watershed. Habitat has been oversimplified in many reaches, and deposited sediment, lack of pool habitat, and lack of woody debris are the limiting factors. The debris torrent was a contributing factor to further reducing the quality of habitat in this watershed.

Other tributaries proximate to John Day Creek, including Wet Creek, Sheep Gulch, and Crawford Creek, do not support fish. They do, however, contribute to conditions in the mainstem Salmon River.

Elfers, Clark, and Rhett Creeks

These three streams enter the Salmon River from the west side and are all considered small named tributaries. All are roaded and developed. Most of these streams flow through private land, and none are believed to support fish.

China, Cow, Sherwin, and Christie Creeks

These four streams enter the Salmon River from the west side and are all considered small named tributaries. All are roaded and developed, particularly in their lower reaches which are located on private land. About 30 percent of the area is National Forest Service Land, 10 percent BLM, while the rest is private. The lower reaches of these streams is diverted for domestic water use and irrigation of hay and pasture land.

Cow and Sherwin Creeks support isolated resident westslope cutthroat trout populations which may be locally significant, considering their distant proximity to the nearest adjacent populations. Both populations are functionally isolated from the mainstem river through irrigation withdrawal and impassible culverts. China Creek does not support cutthroat trout but does support resident rainbow trout and occasional steelhead spawning and rearing. Christie Creek is currently fishless but probably historically supported fish. It is currently dewatered in its lower reaches by irrigation withdrawals.

Habitat limiting factors include high levels of deposited sediment, low number of pools, high summer water temperatures, and low stream flows.

Fiddle Creek

Fiddle Creek is a small tributary that enters the river at about river mile 77. Fish access from the Salmon River into this stream is questionable when river flows are low due to the crossing structure at U.S. Highway 95, but at higher flows the stream is accessible to fish. Rainbow/steelhead trout were documented in the lower quarter mile of Fiddle Creek during an electrofishing survey conducted in 1993. Fish have not been documented elsewhere in the watershed.

Habitat limiting factors for Fiddle Creek include small stream size, steep gradients, difficult access, low number of pools, and moderate to high levels of deposited sediment. The watershed is mostly roaded. Residential and agricultural development has occurred on private lands, which are located in the lower reaches of the stream. The upper reaches, which are composed of U.S. Forest Service and some BLM lands, has been roaded for timber access and harvest.

Race Creek

Race Creek is a small tributary to the Salmon River that enters the river at about river mile 83.
This area is about 60 percent Forest Service land, the remainder a mixture of state, private and BLM lands. Most of the area is roaded, with many streamside roads. Parts of the stream go underground part of the year, but fish are found upstream of those areas. The watershed has three main tributaries, which include Kessler Creek, South Fork Race Creek, and West Fork Race Creek. Most of the streams in the watershed are moderate steep and flow through confined valleys.

Fish species documented in Race Creek include rainbow/steelhead trout and westslope cutthroat trout. Although the stream is accessible to spring/summer chinook salmon, no salmon have been documented in recent years. Bull trout were also not found. Spawning and rearing habitat for both species exists in this watershed, however.

The stream has been impacted by residential and agricultural development on private lands in the lower reaches of the stream and road construction, timber harvest, and domestic livestock grazing higher in the drainage on federal lands. Habitat limited factors include high stream temperatures in the lower reaches and high levels of deposited sediment. Stream size and steep stream channels may limit fish in the upper reaches.

Squaw Creek

Squaw Creek is a small tributary to the Little Salmon River entering this stream about three miles upstream of its confluence with the mainstem Salmon River. Squaw Creek has three major tributaries, which include Papoose, North Fork Squaw, and South Fork Squaw Creeks. It is composed of about 70 percent National Forest Service land, the rest is a mixture of state, private and BLM lands. Much of the drainage is roaded and developed, with some streamside roads.

Rainbow/steelhead trout and westslope cutthroat trout have been documented in Squaw Creek. There have been no known observations of either spring/summer chinook salmon or bull trout in this stream.

Some specific problem areas were noted in Pappose Creek for streamside road density, the South Fork for riparian vegetative condition, and stream stability in Squaw and Papoose Creeks.

Habitat limiting factors include small stream size, steep gradient, low flows from irrigation withdrawal, and high summer temperatures.

Shingle Creek

Shingle Creek is a small tributary to Rapid River in the Little Salmon watershed. It enters Rapid River about two miles from the mouth. Most of the watershed is composed of National Forest Service land, with some public land near the mouth. Diversions on the lower end for hydropower create migration barriers for fish. Much of the drainage is roaded and developed. Rainbow/steelhead trout are the only species which have been documented in Shingle Creek. Above the hydropower diversions, these fish are probably resident with little or no anadromous component because of access difficulty. Habitat limiting factors include small stream size, water diversions for irrigation and hydropower, and high summer temperatures.

Allison, Kelly, Van, and Robbins Creeks

These four streams flow are tributaries of the Salmon River and flow into the river above Riggins, Idaho. They have similar management and conditions. They are all composed primarily of public lands, with some private inholdings near the river. About a third of the area

is roaded and developed. Of the three, Allison Creek is the largest and most significant in terms of importance to fish. It supports rainbow/steelhead trout, and although no salmon have been documented in recent years, it supports spawning and rearing habitat for this species as well. Kelly, Van, and Robbins Creeks are very small but support rainbow/steelhead trout in their lower reaches. Habitat and access are limited in these streams, however.

In Kelly, Van, and Robbins Creeks, habitat limiting factors include small stream size, steep stream gradient, limited access, and high summer temperatures. In Allison Creek, the main limiting factor is very high levels of deposited sediment, which has resulted from construction and maintenance of a road up much of the stream, domestic livestock grazing, and a highly erosive geology on which timber harvest and addition road construction near the headwaters have occurred. A large debris torrent which occurred in West Fork Allison Creek in 1991 resulted in extreme channel erosion in both West Fork and mainstem Allison Creeks, although this was a natural event. The stream is still recovering.

Indian Creek

Indian Creek is a small stream flowing into the Salmon River at about river mile 130. This watershed is almost entirely roadless except at the very headwaters. Similar to other Salmon River breaklands streams, Indian Creek is steep and highly confined in a narrow valley bottom.

Indian Creek supports rainbow/steelhead trout only in its lower reaches. Habitat limiting factors probably include steep stream gradient, low number of pools, and high summer temperatures.

Crooked Creek

Crooked Creek is a large tributary of the Salmon River entering the river at about river mile 124. Although a large portion of the watershed is located in the Gospel-Hump Wilderness Area, the upper reaches are not in wilderness and have been heavily impacted by residential development, road construction, and significant in-channel placer mining. The upper reaches of Crooked Creek and some its tributaries are composed of moderate to low gradient streams, while the rest of the streams flow through narrower, steeper valleys.

Due to its size and accessibility, Crooked Creek is important in terms of fish production. The watershed supports spring/summer chinook salmon, rainbow/steelhead trout, westslope cutthroat trout, and bull trout. The rainbow/steelhead population is primarily anadromous, with a significant resident component in the upper reaches. Distribution of anadromous steelhead in the basin is unclear, but it is likely that steelhead spawn and rear mostly below the mouth of Big Creek, located about midway up the drainage. Above Big Creek, the population probably consists of resident rainbow trout. Spring/summer chinook salmon generally spawn and rear in the lower five or six miles of the stream. Bull trout have been documented in the lower one third of the stream. Westslope cutthroat trout are generally located throughout the watershed, but densities are very low in the impacted headwater section.

In the wilderness portion of the watershed, watershed impacts are associated with the 1992 Porcupine Fire, which burned about 20 percent of the watershed with moderate to high

intensity fire. Post-fire monitoring indicated low to moderate rates of surface erosion into Crooked Creek from burned areas, and in subsequent years numerous small debris torrents and other mass movement events have been documented. These sediment-generating events appear to have only a minimal impact on stream condition, however, as high stream flows are apparently moving fine sediment downstream fairly efficiently. Limiting factors for this watershed are few except in the upper reaches, which are significantly affected by high levels of deposited sediment.

Big Mallard Creek

Big Mallard Creek is large tributary of the mainstem Salmon River entering the river at about river mile 151. This watershed is mostly composed of National Forest lands, with limited private land inholdings in the upper reaches of the stream. The lower reaches flow through the Frank Church-River of No Return Wilderness Area.

Big Mallard Creek is typical of many Salmon River tributaries, with a steep, highly confined channel through the breaklands with extensive moderate to low gradient reaches above the breaklands. The lower three miles are physically separated from the rest of the watershed by Mallard Creek Falls, a 1/4 mile series of very steep cascades and waterfalls which completely block upstream fish migration. Although the lower reaches of the stream flow through wilderness, the upper reaches have been developed to a moderate degree. Human impacts include road construction, homestead development, domestic livestock grazing, timber harvest, limited in-channel mining, and introduction of non-native fish (brook trout).

The lower reaches of Big Mallard Creek, below the falls area, support high densities of rainbow/steelhead trout, lower densities of bull trout, and moderate densities of westslope cutthroat trout. Although spring/summer chinook salmon have not been documented in recent years, the stream is accessible, and there is limited spawning habitat and abundant rearing habitat for this species. The upper reaches above the falls support brook trout and westslope cutthroat trout.

Although the upper reaches of Big Mallard Creek have sustained a variety of impacts resulting in high levels of deposited sediment, in the lower reaches, the only known habitat limiting factor is high summer water temperatures. Levels of deposited sediment are extremely low and number of pools is high. Levels of large woody debris are low, which may be a function both of inability of this high-energy stream to retain debris and fire suppression, which has indirectly inhibited debris recruitment from exclusion of fire. Low levels of large wood in the channel may be an additional limiting factor.

Little Mallard Creek

Little Mallard Creek is a moderate sized tributary of the Salmon River entering the river downstream of Big Mallard Creek at about river mile 143. This watershed is composed of almost all National Forest lands with a minor incursion of private land near the mouth. It is mostly roadless. Exploratory mining, domestic livestock grazing, and limited timber harvest in or near the headwaters constitute the only significant human activities on National Forest lands. The portion of the stream flowing through the private land section near the mouth has been affected by water diversion.

Similar to Big Mallard Creek, Little Mallard Creek flows through steep, canyon breaklands in its lower reaches and through moderate to low gradient channels in its upper reaches. Unlike Big Mallard Creek, however, Little Mallard is fishless above the breaklands. In and below the breaklands, Little Mallard Creek supports low densities of rainbow/steelhead trout. Occasional bull trout have also been documented in this section.

Habitat limiting factors are mainly associated with access, or lack of access, to the upper reaches of the stream. High summer water temperatures and low numbers of large woody debris are also probable limiting factors.

Bargamin Creek

Bargamin Creek is a large tributary of the Salmon River entering the river at about river mile 155. Similar to many other Salmon River tributaries, the lowest reaches of stream are steep and highly confined in a narrow valley bottom, the middle reaches are somewhat less steep and less confined, and the upper reaches are moderate to low gradient and meander through wider valley bottoms. Most of this watershed is located within designated wilderness or in a roadless area, with only one road, the Magruder Road, having been constructed in the upper third of the watershed. The watershed is composed entirely of National Forest lands.

Given its size, accessibility, and location, Bargamin Creek is highly significant in terms of importance to fish. High densities of rainbow/steelhead trout have been documented throughout the watershed, with moderate densities of spring/summer chinook salmon, westslope cutthroat trout, and bull trout also present. The stream provides abundant, high quality spawning habitat for all four species, as well as offering important thermal refuge at its mouth to fish in the Salmon River during the summer. The populations of all species probably support considerable anadromous or fluvial components, and in addition to spawning and early rearing habitat, the stream also offers adult and subadult rearing habitat and winter rearing habitat.

The stream has been affected minimally, if at all, by human activity. The main human use of this watershed is recreation. There are no known habitat limiting factors which have been created or influenced by human development of the watershed. About 75 percent of the watershed burned in 1988 during the Ladder Creek Fire, but only about 20 percent was moderate or high intensity. There were no reports of adverse effects to the stream as a result of this fire.

Salt and Rainy Creeks, which are small tributaries to the Salmon River located near Bargamin Creek, support rainbow/steelhead trout in their lower reaches. These streams are typical small breaklands streams.

STREAMS ON THE PAYETTE NATIONAL FOREST

Fivemile Creek and Little Fivemile/Tepee Creeks

These streams are located in designated wilderness or in roadless areas exclusively. The habitat condition of these streams is essentially natural. All these watersheds are less than 6,000

acres. Little Fivemile and Fivemile Creeks support rainbow/steelhead trout in their lower reaches. It is possible that Fivemile Creek supports westslope cutthroat trout in its upper reaches.

Rattlesnake-Fall Creek

This area is on both sides of the Little Salmon River near Pinehurst. The area is about one fourth each National Forest Service, BLM, state and private land. The area is partially roaded and developed, except for Fall and Lockwood Creek which have had little activity except livestock grazing. Highway 95 runs along the Little Salmon River, which had severe flooding in 1997. The Little Salmon River is used by spring/summer chinook, steelhead, bull trout, and cutthroat trout. Fall and Rattlesnake Creeks are reported to have steelhead.

Upper Boulder Creek

This is the upper half of the Boulder Creek watershed, which enters the Little Salmon River about four miles upstream of Pinehurst. The area has had extensive roading, timber harvest, and livestock grazing. There are effects from water diversions and in the lower watershed. Boulder Creek has spring/summer chinook, steelhead/redband , bull and cutthroat trout.

Partridge/Elkhorn/French Creek

This area includes three different hydrologic units (Lower Partridge, Elkhorn, and Lower French). They are combined because of similar management and conditions. The lower parts of these drainages are a mixture of state, private and BLM lands, where most of the roading and development has taken place. Activities have included grazing, timber harvest, roads, and water withdrawals on private lands near the mouth. Most of the Elkhorn drainage has burned in the last 15 years, but only about 5 percent of this has been of moderate intensity. In French Creek, about two thirds of the drainage has burned in the last 15 years, but only 4 percent has been of moderate intensity. Partridge and Elkhorn Creeks have redband/steelhead, bull trout, and chinook salmon near their mouths. French Creek has spring/summer chinook, redband/steelhead, cutthroat, and bull trout.

Carey Creek

Carey Creek is a small drainage (6000 acres) on the south side of the Salmon River across from the mouth of the Wind River. Part of the area is roaded and there is mining activities in adjacent drainages, but most of the area is undeveloped. A grazing allotment does cover the entire drainage, but its continued use would maintain existing conditions. In the last 15 years about 40 percent of the watershed has burned, but only about 7 percent of this was of moderate intensity. Carey Creek has only redband/steelhead trout.

California Creek

This proposed project area includes parts of the California Creek, Maxwell Creek, Cottontail-Basin, and Elk-T Bone HUs. This area is lumped together as one analysis area, as all the HUs have limited development, and much is in wilderness. The proposed project only included a

small part of any of the HUs. There is an old road across the head of California and Maxwell Creeks. There are old mining activities in these same areas. The rest of the HUs are undeveloped. The main Salmon River is used for migration by spring, summer chinook and sockeye salmon, and steelhead trout. It also has a resident population of bull trout. California and Cottontail Creeks have redband/steelhead, and bull trout, while the other small tributaries are barren of fish.

Lemhi Creek

The proposed project area includes the Lemhi Creek and Spring-Ruff HUs. They are combined because they are all wilderness, and the only fish found in the area are in the main Salmon River. The river in this area does have spring/summer chinook and sockeye salmon, steelhead, and bull trout.

Trout Creek

This area is composed of three HUs; Trout Creek, Spring Ruff, and Little Trout-Big Elkhorn. They are combined because all of the proposed burning would be south of the river in wilderness, and the only fish found in this part of the area are in Trout Creek and the main river. North of the river, Little Mallard Creek has steelhead and bull trout. South of the river, only Trout Creek has redband/steelhead trout. The main river has spring, summer chinook and sockeye salmon, steelhead and bull trout.

Corn-Fountain Area

This proposed project area contains two different HUs: Corn-Fountain and Shell-Long Tom. They are combined because of similar habitat conditions. This area is undeveloped, except for the Salmon River Road and some old roads on Long Tom Ridge. Corn Creek has steelhead, cutthroat hybrids, and possibly some bull trout; the other small streams in the area are barren of fish. The main river has migrating spring/summer chinook and sockeye salmon and steelhead, and resident bull and cutthroat trout.

Colson Creek

This small watershed is about five miles upstream from the mouth of the Middle Fork on the north side of the Salmon River. The area is mostly roaded and developed. Colson Creek is used by steelhead, cutthroat trout, and possibly bull trout.

STREAMS ON THE SALMON-CHALLIS NATIONAL FOREST

East Fork Owl Creek

The East Fork enters Owl Creek about two miles above its mouth. The watershed has a few old roads in its headwaters, but little development. In Owl Creek, nearly half of the watershed was burned in the 1985 Long Tom Complex Fire. Owl Creek has cutthroat, bulltrout and steelhead, the East Fork just steelhead.

Garden-Lower Clear Creek Area

These two streams in lower Panther Creek are lumped together, as they are all in a wilderness and have similar characteristics. Garden Creek has only steelhead and cutthroat trout, Clear Creek is large enough for spring chinook salmon, steelhead, bull and cutthroat trout. Both areas are all wilderness and in near natural condition.

Hot Springs-Gant

This area is the lower 11 miles of Panther Creek, (except for major tributaries). There is a road along main Panther Creek, but little other development in this HUC. Spring/summer chinook, steelhead and cutthroat trout are found in main Panther Creek. None of the tributaries in this HU have any fish. Main Panther Creek is also important for migration to the upper watershed.

There are streamside roads and other developments farther up in the watershed. One of the main problems has been the chemical pollution from upstream mining, which is toxic to resident fish and a barrier to migrant fish.

Pine Creek

Pine Creek flows northwest to the Salmon River about two miles below Shoup. The lower part of the drainage has some roads, development and private land. Main Pine Creek has some steelhead, cutthroat, and some bull trout.

Spring Creek

Spring Creek enters the Salmon River form the north about two miles upstream of Shoup. About half the watershed is roaded and developed, and there are some mining activities in the headwaters. Steelhead, bull, and cutthroat trout use Spring Creek.

Transfer-Sawlog Area

This HU is just below Indianola on both sides of the river. The tributaries (Little Spring Creek, Transfer Gulch, Sawlog Gulch, and Hale Gulch) are too small and steep to have any fish. The main Salmon river is used by spring/summer chinook, sockeye salmon, steelhead, cutthroat and bull trout. The area is lightly developed except for the river road, and roads in the Transfer Gulch area.

Lower Indian Creek

Indian Creek flows south to the Salmon River at Indianola. The lower half of the watershed is roaded and developed. There have been some mining activities in the area and there is some private land. Main Indian Creek is use by spring/summer chinook and steelhead. Bull trout and cutthroat trout are found in Indian Creek and several tributaries.

Shell-Long Tom

This HU is on the north and south sides of the Salmon River just above the mouth of the Middle Fork Salmon River. None of the small, steep tributary streams have any fisheries. The main Salmon River is used by resident bull trout and cutthroat trout, and by migrating spring and summer chinook, sockeye, and steelhead. The area is undeveloped except for the Salmon River Road.

WATER QUALITY

INTRODUCTION

The water quality analysis of the affected environment is divided into three sections, one for each National Forest within the proposed action area. These forests are the Payette, the Nez Perce, and the Salmon-Challis National Forest. The Bitterroot National Forest is not included in this analysis because no prescribed burning is proposed within the Bitterroot National Forest boundaries.

PAYETTE NATIONAL FOREST

SCOPE OF THE ANALYSIS

There are several different watershed boundaries (scales) that are discussed in this and subsequent sections of the document. The area analyzed consists of those watersheds within the planning area where prescribed burning is proposed. Most of the watersheds are "true watersheds". A true watershed has one outflow and is otherwise bounded by watershed divides. The area remaining along the main stem of a river or stream after the major tributaries were delineated was divided into "composite watersheds". A composite watershed has an inflow and an outflow. The entire contributing area to the outflow is not included within the watershed. Only the area on the Payette NF side of the each composite watershed is analyzed in this section of the analysis. The watersheds have been grouped into four general areas; the Wilderness Section, the Middle Salmon Section, the Lower Salmon Section, and the Little Salmon Section. Table 3 - 9 displays the Forest Service watersheds (4th through 7th field), analysis area, and project area boundaries.

Table 3 - 9. Hierarchy of Watersheds Analyzed

Section	Fourth Field	Fifth Field	Sixth Field	Seventh Field
Wilderness	Middle Salmon-Chamberlain	Fivemile-Rhett	Fivemile Creek	
	Middle Salmon-Chamberlain	Fivemile-Rhett	Little Fivemile-Teepee	Little Fivemile Creek
	Middle Salmon-Chamberlain	Fivemile-Rhett	Lemhi Creek	
	Middle Salmon-Chamberlain	Fivemile-Rhett	Trout Creek	
	Middle Salmon-Chamberlain	Fivemile-Rhett	Little Trout-Big Elkhorn	Little Trout Creek

Middle Salmon	Middle Salmon-Chamberlain	California-Bull	Cottontail-Basin	Poly Creek
	Middle Salmon-Chamberlain	California-Bull	Cottontail-Basin	Rabbit Creek
	Middle Salmon-Chamberlain	California-Bull	Cottontail-Basin	Rugged Creek
	Middle Salmon-Chamberlain	California-Bull	Cottontail-Basin	Cottontail Creek
	Middle Salmon-Chamberlain	California-Bull	Maxwell Creek	
	Middle Salmon-Chamberlain	California-Bull	California Creek	
	Middle Salmon-Chamberlain	Fall-Johnson	Carey Creek	
Lower Salmon	Lower Salmon	Partridge-Kelly	Partridge Creek	
	Lower Salmon	Partridge-Kelly	Elkhorn Creek	Lower Elkhorn
	Lower Salmon	Partridge-Kelly	Elkhorn Creek	Upper Elkhorn Creek
	Lower Salmon	French Creek	Lower French	
	Lower Salmon	French Creek	Middle French	Klip Creek
	Lower Salmon	French Creek	Middle French	Middle French
	Lower Salmon	French Creek	Upper French	Upper French
	Lower Salmon	French Creek	Upper French	Jackson Creek
	Lower Salmon	French Creek	Little French	
Little Salmon	Little Salmon	Middle Little Salmon	Lower Boulder	
	Little Salmon	Middle Little Salmon	Upper Boulder	
	Little Salmon	Lower Little Salmon	Rattlesnake-Fall	Indian Creek
	Little Salmon	Lower Little Salmon	Rattlesnake-Fall	Lockwood Creek
	Little Salmon	Lower Little Salmon	Rattlesnake-Fall	Fall Creek
	Little Salmon	Lower Little Salmon	Rattlesnake-Fall	Camp Creek

The Wilderness Section is located along the Main Salmon River from Little Trout Creek to Fivemile Creek. Sixth level subwatersheds include Fivemile Creek, Lemhi Creek and Trout Creek pure subwatersheds and Little Fivemile-Teepee, Spring-Ruff, and Little Trout-Big Elkhorn composite subwatersheds. These subwatersheds are all within the fifth field composite watershed Fivemile-Rhett. The composite subwatersheds have been further delineated to define those drainages where burning is proposed. Within Little Trout-Big Elkhorn, the drainage Trout Creek and a small face drainage (LTBE-1) are included in the analysis area. Within Spring-Ruff, two composite areas are included. One contains no named creeks and extends upstream from Big Blowout Creek to Lemhi Creek (SR-1). The other includes the Fall, Ruff and Moore Creeks (SR-2). Within Little Fivemile-Teepee, Little Fivemile Creek,

the small face drainage between Little Fivemile and Fivemile Creeks (LFT-1), and another small face drainage from Little Fivemile Creek upstream to the mouth of Big Blowout Creek (LFT-2) have been delineated. These watersheds are all within the Middle Salmon-Chamberlain subbasin 4th field hydrologic unit code (HUC) 17060208.

The Middle Salmon Section is located along the Main Salmon River from Carey Creek upstream to, but not including, the mouth of Warren Creek. Sixth field watersheds where burning is proposed include Carey Creek, California Creek, and Maxwell Creek pure subwatersheds and, Elk-T Bone, Cottontail Basin, and Rabbit-Indian composite subwatersheds. Carey Creek subwatershed is within the fifth field composite watershed Fall-Johnson. The other subwatersheds are within the fifth field composite watershed California-Bull. The composite subwatersheds have been further delineated to define those drainages where burning is proposed. Within Elk-T Bone, a small face drainage is included in the analysis area (ET-1). Within Cottontail Basin, the drainage Cottontail Creek, Polly Creek, and a small composite area which does not contain a named creek that extends upstream from California Creek to Cottontail Creek (CB-1). Within Rabbit-Indian, Rabbit Creek, Rugged Creek, and the small face drainages above and below each drainage are included (RI-1, RI-2, and RI-3). These watersheds are all within the Middle Salmon-Chamberlain subbasin (4th field HUC 17060208).

The Lower Salmon Section includes Partridge Creek, Elkhorn Creek and French Creek. Partridge Creek consists of two 6th field watersheds, Elkhorn Creek is one 6th field watershed, and French Creek is a 5th field watershed, divided into four sixth fields. These watersheds are all within the Lower Salmon subbasin (4th field HUC 17060209).

The Little Salmon Section includes Boulder, Indian, Lockwood, Fall, and Camp Creeks, which flow into the Little Salmon River from the west. Upper and Lower Boulder Creek subwatersheds are sixth field watersheds and part of the Middle Little Salmon fifth field composite watershed. Indian, Lockwood, Fall, and Camp Creeks are within Rattlesnake-Fall sixth level composite subwatershed and the Lower Little Salmon fifth field composite watershed. All are within the Little Salmon subbasin (4th field HUC 17060210).

This Chapter will discuss the affected environment of the water resource on the Payette NF for the Salmon River Canyon Project. The current condition of the watersheds will be discussed to provide baseline conditions.

DESIRED CONDITION

The desired future condition of the water resource is described in the Payette NF Forest Plan as the management of the watershed condition to meet defined objectives. Those objectives include:

- Minimize the potential for damage to watershed resources while meeting multiple use objectives.

- Meet or exceed Idaho Water Quality Standards and protect beneficial uses.

- Manage the cumulative effects of soil loss from surface and mass erosion so that erosion will not result in significantly reduced productivity of the soil, stream channel changes, reduction of aquatic habitat or other impacts on watershed resources.

- Promote Coordinated Resource Management Planning in watersheds which involve multiple ownerships.

- Plan and implement restoration of areas altered by floods, landslides, fires, or other events, recognizing the immediate management issues, natural rehabilitation processes, and the long-term role of events in shaping the landscape.

- Monitor and evaluate resources and activities to determine if the projects and practices being implemented are meeting management objectives.

The Idaho Water Quality Standards (IDAPA 16.16.01.02) provide for water quality protection of designated and existing beneficial uses of water. Designated beneficial uses specifically listed for the main Salmon and Little Salmon River are domestic water supply, agricultural water supply, cold water biota, primary contact recreation, secondary contact recreation, and special resource waters. The Little Salmon River is also designated for salmonid spawning. For undesignated waters the applicable water quality criteria include primary and secondary recreation, salmonid spawning and cold water biota.

The Salmon River, Little Salmon River, and Indian Creek are listed as Water Quality Limited Streams (WQLS) on the State of Idaho, Division of Environmental Quality, 303(d) list for 1998. The Salmon River and the Little Salmon River have been listed as a low priority WQLS, without identification of a contaminate. Indian Creek has sediment identified as the pollutant of concern. Goals for Indian Creek include a decrease in management related sediment from existing nonpoint sources and a "no net increase" of sediment within the watershed. The overall goal for WQLS is to avoid increasing the pollutant of concern to the point that it affects beneficial uses.

PAST EVENTS THAT HAVE AFFECTED THE CURRENT CONDITION

Wilderness Section

Fire has played an important role in the disturbance regime along the Salmon River. Since 1987, about 3220 acres have burned in Fivemile Creek, Lemhi Creek and Fall Creek. The most recent and extensive burn has been the Chicken Complex Fire in 1994. Within Fivemile Creek the Chicken Complex burned over 2000 acres. Other fires have been the Sheepeater Fire in 1989 (85 acres) and the Sleepy Knoll Fire in 1987 (392 acres). These fires all occurred in the upper elevations of the watershed. In Lemhi Creek the China Bar and Sheepeater Fires burned a total of 386 acres in 1989. The China Bar Fire burned 315 acres within the small drainage of Fall Creek.

Because these drainages are designated as wilderness very little development has occurred. No timber harvest activity, roading, and very little mining activity has occurred. The most significant impact to the water resource comes from recreation, mainly along the main

Salmon river corridor. It could be argued that the actual greatest effect humans have had on this watershed is fire exclusion.

Middle Salmon Section

Since 1983, about 5797 acres have burned in Carey Creek and Fall Creek. The most recent and extensive burns have been the Tomato Point Fire in 1992 and the Corral Fire in 1994. Within Carey Creek the Corral Fire burned over 2300 acres. This fire also burned 890 acres in the upper portion of Maxwell Creek. The Tomato Point Fire burned about 30 percent (670 acres) of Polly Creek. Other fires have been the Rugged Creek Fire in 1983 (220 acres) and the French Creek Fire in 1985 (48 acres in Carey Creek). The Tomato Point and Rugged Creek Fires occurred along the Main Salmon River in the steep breaklands of the river corridor. Corral Fire burned mostly in the upper elevations.

Logging and road building for the Fall-Carey Timber Sale has been occurring in the south west portion of Carey Creek subwatershed since 1996. About 700 acres of harvest is planned. Approximately .9 miles of light road reconstruction and 2.1 miles of road construction has occurred. Past harvest in Carey Creek has resulted in an ECA of 21 percent. (Main Salmon Post-fire Project, Final EIS, September 1995)

Past mining activities have occurred in many of these drainages. The BLM mining district which includes the upper half of Carey and Maxwell Creeks and a small area in upper California Creek has been the site of numerous gold mining explorations and excavations. Mining has been ongoing in the district since the 1800s. Approximately 21 small active mines are present in this area. Most are located in California and Maxwell Creek subwatersheds. (USDI, Mines and Prospects in the Payette NF, Summary Report by the U.S. Bureau of Mines, 1996.)

Lower Salmon Section

Since 1985, about 15,000 acres have burned in Partridge, Elkhorn, and French Creek. The most extensive burns have been the French Creek Fire in 1985, Warm Springs Fire in 1992, Partridge Fire in 1989 and the Corral Fire in 1994. Within Elkhorn and French Creek, the Corral Fire burned about 8000 acres.

Recent timber harvest has occurred in Lower, Middle, and Little French Creek 6th fields (Jenkins Salvage, Skor and Smore Timber Sales). Logging and road building have been occurring since 1996 and are ongoing. About 1000 acres of harvest is planned. Harvest methods include tractor, skyline, and helicopter. One and a half miles of road construction has occurred.

Little Salmon Section

Logging and grazing have been the important past events rather than fire that have occurred in the Little Salmon Section that have affected the current conditions. There are currently three active allotments which have activities occurring within the Boulder Creek drainage. The Price Valley Allotment includes the upper elevations of the Boulder Creek drainage. Boulder Creek Allotment includes the majority of the middle section of Boulder Creek

drainage. The Round Valley Allotment includes the lower section on the south side of Boulder Creek.

Table 3 - 10.

Allotment Name	Acres within Boulder Creek	Livestock Numbers
Boulder Creek Allotment	14939 acres	1023 ewe/lambs
Price Valley Allotment	2351 acres	900 ewe/lambs
Round Valley Allotment	1695 acres	Variable/steers

Boulder Creek and Indian Creek watersheds have high road densities. Lockwood, Fall, and Camp Creek watersheds are relatively unmanaged. Extensive logging has occurred in Boulder Creek.

CURRENT CONDITIONS

The Main Salmon River portion of the planning area is located in the Idaho Batholith. Rock types are generally intrusives which are dominantly quartz monzonite (commonly associated with the granitic family). The physiographic setting is one of steep, rugged, mountain terrain. Elevations range from 1000 feet to 8500 feet. Slopes are extremely steep, straight and very long. Slope gradients are between 50 and 90 percent. Soils are mostly derived from granitic rock and are commonly very shallow and coarse textured. Rock outcrop and rocky cliff lands are common. The climate of low annual precipitation and high average temperature produces dry, sparsely vegetated slopes at low elevations and southerly aspects. North facing slopes at mid and high elevations differ greatly from the breakland slopes. They tend to have deeper soils and are densely vegetated. Precipitation is much greater and snowpacks persist throughout the winter.

Mass movements in the form of landslides and debris torrents are common and very active in periods of intense precipitation. A correlation to mass wasting from removal of vegetation due to wildland fire has been documented. Burned vegetation can result in changes in soil moisture and loss of rooting strength that result in slope instability.

Equivalent Clearcut Area (ECA) is a general index of vegetation condition in forested watersheds and is correlated to increases in water yield. The amount of area in an ECA condition has been referenced in several studies in the United States. Nearly every study in forested zones has shown a increase in streamflow following forest cutting and a gradual decrease in streamflow if an area is reforested (Hibbert 1967). A review of annual water yield increases versus percent harvested area for various watersheds in regions of the United States (Stednick (1996), found measurable increases of water yield at 15 percent of the watershed harvested in the Rocky Mountain Inland Intermountain region. The harvest area resulted in a measurable increase in annual water yield.

As vegetation is removed through timber harvest, increases in water yield occur because of one or more factors: a reduction in transpiration; an increase in wind turbulence (results in redistribution of snow and greater local snow accumulations); and a reduction in interception (results in more efficient conversion of the snow pack to streamflow). The magnitude of the

increase or decrease and the threshold for water yield increases that begin to affect stream channel stability, may vary substantially depending on geo-climatic setting, geology, vegetative conditions, and processes that form the landscape (USDA-FS 1973).

The procedure used to evaluate ECA for the watersheds within the Salmon River Canyon Planning Area is described in "Forest Hydrology, Hydrologic Effects of Vegetative Manipulation, (USDA Forest Service, 1974). Roads were assumed to have complete vegetation removal and in an un-recovered condition (USDA-FS 1973). Past harvest areas were recovered over time and adjusted for prescription. It is important to note that the recovery curves used from Forest Hydrology are calibrated for forests in Northern Idaho, which probably revegetate faster than those within the planning area. Another potential problem in accuracy may result from the estimate of natural crown closure. ECA was not stratified by habitat type, thus the ECA is the same for 100 percent removal of a dense stand versus an open stand.

The BOISED sediment yield model (R1/R4 Sediment Yield Guide, USDA Forest Service, 1981) is used to predict sediment delivered from each watershed based on past harvest, roads and fire events. This model estimates natural or base sediment yield from landtype-derived surface and mass erosion ratings (Benson and Larson 1969; Potyondy et al 1991). The measure "percent over natural (% ON)" is the predicted amount of sediment from management activities that is above the natural level for each watershed. Many watersheds in the Salmon River Canyon have high natural erosion rates because of the granitic geology, soil depths and vegetation. The average natural sediment yield for watersheds within the planning area ranges from 13 to 73 tons per square mile per year.

Wilderness Section

Fivemile and Little Fivemile Creek originate near Chicken Peak at an elevation of 8500 feet, and is almost 11 miles long. Trout, Little Trout and Lemhi Creeks originate near Sheepeater Mountain at 8490 feet. Near the main Salmon River these tributaries are very steep A channels, very high energy, well confined, and capable of transporting large sediment loads.

Table 3 - 11. Stream order and BOISED results for Wilderness Section

Watershed	Watershed Area (acres)	Highest Stream Order	% Over Natural Sediment (1999)	Average Natural Sediment Yield (tons/sqmi/yr)
Fivemile Creek	18111	4	0	47.7
Little Fivemile	5618	2	0	72.8
Lemhi Creek	8886	3	0	33.5
Trout Creek	8059	3	0	31.2
Little Trout Creek	1940	2	0	68.5

For all of these drainages very little information is available. Very few aquatic inventories have been conducted. In 1972 a Soil and Water Resource Inventory was conducted for what was then known as the Idaho Primitive Area. Erosion rates for the landtypes in this section are high due to the steep slopes, granitic bedrock, and lack of ground cover. Generally, all streams were reported to be in good to excellent condition in the 1972 stream inventory.

Watershed condition is described as "naturally unstable". The percent over natural sediment estimated by BOISED is zero, as there is no timber harvest or roading in these watersheds. Past fires are reflected in the ECA indicator. All are less than 15 percent for all watersheds.

Middle Salmon Section

California Creek originates near War Eagle Mountain at an elevation of 8200 feet, and is about 9 miles long. Carey and Maxwell Creeks originate near Carey Dome at 7681 feet. Near the main Salmon River, these tributaries and the smaller ones as well, are very steep A channels, very high energy, well confined, and capable of transporting large sediment loads. Natural sediment yields are high for these watersheds. Carey Creek is currently producing 26 percent over natural sediment due to recent timber harvest, roading, and wildland fire.

Table 3 - 12. Watershed Condition Indicators

Watershed	Road Density (mi/mi2	Harvest (acres)	Past wildland fire (acres)	ECA (Acres)	ECA (%)
Fivemile Creek	0	0	2519	0	14%
Little Fivemile Creek	0	0	0	0	0
SR-1	0	0	0	0	0
Lemhi Creek	0	0	386	0	4%
SR-2	0	0	315	0	6%
Trout Creek	0	0	378	0	5%
LTBE-1	0	0	0	0	0
Little Trout Creek	0	0	0	0	0

Table 3 - 13. Stream order and BOISED results for Middle Salmon Section

Watershed	Watershed Area (acres)	Highest Str-eam Order	% Over Natural Sediment (1999)	Average Natural Sediment Yield (tons/sqmi/yr)
Carey Creek	6016	3	26%	33.4
California Creek	22637	4	.8%	31.4
Cottontail Creek	4238	2	0%	45.1
Rabbit Creek	5593	3	.4%	28.8
Polly Creek	2320	2	0%	52.7
Rugged Creek	1855	2	0%	54.9
Misc Face Drainages	5873	1	NA	NA

A 1993 Riparian Inventory described upper Rabbit Creek as a B3a, A4, and A2a+ channel with good to fair stability. Some mining excavation was observed which resulted in disturbance to the riparian area. Road erosion and culvert malfunction was also noted on the non-Forest road that crossed the drainage in the upper end.

Aside from the Fall-Carey Timber Sale activities, Carey Creek is relatively undisturbed except for Forest Road 318, which runs from the mouth of Carey Creek along the right bank for

approximately one mile. It then switchbacks upslope and is located on the ridge to the northeast. Most of the effects to water yield are attributable to recent fire. Overall, the 1992 Level II Riparian Stream Inventory found the stream condition to be good. Stream banks were described as well armored with boulders and late seral vegetation.

No survey data was available for Maxwell, Cottontail, Polly, and Rugged Creek or the smaller face drainages along the river. Generally, the small face drainage areas are long smooth slopes along the river with straight, very steep, bedrock controlled channels. Most channels are ephemeral or intermittent with evidence of past debris torrents.

Table 3 - 14. Watershed Condition Indicators for Middle Salmon Section

Watershed	Road Miles (mi)	Road Density (mi/mi2)	Harvest (Acres)	Past Wildland fire (Acres)	ECA (Acres)	ECA (%)
Carey Creek	10.8	1.1	1283	2413	1283	21%
California Creek	15.4	.6	0	0	721	4.5%
Cottontail Creek	0	0	0	26	0	0%
Polly Creek	0	0	0	672	0	0%
Rugged Creek	0	0	0	190	0	0%
Misc Face Drainages	0	0	0	0	1631	0%

Lower Salmon Section

The National Forest portion of Partridge Creek is relatively undisturbed. A 1997 Level II Riparian Stream Inventory rated stream stabilities as good to excellent. Stream banks were described as well armored with boulders and late seral vegetation. Rosgen stream types included A3 and A2. The inventory noted some burned (Corral Fire 1994) and overgrazed riparian areas.

Table 3 - 15. Stream order and BOISED results for Lower Salmon Section

Watershed	Watershed Area (acres)	Highest Stream Order	% Over Natural Sediment (1999)	Average Natural Sediment Yield (tons/sqmi/yr)
Partridge Creek	16809	3	0%	18.6
Elkhorn Creek	14178	3	18.2%	21.8
French Creek	49639	4	14.9%	17.9

French Creek was identified as a Rosgen B2 and B3 channel type in a 1991 Level II Riparian Inventory. Several tributaries to French Creek were identified as A3 channels. Channel stability was evaluated as generally good, with two streams rating as fair. Several tributaries in lower French Creek were inventoried in 1992 on the west side of French Creek. Channel types were identified as A4 with stability ratings of good to very good. The A4 Rosgen type is considered to be very sensitive to increases in water and sediment yields.

Lower Elkhorn Creek was inventoried in 1992 and was described as an A2 channel with good to excellent stability. Tributaries were generally described as A2 or A4 channels with stability ratings from fair to good. Recent logging and road construction has occurred in this watershed (Lower Elkhorn, Bar None, and Smore Timber Sales). ECA for Elkhorn Creek watershed is 33 percent due to recent timber harvest, road construction, and wildland fire.

Table 3 - 16. Watershed Condition Indicators for Lower Salmon Section

Watershed	Road Miles (mi)	Road Density (mi/mi2)	Harvest (Acres)	Past Wildland fire (Acres)	ECA (Acres)	ECA (%)
Partridge Creek	0	0	0	2224	850	5%
Elkhorn Creek	17.6	1.0	3286	3715	4604	33%
French Creek	24.4	.3	2230	9082	9672	20%

All values calculated for non-forest areas only.

Little Salmon Section

The Little Salmon River subbasin contains a mix of lithologies and landforms due to a rather chaotic series of events in the geologic history. Included are metamorphic, sedimentary, and the intrusive granitics of the Idaho Batholith. Soils that are derived from the metamorphic rocks have some potential for slope instability. The landforms of the Little Salmon River corridor have been created by the predominant and frequent natural process of landslides. River terraces, hillslopes, and alluvial fans display hummocky topography and other evidence of recent and historical slope failure. Natural sediment yields for the watersheds in this section are lower than those along the Main Salmon due to different rock types, geomorphic setting, and soil characteristics.

Boulder Creek is about 19 miles in length with the lower 1.6 miles flowing through private land. Elevations in the watershed range from 8500 to 3000 feet.

Table 3 - 17. Stream order and BOISED results for Little Salmon Section

Watershed	Watershed Area (acres)	Highest Stream Order	% Over Natural Sediment (1999)	Average Natural Sediment Yield (tons/sqmi/yr)
Boulder Creek	25103	4	6.7%	14.5
Camp Creek	796	1	0%	14.7
Fall Creek	2474	2	0%	13.4
Lockwood Creek	1924	2	3%	17.0
Indian Creek	1734	3	19.6%	20.3

The existing road system in the lower part of Boulder Creek disconnects the stream from its floodplain area. Channel gradient steepens and confinement increases in the headwaters. Impacts are less than on lower Boulder Creek due to inacessiblity of the stream to livestock. Some riparian areas along Boulder Creek have been impacted by over-grazing.

There are 132 miles of road in the Boulder Creek watershed, for an overall road density of 3.3 miles per square mile. Timber harvest has occurred in both Upper and Lower Boulder Creek. Indian Creek is also densely roaded with 10.2 miles of road within the watershed (3.6 miles per square mile).

Table 3 - 18. Watershed Condition Indicators for Little Salmon Section

Watershed	Road Miles (Mi)	Road Density (Mi/Mi2)	Harvest (Acres)	Past Wildland Fire (Acres)	ECA (Acres)	ECA (%)
Boulder Creek	132	3.3	3182	0	3182	14.5%
Camp Creek	.1	.1	0	0	721	4.5%
Fall Creek	2.9	2.6	0	0	0	0
Lockwood Creek	.3	.1	0	0	0	.1%
Indian Creek	10.2	3.6	0	0	0	2.2%

Camp, Fall, and Lockwood Creek are described as A4 channels in a July 1991 Level II Riparian Inventory. Channel stabilities ranged from fair to good. Grazing impacts were observed in the headwaters.

Wetlands and Floodplains

Riparian communities support a unique variety of herb and shrub species that provide food and cover for almost all mammals, birds and amphibians in the analysis area. These areas are associated with water and are an important influence of aquatic habitat conditions. Palustrine wetlands (241 acres) are mapped on the USGS topographical map within analyzed watersheds. Many more may actually exist and can be delineated with field mapping. Protection of these areas is required by PACFISH Executive Orders, and Payette National Forest Plan standards through existing laws and regulations. PACFISH requires these area to be protected as Riparian Habitat Conservation Areas (RHCA). Map 3 - 6 is a map of hydrologic features including streams and watersheds in the analysis area.

Riparian areas in the analysis area are predominantly upland types associated with either basins or streams. The areas adjacent to the 700+ miles of stream serve as travel corridors for numerous wildlife species. Two main types of wetlands are found in the project area : riverine (type 1) and Palustrine (type 6) (USDI-FWS 1979).

Type 1. Along main stream channels, Riverine - upper perennial, permanently flooded, rock/unconsolidated bottom, scrub/shrub and forested, wetlands follow stream and glacial outwash floodplains (approximately 15,400 acres). These areas provide value to fisheries, bird and mammal species.

Type 6. Adjacent to upper stream channels, Palustrine - seasonally and intermittently flooded, scrub/shrub, forested wetlands, follow intermittent channels to the heads of watersheds (approximately 2,483 acres). These areas provide value to primary bird and mammal species. There are many small seeps and springs that could not be quantified that would most

likely be delineated into this wetlands type.

The current conditions of wetlands and floodplains are variable. Some riverine wetlands and floodplains have been impacted by mining and at road and stream crossings. The disturbance during culvert installation is short term but the presence of the culvert affects the value and function of the wetland at those specific sites.

NEZ PERCE NATIONAL FOREST

SCOPE OF THE ANALYSIS

The area analyzed consist of those watersheds within the planning area that are located on the Nez Perce National Forest north of the Salmon River from Sabe Creek to Whitebird, and the prescription watersheds that flow into the Little Salmon River. Some of the small face watersheds on the Salmon River are grouped into composite watersheds. The scope of the analysis for direct and indirect effects is the 6th field prescription watersheds, and the Nez Perce Cumulative effects watersheds that are a composite of 6th field watersheds, or composites delineated to one 5th field watershed. The scope of analysis for cumulative effects is the 5th and 6th field composite cumulative effects watersheds and the Little Salmon and Main Salmon River subbasins. Descriptions of individual watersheds are included in the Current Condition portions of this section.

Indicators that are used in this analysis for direct and indirect effects are equivalent clear-cut area (ECA), an indicator of water yield, percent over natural sediment, and channel stability. The main indicator used for the cumulative effects analysis is the predicted activity sediment that would be generated by the proposed burning and routed to the Salmon River.

DESIRED CONDITION

Nez Perce Forest Plan, State Water Quality Standards, and the Clean Water Act

Appendix A of the Nez Perce Forest Plan lists forest fish/water quality objectives and Forest Standards by prescription watershed for current fishery potential, number of entries allowed in the watershed per decade, and allowable percent over natural sediment. The prescription watersheds in the Salmon River and Little Salmon River basins that are included in the analysis area are listed in Appendix A with a current fishery potential, number of entries per decade, and allowable percent over base sediment. The desired condition in these watersheds is to stay within Nez Perce Forest Plan guidelines, follow PACFISH direction and meet or exceed State Water Quality Standards.

Beneficial Uses

Idaho Water Quality Standards provide for water quality protection of designated and beneficial uses of water. There are no specifically designated beneficial uses for Slate Creek watersheds, the Lower Salmon River East watersheds, the Lower Salmon River West watersheds, Race Creek prescription watersheds, Lower Big Mallard Creek watershed, John Day Creek watersheds, Fiddle Creek watershed, Bargamin and Crooked Creek watershed, Allison Creek watershed, and Squaw/Papoose watersheds. Therefore for these streams the

applicable water quality criteria include primary and secondary recreation, salmonid spawning and cold water biota.

Designated beneficial uses listed for the Rapid River and the Little and Main Salmon Rivers are domestic and agricultural water supply, cold water biota, salmonid spawning, and recreation.

Water Quality Limited Segments

A Water Quality Limited Stream (WQLS) is a stream that is listed under Section 303(d) of the Clean Water Act as not meeting applicable water quality standards. The current list of water bodies for Idaho was compiled by the Environmental Protection Agency and the Idaho Division of Environmental Quality in response to a lawsuit and subsequent court ruling. Total Maximum Daily Loads (TDMLS) must be developed for each water quality limited stream for the pollutants that impair water quality.

The main Salmon River from Corn Creek to Wind River and the Little Salmon River from the headwaters to Round Valley Creek, and Round Valley Creek to the confluence at the main Salmon are listed as WQLS. The main pollutant of concern is listed as sediment.

Shingle Creek, Allison Creek, Big Mallard Creek, China Creek, Cow Creek, Race Creek, Slate Creek , Little Slate Creek, and Squaw Creek have been listed as low priority, with sediment listed as the pollutant of concern. Under this designation, State Water Quality Standards state that"... the Department shall require ... best management practices for non-point sources deemed necessary to prohibit further impairment of the designated or existing beneficial uses".

PAST EVENTS THAT HAVE AFFECTED THE CURRENT CONDITION

The lands within the project area have been affected in the past by timber harvest, grazing, roads and past wildland fires.

Grazing

The lower reaches of Allison Creek show some impacts from grazing. Van Creek and Kelly Creek are within the Allison/Berg allotment, but show minimal damage due to steep slopes and brushy riparian areas. Most damage is concentrated near springs, seeps, bogs, and some streamside areas.

Forest lands in the upper part of the John Day watershed are part of the Florence Grazing Allotment, with 400 AUMs. Lower Big Mallard supports three grazing allotments, two active and one inactive. Grazing has occurred as various levels since 1946. The Mallard Creek and Green Mountain grazing allotments total 73,630 acres, with 28,830 of those acres within the Big Mallard Creek watershed. The Salmon River Breaks allotment is currently vacant.

Riparian function and channel characteristics have been altered at ranch and residential areas along Jack, Meyers, and Big Mallard Creeks. Stream surveys in 1989 noted heavily grazed riparian areas and some bank sloughing. Grazing practices have changed and these areas are

recovering. The private lands are used primarily as recreational residences and the current level of activity in these areas is considered to have a low impact on riparian areas.

Race Creek has three active grazing allotments, the Race Creek, Cow Creek, and Papoose allotments. Some areas of localized grazing impacts were noted during monitoring in 1994 and 1997, but these affected only a small percentage of streams.

There are currently three active allotments which have activities occurring within the Lower Salmon River West drainages. The Sherwin Creek allotment is managed under a deferred grazing system with 46 cow/calf pairs. The Christie Creek/Riverview allotment is within a larger allotment which is managed under a deferred rotation system. Most of the problem areas on the allotment are small in size and may be mitigated. Fourteen sites on three allotments were identified in 1995 (Biological Assessment Lower Salmon River) for mitigation to protect and enhance riparian resources.

Within the Slate Creek Watershed permanent open grassland areas are limited to the lower south facing slopes. Long term grazing use has focused on some of the larger meadow sites, but smaller meadows dispersed through the area also contain significant forage quantities. The riparian areas and streams have been impacted in varying degrees from both grazing and placer mining.

Timber Harvest and Roads

Timber Harvest has occurred in varying degrees within the drainages of Race Creek, Allison Creek, Kelly Creek, Robbins Creek, Fiddle Creek, John Day Creek, Lower Big Mallard, Salmon West, and Slate Creek.

Allison Creek was logged in the ’60s and ’70s by methods that created extensive low-grade road mileage and surface-disturbance. The private timber in the drainage has been extensively harvested in the 1990s. Forty five miles of road have been build in this watershed to support timber harvest over the past 4 decades. Allison Creek is a stream of "high concern due to past harvest, road construction, and grazing.

About 293 acres of Kelly Creek has been harvested in the past, and 505 acres of Robbins Creek drainage. Van Creek has 7 miles of road, Kelly Creek has 30 miles of road related to past timber harvest, and Robbins Creek has 8.6 miles of roads that were built in the past few decades.

Face Drainages West contain about 14 miles of existing roads, and 359 acres of timber harvest that has taken place mostly since the 1960s.

Because Lower Bargamin is designated as wilderness, it has experienced very little development. No timber harvest activity has occurred in the watershed. Crooked Creek has been heavily developed in the upper watershed and minimally developed due to the wilderness designation in the lower watershed. The proposed burn project should have no effect on the upper watershed, but human caused disturbance such as mining, timber harvest, road construction and grazing will be evaluated for the Crooked Creek watershed in the Cumulative Effects section.

Approximately 1,029 acres of timber harvest has occurred in upper Fiddle Creek watershed and on the private lands in lower Fiddle Creek.

Timber harvest has occurred on all of the three prescription watersheds in upper John Day Creek and on the private lands in lower John Day Creek. Of the 13,851 acres making up the prescription watersheds plus the lower John Day watershed, approximately 1,723 acres have had harvest activities. There are about 56 miles of road in John Day Creek. Of these, 21 miles are National Forest Roads, and 35 miles are non-forest roads. Most of the remaining roads were constructed historically to support timber sales in the East Fork and Middle Fork John Day Creek

Timber harvest occurred within the Lower Big Mallard watershed from 1965 to 1994, predominantly along Forest Road 1190 (Jack Mountain Road) and Forest Road 469 (Montana Road). 132 acres were clearcut during 1965-67. During 1985-88, 468 acres were harvested. During 1992-1994 the Grouse timber sale was cut. The Noble Timber Sale has been completed, and roads for the Jack Timber Sale are completed. There are about 33 miles of road in the Big Mallard watershed , for an overall road density of .58 miles per square mile.

Timber harvest has occurred on all of the four prescription watersheds in Race Creek. Of the 18,164 acres making up the prescription watersheds, approximately 4780 acres have had harvest activities. There are 66 miles of road in the Race Creek watershed, for an overall road density of 2.5 miles per square mile. Of these, 52 miles are on National Forest and 14 miles are non National Forest roads.

Timber harvest has occurred on all of the four prescription watersheds in the Lower Salmon River West watersheds. Of the 16,394 acres making up the prescription watersheds, approximately 2541 acres have had harvest activities. Heavy timber harvest has taken place in the headwaters of the three small watersheds. There are 98 miles of road in the four prescription watersheds. This includes private land and National Forest. The headwater of the small watersheds also have high road densities.

Timber harvest has occurred on all of the 20 prescription watersheds in Slate Creek, accounting for approximately 7,843 acres in this drainage from 1966 through 1997. Timber harvest has affected riparian function by removing streamside shade, removing sources of large woody debris in first and second order channels that stabilize streams and store sediment, and has added to channel instability through in channel erosion tied to harvest activities such as skid trails in stream zones. There are currently about 260 miles of roads in this drainage, for a road density of 2.0 miles per square mile.

Fire

Fire has played an important role in the disturbance regime in Bargamin Creek. Since, 1960, about 60 percent of the watershed (17,904 acres have burned). In 1988, the Ladder Creek fire burned a large percentage of the Lower Bargamin watershed (13,739) acres. This is of concern in the analysis of the affects of proposed fire on lower Bargamin Creek.

As in Bargamin Creek, fire has played a major role in the recent disturbance history of the Crooked Creek watershed. From 1960 to present, 15,980 acres have burned in the Crooked Creek watershed (19 percent of the total watershed acres). Some of the higher severity burns resulted in mass erosion.

In Lower Big Mallard, the Ladder Creek fire burned 1735 acres. This burning took place in Ponderosa pine, Douglas-fir, and grassland habitat types. Fire suppression has affected the watershed by gradually allowing climax species such as Douglas-fir, grand fir, and Engelmann spruce to become dominant.

Mining

Smaller watersheds that have been affected by mining include Miller, Rubie, Little French and Gold Lake Creeks, and Baboon Gulch. This area was repeatedly mined in the 1890s and 1930s, which resulted in major modifications to terrain, soil, and streams. Over the past two years five small projects have been conducted, and the sites reclaimed after mining. The demand for this level of activity is not expected to change in the near future. Current mining in the Florence area is limited primarily to recreational mining activities.

CURRENT CONDITION

For this analysis, watershed condition is discussed in terms of disturbance indicators (road density, percent timber harvest, percent equivalent clearcut area), estimates (percent over natural), and narratively for other impacts. This section provides a watershed-wide view of sediment yield.

Allison Creek

Table 3 -19. Watershed Condition Indicators

Watershed	Acres	Road Density (mi/mi2)	Harvest (ac)	Harvest (%)	ECA (ac)	ECA (%)
Allison Creek	7679	2.51	1136	15	757	9.86
West Fork Allison Creek	4892	1.85	5537	11	353	7.22
Plant creek	354	3.32	278	25	95	26.64
Van Creek	2654	2.22	293	11	282	10.64
Kelly Creek	5241	3.55	1049	20	495	9.45
Robbins Cr.	3239	2.75	521	16	396	12.23
Smith Creek Canyon	1117	.23	-	0	1	.13
Gasper Creek	1540	.33	-	-	4	.26
Flock Creek	757	1.69	-	-	6	.85
Chamberlin	791	.97	-	-	4	.48
Spring Creek	513	1.86	-	-	8	1.56

Disturbance indicators are used to index watershed condition based on their effects on runoff or erosional processes. For example, roads affect runoff processes through creation of impervious surfaces and disruption of subsurface flow patterns. Roads also expose soil and change slope conditions, which nearly always results in increased surface erosion and can result in accelerated rates of mass erosion, relative to natural conditions. Timber harvest effects are generally not as severe on a per unit area basis as roads, but generally result in increased runoff and erosion. The magnitude of timber harvest effects are similar to fire, although substantial differences exist between timber harvest and fire effects.

Table 3 -19 summarizes road density, timber harvest, and equivalent clearcut acre (ECA) for prescription watersheds within Allison Creek.

Current Condition for Sediment

The Nez Perce Forest Plan established fish/water quality objectives, sediment yield guidelines, and entry frequency guidelines (USDA Forest Service, 1987). These are displayed in Appendix A of the Forest Plan and displayed in the table below:

Table 3 - 20. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% Of Potential)	Sediment Yield Guideline (% Over Base)	Entry Frequency Guideline (Peaks Per Decade)
Allison Creek	85	80	45
West Fork Allison Creek	85	80	45
Plant Creek	70	70	3
Van Creek	70	60	3
Kelly Creek	70	60	3
Robbins Creek	70	60	3
Smith Creek Canyon	70	70	3
Gasper Creek	70	70	3
Flock Creek	70	70	3
Chamberlain Gulch	70	70	3
Spring Creek	70	70	3

Sediment yield is estimated using NEZSED, the Forest's adaptation of the R1/R4 Sediment Yield Guide (USDA Forest Service, 1981). This model estimates natural or base sediment yield from landtype-derived mass erosion ratings. It estimates surface erosion only from roads, timber harvest, and fire.

The steep breakland landtypes in the Main Salmon Tributaries Northwest Area have a natural debris torrent history, and debris torrents are part of the landscape building process. Summer intense thunderstorms and winter floods can trigger debris torrents. Such an event can be visible and measurable in the Main Salmon River. Observations of a debris torrent event, such as that from Allison Creek in the summer of 1991, are examples of this.

Table 3 -21. 1995 NEZSED Sediment Yield

Watershed	Area (Acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
Allison Creek	7679	374.1	33.7	6
West Fork Allison Creek	4892	248.4	12.8	4
Allison Creek	12,925	554.8	52.6	5
Plant Creek	354	13.2	6.1	46
Kelly Creek	5241	212.4	22.6	7
Van Creek	2654	212.5	6.4	2
Robbins Creek	3239	165.6	12.6	6
Smith Creek	1117	63.3	.3	-
Gasper Creek	1540	92.8	.8	-
Flock Creek	757	49.8	.2	-
Chamberlain	791	64.5	.2	-
Spring Creek	513	46.7	.1	-

The watersheds of concern are Allison Creek Watershed , and Robbins Creek watershed. Allison Creek is of special concern due to heavy timber harvest, roads in riparian areas, past debris torrent history, and areas of riparian grazing. A large percent of Robbins Creek burned during the Scott Fire in 1992.

The NEZSED results suggest that the Forest Plan sediment yield does not exceed Appendix A percent over base at the present time. Modeling done in 1993 indicates that the watersheds are within Appendix A guidelines for percent sediment over base and number of entries per decade.

Streambank and Channel Stability

Timber harvest practices within the Allison drainage may have increased periodic flows, but not measurably. Road 221 along Allison Creek may have affected streamflows and reduced sinuosity, therefore loss of the riparian area to store water. There is one water withdrawal in the private lands used for sheep grazing and field irrigation. Channel stability has been affected in Allison Creek and some tributaries by debris torrents. Stream bank stability has been altered in scattered sites on the grazing allotments and by dispersed recreations sites. Riparian vegetation within the National Forest has been altered by logging and roads within Allison Creek watershed.

Bargamin and Crooked Creek

Table 3 - 22 summarizes road density, timber harvest, and equivalent clearcut are (ECA) for prescription watersheds within Big Mallard Creek.

Road density is rated low or less for all of the watersheds. Roaded density is not a concern for these watersheds due to the low level of development.

Lower Bargamin and Lower Crooked Creek are located in designated wilderness and have had no timber harvest. The Face watersheds are roadless and the main disturbance affecting

vegetation has been fire. The data needed to calculate existing condition ECA for Bargamin, Crooked River, Upper Indian Creek, Rattlesnake, and Cougar are not available due to lack of data base.

Table 3 -22. Watershed Condition Indicators

Watershed	Area (Ac)	Road Density (Mi/Mi2)	Harvest (Ac)	Harvest (%)	ECA (Ac)	ECA (%)
Lower Crooked River	9,491	.09	0	0		Not Available
Lower Bar-gamin	8,709	0	0	0		Not Available
Upper Indian Creek	2,718	.36	0	0		Not Avail-able
Lower Indian Creek	1,116	0	0	0	60	5.35
Moccasin Creek	1,573	0	0	0	55	3.52
Cougar Creek	2,345	0	0	0		Not Available
Rattlesnake Creek	499	0	0	0	0	Not Available
Unnamed Face watersheds						NA

Fire has been the main influence on water yield in Lower Bargamin, lower Crooked River, and other small watersheds shown above. Because most of the watersheds that are included within the fire polygons have had very little man-caused disturbance, it is assumed that high ECAs are not a concern.

The Nez Perce Forest Plan implies that wilderness watersheds are 100 percent objective watershed with 0 percent increase over base sediment allowed. At this time the watershed data base does not have the capability to model Lower Bargamin Creek and Lower Crooked River with the NEZSED model.

The NEZSED results suggest that the Forest Plan sediment yield percent over base meets forest Plan Standards for the watersheds that were modeled in NEZSED. Lower Bargamin Creek is largely an undisturbed watershed. Streambank conditions are near natural and str-eambank stability is near natural except where the trail crosses or in a few scattered camping sites along the stream.

Steam channel stability was adversely affected in the Lower Crooked Creek watershed by debris torrents after the Porcupine Fire in 1992. The two debris torrents occurred approximately four miles up from the mouth of Crooked Creek, one upstream and one downstream of Fitz Creek. Slopes on the east side of Crooked Creek, where the debris torrents took place are very steep (60-100 percent). A high percentage of the drainages in this are burned with a high intensity. The debris torrents carried material into Crooked Creek up to one half mile downstream. Deposited sediment was observed in the channel. The drainages where the debris torrents occurred were scoured and alluvial fans formed where these drainages meet Crooked Creek.

Table 3 - 23. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% of potential)	Sediment Yield Guideline (% Over Base)	Entry Frequency Guideline (Peaks Per Decade)
Lower Crooked River	100	0	0
Lower Bargamin Creek	100	0	0
Upper Indian Creek	70	60	3
Lower Indian Creek	70	70	3
Moccasin Creek	70	60	3
Cougar Creek	70	60	3
Rattlesnake Creek	70	70	3
Unnamed Face watersheds			

Table 3 - 24. 1995 NEZSED Sediment Yield

Watershed	Area (acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
Lower Crooked Creek	9,491			
Lower Bargamin Creek	8,709			
Upper Indian Creek	2,718	218.5	.1	0
Lower Indian Creek	1,116	118.6	0	0
Moccasin Creek	1,573	140.3	0	0
Cougar Creek	2,345	212.5	0	0
Rattlesnake Creek	499	56.8		
Unnamed Face watersheds	3367	-	4.3	0

Fiddle Creek

The following table summarizes road density, timber harvest, and equivalent clearcut area (ECA) for prescription watersheds within Fiddle Creek.

Table 3 - 25. Watershed Condition Indicators

Watershed	Area (Ac)	Road Density (Mi/Mi2)	Harvest (Ac)	Harvest (%)	ECA (ac)	ECA (%)
Fiddle Creek Watershed	5408	4.03	1150	21	1029	19.02

Road density for the Fiddle Creek watershed is rated high, and the ECA is high for a small watershed. Stream channels in some reaches are in poor condition due to scouring from debris torrents. The road density in the watershed is also high, but the burn acreage proposed in Fiddle Creek for this analysis is so small the watershed condition may not change due to the activities.

Table 3 - 26. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% Of Potential)	Sediment Yield Guideline (% Over Base)	Entry Frequency Guideline (Peaks Per Decade)
Fiddle Creek	70	60	3

Table 3 - 27. 1995 NEZSED Sediment Yield

Watershed	Area (acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
Fiddle Creek Watershed	5408	294.6	11	8

The NEZSED results suggest that sediment yield does not exceed Appendix A percent over base sediment yield guidelines at the present time.

Streambank and Channel Stability

Timber harvest has reduced shade and a source of large woody debris in the upper watersheds of Fiddle Creek. Road crossings on streams are sediment sources for small headwater tributaries to Fiddle Creek, and are often the site of road failures. When fill material moves down the stream channels, scour occurs in the channel and sediment is delivered to main Fiddle Creek and the Salmon River. Streambank and channel stability are affected by mass failures in the watershed, mostly tied to roads on steep, landslide prone landscapes.

John Day

The following table summarizes road density, timber harvest, and equivalent clearcut are (ECA) for prescription watersheds within John Day Creek.

Table 3 - 28. Watershed Condition Indicators

Watershed	Area (Ac)	Road Density (Mi/Mi2)	Harvest (Ac)	Harvest (%)	ECA (ac)	ECA (%)
EF John Day	3,624	3.37	1139	31	724	19.9
MF John Day Creek	3,795	2.33	183	5	226	5.95
SF John Day	2,503	Roadless	0	0	0	0

Road densities in the East Fork of John Day Creek are rated high.

East Fork John Day Creek has a high ECA for a small watershed. ECA, high road density and other indicators show that there may some risk of slowing watershed recovery with further proposed activities due to the poor current condition.

Table 3 - 29. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% Of Potential)	Sediment Yield Guideline (% Over Base)	Entry Frequency Guideline (Peaks Per Decade)
EF John Day Cr	70	60	3
MF John Day Cr	70	60	3
MF John Day Cr	70	60	3

Sediment yield was calculated for the East Fork, Middle Fork and South Fork watersheds near their confluence, hence most of the contributing land area is included. Approximately 27 percent of these watersheds include non-National Forest Lands. The only activity-generated sediment yield for these lands included in the NEZSED model was road construction on BLM lands. Lower John Day Creek was not modeled since it does not flow through National Forest.

Table 3 -30. Forest Plan Fish/Water Quality Objectives

Watershed	Area (acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
E F John Day Cr	3624	138.5	13.9	6
M F John Day Cr	3795	184.4	9.6	4
S F John Day Cr	2503	147.7	0	0
John Day Cum Aff Brdy	9922		23.5	3.7

The NEZSED results suggest that the Forest Plan sediment yield does not exceed Appendix A percent over base sediment yield guidelines at the present time. Modeling done in 1995 shows that the effects of road construction in 1988 for the John Day II Timber Sale produced an estimated 18 percent over base sediment yield for East Fork John Day Creek and 30 percent over base sediment yield in the Middle Fork John Day Creek. NEZSED modeling that was conducted for the Salmon River westside tributaries in 1995 for the "Biological Assessment of the Lower Salmon River " indicates that the sediment yield has not exceeded entry frequency guidelines for the past decade.

Streambank and Channel Stability

Streamflow in John Day Creek has been altered from hydropower diversion and irrigation withdrawals. The hydropower operation can divert up to 27 cfs, but must allow a minimum flow of 4.5 cfs as a general minimum flow requirement and 12 cfs from April 15 to July 15th. An unknown amount of water is also removed from main John Day Creek for irrigation and domestic use.

Riparian function and channel stability have been affected by timber harvest and road building on National Forest Lands. Streams within the John Day watersheds are resistant to bank damage because of well-armored banks, large substrate materials, high channel confinement, or a combination of both. Above private land the watershed is steep to the headwaters, with steep gradients dominating the reaches.

Lower Big Mallard

Current Watershed Condition

The following table summarizes road density, timber harvest, and equivalent clearcut are (ECA) for the prescription watershed in Lower Big Mallard Creek.

Table 3 - 31. Watershed Condition Indicators

Watershed	Area (Ac)	Road Density (Mi/Mi2)	Harvest (Ac)	Harvest (%)	ECA (ac)	ECA (%)
Lower Big Mallard Creek	6,672	.47	0	0	304	4.56

Lower Big Mallard Creek where proposed burn unit five is located has a very low road density of 0.47 miles per square mile. The burn proposal only affects Lower Big Mallard Creek.

Lower Big Mallard Creek has an ECA of 4.56, which is not due to timber harvest, but from the Ladder Creek fire in 1988 when 1735 acres burned. This still accounts for 300 Equivalent Clearcut Acres.

The NEZSED results suggest that the sediment yield does not exceed Forest Plan sediment yield guidelines at the present time. NEZSED modeling that was conducted for the Big Mallard prescription watersheds in 1996 for the "Draft, Mallard Creek Watershed Analysis" indicates that the sediment yield has not exceeded entry frequency guidelines for the past decade. The prescription watersheds where the proposed action is located, Lower Big Mallard Creek and the Face drainages of the Salmon, have had very little accelerated sediment activity, except for wildland fire. Lower Big Mallard Creek has had very little human caused accelerated sediment.

Table 3 - 32. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% Of Potential)	Sediment Yield Guideline (% Over Base)	Entry Frequency Guideline (Peaks Per Decade)
Lower Big Mallard	70	60	3

Table 3 - 33. 1995 NEZSED Sediment Yield

Watershed	Area (acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
Lower Big Mallard	6,672		8.7	3

Recent road construction and timber sales have increased sediment yield as shown above.

Streambank Stability

Streams in the Big Mallard drainage are generally considered to be functioning under conditions of dynamic equilibrium. No excessive changes in channel morphology or sediment/energy relationships, such as abnormal downcutting, bar formation, or excessive bank erosion were noted during steam surveys. Changes in channel stability due to increased sediment are being monitored and will be a long-term observation. Other changes in steambank stability may be caused by natural disturbances such as wildland fire and high intensity rainstorms causing slides and debris torrents in steep gradient channels on the breaklands in Lower Big Mallard Creek.

Race Creek

Race Creek is seven miles in length with the lower 4.5 miles flowing through private ground. The Race Creek watershed ranges in elevation from 7,357 feet to 1,719 feet at its confluence with the Salmon River. At 1.6 miles above the mouth of Race Creek, the stream forks into the West Fork and the South Fork. The West Fork has one major tributary, Bean Creek. The South Fork has two major tributaries, Kessler Creek and Grave Creek.

Table 3 - 34. Watershed Condition Indicators

Watershed	Area (Ac)	Road Density (Mi/Mi2)	Harvest (Ac)	Harvest (%)	ECA (ac)	ECA (%)
Kessler	2210	3.5	783	35	310	14
SF Race	4343	1.28	393	9	235	5.4
WF Race	6795	2.7	1404	21	986	14.5
Face Drainage	643	2.8	1404	21	-	-

Road density is high in Kessler Creek, and ECA is moderately high in Kessler and West Fork Race Creek.

Table 3 - 35. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% Of Potential)	Sediment Yield Guideline (% Over Base)	Entry Frequency Guideline (Peaks Per Decade)
Kessler Creek	80	45	2
SF Race Creek	80	45	2
WF Race Creek	80	45	2
Unnamed Face S Race	80	45	2

Table 3 - 36. 1998 NEZSED Sediment Yield

Watershed	Area (acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
Kessler Creek	2210	88.4	.9	1
SF Race Creek	4343	170.7	3.3	1
WF Race Creek	6795	Missing	6.4	Missing
SF Race Face	643	27.8	0	0
Race Creek @ By	13391		10.6	1.4

The NEZSED results suggest that the Forest Plan sediment yield does not exceed sediment yield guidelines at the present time.

The sediment yield includes both suspended and bedload sediment derived from timber harvest, roads and fire. Not included in these estimates is sediment caused by mining and grazing activities. In particular, the sediment introduced into Grave Creek by mining activities in the early 1980s was expected to affect Grave Creek and the South Fork of Grave Creek for at least 10 years.

Streambank Stability

Reconnaissance level stream surveys have located meadow stream reaches with over-grazed riparian vegetation in the upper watershed within the Papoose Allotment. Livestock activities within the Race Creek drainage do not appear to have caused changes in plant species composition at this time.

Floodplain Connectivity

The existing road system in the lower part of Race Creek affects the stream's ability to access normal floodplain area and adjust to increase flows expected during high runoff periods. Upsteam of the forks of Race Creek, channel gradient steepens and confinement increases up to the headwaters. Impacts are less than on lower Race Creek due to inacessiblity of the steams to livestock. Local areas have been impacted by grazing.

Salmon West

The following table summarizes road density, timber harvest, and equivalent clearcut are (ECA) for prescription watersheds within Race Creek.

Table 3 -37. Watershed Condition Indicators

Watershed	Area (Acres)	Road Density (Mi/Mi2)	Harvest (Acres)	Harvest (%)	ECA (Acres)	ECA (%)
Christie Cr	2651	3.36	207	8	132	4.96
Sherwin Cr	3726	3.22	284	8	178	4.78
China Cr	3070	3.46	439	14	384	12.52
Cow Cr	6947	4.46	1621	23	908	13.07
Elfers Cr	473	7.27	121	26	120	26.00
Clark Cr	519	9.9	200	39	NA	NA
Rhett Cr	461	3.9	61	13	125	24.00

The road densities for all watersheds are high to very high. Cow Creek currently has the highest road density of the four largest prescriptions watersheds, and Elfers and Clark Creek have very high road densities for small watersheds. This contributes toward water yield effects and chronic sediment related to roads.

ECA is a concern in Cow Creek and all three of the smaller watersheds. The condition at the headwaters of Cow Creek and the small watersheds is currently a concern and will be further analyzed in chapter 4 under Cumulative Effects.

Table 3 - 38. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% of potential)	Sediment Yield Guideline (% over base)	Entry Frequency Guideline (Peaks per decade)
Christie Cr	70	60	3
Sherwin Cr	70	60	3
China Cr	70	60	3

Cow Cr	80	45	2

Table 3 - 39. 1995 NEZSED Sediment Yield

Watershed	Area (acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
Christie Creek	2651	100.4	1.4	1
Sherwin Creek	3726	141.1	2.1	1
China Creek	3070	108.2	1.7	1
Cow Creek	6947	203.9	9.6	3

The NEZSED results suggest that the existing sediment yield does not exceed sediment yield guidelines at the present time. NEZSED modeling that was conducted for the Salmon River westside tributaries in 1995 for the "Biological Assessment of the Lower Salmon River " indicates that the sediment yield has not exceeded entry frequency guidelines for the past decade. All watersheds are well within guidelines for percent over base sediment in 1998.

Streambank Stability and Stream Temperature

Reconnaissance level stream surveys have located stream reaches with over-grazed riparian vegetation in the upper watershed within the Papoose, Sherwin, Christie Creek, and Cow Creek allotments. Streamside roads are also infringing on the riparian zone along mainstems and tributary streams.

Slate Creek

The following table summarizes road density, timber harvest, and equivalent clearcut area (ECA) for prescription watersheds within Slate Creek.

Table 3 - 40. Watershed Condition Indicators

Watershed	Area (Ac)	Road Density (Mi/mi²)	Harvest (Acres)	Harvest (%)	ECA (Ac)	ECA (%)
Little Van Buren	3,612	2.46	214	6	270	8
Bear Gulch	1,704	7.40	232	14	181	11
No Business	1,279	.30	10	1	34	3
Lower Main Slate	6,088	1.57	199	3	198	3
Lowest Main Slate	4,888	NA	NA	NA	NA	NA
Slate @ Forest Bdy	78,250	2.16	7,614	10	5,689	7

NA - Not available due to lack of private land data.

Road densities range from low to moderately high on most of the watersheds, but Bear Gulch has a very high road density at 7 mi/mi². Current watershed condition of Bear Gulch is a concern due to high road densities and timber harvest.

Table 3 - 41. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% of potential)	Sediment Yield Guideline (% over base)	Entry Frequency Guideline (Peaks per decade)
Little Van Buren	70	40	3
Bear Gulch	70	60	3
No Business	70	60	3
Lower Main Slate	90	30	1

The NEZSED results suggest that Forest Plan sediment yield and entry frequency guidelines have not been exceeded in the past decade.

Table 3 - 42. 1998 NEZSED Sediment Yield

Watershed	Area (acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
Little Van Buren	5,273			2
Bear Gulch	1,704			2
No Business	1,279			0
Lower Main Slate	6,088			4
Slate @ Forest Bdry		1,551		7

Impacts to sediment yield in the watershed have occurred from roads, trails, grazing, and mining. Erosion from roads is perhaps the biggest current source of human-caused suspended and deposited sediment in Little Slate Creek channel stability.

In the Florence area, mining disturbances have historically produced large quantities of sediment. Recent field surveys suggest that significant gully and channel erosion is still occurring from some of these disturbances. Impacts to stream channels included dredging, ditching, straightening, rerouting, and interbasin water transfers. Upland impacts included hydraulic placer mining and the road system used to access mining claims.

Squaw Creek

The following table summarizes road density, timber harvest, and equivalent clearcut are (ECA) for the Squaw Creek and Papoose Creek Watersheds.

Table 3 - 43. Watershed Condition Indicators

Watershed	Area (Acres)	Road Density (Mi/Mi2)	Harvest (Acres)	Harvest (%)	ECA (Acres)	ECA (%)
Squaw Creek	5236	1.76	515	10	-	-
Papoose Creek	3125	1.82	258	8	-	-
Squaw Creek @ Forest BDY	8408	1.77	772	9	386	4.6

The Nez Perce Forest Plan established fish/water quality objectives, sediment yield guidelines, and entry frequency guidelines (USDA Forest Service, 1987). These are displayed in Appendix A of the Forest Plan.

SALMON CHALLIS NATIONAL FOREST

SCOPE OF THE ANALYSIS

This section contains the hydrological analysis for the Salmon-Challis National Forest portion of the Main Salmon River. This covers the river section from North Fork to Corn Creek and includes the composite watersheds of Colson Creek, Corn Fountain, Owl Creek, Panther Creek, Pine Creek, Indian Creek, Spring Creek, and Squaw Creek. The analysis will cover significant issues relating to water quality such as erosion and sedimentation, disturbance indicators, and channel stability.

DESIRED CONDITION

State Water Quality Standards and the Clean water Act

The Idaho Water Quality Standards (IDAPA 16.16.01.02) provide for water quality protection of designated and existing beneficial uses of water. For undesignated surface waters, the Water Quality Standards stipulate protection of beneficial uses (including recreational use and the protection and propagation of fish, shellfish, and wildlife).

The Main Salmon River and Panther Creek have designated Beneficial uses, while the other tributaries listed in this section do not. Designated beneficial uses specifically listed for the main Salmon River are domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, secondary contact recreation, and special resource water. Designated beneficial uses for Panther Creek are Domestic Water Supply, Agricultural Water Supply, Cold Water Biota, Salmonid Spawning, and Primary and Secondary Contact Recreation.

The Salmon River is been listed by the Idaho Division of Environment Quality as a low priority WQLS, without identification of contaminate.

Panther Creek is listed as a WQLS from Blackbird Creek to the mouth at the Salmon River. This stream is listed as high priority, with metals listed as the pollutant of concern. Work is ongoing with EPA and state agencies to improve water quality in Panther Creek.

PAST EVENTS THAT HAVE AFFECTED THE CURRENT CONDITION

Past activities in the Colson Creek drainage include timber harvest and associated road construction. Colson Creek Road follows along Colson Creek and is encroaching on the stream zone in some road segments. There was also been a several hundred acre burn on the East side of Colson Creek in 1998.

A majority of the Long Tom watershed burned in the 1985 Fountain Creek Fire. Ebenezer Creek, which is in this composite of watersheds, burned with a high percent of high severity fire in 1985.

There is very little human influence in the Shell Creek watershed primarily because it is totally within the wilderness boundary. Total acres of fire in the Lake/Shell watershed was unavailable, but two recorded stand- replacing fires in the last 20 years are the Dome Lake Fire with 2070 acres of stand- replacing fire, and the Lake Creek fire in 1992, with 408 acres of stand- replacing fire.

This tributary is located within the wilderness boundary and is mostly an unroaded drainage. Use in this area is mostly river recreation and some dispersed recreation. The Corn Creek Campground, boat ramp, and wilderness trailhead are located along the Salmon River and immediately down the river from Corn Creek.

Human influence in the Owl Creek watershed is primarily associated with existing roads , private lands, logging, firewood gathering, recreation and fire suppression. Logging has taken place since the early 1930s, mostly after 1960 in the mature Ponderosa pine and Douglas fir stands. Several million board feet of trees were removed in the late 1980s with fire helicopter salvage logging.

In 1985, The Long Tom fire burned over 27,000 acres in the Owl Creek drainage, of these 3,389 acres were in East Fork Owl Creek. Of the total acreage 16,850 acres is considered to be stand- replacing fire. The stream channel in Owl Creek shows in-channel degradation from fine sediment buildup which is attributed to the Long Tom Fire. This is a concern when considering the effects of the proposed burn in East Owl Creek and Owl Creek.

The Panther Creek watershed has been somewhat affected by past wildland fires. Historically, Panther Creek supported two chinook salmon runs. The larger spring run spawned in August in the headwaters, and the smaller summer run spawned in September in Panther Creek below Napias Creek, mainly between Clear Creek and Beaver Creek. The summer run had adapted to the temperature regime in lower Panther Creek where the temperatures dropped below spawning threshold in September. The runs began to decline around the 1940, and were eliminated by 1960s due to water quality problems related to heavy metals from the

Blackbird Mine. Clear Creek Drainage had a historical homestead and grazing in the lower half mile, but very little past history is available for Garden Creek or Hot Springs-Gant. With the large area of these watersheds in wilderness, it can be assumed that watersheds are near natural condition.

The main human influences within the Pine Creek watershed are centered around past logging activities, roads and private lands. Logging activities have taken place since the early 1960s, primarily through the use of tractor and cable harvest systems. Harvest methods generally included uneven-aged or shelterwood removals of large mature ponderosa pine or Douglas-fir at elevations below 6500 feet. Only intermittent salvage removal of deadwood products through small sales have occurred since about 1970. The road up the valley bottom of Pine Creek has an influence on the stream.

Stream enhancement projects for fish have affected the natural stream channel in Pine Creek. In 1990, the forest blasted jump pools in one reach to enhance the existing baffles to a new design that would enhance both adult and juvenile fish passage though an existing culvert. Twenty migration barriers were also corrected or improved in the first two miles of Pine Creek in 1989 and 1990.
Land uses within the Indian Creek watershed include domestic residences, timber harvest, dispersed recreation, and mining. Recent changes in the Indian Ridge Grazing Allotment implemented to protect bull trout have improved conditions of the riparian and upland pastures, and have improved bull trout habitat.

The historic Ulysses mine and townsite are located below the confluence of the East Fork and Indian Creek. The Kitty Burton Mine is located west of Ulysses. Mining exploration activity has occurred in the West Fork and the East Fork of Indian Creek. Recent mining activity has been limited to exploration drilling.

A total of 1486 acres have been harvested in the Indian Creek watershed in the past 30 years. Numerous roads have been constructed for mining and timber harvest in the watershed.

Land uses within the Spring Creek watershed include domestic residences, timber harvest, dispersed and developed recreation, and mining. A total of 1809 acres have been harvested in the Spring Creek watershed in the past 30 years. Numerous roads have been constructed for timber harvest in the watershed.

In the recent past two grazing allotments have been managed in the Papoose and Squaw Creek watersheds. In the lower watershed on private land , grazing activity and development have been extensive along lower Squaw Creek and Papoose Creek. Riparian vegetation has been severely impacted, and the channel has lost much of the shading that would normally be provided by shrubs and overstory trees within the riparian zone. This has affected summer stream temperatures.

Timber harvest has occurred on both of the prescription watersheds . Of the 11,829 acres making up the prescription watersheds, approximately 643 acres have had harvest activities on National Forest Land and 650 acres have had harvest activities on private land. Around 1 percent of both watersheds have had wildland fire in the recent past. Timber harvest in riparian zones have had the most influence on National Forest Lands.

Current Conditions

Colson Creek

The following table summarizes road density, timber harvest, and percent of stands less than 30 years old in Colson Creek, Long Tom, and Shell Creek watersheds.

Table 3 - 44. Watershed Condition Indicators

Watershed	Area -Acres	Road Density (Mi/Mi2)	(%) Stands <30 Years Of Age
Colson Creek Watershed	6,842	1.5	1.3 %
Long Tom Watershed			**
Shell/Lake Creek Watershed	11,727	.05	10.8%

**The acreage of the stands less than 30 years is not calculated for the Long Tom watershed, but communication with the Forest Hydrologist reveals that most of the Long Tom and Ebenezer watersheds are occupied by stands less than 30 years due to 1985 wildland fires.

ECA was not available for Colson Creek or Long Tom Creek, but percent of the stands less than 30 years of age was calculated for a composite of watersheds including Colson Creek, Long Tom Creek, and Ebenezer Creek. The total acreage of this composite is 15,536 acres. Colson Creek is the largest at 6,842 acres. For the composite of the three watersheds, 21 percent of the area is in stands less than 30 years old. Colson Creek has only 1.3 percent of the stands less than 30 years. Ebenezer Creek has 90 percent of the stands in the watershed in stands less than 30 years due to the Fountain Creek Fire. Long Tom Creek also has a high percentage of stands less than 30 years due to the Fountain Creek Fire.

Shell Creek and Lake Creek are discussed as one watershed in the Salmon National Forest Cumulative Effects Data Summary. Road density is low at .05, and percent of stands in the watersheds less than 30 years in the watersheds is also low at 10.8 percent, which is attributed to wildland fire, because no man-caused openings occur in the watershed. The only road in the watershed is a short segment of the Salmon River Road between Panther Creek and the Cove Creek bridge.

Corn Fountain

The main disturbance in this watershed is wildland fire and the presence of wildland fire suppression. The following table summarizes road density, timber harvest, and percent of stands less than 30 years old, in this case mostly attributed to wildland fire.

Table 3 - 45. Watershed Condition Indicators

Watershed	Area (Acres)	Road Density (Mi/Mi2)	Acres Burned (Wildland Fire)	% Of Stands <30 Years Old)
Corn-Fountain	19,611	0.16	5870	6.00

The road density in the Corn-Fountain watershed is low due to wilderness and roadless area.

Percent of stands less than 30 years is used as a water yield indicator on the Salmon National Forest. When the six percent of stands less than 30 years is compared to ECA, it would equate to about 0 percent ECA.

Owl Creek

Table 3 - 46. Watershed Condition Indicators

Watershed	Area (Acres)	Road Density (Mi/Mi2	Harvest (Acres)	% Of Stands <30 Years Old
Owl Creek	34,240	0.4		49 %

Road density is not a concern in the proposed burn analysis for Owl Creek.

ECA was not calculated for Owl Creek, but a procedure which is similar to ECA was used. The percent of the stands less than 30 years old was calculated at 49 percent. Some of this was attributed to salvage logging in the late 1980s after the Long Tom Fire, and the Long Tom Fire itself. This a very high percentage of the watershed with young stands. This indicates increased water yields and peak flows in the first few years after the fire. Increased peak flows can increase flows to the point that in-channel erosion increases in some sections, and deposition of fine substrates increases in other reaches.

Panther Creek

In wilderness watersheds such as Clear Creek, and Garden Creek, wildland fire is usually the main disturbance.

Table 3 - 47. Watershed Condition Indicators

Watershed	Area (Acres)	Road Density (Mi/Mi2)	Equivalent Clearcut Percent
Clear Creek	18,600	0.0	<1
Garden Creek	7,900	0.0	<1
Hot Springs-Gant	27,000	-	Not Available

Hot Springs-Gant watershed is mostly unroaded, and the road density is low, but the exact density is unavailable.

There has been no timber harvest in Clear or Garden Creek due to the wilderness designation. Hot Springs-Gant is mostly roadless and is mostly undeveloped, and ECA is expected to be less that one percent, but exact information is not available. The wildland fire acreage in the 3 watersheds is minimal and has had a minimal impact on the watershed condition in the last 20 years.

Pine Creek

Table 3 - 48. Watershed Condition Indicators

Watershed	Area (Acres)	Road Density (Mi/Mi2)	% Of Stands < 30 Years In Watershed
Pine Creek	29,044	0.6	3.5

A total of 3.5 percent of the Pine Creek watershed is in stands less than 30 years of age. This would equate to an ECA of around 0 percent. At this time past timber harvest or fire are not having any detrimental effect on water yield.

Indian Creek

Table 3 - 49. Watershed Condition Indicators

Watershed	Area (Ac)	Road Density (Mi/Mi2)	Harvest (Ac)	ECA (Ac)	ECA (%)	Stand Ac Less Than 30 Yrs.
Indian Creek	27,755	1.6	1486	1256	3.7	1486

In the UCRB rating system the Indian Creek watershed is rated high. Using the Salmon/Challis coarse filter analysis criteria the road density for Indian Creek is rated moderate. The low road density for Indian Creek is somewhat misleading, because it includes McCann Creek watershed, which is a large unroaded area. If the road density is computed for Lower Indian Creek, the road density is 3.0 mile/square mile. This is rated very high using the Salmon/ Challis rating system and high using the UCRB rating system. A proposed action called "the Indian Creek Vegetative Management Project" would increase road density by building .55 miles of road, but road obliteration would actually reduce road density in the next 5-15 years to 1.5 mi/sq mi.

The majority of the roads in the Indian Creek watershed are located on the middle and upper slopes of the watershed and are not a significant sediment source to Indian Creek. The exceptions would be the Indian Creek Road (#036) and several mining roads. The Indian Creek Road is located in the valley bottom for its entire length (approximately nine miles). This road location has caused problems during flood events. Mining roads in the West Fork of Indian Creek and on the patented Kitty Burton Mine property are located on steep slopes and can be a source of sediment to Indian Creek. In the proposed unit along Indian Creek, mitigation where the Indian Creek road has affected the riparian zone needs to be considered.

A total of 1486 acres has been harvested in Indian Creek watershed in the past 30 years. This equates to 1256 equivalent clear-cut acres, or 3.7 percent of the watershed. This is a low ECA percent for a large watershed. Timber harvest associated with the "proposed Indian Creek Vegetative Management Plan" would increase ECA a small amount from 3.7 to 4.1 percent ECA.

Spring Creek

The following table summarizes road density, timber harvest, and equivalent clear-cut acres (ECA) for prescription watersheds within the Spring Creek watershed.

Table 3 - 50. Watershed Condition Indicators

Watershed	Area (Acres)	Road Density (Mi/Mi2)	Harvest Acres	% Of Stands Stands < 30 Years
Spring Creek	15,452	1.7	1809	11.7

In the Salmon Forest Cumulative Effects Summary road density was shown at 1.1 mi/mi sq, but the update by B. Reiffenberger showed the road density to be 1.7 mi/mi sq as shown in the table above.

The road density for Spring Creek is 1.7 miles per square mile. In the UCRB rating system the Spring Creek watershed is rated high. Using the Salmon/Challis coarse filter analysis criteria the road density for Spring Creek is rated moderate. The main Spring Creek road and the East Fork Spring Creek road parallel the streams in several locations resulting in a

high risk of sediment delivery to the streams. Surfacing on the lower two miles of the Spring Creek road and spot gravel on the East Fork have improved this situation. A proposed action called "The Boulder Spring Timber Sale" would increase road density by building .48 miles of road and opening about two miles of closed roads, but 3.6 miles of road closure/road obliteration would actually keep road density the same in the next 5-15 years at 1.7 mi/sq mi. Road density is currently not at levels that are a concern for this burn proposal.

A total of 1809 acres has been harvested in Spring Creek watershed in the past 30 years. This equates to 658 equivalent clear-cut acres, or 5.4 percent of the watershed. This is a low ECA percent for a large watershed. Timber harvest associated with the "proposed Spring Boulder Timber Sale" would increase ECA a small amount from 5.4 to 6.9 percent ECA.

Table 3 - 51. Forest Plan Fish/Water Quality Objectives

Watershed	Fish/WQ Objective (% Of Potential)	Sediment Yield Guideline (% Over Base)	Entry Frequency Guideline (Peaks Per Decade)
Squaw	80	45	2
Papoose Creek	70	60	3

Current Condition Of Sediment

The Salmon/Challis Forest Plan lists a standard for sediment as less than 20 percent fine sediment for anadromous fish and less than 29 percent for resident fish.

Colson Creek

The percent of fine sediment in spawning habitat which is referred to as "depth fines" is monitored as an important parameter due to the high correlation between fine sediment in the substrate and fry survival. The percent of fine sediment "depth fines" is also a Forest Plan Standard for anadromous fish (less than 20 percent fine sediment), and for resident fish (less than 29 percent fine sediment) (Salmon National Forest Land Resource Management Plan, pp II-21, II-23). Monitoring in Colson Creek to determine the amount of fine sediment in the substrate was conducted 1992 and 1998.

Table 3 - 52. 1992-1998 Salmon - Challis National Forest Core Sampling Results

		Mean Percent Depth Fines < 1/4"						
Station	Location	92	93	94	95	96	97	98
Colson 1	Near IDFG Cabin		19.9	12.2	21.2	20.3	13.4	8.6

Percent fine sediment collected in Colson Creek during the summer of 1993 averaged 19.9 percent fines, and samples collected in 1994 averaged 12.2 percent fines. Both 1993 and 1994 samples met the Forest Plan goals for percent "depth fines" for anadromous and resident fisheries. During the years 1995 and 1996, percent depth fines increased, but decreased in 1997 and 1998. Consultation with the Salmon National Forest Hydrologist said this was a common trend on several of the monitoring stations on Salmon River tributaries during the 1992 - 1998 period and may be related to a difference in flows. Sediment information is not available for Long Tom Creek or Ebenezer Creek. These channels are very steep high energy systems and move sediment through quickly. The main concern for sediment in Long Tom Creek and Ebenezer Creek is accelerated surface sediment on steep highly erosive slopes, and impacts from burn activities from the 1985 fires.

Corn Fountain

Percent depth fines were monitored on Corn Creek near the mouth at one site in 1994 and 1995. In 1994, percent depth fines were 24.4 percent and in 1995 percent depth fines were 10 percent. This meets the guidelines for anadromous and resident fisheries. There were no large recent catastrophic fires that have had an affect on increasing fine sediment, as the Long Tom Complex did in Owl Creek.

Owl Creek

Monitoring in Owl Creek to determine the amount of fine sediment in the substrate has been conducted since 1984, at four points, all in the one mile section above the confluence of Owl Creek with the mouth of the Salmon.

Owl Creek has suitable spawning and rearing habitat for Chinook salmon. Owl Creek has a high percent of "depth fines" due to the Long Tom fire in 1985. Post fire monitoring in 1984 showed depth fines at 18.4 percent, which is a good rating. This is within the Salmon Forest Plan guidelines of less than 20 percent depth fines for anadromous fisheries. The following table shows core sample data from 1984 to 1992.

Table 3 - 53. 1984 - 1992 Salmon - Challis National Forest Core Sampling Results

Year	STA-1 Mouth	STA-2 Low	STA-3 Mid	STA-3 upper
1984	18.3%	33.5%	22.8%	No Data
1985	No Data	No Data	No Data	No Data
1986	31.8%	99.6%	No Data	30.9%
1987	30.3%	52.0%	No Data	23.2%
1992	No Data	35.1%	No Data	No Data

The Long Tom Fire occurred in 1985, showed on the table as no data available. In 1986 and 1987, a high increase in fine sediment occurred, reaching a high of 99.6 percent on station #2. The trend shows a gradual, but steady decrease in fine sediment from 1986 - 1992. Most stations are still above the less than 20 "depth fines" that is desired for anadromous habitat, but the stream is showing slow recovery from the fire. The proposed fire project in East Owl Creek is a concern, due to the potential of increasing sediment main Owl Creek,

which is still recovering from the Long Tom Fire. Mitigation may be required to exclude fire from streams zones to be sure that fine sediment is not delivered to stream channels.

Table 3 - 54. 1992-1998 Salmon - Challis National Forest Core Sampling Results

Station	Location	Mean Percent Depth Fines < 1/4"						
		92	93	94	95	96	97	98
Owl 1	Mile Point 0.25	35.1	19.5	19.4	13.0	17.4	16.1	17.8
Owl 2	Mile Point 0.50		38.3					
Owl 3	Mile Point 1.0		25.5	25.6				

Data that was collected from 1992 to 1998 showed improving trends on the Owl 1 Station near the mouth of Owl Creek. Monitoring on the Owl Creek 2 and Owl Creek 3 in 1993 and 1994 showed sediment still above the objective of less than 20 percent for anadromous fish. In personnel communication with the Salmon National Forest Hydrologist, it was observed in the stream in 1998 there were still deposits of sediment behind rocks and other debris in the stream. In the judgement of the Forest Hydrologist, Owl Creek was still below Forest Standard for sediment and it was not recovered from the Long Tom Fire. The current condition of sediment in Owl Creek, even though it shows improving trends, poses a high risk when introducing more prescribed burning in the next 10 years.

Panther Creek

Monitoring in Clear Creek and Panther Creek is used to determine the amount of fine sediment. Below are the monitoring Stations on Panther Creek, Clear Creek, and Garden Creek.

Table 3 - 55. 1992 - 1998 Salmon-Challis National Forest Core Sampling Results

Station	Location	Mean Percent Depth Fines < 1/4"						
		92	93	94	95	96	97	98
Panther 1	Above Clear Cr		32.8	25.2	23.8	23.0	16.4	25.2
Panther 2	Below Gant Cr		25.2	27.8	28.7	26.0	23.2	27.4
Panther 3	Above Musgrove Cr		27.7	24.2	28.0	30.3	19.6	18.0
Panther 4	Above Wade Tribe Bridge				13.0	24.6	11.1	14.5
Panther 5	Below Opal Cr					22.6	12.8	13.7
Garden 1	Near FS Boundary		15.7	20.1				
Clear 1	Near Mouth		34.3	31.2	14.3	24.8	5.5	8.7
Clear 2	Near Mouth		40.5	29.5				

Clear Creek 1 data shows improving trends from 1993 to 1998 of 34.3 percent depth fines to 8.7 percent depth fines. This meets the Forest Plan standard for anadromous fish. Clear Creek 2 also shows an improving trend for the 2 years monitored, but data is missing after 1994. Garden Creek 1 has two years of data that shows it meets the Forest Standard for anadromous fish one year and was slightly over in 1994. Panther 2 monitoring site below Gant Creek shows trends that don't quite meet the Forest Plan standard for anadromous fish, but a steady improving trend is shown over the 6 years of monitoring. From a watershed

standpoint, looking at the Panther Creek watershed, the following sites show sharply improving trends for 1993-1998: Panther 1, Panther 3, Panther 4 and Panther 5. Panther 1 is still above standard for percent depth fines in 1998, but was within the standard in 1997. Panther 3, 4, and were all within standard in 1997 and 1998. When taking an overall look at the sediment data for Panther Creek, the watershed is showing a good improving trend from past mining effects.

Pine Creek

Monitoring in Pine Creek to determine the amount of fine sediment in the substrate has been conducted since 1993.

Pine Creek was monitoring for percent "depth fines" in 1984 at three monitoring sites. At the lower and mid site, percent depth fines were 28.8, and 28.5, respectively. Percent " depth fines" exceed the less than 20 percent fine sediment guideline for the Forest Plan. This does meet the guideline for resident fish. The upper monitoring site was 17.8 percent "depth fines" in the substrate and was within the guidelines for anadromous fish. One point at mile marker point 0.20, percent fine sediment was monitored from 1939- 1999.

Table 3 - 56. 1992-1998 Salmon-Challis National Forest Core Sampling Results

Station	Location	Mean Percent Depth Fines < 1/4"						
		92	93	94	95	96	97	98
Pine 1	Mile Point 0.20		21.6	19.9		40.2	12.9	39.5

Sediment was within Forest Plan objectives in 1993 and 1994. Percent depth fines increased in 1996, which was common at other monitoring stations on Salmon River tributaries in 1996, and dropped in 1997, and once again exceeded the Forest Plan objective 1999. The fluctuation in percent depth fines may be due to yearly stream flow conditions during high water. Sawmill Creek and Virginia Gulch areas are in the high intensity storm track of the Salmon River Canyon, have steep breakland landtypes, and have highly erosive soils. These watersheds are of special concern for sediment due to the sensitive nature of the soils, and the risk of increased sediment if bare soils are exposed after prescribed burning.

Indian Creek

Monitoring in Indian Creek to determine the amount of fine sediment in the substrate has been conducted since 1993.

Table 3 - 57. 1992-1998 Salmon-Challis National Forest Core Sampling Results

Station	Location	Mean Percent Depth Fines < 1/4"						
		92	93	94	95	96	97	98

Indian 1	Near Mouth			20.6	20.6	31.6	14.6
Indian 2	Above Ulysses Mine	10.8	14.20	20.6	21.5		

Monitoring in Indian Creek has been conducted at two locations: 1] near the mouth above the Salmon River confluence, and 2] below the East fork in the vicinity of the historic Ulysses Mine. Depth fines at the upper station was measured from 1993-1996. The percent of fine sediment ranged from a low of 10.8 percent in 1993 to a high of 21.5 percent in 1996. The Forest Plan Standard for resident fish was met every year, and the Standard for anadromous fish was met all years except 1996. (Rieffenberger, 1997, Hydrologic Report for The Indian Creek Vegetative Management Plan).

At the lower station on Indian Creek near the Salmon River confluence, the percent fines ranged between 15 and 26 percent from 1993-1996. In 1997 the percent fine sediment increased to 31.6 percent. This was in response to a channel change during the June 1997 flood. During the snowmelt runoff of 1997 (snowpacks in the Salmon River drainage approached 200 percent of normal in 1997) a large debris jam formed in Indian Creek causing the deposition of the streams bedload, channel filling and eventually the cutting of a new stream channel down the Indian Creek Road that was adjacent to the stream. The channel that was cut in the road was approximately 700 feet in length, 10 feet wide, and 3-4 feet in depth. This material was carried downstream and the coarser material was deposited in the lower reaches of Indian Creek above the confluence with the Salmon. The plan is to restore the stream to it's natural channel, and reconstruct the Indian Creek road upslope of the floodplain. This monitoring station dropped from 31.6 percent down to 14.6 5 in 1998. In summary the Forest Plan Standard for anadromous fish was met only in 1994, and in 1998 on the lower monitoring site, although the percent depth fines was just over at 20.6 percent for both 1995 and 1996. The Forest Plan Standards for resident fish was met every year except 1997.

The implication that this has to fire is that the prescribed burn polygons show that the prescribed burn goes right to the stream. Due to the narrowing effect of the Indian road on the riparian zone, loss of shade and large woody debris sources, and effect of the 1997 flood, mitigation during burning along the Indian Creek road needs to be designed into the burn prescription.

Spring Creek

Monitoring in Spring Creek to determine the amount of fine sediment in the substrate has been conducted since 1993. The table below displays mean depth fine core sample results from 1993 to 1998.

Table 3 - 58. 1992-1998 Salmon-Challis National Forest Core Sampling Results

Station	**Location**	**Mean Percent Depth Fines < 1/4"**						
		92	**93**	**94**	**95**	**96**	**97**	**98**
Spring 1	Near Mouth				16.2	12.8	13.6	5.6

Core sampling in suitable spawning habitat on Spring Creek has found depth fines less than one quarter inch to range from a low of 12.8 percent (1996) to a high of 26.6 (1994). Other than 1994 the data collected from the 1993 through 1998 has shown depth fines less than 16.2 percent which meets Forest Plan for anadromous habitat of depth fines less than 20 percent.

Squaw Creek

Sediment yield is estimated using NEZSED, the Forest's adaptation of the R1/R4 Sediment Yield Guide (USDA Forest Service, 1981). This model estimates natural or base sediment yield from landtype-derived mass erosion ratings. It estimates surface erosion only from roads, timber harvest, and fire.

Table 3 - 59. 1995 NEZSED Sediment Yield

Watershed	Area (acres)	Base Sediment Yield (tons)	1998 Activity Sed (tons)	1998 Percent over Base
Squaw Creek	5236	142.4	7.6	2
Papoose Creek	3125	269.2	3.0	1
Squaw Creek @ Bdy	8361	-	10.0	1.8

The NEZSED results suggest that the Forest Plan sediment yield does not exceed Appendix A percent over base at the present time. NEZSED modeling that was conducted for the Squaw Creek and Papoose Creek prescription watersheds in 1995 for the "Biological Assessment of the Little Lower Salmon River /Rapid River " indicates that the sediment yield has not exceeded entry frequency guidelines of percent sediment over base for the past decade (the highest modeled was 3 percent). Papoose and Squaw Creek watersheds meet Forest Plan Guidelines for Appendix A.

Assessment of the effects of both natural and management-induced sediment yields on fish habitat and fish production within critical habitat is related to existing measurements of the substrate and also consideration of elements such as mass wasting, grazing, and bank erosion which are not modeled by NEZSED. Although the data are highly variable, surface fines data indicate that sediment storage is probably slightly above the amount that is optimal for salmonid production.

Streambank And Channel Stability

On Colson Creek, the stream channel stability rating is 78 percent which is considered good stream bank stability. Long Tom and Ebenezer Creek have very steep channels that are prone to debris torrents and have a history of past events. Shell Creek also has steep high energy channels that have are fairly stable, but have high debris torrent potential if a high severity fire burned through the riparian zones.

Stream channels in Corn Creek and Fountain Creek are rated good to excellent where stability ratings were available from the 1984 channel and valley bottom survey maps (Salmon National Forest, 1984). Channel conditions should be as near natural condition as possible due to undisturbed watersheds.

Stream channel stability and condition is a concern in Owl Creek, due to concerns over fine sediment in the substrates. The Salmon National Forests rated Owl Creek as a high risk watershed with an overall poor condition in their 1993 cumulative effects summary of data. This is mostly due to the poor channel condition of Owl Creek and the high percent of stands 30 years old. Specific channel stability and sediment information is not available on East Fork Owl Creek, but a high percent of the watershed was burned in the Long Tom Fire. Activities in East Fork Owl have had an effect on main Owl Creek within the anadromous section.

Streambank and channel stability are rated as good for Clear Creek, Garden Creek, Hot Springs Creek and Gant Creek. Most of these streams have had little human disturbance. There is some history of debris torrents with high intensity rainstorms and flood conditions.

Stream channels in Pine Creek are rated good, with some channel confinement and loss of function of floodplain due to the Pine Creek road. Indicators discussed above lead to the conclusion that most of the stream channels are in good condition, and have not been degraded except in a few confined areas due to human activity.

Lower Indian Creek is rated fair to good, with some loss of channel stability due to the flood section described above. Portions on the lower Indian Creek road affect riparian area function by narrowing of the riparian zone. Stream shading and large wood sources are reduced in some sections.

Stream channel stability ratings in Spring Creek are rated good in reaches within the proposed burn area. In areas, the Spring Creek road and the East Fork road parallel the stream and have a narrowing affect on the riparian zone. Areas of riparian vegetation throughout Squaw Creek watershed have been affected by timber harvest, road construction, livestock grazing , livestock feedlots, and homesites.

SOILS

SCOPE OF THE ANALYSIS

In this section, the existing condition of the soil within the project area is discussed in relation to soil properties that may be affected by fire. These soil properties have been used to develop soil-related interpretations which are presented in detail in the watershed portion of this section, along with an abbreviated description of the soil mapping unit. Complete map unit descriptions are included in the project file.

The Salmon River Canyon Project area soils were mapped using the Land Systems Inventory (LSI) methodology in which landscapes can be described in a hierarchical system. The hierarchy consists of broadly defined and delineated land units that consist of many thousands of square miles, with high variability of land and climate features at the upper level, and progresses downward in size of units with increasing homogeneity at the lower end of the hierarchy. Analysis for this project incorporated the lower levels of LSI- Landtypes (LT) and Landtype Associations (LTA). LTAs are aggregations of the smaller LTs.

Characteristics that differentiate LTAs include landform, parent material of the soil, potential natural vegetation, and climate in various combinations of these factors. Some portions of the project area were previously mapped using the more refined LT units and these LT units were then grouped into the larger LTA. Other areas had no previous soil mapping and these were mapped directly at the LTA level. Due to the inaccessibility of the area, considerable portions of the Salmon River Canyon Project have not been field inventoried by soil scientists. Soil types were inferred for these areas using available topographic and geologic maps and then correlated with other similar areas nearby in order to arrive at a reasonable estimate of expected soil types. Several field days of spot checks were spent on this project confirming and adjusting these predictions .

CURRENT CONDITION

As expected, in an area as large as the Salmon River Canyon Project there exists quite a variety of soil types because of the different combinations of soil forming factors: microclimate, geology, vegetation, soil organisms, and topography. Climate ranges from hot, dry canyon slopes to high elevation, glaciated headlands with cold soils and abundant moisture. Geology includes highly weathered to weakly weathered granites of the Eocene and Cretaceous (Idaho Batholith) periods, extremely old granites and gneisses of the Precambrian era, Precambrian quartzite and schist, and a complex of volcanic (basalt and andesite) and metamorphosed marine sediments. The vegetation ranges from hot, dry grasslands at low elevations to subalpine forests associated with glaciated and periglacial lands. Much of the area consists of very steep stream breaklands and steep mountain slopes, mostly at low to middle elevations. At the upper elevations glaciated cirques and troughs occur along with frost-churned ridges. The following discussion is a generalization of the soils and landscapes of the Salmon River Canyon Project, including major interpretations related to this project.

Breaklands, granitics

These very steep landscapes mostly occur at the lower to middle elevations of the area. The soils formed in this material are coarse to medium coarse in texture - typically very cobbley or stony, light, sandy loam or loam in the surface layers and extremely cobbley or stony, sandy, loam or loamy sand in the substrata layers. Under grass or savannah vegetation cover, the subsoil often has an accumulation of clay (argillic horizon) that is sandy, clay loam or heavy, sandy loam. On droughty east, south, and west aspects soils are mostly shallow to moderately deep. They have a dark, organic, rich mineral horizon 4 to 12 inches thick (mollic epipedon) at the surface, unless this layer has been eroded. Rock content throughout the profile is about 50 to 80 percent by volume. The soils of these lands are the most erodible in the project area. Due to the shallow droughty soils, vegetative cover is low and the fire frequency is high, which results in frequent post-fire exposure of the surface soil to rain splash and overland flow erosion.

The shallow nature of the soils, abundance of rock outcrop, and the steep slopes of this breaklands landscape also present a high hazard for debris avalanches and debris flows during intense rain or rain on snow events. Rain falling on the impervious rock outcrop runs off onto the shallow soils in great quantity. The shallow, rocky soils can’t absorb the rain and the additional runoff quickly enough and overland flow across the soil surface occurs. Considerable soil erosion can occur on the slopes in the form of rills and small gullies. The

overland flow enters the drainageways which are unable to handle the large amounts of water and sediment, resulting in the debris torrents that severely erode the drainageways. The drainages may be cut down to five or six feet deep, often to bedrock, at the lower one half of the slopes. The sediment is deposited at the toe of the drainage channel and/or deposited directly into the main river channel. These are normal landform forming processes that have been responsible for the formation of the alluvial fans at the mouths of Salmon River tributaries. Fire can play a normal role in this process if it occurs under normal conditions of light fuels associated with low intensity underburns.

However, the buildup of fuels and consequent high severity fires can cause soils to become water repellent and thus increase greatly the potential for overland flow during intense rains. Several debris torrents were investigated last summer in the Lantz-Rainier fire that fit this pattern very well, and hydrophobic (water repellant) soils were found to have played a role in the overland flow. The dominant potential vegetation types are warm, dry forest with ponderosa pine, conifer/grassland (ponderosa pine, Douglas-fir), and dry grassland.

Breaklands, border zone metamorphics

On the western end of the area stream breaklands formed in moderately weathered gneiss, schist, quartzite, and some volcanics. Slopes are predominantly 50 to 90 percent and occur at the lower elevation of the canyons. The soils are dominantly shallow, with loam to sandy loam surfaces that overlie sandy loam to loam substrata. On the warm, droughty aspects with gentler slopes soils have a thick dark organic rich surface layer. On the upper elevations and northerly aspects the dark surface layer is only an inch or two thick. Field evidence of over-thickening of the dark surface layer indicates that soils are unstable and deposition of organic rich material accumulates on the lower portions of these slopes. These soils have a high erosion and mass movement potential. Similarly to the granitic breaklands, the droughty, shallow soils permit only sparse vegetative cover. This, combined with a high fire frequency, creates a condition where bare soil is exposed to erosion on a relatively frequent basis. The dominance of shallow soils with low water holding capacity encourages debris avalanching, especially at elevations below about 4500 feet. At these elevations rain on snow or on frozen soil can cause very large overland flow events and numerous debris avalanches and debris torrents. Field evidence of fresh slumps was observed on the breaklands east of Riggins in soils formed from gneissic rocks with high mica content, indicating that locally these LTAs can have a high slump-earthflow hazard. The dominant potential vegetation types are warm dry forest with ponderosa pine, conifer/grassland (ponderosa pine, Douglas-fir), and dry grassland.

Mountain slopes and ridges, granitics

At elevations above the stream breaklands in the eastern two-thirds of the project area, soils formed in the same granitic and gneissic rocks as the breaklands below, but slopes are less steep - predominantly 20 to 60 percent. The soil textures and profiles are similar to those discussed above in the granitic breaklands section, except that the proportion of shallow soils is somewhat less on these mountain slopes and ridges. Rock outcrop comprises only about 10 percent of these units. Debris avalanche and debris torrent hazards are moderate over most of these lands. These soils are somewhat more productive that those of the steep breaklands and have more vegetative cover and less bare soil under natural conditions. The

dominant potential vegetation types are warm, dry forest with ponderosa pine and cool Douglas-fir forest. High elevation forest occurs on about 15 percent of the map unit.

Mountain slopes and ridges, border zone metamorphics

On the west one third of the project area similar landscapes are underlain by border zone metamorphic rocks including moderately weathered gneiss, schist, quartzite, and some volcanic rocks. The soils have surface layers of loam, silt loam or sandy loam overlying sandy loam or sandy clay loam substrata. They generally are lacking both a mollic and an argillic horizon. At the higher elevations and on more gentle, protected slopes soils have volcanic ash influenced surface horizons. Shallow soils dominate the map units and rock outcrops comprises less than 25 percent of the land. Erosion hazard and debris avalanche and debris torrent hazard are both moderate. Where the soil has a thick layer of volcanic ash at the surface, the hazard of creating hydrophobic (water repellent) soils following moderate to high intensity burns is increased. Subsequent overland flow may occur during heavy rain or rain on snow events, causing soil erosion. The dominant potential vegetation types are Warm Dry forest with ponderosa pine and Grand Fir Forest.

Mountain slopes and ridges, quartzite

At the far eastern portion of the project area hard, competent quartzite forms relatively stable landforms. These lands occur at a higher elevation than comparable mountain slope landforms to the west. The bedrock weathers to very fine to fine sands, producing soils with fine sandy loam, sandy loam, or loam textures. Rock fragment content comprises more than 60 percent of the soil volume. The soils are dominantly moderately deep to deep. Slopes range from 30 to 50 percent gradient and rock outcrop comprises less than 25 percent of the unit. Debris avalanche and debris torrent hazard are low; erosion hazard is moderate. Risk of hydrophobicity is low, due to the fine sandy loam surface or loam textures. The potential vegetation types are warm, dry forest with ponderosa pine, cool Douglas-fir forest, and high elevation forest (lodgepole, spruce, and subalpine fir).

Glaciated lands, undifferentiated rock type

These areas are found on the highest elevations of the project area, generally above about 5500 to 6000 feet and ranging up to the high peaks above 8000 feet elevation. Slopes range from 5 percent to nearly vertical. In much of these high elevations glaciation has left a complex landscape of scoured areas mixed with areas of deposited glacial debris. Prediction of these types of soils can be more difficult than for areas formed under stream erosion, because of the variety of rock types that tend to form the glacial headlands. In high elevation ridges adjacent to heavily glaciated headlands and valleys, broad ridges of frost- churned or weakly glaciated slopes occur. The glacial lands make up about 12 percent of the project area, with about 90 percent of that amount occurring as heavily glaciated troughs and cirques; the remaining 10 percent occur as weakly glaciated ridges. About 40 percent of the glaciated lands are comprised of granitic sources. The soils formed in these parent materials generally have a very cobbley to very bouldery, sandy loam, or silt loam surface overlying a coarse sandy loam to loamy sand substrata. Rock content throughout the soil profiles is greater than 60 percent. On the weakly glaciated and frost-churned ridge tops, a thick volcanic ash cap occurs that typically is very cobbley to very bouldery silt loam with very low bulk density.

This layer supplies much of the productivity of these soils. The ash cap soils readily become hydrophobic following intense fires that naturally occur in these lands. The hazard for debris avalanche/debris torrent is low to moderate (see individual Land Type Association map unit descriptions elsewhere in document or project file). Some of these units have a moderate slump-earthflow hazard due to fine soil textures combined with high soil moisture. Erosion hazard is moderate to high. The dominant potential vegetation types are Douglas-fir/grand fir forest, cool Douglas-fir forest, and high elevation forest of whitebark pine, lodgepole pine, subalpine fir, and Engelmann spruce.

Mass-wasted slopes

Scattered about the western one-fourth of the project area are lands comprised of mass wasted slopes. These lands predominantly formed in unstable border zone gneiss and basalt rock materials. The main process that formed these slopes is slump/earthflow. The soils that formed in this mass- wasted parent material are mainly deep cobbley loams, clay loams, and clays. Shallow soils may occur on steep escarpments within the units. Slopes are 30 to 80 percent, the steeper slopes occurring on the escarpments. Rock outcrop comprises less than 10 percent of the unit. This Land Type Association has a high slump/earthflow hazard rating. Factors that can serve as triggers to new slump/earthflows are: sustained increases in soil moisture, road construction, and earthquakes. Soil surface erosion hazard is rated low to moderate when these lands have had time to revegetate, but becomes high after major landslide events bring fresh earth to the surface. The potential vegetation types of this Land Type Association are dry grassland at the lower elevations and cool Douglas-fir with grand fir at the upper elevations.

Previously Harvested Areas

Areas that have previously been harvested typically have evidence of damaged soil resultant from the harvest operations. Logging effects for the most part are soil compaction and displacement of the upper nutrient rich surface soil layers. Soil compaction is the reduction in bulk density of soil due to the loss of soil macropores by heavy equipment or logs. Soil displacement occurs through dragging of logs and through ground-based heavy equipment usage. Ground-based heavy equipment operations typically create more soil damage than cable logging systems. Helicopter logging creates the least impact under normal logging conditions. Intensive on-the-ground assessments are needed to determine accurately the amount of soil damage, but in lieu of that the following generalizations can be made from previously monitored harvest units on forests in the area. Tractor yarding followed by tractor slash piling as conducted in the 1960s through the late 1980s caused substantial soil damage, often not meeting current soil quality standards meant to protect long-term soil productivity. In addition, coarse woody debris that is a necessary soil component for healthy, productive soils was excessively eliminated by dozer-piling and hot, broadcast burning. In the last decade much more care has been taken to protect the soil and maintain adequate amounts of coarse, woody debris. Use of machinery with lighter touch on the land, tighter regulation of logging conditions, and use of lower intensity burning have generally helped bring the amount of soil damage down. On units where excessive soil damage has occurred, there is a risk of adding substantially to the problem if hot fires sweep across the units. The main concern is the loss of the protective litter and duff layers and the consumption of coarse woody debris, all of which may be in short supply due to previous harvesting.

AIR QUALITY

AFFECTED ENVIRONMENT

The area potentially affected by smoke emissions consists of the project area and the airsheds that immediately surround it. Climatic conditions in this central Idaho area, as elsewhere, are governed by a combination of large-scale and small-scale factors. Among the large-scale factors are latitude, prevailing hemispheric wind patterns, and extensive mountain barriers to the west and east. Small-scale or local factors include the topographic setting and position (canyon, slope or ridge location), as well as vegetation cover (Oke 1978; Schroeder and Buck 1970). The average large-scale airflow is generally from a westerly direction throughout the year. Annual precipitation ranges from seven to more than 60 inches with the wettest months in the higher elevation areas occurring in December and January. Snowfall contributes more than 50 percent of the total precipitation in the project area. May and June are normally the wettest months in some lower canyon areas, particularly along the main Salmon River (Finklin 1988).

The air quality is generally considered good to excellent most of the year. However, temperature inversions are commonplace at night and when combined with smoke, can noticeably affect air quality throughout the project area. This combination of events occurs mostly in the summer and autumn months (July - Oct), when temperature inversions can trap smoke from wildland or prescribed fires. In winter months the same conditions can occur, except the inversions trap smoke from wood stoves and pollutants from local industry. Agricultural burning is also a source of smoke in neighboring airsheds, as for example in the spring (March - May) when local residents burn ditches, fence lines and pastures, and grass and grain stubble in August through September.

The Clean Air Act, passed in 1963 by the US Congress and amended several times, is the primary legal instrument for air resource management. The Clean Air Act amendments of 1977 set up a process which included designation of Class I and II areas for air quality management. The primary differences between Class I and Class II areas are in the protection and processes provided in the 1977 amendments. Class I areas receive the highest level of protection under the Prevention of Significant Deterioration program. This program protects air quality in these areas through application of numerical criteria for specific pollutants and use of the best available control measures. The numerical criteria are more restrictive for Class I than Class II areas. These amendments also set forth a process which requires designation of Air Quality Related Values (AQRVs) to be protected in Class I areas. AQRVs have been developed and adopted for the Selway-Bitterroot Wilderness under the Regional Air Resource Management Program.

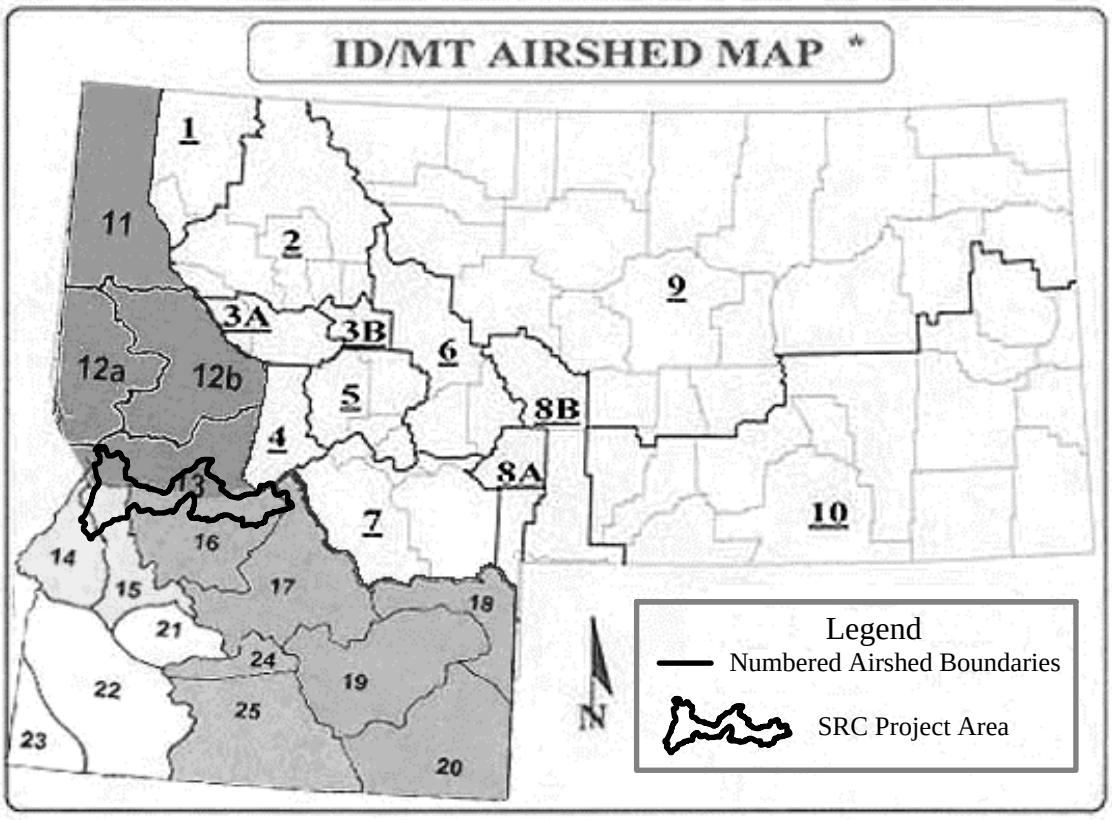


Figure 3 - 3. Idaho - Montana Airsheds (From Idaho - Montana Airshed Group).

The Montana/Idaho State Airshed Group delineated 25 airsheds based on topography and climatology. The purpose of these airsheds is to organize and operate Idaho's and Montana's Smoke Management Plan. The Salmon River Canyon Project has the potential to affect Airshed numbers 13, 14, 15, and 16 (Figure 3 - 3).

The Class I airsheds closest to the project area are the Hells Canyon Wilderness at the western boundary of the project where proposed burn units border the Wilderness boundary and the Selway-Bitterroot Wilderness, with proposed burn units located just north, west, and east of its boundary. Other Class I areas located less than 50 air miles from the project area are the Eagle Cap Wilderness to the west, the Sawtooth Wilderness to the east and the Anaconda-Pintler Wilderness to the northeast. Class II areas located within the project area include the Gospel Hump Wilderness and the Frank Church River of No Return Wilderness. Other sensitive airsheds are communities located within and surrounding the project area, including Challis, Salmon, the Bitterroot Valley, Missoula, Grangeville, Lucille, and Riggins.

The Clean Air Act requires the Environmental Protection Agency (EPA) to identify pollutants that have adverse effects on public health and welfare, and to establish air quality standards for each pollutant. Each state is also required to develop an implementation plan to maintain air quality. The EPA has issued National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter less than or equal to 10 microns, and particulate matter less than or equal to 2.5 microns. The state of Idaho also has standards for these pollutants.

SOCIAL VALUES/RECREATION

SCOPE OF THE ANALYSIS

The planning area for the Salmon River Canyon project is used by a wide variety of forest and BLM users. Primary users who may be affected include those who recreate (rafters, anglers, hunters, campers, sightseers, etc.), and those people who depend on the resources in the area for a source of income (grazing permittees, outfitters and guides, loggers, etc.). This area is also used by members of the public for collecting miscellaneous forest products (e.g. beargrass, Christmas trees, antlers). In addition to those who use the resources within the planning area, there are several population centers and private landowners within or adjacent to the planning area who may be affected by this proposal.

The planning area is also important to the public for non-measurable attributes, such as wilderness areas, abundance of wildlife, and ample opportunities for solitude. The effects to these attributes are discussed in other sections of this document.

This analysis will focus on the effects to the users and population areas by the proposed action and alternatives to the proposed action.

PHYSICAL SETTING

Special/Unique Designations/Geographical Zones

There are three primary geographic zones which would be affected by the proposed project.

1. The Salmon Wild and Scenic River Corridor, Recreation section. This portion stretches from North Fork, Idaho to Corn Creek Boat ramp. This area includes proposal units 21a, 21b, 21c, 22, 23, 24, 36, and 37a and 37b totaling approximately 66,500 acres.

2. Designated Wilderness. The Frank Church--River of No Return Wilderness, from Corn Creek Campground on the eastern portion of the proposal area to Long Tom Creek Bar on the western side. The Gospel-Hump Wilderness dips down to the Salmon River near Shepp Ranch. This area includes units 5, 6, 13, 14, 15, 16, 17, and 38 totaling approximately 48,500 acres.

3. The Little Salmon River and Highway 95 corridors. This is the most human populated portion of the planning area and includes units 2a, 2b, 2c, 2d, 2e, 4a, 4b, 4c, 4d, 8, 9, 10, 11, and 12 totaling approximately 99,500 acres.

Unique areas within the project proposal which may warrant special attention include:

Wilderness

The planning area includes portions of both the Frank Church--River of No Return and the Gospel-Hump Wilderness areas. Of the proposed planning area, nearly 692,000 acres are

located within the Wilderness. Of the 45 proposed burn units, all or portions of 13 units (or approximately 46,500 acres) are located within the Wilderness boundaries. The proposed units in Wilderness are primarily adjacent to the private inholdings along the Salmon Wild and Scenic River.

Wild and Scenic Rivers

The project area encompasses the Salmon Wild and Scenic River. From North Fork, Idaho to Corn Creek Campground, nearly 47 miles, the river is designated as "Recreational" . At Corn Creek Campground the river enters the Wilderness and is designated as "Wild" for the next 77 miles. At Long Tom Creek Bar the Salmon River has not been formally classified but is considered eligible for recreation designation under the Wild and Scenic Rivers Act.

Population Centers

The primary population centers that the proposed project may affect include Riggins (population 443), Grangeville (population 3226), and Salmon (population 2941). Additionally, smaller communities such as White Bird, Lucille, Pollock, Pinehurst, and North Fork may be affected by the proposed project.

SOCIAL SETTING

Affected Populations (User Groups)

Residents

Approximately 46 percent of the proposed activities will occur within the vicinity of Riggins and the Little Salmon River and Highway 95 Corridors. Additionally, residents along or adjacent to the Salmon River at North Fork, Indian Creek, Shoup, Colson Creek, Rams Head, Allison Ranch, Yellow Pine Bar, Whitewater Ranch, Campbell's Ferry, Five Mile Bar, Painter Mine, Mackay Bar, Copenhaver, Badley Ranch, Indian Creek, James Ranch, Romine Ranch, Shepp Ranch, and Polly Bemis Ranch may be affected by the proposed project.

Except for Salmon, Idaho the primary source of income in these areas is recreational and related to outfitter and guide businesses. These are primarily related to whitewater rafting, salmon fishing and hunting. Some of the outfitters also offer sight-seeing tours. Salmon Idaho has most of its economic base split between recreation and agriculture (primarily grazing).

Boaters

Over 10,000 floaters and several thousand power boaters use the Salmon Wild and Scenic River annually. Whitewater rafting and powerboating are favorite recreation activities for many visitors to the Salmon River canyon area as well as for local residents. These activities contribute significant incomes to the local businesses. Float boating is heaviest during the summer control season (6/20-9/10) but is increasing during the late spring months. Power boating picks up during spring steelhead season, declines during high runoff periods in May

through early June, increases during the summer season, and reaches its greatest level during October and early November by fishermen and hunters.

Table 3 - 60. Visitor use days during calendar year 1998.

Activity	Spring	Summer	Fall	Winter	Total
Power Boat (and vehicle access)	2220	3000	6800	100	12,100
Float Boat	8660	35,000	6500	0	50,200
Total	10,880	38,000	13,300	100	62,300

Trends have indicated that anglers make up the next highest use of the river corridor after boaters. During the spring and fall runs of steelhead, fishing is a very popular pastime. The Idaho Department of Fish and Game tallies angler days annually. The following table depicts angler days by section of the Salmon River for 1996 and 1997.

Table 3 - 61. Steelhead Angler Days on the Salmon River

Year	Section of River	Spring Run/ Angler Days (1/1-4/30)	Fall Run/ Angler Days (9/1-12/31)
1996	11	3740	7368
	12	22932	36598
	13	1144	816
	14	13324	22599
	15	46433	72563
TOTAL Total angler day	Whitebird to NF	87573	139944 227517
1997	11	5441	7887
	12	25931	28187
	13	242	1728
	14	3836	62240
	15	33107	125405
TOTAL Total angler day	Whitebird to NF	68557	225447 294004

Table 3 - 62. Structures and improvements located within proposed burn units.

Burn Unit	Forest	Campgro-unds	Other Facilities	Approx. Extra Trail Miles	Approx Road Miles	Dispersed Sites R=River L=Land	Special Uses	Private/ Other
2a	Nez Perce					3l		
2b	Nez Perce					1l		
2c	Nez Perce				1.6	2l		
2d	Nez Perce				5.8	2l		
2e	Nez Perce			3.6	7.2	2l		
4a	Nez Perce			8.2	2.8	4l		
4b	Nez Perce			12.4	6.5	2l		
4c	Nez Perce	Allison Creek,Spri-ng Bar,Van Creek		7.2	17.2	16l		
4d	Nez Perce					4l		
5	Nez Perce	No	No	5.6	Adj.	2r/1l	No	Adj. Whitewater Ranch
6*	Nez Perce			9.2	1r	No	No	
8	Payette	No	No	7.0	2.4	No	No	No
9	Payette	No	No	5.7	No	No	No	No
10	Payette	No	No	0.4	No	No	No	No
11	Payette	No	No	11.0	2.0	No	No	No
12	Payette					No	No	No
13	Payette	No	No	No	No	2r	No	No

14	Payette	No	No	No	No	1l	No	Adj. James Rch. - L. Strip. Bemis Rch.
15	Payette	No	No	1.2	No	No	Whitewater Ranch	Painter Mine
16	Payette	No	No	No	No	No	Whitewater Ranch	Lemhi Bar
17	Payette	No	No	6.0	No		Whitewater Ranch	Campbells Ferry
21 Abc	Salmon-Challis	Long Tom	Cach Bar, Stodd Trail H.	3.8	28.6	No	S. Potts, Sal. Riv. Lodge, Horse Cr.	Adj. Col-son Creek
22	Salmon-Challis	No	No	3.5	6.0	No	Sal. Riv. Lodge	Owl Creek Hotsprings
23	Salmon-Challis	No	No	2.0	8.8	No	Saddle Springs	Adj. Indian Cr., Ulysses
24	Salmon-Challis	Spring Creek	No	2.4	31.6	No	Sal. River Lodge	Yes
36	Salmon-Challis	No	No	No	14.4	No	Girl Sco-uts, Sal Riv. Lodge	Pine Cr. Ranch
37ab	Salmon-Challis	No	Clear Cr. Garden Cr. Trail H.	27.5	5.0	No	Big Horn	Adj. Beaver Creek
38	Nez Perce	No	No	9.6	2r	No	No	Indian Cr. & Adj. Shepp Ranch

[1]*Actual number of dispersed campsites are probably higher. Identified are those that are maintained at some level by the Forest Service.*

River sections are defined (going up river) as follows:

Section 11: Whitebird to mouth of Little Fork of Salmon;

Section 12: Little Fork to Vinegar Creek;

Section 13: Vinegar Creek to South Fork of the Salmon;

Section 14: South Fork to Middle Fork;

Section 15: Middle Fork of the Salmon to the North Fork of the Salmon River.

In 1997 the total angler days of both the spring and fall steelhead runs on the Salmon River came to 294,004 angler days. The Idaho Department of Fish and Game defines an angler day as equal to one person fishing for six hours at a time.

Hunters

The planning area includes small portions of Idaho Department of Fish and Game hunting units 13, 14, 18, 19, 19-A, 20, 20-A, 21, and 23. Generally, September through November are the most popular months for hunting in the project area. Table 3 - 63 shows the approximate number of hunters and the duration of hunts for the 1997 hunting season.

Table 3 - 63. 1997 Use Figures: Elk and Deer Hunting

UNIT	#HUNTERS-- General Season	MEAN #DAYS Hunting	#HUNTERS- Controlled Season	MEAN #DAYS Hunting
13	1060	3.6	71	5.0
14	3007	4.5	307	4.8
18	1373	4.0	240	5.4
19	700	5.5	400	6.5
19A	535	6.2	14	4.5
20	678	8.1	119	6.7
20A	957	6.3	366	4.8
21	1419	6.5	688	4.9
23	2525	4.8	553	4.0

Numbers are based on Idaho Fish and Game 1997 harvest data preliminary results.

The project area overlaps into only small portions of these hunting units.

Hikers

Backpacking is a popular recreational activity within the Wilderness areas. Most backpacking occurs in the summer with the fall season following a close second. The large percentage of hikers outside the Wilderness areas are day hikers. Summer and fall are the primary seasons for hikers.

General Recreation Users

Generally, the majority of recreation use occurs during the summer and fall seasons. This includes activities such as camping, driving for pleasure, collecting firewood, berry picking and picnicking.

Outfitters & Guides

Boating (raft and jet), fishing, and hunting outfitter and guides businesses have special use permits to take clients in and adjacent to the proposed project area.

Infrastructure

The Forest Service, outfitters, and permittees maintain a number of structures and improvements on federally managed lands. Table 3 - 62 depicts the structures and improvements located within the proposed burn units. Maps can be referenced in the project files.

Other Resources

In addition to recreation and special use permittees, other communities may be affected by the proposed project.

Timber

Idaho county was rated as having a high dependence on Forest Service/BLM timber harvest. Valley County was rated as moderate, and Lemhi County was rated as low (ICBEMP). While a portion of this project will occur on lands within the suitable timber base, this proposal is designed to result in minimal fatality to merchantable trees.

Mining

There are no active mines within the planning area.

RANGE - Livestock Grazing

Scope Of The Analysis

This analysis will address the effects of the proposed action on active grazing allotments within the planning area.

Desired Condition

The desired condition for range allotments is for a suitable forage base that supports a certain allowable number of Animal Unit Months (AUMs). Non-native plants and noxious weeds will be minimized by vegetation management practices. Prescribed burning has been identified in the Salmon Forest Plan as a tool to restore vigor to rangeland grass communities.

Past Events That Have Affected Current Conditions

Livestock grazing Nez Perce tribal horses grazed on the plateau grasslands and wintered in the canyons in the mid-1700s (Tisdale 1986). From the 1860s to the 1880s, settlement in the Salmon River valley and larger tributary valleys led to unregulated livestock grazing until around 1940. This unregulated grazing also occurred within the present wilderness portion of the analysis area. Sheep grazed the steeper slopes, while cattle stayed on the flatter bottomlands and gentle slopes. Overgrazing and trampling depleted the native grassland and shrubland communities (Hironaka and others 1983, Tisdale 1986). In addition, mechanical damage to the soil, particularly on the steep granitic soils, also created erosion of the top soil, which made regeneration of native grasses by seed very difficult (Tisdale 1986).

The alteration of species composition and structure, coupled with the introduction of non-native grasses and forbs, led to a shift away from native plant communities to those dominated by non-native species. The relationship between livestock grazing and noxious weed introduction and spread is discussed in the Noxious Weeds section of this chapter. Although some portions of the Salmon River canyon were ungrazed due to inaccessibility and slope steepness, most of the lower elevation non-forest vegetation in the planning area has been altered due to grazing. In addition, certain high-elevation grasslands have been altered as well. The dry shrub communities, particularly curl-leaf mountain mahogany, were probably affected by overgrazing. Young mahogany were grazed by both sheep and native ungulates. As a result, there are more old and decadent mahogany, and less in the young to mature age class (Tisdale 1986). Cover of certain dry shrub species (e.g., rabbitbrush, sagebrush) likely increased in response to overgrazing.

In addition to changes in species composition, overgrazing effects to vegetation in riparian areas can lead to altered riparian function, loss of shading, and increases in stream temperatures. These effects have been documented in the Boulder Creek allotment (Payette NF) and in the Allison/Berg, Slate Creek, Squaw Creek, Papoose Creek, Sherwin Creek, Christie Creek, and Cow Creeks allotments (Nez Perce NF). Past effects to riparian conditions from heavy grazing were noted in 1989 along Jack, Meyers, and Big Mallard Creeks (Mallard allotment, Nez Perce NF), but current grazing is having a low impact on riparian areas.

Past fire exclusion has also affected rangeland plant communities. As a result of fire exclusion, conifers such Douglas-fir and ponderosa pine have colonized the fire-maintained grassland and shrubland communities, decreasing the acreage of these vegetation types. Fire apparently had a minor influence on those grassland types in which site characteristics preclude conifer establishment (Horton 1972 in Tisdale 1986). However, conifer encroachment has occurred within the whole planning area, but is particularly evident on the Island unit of the Salmon River Ranger District, Nez Perce National Forest (Gary Solberg, pers. comm.).

Current Condition and Management

There are 61 livestock allotments within the planning area, including active, inactive, and historical allotments. The numbers of animals on active allotments range from 50 cow/calf pairs to 1400 ewes/lambs. Season of use is generally May or June through October, with some allotments having only spring and fall use. Generally, pasture rotation and deferred

grazing are part of the allotment management plans (AMPs). A deferred grazing system means the pasture is not used until after seed has set. Pasture rotation requires that animals are rotated through separate pastures in the allotment throughout the season of use. A number of commercial hunting outfitters in the planning area have grazing use allowed under their operating plans, but numbers of horses and mules is generally relatively low compared to grazing allotments.

Fifteen active allotments contain proposed burn units. Table 3-64 shows the proposed burn units within each active allotment. Units 4a, 4b, 6, and 38 are within vacant or historical allotments on the Nez Perce NF (Slate Point, Florence, Salmon River Breaks, Crooked Creek, and Cove Recreational allotments). Unit 37 a and b is within the inactive Panther/Clear Creek allotment on the Salmon NF.

Table 3 - 64. Proposed burn units within active grazing allotments.

Burn Unit	Forest	Active Allotments	Livestock Numbers (total allotment area)	Season of Use
2a	Nez Perce	Cannonball	250 cow/calf pairs	June-Oct
2b	Nez Perce	Papoose	105 cow/calf pairs	June-Oct
2c	Nez Perce	Race Creek	65 cow/calf pairs	April-June Oct-Dec
2d	Nez Perce	Cow Creek	589 cow/calf pairs	June-Nov
2e	Nez Perce	Sherwin Creek Christie Creek	50 cow/calf pairs	May-Nov
4c	Nez Perce	Allison/Berg	1000 sheep 1400 sheep	Nov-Feb April-June
4d	Nez Perce	Allison/Berg	1000 sheep 1400 sheep	Nov-Feb April-June
5	Nez Perce	Mallard Creek	100 cow/calf pairs	July-Sept
8	Payette	Boulder Creek	950 ewes/lambs	6/18 - 8/31
9	Payette	Fall Creek-Whitebird	441 cow/calf pairs	7/16 - 10/31
10	Payette	Fall Creek-Whitebird	441 cow/calf pairs	7/16 - 10/31
11	Payette	Hershey-Lava French Creek Bear Pete	1000 ewes/lambs 833 ewes/lambs 833 ewes/lambs	7/10 - 10/15 7/7 - 10/7 7/7 - 10/7
23	Salmon-Challis	Indian Ridge Sage Creek	140 cow/calf pairs 30 cow/calf pairs	5/23 - 9/30 6/1 - 9/30

Vegetation within the allotments in the planning area is a mosaic of dry grasslands, dry shrublands, mesic shrublands, riparian, conifer/grasslands, and fescue grasslands. These potential vegetation groups (PVTs) have been described earlier in this chapter.

WILDERNESS

SCOPE OF THE ANALYSIS

Wilderness is valuable for providing water, air quality, personal and social benefits, recreation opportunities, historic context, and economic benefits to many local communities. In fire dependent ecosystems such as the Salmon River Canyon, fire has always been a critical part of ecosystem processes and is an integral part of wilderness preservation. Under

Alternatives B and D, 45,000 Wilderness acres in units 5, 6, 13 - 17, 21 C, and 37 A & B are scheduled to be burned over the duration of the project.

The Gospel Hump Wilderness was designated under the 1978 Endangered American Wilderness Act. The Frank Church-River of No Return Wilderness was designated under the 1980 Central Idaho Wilderness Act. The 1964 Wilderness Act provides the foundation for management of both wilderness areas. Those parts which apply to Wilderness fire are as follows:

Section 2(c): A wilderness ... is hereby recognized as an area where the earth and its community of life are untrammeled by man ... retaining its primeval character and influence ... protected and managed so as to preserve its natural conditions ... "

Section 4(b): " ... each agency ... shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character."

Section 4(d)(1): "... such measures may be taken as may be necessary in the control of fire, insects and diseases, subject to such conditions as the Secretary deems desirable."

Other Direction which applies to Wilderness includes the Federal Code of Regulations CFR 293.2 and the Forest Service Manual. These discuss the use of ignited fire in Wilderness as follows:

CFR 293.2 "National Forest Wilderness resources shall be managed to promote, perpetuate, and where necessary, restore the wilderness character of the land and its specific values."

CFR 293.2(a) "Natural ecological succession will be allowed to operate freely to the extent feasible. "

Forest Service Manual 2324.2 gives objectives and policy for wilderness fire.

2324.21 - Objectives

1. Permit lightning caused fires to play, as nearly as possible, their natural ecological role within wilderness.

2. Reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness.

2324.22 - Policy

6. Forest Service managers may ignite a prescribed fire in wilderness to reduce unnatural buildups of fuels only if necessary to meet at least one of the fire management objectives set forth in FSM 2324.21 and if all of the following conditions are met:

a. The use of prescribed fire or other fuel treatment measures outside of wilderness is not sufficient to achieve fire management objectives within wilderness.

b. An interdisciplinary team of resource specialists has evaluated and recommended the proposed use of prescribed fire.

c. The interested public has been involved appropriately in the decision.

d. Lightning-caused fires cannot be allowed to burn because they will pose serious threats to life and/or property within wilderness or to life, property, or natural resources outside of wilderness.

7. Do not use prescribed fire in wilderness to benefit wildlife, maintain vegetative types, improve forage production, or enhance other resource values. Although these additional effects may result from a decision to use prescribed fire, use fire in wilderness only to meet wilderness fire management objectives.

8. Do not use management ignited fire to achieve wilderness fire management objectives where lightning -caused fires can achieve them.

EXISTING CONDITION

The project area includes 651,668 acres of the Frank Church River of No Return and Gospel Hump Wildernesses. The area is very rugged and characterized by steep slopes and mountainous terrain. Access into the Windernesses is by river, by trail, or from isolated air strips. Except for development in places along the river corridor and jet boat traffic, the area seems natural and wild to most people. Campsites, trails and inholdings show evidence of human influence, but for the most part these human influences do not interfere with natural processes or substantially influence the overall wildness of the area. Two other human influences, fire exclusion and weed introduction, create a greater threat to naturally functioning ecosystems within the Wilderness.

Most of the vegetation in the Wilderness has evolved with fire as a natural disturbance process. The historic frequency of fire in the project area is discussed in the fire regimes section (Page 3 - 1), as are the changes in vegetation patterns as a result of fire exclusion. These changes in vegetation and those things it influences such as habitat, water runoff, fire size, intensity and severity are substantial. Differences in the historic conditions brought on by fire exclusion have created a situation that does not fit with the intent of the Wilderness Act. Section 2c of the Wilderness Act states that wilderness will be an area "where the earth and its community of life are untrammeled by man". "Trammel" means to prevent or impede the free play of, to confine or hamper. Because human influence has impeded the natural occurrence of fire, natural conditions and processes have changed. Grazing, recreation, and the introduction of noxious weeds have also influenced natural conditions, but fire exclusion, in particular, has had wide spread effects. This influence is more marked some places than others. Conditions have changed most in areas of short fire return intervals (*Fire Regimes*, page 3 - 2). Fire has burned in some areas and vegetation in those places is closer to or within the Historic Range of Variability. Areas of the wilderness that fall within the Historic Range Of Variability are more common at higher elevations than in lower areas where natural fire intervals would be more frequent without fire suppression.

In addition to wilderness condition and natural processes, the wilderness experience is also influenced directly and indirectly by fire suppression activities and by fire exclusion from the ecosystem. Fire suppression activities can create short- term noise and intrusion. Fire suppression activities create visible scars on the landscape from helispots, line construction, falling snags, and other suppression activities. Current suppression usually utilizes Minimum Impact Suppression Tactics (MIST), which was developed to alleviate long term impacts to the wilderness resource. Fire exclusion can make an area look and function differently from natural processes. For example, as a result of fire exclusion, large, open pine stands have been filled in by understory species and thus created create more shade, diminished vistas, and made game in some places less visible.

Inholdings and the location of Wilderness boundaries are another obstacle that can prevent fire from playing its natural role. Often lives, properties, or non-wilderness commodities are at risk and thus fire has usually been suppressed in these areas. The "footprint" that inholdings and boundaries exert is far larger than their immediate surroundings. Often the decision to allow a fire to take its natural course must be considered when weeks or months remain in the burning season. Thus a fire manager must decide if a fire will reach an inholding or boundary sometime in the future with enough intensity to threaten life or property. Larger, more intense fires create more risk to firefighters and cost more to suppress, which is an added incentive to suppress a fire early, if in fact it looks as if suppression may be eventually necessary. Thus, fires are often suppressed even when they start quite a distance from an inholding or boundary. This creates a cycle of increased risk as fuels which preclude cool or easily controlled burns accumulate.

In an effort to adequately address the potential effects to the wilderness resource, the following four aspects of the Wilderness within the planning area will be considered: 1) Natural Integrity, 2) Natural Appearance, 3) Solitude and 4) Primitive and Unconfined Recreation Opportunities.

Natural Integrity

The vegetation within Salmon River Breaks has evolved through centuries of frequent, low intensity fires. Fire suppression efforts over the past several decades have altered the open stand conditions that historically occurred within lower elevation portions of the planning area. These areas are now being encroached upon by stands of shade -tolerant tree species that would, under natural conditions, be killed by these frequently occurring, low intensity fires. This has resulted in overgrown vegetative conditions which increase the competition for nutrients and water for the older trees, causing increased stress and susceptibility to insects, disease and fire. These changes have also resulted in altered habitat for plant and animal species which were historically present within the canyon.

Natural Appearance

The vegetation within the planning area appears natural to the casual observer, in that there are no obvious breaks apparently consistent with vegetative manipulation (e.g., timber harvest). However, this appearance is not consistent with what would appear normally, due to the encroachment of undergrowth as described above.

Solitude

Whitewater Ranch, Shepp Ranch and Polly Bemis Ranch are popular stopping points for floaters on the Salmon River. Whitewater Ranch can also be accessed by road. The Shepp Ranch has a trailhead that provides access to the Gospel Hump Wilderness and the Polly Bemis ranch has a trailhead that provides access to the Frank Church-River of No Return Wilderness. While the ranches do not consistently provide opportunities for solitude due to the number of people who stop and the caretakers at the ranches, solitude can be found a very short distance from these ranches.

Campbell's Ferry and Bargamin Creek are popular stopping points for rafters and hikers. There is ample space for large parties to camp at Bargamin Creek and the Jim Moore Place (across the river from Campbell's Ferry. Both camping areas provide trail access into the Frank Church-River of No Return Wilderness.

During fire suppression efforts, the solitude is often broken by aircraft flying overhead. This may not have much impact to visitors if the fire is within the planning area, as area closures will normally restrict access to the public. However, fires outside the planning area may result in aircraft flying overhead.

Primitive and Unconfined Recreation Opportunities

The wilderness portion of the planning area has (as mentioned above) numerous trails that access the upland and interior portions of the wilderness and the Salmon River. These result in numerous locations available for recreational opportunities including hiking, camping, hunting, and fishing.

DESIRED CONDITION

Desired condition in Wilderness involves not only natural condition but allowing natural processes to operate. See the Wilderness Act Sec. 2 (c) above.

PAST EVENTS THAT HAVE AFFECTED CURRENT CONDITIONS

Fire exclusion, grazing, recreation, inholdings and noxious weeds have changed wilderness appearance, experience, condition and processes.

CULTURAL RESOURCES

The Salmon River Canyon and adjacent areas contain numerous known and many undocumented archaeological sites. The Nez Perce, Payette, and Salmon-Challis National Forest portions of the Salmon River Canyon has been home to many different people. For about the past 10,000 years, ancestors of today's modern Indians along with many European

and Asian (Chinese) people have inhabited the river canyon. There are 515 known, previously documented locations where evidence has been found from prior occupants using the canyon. No doubt there are many more places that exist which have yet to be documented.

Prehistorically site types include campsites, lithic scatters (stone tool manufacturing areas), rock shelters, rock art panels, and village sites, among others. Approximately 245 such sites exist in the Salmon Canyon Project area. During historic times (circa 1800 to present), many people came to or passed through the canyon in search of gold or to claim lands in which to homestead. Some examples of these historic sites are cabins and other buildings, mining sites, Forest Service lookouts and Ranger Stations, graves, and trails.

Of the 515 previously recorded archaeological sites, nearly 66 percent (340) are considered eligible for listing in the National Register of Historic Places (NRHP) while 15 percent (76) have been determined to be not eligible for listing in the NRHP. Many of the sites lie in close proximity to the river. However, there are many sites that occur in upland zones within the project area.

A large number of sites have been located during various archaeological surveys within the project area. One of the earliest such surveys was a float trip on the Salmon River in 1958. Another float trip was performed in 1972 in order to locate additional archaeological sites along the river corridor. These two cursory surveys focused their attention on areas along the river and the immediately adjacent zones. Still more recently, surveys by Forest Service Archaeologists and other contractors have inventoried upland zones away from the river bottom. Fewer sites have been located in these areas, but the rugged terrain of the canyon landscape will only allow certain types of sites to occur outside the sandy beaches and elevated benches along the river.

Through time, the landscape has evolved in response to the dynamic geologic, climatic, and population changes within the canyon. These natural environmental forces have created areas where human occupation could occur (beaches, rock shelters, terraces, alluvial fans, etc.). These same forces have also removed areas where people may have lived through river migration from one side of the canyon to the other, flooding, or landslides. More recently, many areas that experienced regular intervals of wildland fire (natural or man caused) have been relatively fire-free, due at least partially to the active suppression efforts adopted by the Forest Service ca. 1910. The result of this has been a large accumulation of burnable materials across the landscape. Many historic sites such as homesteads, mining cabins, and other structures, along with some prehistoric sites are at risk of being lost to wildland fire because of accumulated fuels in areas where these types of sites occur. Other activities that have affected the integrity of the cultural sites within the project area include sheep and cattle herding and grazing, logging and its associated activities, road building, mining, and trail construction. More recently, increased public interest in historical sites and higher levels of river traffic have caused some damage to these sites, due to the very fragile nature of many archaeological sites across the forest. Many 19th and 20th century mining activities (placer mining along the river, dredging and lode mining in the uplands) have disturbed or destroyed sites in their efforts to extract precious metals such as gold and silver from subsurface deposits.

The ultimate desired future condition for the preservation of archaeological sites within the canyon would be to preserve all sites without further degradation. However, the river canyon is not a static environment and changes do and will continue, just as they have for thousands of years. Those areas that possess archaeological sites that may be threatened by any proposed Forest Service activity will be revisited in order to collect all the available information from those cultural resources. Through this type of field research and with available information from local informants and other documents, proper documentation can be assembled that can provide a picture of what life was like during prehistoric as well as historic times within the Salmon River Canyon Project area.