CHAPTER 3: AFFECTED ENVIRONMENT

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CHAPTER 3: AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the existing condition of resources within the Granite Watershed. These conditions can be used to compare the consequences of the alternatives (which are described in Chapter 4). This information is generally organized in the same order as the issues listed in Chapter 1. Bolded sections are associated with the Key Issues identified in Chapter 1 and as such, are most relevant to the decision.

- WATER QUALITY (Covers Key Issue and the soils resource)
- FISH AND AQUATIC HABITAT (Covers Key Issue 2 and the Proposed, Endangered, Threatened and Sensitive species as well as Forest Plan required Management Indicator Species tracking issue)
- RECREATION (Covers the Recreation Use tracking issue as well as Wilderness Resources)
- WILDLIFE (Covers Wildlife Habitat and the Proposed, Endangered, Threatened and Sensitive species and Management Indicator Species tracking issues)
- SOCIO-ECONOMICS (Covers Economics as well as the Health and Safety and "Miners Rights" tracking issues.
- NON-FOREST VEGETATION (Covers Proposed, Endangered, Threatened and Sensitive plant species and the Noxious Weed tracking issues)
- HERITAGE RESOURCES (Covers the Heritage Resources tracking issue)
- TRANSPORTATION SYSTEM (Covers the Transportation tracking issue)

WATER QUALITY

The analysis area consists of the Granite Creek watershed (93), which comprises 15 subwatersheds (93A through 93O). Subwatersheds for which specific mining claims have received current Plans of Operation (POO) include the Lower Granite Creek subwatershed (93A), the Ten Cent Creek subwatershed (93B), the Upper Granite Creek subwatershed (93C), the Rabbit Creek subwatershed (93E), the Middle Clear Creek subwatershed (93J), and Lightning Creek subwatershed (93K).

The Granite Creek watershed (93) encompasses 94,052 acres, 95.5 percent of which are Federal lands managed by the Forest Service. The remaining 4,345 acres are privately owned, many of them as patented mining claims. Land ownership information for the subwatersheds that are the subject of this report is summarized in Table 3.1, below.

Table 3.1 – Land ownership within affected subwatersheds (acres)

Subwatershed		Total Area	National Forest	Private	% National Forest Ownership in SWS
93A	Lower Granite Creek	9,675	9,134	541	94.4
93B	Ten Cent Creek	4,169	3,533	635	84.7
93C	Upper Granite Creek	10,786	10,282	504	95.3
93D	Lake Creek	12,043	11,993	49	99.6
93E	Rabbit Creek	4,868	4,868	0	100
93F	Lower Clear Creek	2,650	2,273	377	85.8
93G	Upper Clear Creek	6,372	6,277	95	98.5
93H	Ruby Creek	3,046	3,046	0	100
93I	Congo Gulch	1,478	1,397	81	94.5
93J	Middle Clear Creek	2,117	1,988	128	93.9
93K	Lightning Creek	4,826	4,453	373	92.3
93L	Olive Creek	4,725	3,921	804	83.0
93M	Beaver Creek	8,351	8,165	187	97.8
93N	Lower Bull Run Creek	10,120	9,672	448	95.5
93O	Upper Bull Run Creek	9,298	9,113	185	98.0
Total		94,526	90,119	4,407	95.3

Past activities such as mining, timber harvest, road construction, and livestock grazing have affected the existing condition of the watershed to varying degrees. The residual effects of these activities are discussed in the following sections of this report.

Sedimentation and water temperature are the primary water quality parameters that may be affected by the proposed action. Water chemistry is discussed in this section because past lode mining practices have locally affected water quality, potentially contributing to cumulative effects. Each of these water quality factors is discussed separately in the following subsections.

Sedimentation

Rainfall intensity, which plays an important role in the rate of soil erosion, is low in this area. Sediment levels in Forest streams vary significantly with flow, and are highest during periods of spring snowmelt. However, isolated high intensity thundershowers do occur in the study area. These high intensity storms can result in high runoff events and attendant heavy pulses of sediment transport, especially in disturbed areas such as roads, burns, and recently mined areas.

Sediment can be mobilized and introduced into stream systems through three primary mechanisms within the analysis area. First, sediment can be mobilized by overland flow across mineral soils exposed or compacted by fire, logging, or other disruptive activities such as prescribed burning, road building, and grazing. Second, placer mining can expose mineral soils in riparian areas and/or destabilize stream banks, and thus mobilize sediments. Finally, increased

peak discharge from logged, mined, or otherwise disturbed areas can increase channel scour in first order channels.

Past timber harvesting has almost certainly contributed to increased sediment yield from the analysis area. The collection of quantitative data regarding this potential increased sediment yield has been precluded by the high cost and complexity of such data collection as well as the high temporal and spatial variability of sedimentation within the analysis area. While Helvey's 1995 study (Helvey and Fowler, 1995) at High Ridge documents the direct effects of logging on sediment yields, mining-related impacts were not studied.

Mining has and continues to produce sediment periodically. The seasonal operation of suction dredges in creeks mobilizes fine sediments, which are transported downstream in plumes. Past and current excavation on upland placer deposits and lode mines loosens soils and removes vegetation that can serve to catch mobilized sediments.

Monitoring changes in sediment yield that result from management activities is challenging at the watershed scale due to high spatial and temporal variability. In addition, sediment data information is sparse and incomplete. Monitoring on the Umatilla Barometer Watershed showed that annual sediment yield varied by an order of magnitude during an 8-year period (Harris and Clifton 1999). Intensive monitoring of sediment yield also was conducted in the High Ridge Evaluation Area prior to and following the second ground based logging treatment. Watersheds 1 and 2 were clearcut and a shelterwood prescription conducted on Watershed 4. Unfortunately, the changes in sediment yield cannot be compared to determine statistical significance because the one pretreatment year of data does not account for natural temporal variation. During the first year after logging (including harvest within riparian areas), sediment yield from Watershed 4 experienced a 34 percent decrease in sediment yield (Helvey et al. 1995). Watershed 3, which was untreated, increased 168 percent. The authors concluded that the pulse of sediment from Watersheds 1 and 2 were probably caused by logging related soil. A comparison of sediment yields from the logged and unlogged watersheds showed that during the year prior to logging sediment yields from watersheds 1 and 2 were 5.5 and 7.4 times greater than Watershed 3, respectively. During the 5-year period after logging, sediment yield from watersheds 1 and 2 was 2.6 and 9.8 times greater than the unlogged watershed, respectively. With only one year of pretreatment data it is not possible to conclude how much spatial variability in sediment yield existed before logging occurred. Also, watersheds 1, 2 and 4 were logged 7 years prior to the initiation of sediment monitoring, so these watersheds may have experienced some effect prior to monitoring. Six to 11 years after treatment sediment yield was 10 percent (watershed 1) and 51 percent (watershed 2) lower than the amount from the untreated watershed. The authors concluded that the decrease in sediment yield resulted from the dense riparian vegetation that became re-established with the riparian area after the forest canopy was removed and that much of the loose material was scoured from the stream during the previous years of elevated sediment levels.

Equivalent clearcut acre (ECA) percent approaches 15 percent in the Lower Granite Creek (93A) subwatersheds and is exceeds 15 percent in the Ten Cent Creek (93B), Upper Granite Creek (93C), Lower Clear Creek (93F), Middle Clear Creek (93J), Olive Creek (93L), Beaver Creek (93M), Lower Bull Run (93N) and Upper Bull Run (93o) subwatersheds.

Perceptible changes in hydrology occur when a threshold percentage of vegetation within a given watershed is altered or disturbed. The threshold as stated in the Umatilla Forest Plan (pg 4-77) is reached when 30 percent or more of a subwatershed is composed of timber in the 0 to 30 year age class. Since less than 30 percent of the analysis area is currently in the 0 to 30 year age class, as shown in Table 3.2 below, hydrology has probably not been greatly affected by past timber management activities. With the exception of the Upper Granite Creek (93C) subwatershed, the subwatersheds in which mining activities are proposed (named in bold type) fall into the "Low" risk category. Upper Granite Creek (93C) falls into the low end of the "Moderate" risk category, exceeding the category limit of 15 percent by 1.9 percent.

Table 3.2 – ECA, Stands younger than 30 years, by subwatershed.

Subwatershed (SWS)		Forested Acres (1)	ECA % (1)	Harvest/ Plant Acres (2)	Wildfire Acres (2)	Stands < 30 years (acres) (2)	Percent Stands < 30 years	Watershed Risk Rating (3)
93A	**Lower Granite**	9,069	14	433	337	770	8.4	Low
93B	**Ten Cent**	3,471	26*	240	17	257	7.4	Low
93C	**Upper Granite Creek**	9,556	45	1616	0	1616	16.9	Moderate
93D	Lake Creek	11,649	9	676	0	676	5.8	Low
93E	Rabbit Creek	4,846	4	21	0	21	0.4	Low
93F	Lower Clear Creek	2,208	29*	365	0	365	16.5	Moderate
93G	Upper Clear Creek	6000	6	0	0	0	0	Low
93H	Ruby Creek	3,046	6	69	0	69	2.2	Low
93I	Congo Gulch	1,396	9	305	0	305	21.8	Moderate
93J	**Middle Clear Creek**	1,918	16*	7	0	7	0.3	Low
93K	**Lightning Creek**	4,826	5*	0	0	0	0	Low
93L	Olive Creek	4,724	18*	371	0	371	7.8	Low
93M	Beaver Creek	7,896	31	1514	0	1514	19.1	Moderate
93N	Lower Bull Run Creek	9,885	32*	1907	0	1907	19.2	Moderate
93O	Upper Bull Run Creek	8,902	31	2063	0	2063	23.1	Moderate

Source: (1) North Fork John Day River Subbasin Draft Biological Assessment, 1999.
(2) Communication, North Fork District Silviculturist, 2002.
(3) From Chart, p.7, USDA 1993.
* 15% - 33% forested acres with no data, may be private land

Common sediment measuring parameters include percent fines and cobble embeddedness. Available data for the analysis is summarized in Table 3.3. The names of subwatersheds in which the proposed action(s) will occur are highlighted in bold text. The Umatilla Forest Plan standard for fines is less than 20 percent, and for cobble embeddedness is less than 35 percent embedded.

Table 3.3 – Sediment Parameters

Subwatershed		Percent Fines (<6mm) (Standard = <20%)	Cobble Embedded-ness (Standard = <35%)	Number Reaches >35% Embedded
93A	**Lower Granite Creek**	NA	>35%	NA
93B	**Ten Cent Creek**	NA	<35%	2
93C	**Upper Granite Creek**	NA	>35%	3
93D	Lake Creek	NA	NA	NA
93E	Rabbit Creek	>20	NA	NA
93F	Lower Clear Creek	NA	NA	NA
93G	Upper Clear Creek	7-13	NA	NA
93H	Ruby Creek	>20	NA	NA
93I	Congo Gulch	NA	NA	NA
93J	**Middle Clear Creek**	NA	NA	NA
93K	**Lightning Creek**	NA	NA	NA
93L	Olive Creek	NA	R 1 & 5 < 35%	2
93M	Beaver Creek	NA	>30%	4
93N	Lower Bull Run Creek	NA	NA	4
93O	Upper Bull Run Creek	NA	NA	1

Source: NFJDRS BA (1999), and FS Communication

The fines content of stream sediments in Rabbit Creek (93E) and Ruby Creek (93H) exceed the Umatilla Forest Plan goal of not more than 20 percent. Cobble embeddedness exceeds the 35 percent standard in both Lower Granite Creek (93A) and Upper Granite Creek (93C), and is relatively high (>30%) in Olive Creek. This suggests that at least some of the creeks in the Granite Creek watershed are carrying more sediment then desired to meet Forest Plan goals. More data would be required to fully assess sediment issues in the Granite Creek watershed.

Water Temperature

Water temperatures in the Granite Creek watershed are controlled primarily by the local climate, drainage aspect, and elevations. High temperatures coinciding with low rainfall and low stream flow during the summer months cause stream water temperatures within the area to increase to high levels. South-facing aspects and lower elevations tend to create drier and hotter conditions, which serve to further elevate temperatures.

Aside from natural conditions, past uses and management activities have created conditions conducive to raising water temperatures above what would have been their normal range. Placer mining and past livestock management practices reduced the riparian vegetative canopy through removal of riparian hardwood vegetation. Past regeneration-type harvest practices, which often impacted perennial streams have also reduced stream canopy cover. Research of the effects of the riparian logging in the H.J. Andrews Experimental Forest (western Oregon) showed water temperature increases between 0° F and 1.2 F per 300 feet of channel after clearcutting. In other studies (Helvey, et al, 1995) (Brown and Kygier, 1967; and Brown and Kygier, 1970) water temperature increases after clear-cutting ranged from “small” to 16° to 18°. Similar temperature increases could be expected from placer mining activities in which equivalent areas of riparian vegetation were disturbed.

Review of the available data summarized in Table 3.4, below, suggests that riparian shading in many areas is significantly less than the Umatilla Forest Plan goal of no less than 80 percent.

Table 3.4 – Riparian Shade

SWS	Reach	Percent Shade
93A	Lick Creek	57
93D	Lake Reach 1	51
93D	Lake Reach 2	46
93D	Lake Reach 3	54
93D	Lake Reach 5	55
93D	Lake Reach 6	33
93D	Lake Reach 7	56
93D	Lost Reach 1	66
93D	Lost Reach 2	46
93F	Clear Reach 1	16
93G	Clear Reach 4	81
93G	Clear Reach 5	77
93G	East Fork Clear Creek	81
93G	West Fork Clear Creek	66
93G	Wolsey Creek	77
93H	Ruby Reach 1	32
93H	Ruby Reach 2	35
93H	North Fork Ruby Creek	33
93J	Clear Reach 2	42
93J	Clear Reach 3	60
93L	Spring Creek	79
93L	Salmon Creek	71
93L	Dry Creek	78
93L	Lightning Reach 1	59
93L	Lightning Reach 2	65
93L	Lightning Reach 3	69

Source: NFJD River Subbasin Draft BA, 1999

State water temperature standards stipulate that the seven (7) day average of the daily maximum temperature is not to exceed the following values unless specifically allowed under a Department-approved basin surface water temperature management plan:

- 64°F maximum 7-day average stream temperature for Chinook and steelhead
- 55°F during times and in water that support salmon spawning, egg incubation, and fry emergence from eggs and gravels
- 50° in waters that support Oregon Bull Trout.

Water temperature data for the Granite Creek basin are sparse at this time. Review of available data, summarized in Table 3.5, below, suggests that water temperatures in much of the Granite Creek basin clearly do not conform to current water temperature guidelines.

Table 3.5 – Seven-Day Average of Daily Maximum Temperature

Creek Name	TRS	1993	1994	1995	1996	1997	1998	1999	2000	2001
Clear Cr. below Ruby Cr. (1)	T9S R35E S22		65	63	64					
Granite Cr., Site 2 (1)		64	71	65	68	66				
Lower Granite Cr. (2)				>64	>64	>64	>64	>64	>64	>64
Upper Granite Cr. (2)		63.5	70.6	66.7						
Ten Cent Cr. (1)	T8S R35E S35	64	72	65						

Sources: (1) NFJD River Subbasin Draft BA, 1999 (2) NFRD Umatilla Fisheries Biologist

Since there are no basin-specific ODEQ-approved water quality management plans in place at this time, all streams in the project area are subject to the general guidelines.

Water Chemistry

Chemical impacts to streams and rivers can occur in a variety of ways, some of them natural. As an example, the natural weathering, exposure and subsequent erosion of mineral deposits can introduce a variety of toxic metals such as arsenic into local stream systems. As there is much native cinnabar (USDA, 1997) reported in the area, mercury may be present in low concentrations in some areas. Cyanide can be produced in very low concentrations by the natural decay of vegetation, as well.

Impacts created by the development of lode mineral deposits can be significant, especially in instances in which sulfide minerals come into contact with large volumes of oxidizing surface or groundwater. Exposure of sulfide rocks to oxidizing water, both *in situ* and in mine dumps (tailings piles), can create acid rock drainage (ARD). ARD consists of low pH water that contains elevated concentrations of various metals, many of which are harmful to aquatic life if present in high enough concentrations. Placer mining, however, creates little if any chemical impact in watersheds, except when mercury is used to amalgamate fine particulate gold. If released into streams, the liquid mercury can collect in depressions in stream beds, and be mobilized by subsequent placer mining activities. Adverse environmental impacts from placer mining, however, are typically more morphological rather than chemical.

Previous lode mining has resulted in the creation of ARD in some locations in the Granite Creek watershed. While there are over 100 prospects and lode mines in the Granite Creek watershed, the actual number of prospects and mines generating ARD is unknown. A study of water quality in and near 12 relatively large lode mines in the Granite Creek watershed was completed for the Environmental Protection Agency (EPA) in 1997 (Weston, 1997). The mines studied appear to represent local mines from which the most significant volumes of ARD is generated, and as such may be considered "worst" cases for the purposes of this report. Data is summarized in Table 3.6, below. Note that the Magnolia Mine (in bold type) is the only lode mine of the 12 listed that is the subject of this report.

Table 3.6 – Lode mine water compliance violations.

Mine Name	Creek	SWS	TRS	Water Quality Compliance Violation(s)
Ajax	Lucas Gulch	93C	T8S R351/2E Sec22	None
Buffalo	Chipman Gulch	93C	T8S R351/2 Sec14	Arsenic (pond)
Cougar	E. Ten Cent Creek	93B	T8S R351/2E Sec22	None
Independence	China Gulch	93C	T8S R351/2E Sec22	Arsenic (portal)
New York	Upper Granite Cr.	93C	T8S R351/2E Sec27	Arsenic (portal)
Magnolia	Lucas Gulch	93C	T8S R351/2E Sec 22	Arsenic (portal)
Blackjack	Clear Creek	93J	T9S R35E Sec 14	None
Bluebird	Clear Creek	93F	T9S R35E Sec11	None
Pride of Oregon	Clear Creek	93I	T9S R35E Sec 10	None
Red Boy	Congo Gulch	93I	T9S R35E Sec 10	None
Pyx	McWillis Gulch	93L	T10S R35E Sec 1	None
Rabbit	Olive Creek	93L	T10S R35E Sec 10	Arsenic (outlet)

Source: Weston, 1997

Review of data presented in Weston's 1997 report suggests that while the concentrations of some metals exceed both EPA Ambient Water Quality Criteria, and Oregon State Ambient Water Quality Criteria in water samples collected from mine portals, drainage ditches, and/or settling ponds (as noted in the right hand column of Table 3.6), concentrations of these same metals approach background levels in water samples collected from locations several hundred feet downstream from the point of infraction. In many instances, dilution has reduced concentrations to less than laboratory detection limits in the samples collected from these downstream locations. In addition, according to the 1997 Granite Creek Watershed Analysis, "water samples taken in 1993 and 1994 indicate heavy metals are not a problem in this watershed." Based on this information, it would appear that adverse impacts to water chemistry resulting from past lode mining activities are localized, and ARD generated on lode mine properties does not appear to significantly impact the overall water chemistry in the Granite Creek watershed. Impacts are, therefore, expected to be immeasurable.

Hydrology

Most of the total water yield in the area occurs during the snowmelt season of May and June. Except for periodic and localized thunderstorms, which may create locally heavy runoff for short periods, rainfall in the area is generally sparse July through September. Water yields drop once water that was stored as snow has melted, and as groundwater stored in upland aquifers is depleted during the dry summers. Summer base flows are, therefore, low relative to the spring snowmelt period. Highest peak flows occur during rain-on-snow events and during unusually warm winter weather such as Chinooks.

There are no gaging stations in the analysis area. Review of data from nearby Desolation Creek (approximately 4 miles to the west of the analysis area) suggests that maximum flows occur in the spring, reflecting the contribution of melting snow to overall water yields. It is likely that stream flows in the analysis area are similarly affected by seasonal patterns of winter precipitation accumulation and low temperatures, spring runoff peaks, and low fall baseflows.

The hydrologic functioning of Granite Creek (93A and 93C) and many of its tributaries has been highly impacted by historical placer mining, which has significantly altered stream channel morphology, stream bank stability, and vegetative potential along many subwatershed reaches.

Dredge mining in the Granite Creek watershed has greatly affected floodplain function and water quality. Much of the alluvial material in the 6-mile long reach of Granite Creek between Squaw Creek and China Gulch was excavated, sieved for gold, and piled behind the dredges. The flood plains of Bull Run Creek (93N) and Clear Creek (93F and 93J) were similarly affected by large dredges. Other smaller watersheds such as Ten Cent Creek (93B) and Lightning Creek (93K) were locally impacted by hydraulic mining.

Table 3.7, below, summarizes available information regarding streambank conditions. The Umatilla Nation Forest Plan goal is for no less than 80 percent of streambanks to be in stable condition. Based upon available information, stream banks appear to be in generally good condition in the areas surveyed. However, stream bank condition for many of the most heavily disturbed placer-mined creeks is not currently available. In many instances, stream banks in heavily disturbed creeks are armored with large cobbles and boulders, which tend to stabilize stream banks rather than destabilize them.

Table 3.7 – Streambank Condition

SWS	Reach	Percent Stable Banks
93A	Lick Creek	96
93A	Squaw Creek	95.4
93D	Lake Reach 1	100
93D	Lake Reach 2	100
93D	Lake Reach 3	100
93D	Lake Reach 5	100
93D	Lake Reach 6 (upper reservoir)	98.2
93D	Lake Reach 7	99.6
93D	Lost Reach 1	98.2
93D	Lost Reach 2	92.5
93E	Rabbit Reach 1	97.5
93E	Rabbit Reach 2	96.2
93E	Rabbit Reach 3	83.5
93F	Clear Reach 1	99.1
93G	Clear Reach 4	100
93G	Clear Reach 5	99.4
93G	East Fork Clear	96.7
93G	West Fork Clear	97.8
93G	Wolsey Creek	96.1
93H	North Fork Ruby	97.5
93H	Ruby Reach 1	90
93H	Ruby Reach 2	80
93J	Clear Reach 2	92
93J	Clear Reach 3	83
93K	Dry Creek	99.5
93K	Lightning Reach 1	97.1
93K	Lightning Reach 2	99.3
93K	Lightning Reach 3	99.8

SWS	Reach	Percent Stable Banks
93K	Salmon Creek	100
93K	Spring Creek	99

Source: NFJDRS BA, 1999

Other human activities such as road building and timber harvesting have also impacted hydrologic functioning. Fires, both natural and human caused, have affected hydrologic functioning as well. Increased peak discharge from logged, mined, or otherwise disturbed areas can increase channel scour in first order channels which may lead to channel destabilization and changes in channel morphology. This may in turn damage aquatic habitat.

Geology and Geomorphology

The area is characterized by broad summits and ridges. Elevations in the analysis area range from approximately 3900 at the confluence of Granite Creek and the North Fork of the John Day River, to 8120 feet at the summit of Vinegar Hill on the south end of the watershed. Canyon wall slopes range from 20 percent to 35 percent or more in localized areas.

The study area is located in the Blue Mountains physiographic province. The province, a complex of mountain ranges and plateaus comprising the Ochoco-Blue Mountains Uplift, has been dissected by broad inter-montane valleys and steep-sided canyons. The analysis area is underlain by the broad Dooley Anticline and Dixey Anticline, which trend southeast to northwest. There is local evidence of normal faulting, with fault strikes roughly paralleling SE-NW trending fold axes. (Walker, 1977).

The study area is underlain primarily by Tertiary andesites and Triassic metasediments such as argillites, phyllites, and cherts. Based on field observations, argillite and andesite appear to be the most prevalent lithologies in the area of the 16 claim groups considered in the report. Cretaceous granodioritic rocks underlie approximately 11 percent of the Granite Creek basin, and are exposed near the headwaters (SWS 93C) and lower reaches (SWS 93A) of Granite Creek. Widespread areas within the Granite Creek (93) watershed are mantled by Mazama Ash, a poorly consolidated, fine-grained, easily eroded deposit of volcanic ash ranging from a few inches to 18 inches thick.

Stream morphology varies throughout the Granite Creek basin, although Rosgen (Rosgen, 1996) “B” and “C” types dominate. Lucas Gulch and the upper reaches of East Ten Cent Creek, on which the Magnolia and Brice 1-3 claims are located, appear to be “A” type streams. “A” type streams are characterized by gradients greater than 10.0 percent, low sinuosity, and are well entrenched and confined. “B” type streams are characterized by gradients ranging from 2.0 to 4.0 percent, low sinuosity, and are moderately entrenched. “C” type streams have gradients of less than 2.0 percent, meander, are slightly entrenched, and are not confined.

Soils and Erodability

Soils within the analysis area are of three general types: (1) alluvial soils formed along creeks (2) residual soils which form from underlying bedrock, and (3) ash soils which form from the

volcanic ash deposits that mantle underlying bedrock and the older residual soils. Thirteen (13) of the 16 claim groups, all placer claims, are situated on alluvial soils. The remaining three (3) claims are lode claims, and are located on residual and/or ash soils developed on bedrock.

Alluvial soils have developed from a mixture of alluvium deposited by local creeks and the colluvium that collects at the bottoms of slopes. The texture and composition of alluvial soils varies greatly, being dependent upon a variety of factors including the local sediment carrying capacity of streams, flooding dynamics, floodplain morphology, and upslope geology. In many instances, soil characteristics have been profoundly altered by historic placer mining, which removed fines leaving coarse-grained deposits of gravel- to boulder-sized "soil" behind. Given the coarse textures of processed alluvial soils along impacted creeks, these soils are not easily eroded nor do they support riparian vegetation well.

Residual soils are exposed in areas from which volcanic ash deposits have been eroded. Residual soils typically occur in upland areas and on south-facing slopes because such aspects are drier, subject to a higher fire-frequency, and support less soil-stabilizing vegetation. Residual soils are characterized by a clay-loam texture, high bulk density (0.9 to 1.2 gm/cm^2), and lower water-holding capacity than ash soils (Geist, et. al., 1989). The erosion potential of residual soils is low to moderate.

In contrast, ash soils have very high water-holding capacity (0.31 cm/cm), which allows them to absorb and store precipitation, thus reducing the intensity of hydrologic response to precipitation events. The bulk density of ash soils range from 0.6 to 0.7 g/cm^2, and ash soils are highly productive and promote lush forest vegetation. Although the silt-loam texture of ash soils makes them highly susceptible to surface soil erosion when disturbed, their high infiltration rate can counteract, to some extent, their high erodability by reducing overland flow.

It is not known how current soil erosion and sedimentation rates quantitatively differ from historical rates, but some observations about changes can be made. Prior to Euro American settlement, periodic fires frequently consumed vegetation, which protected the soil from erosion. Although the past century of fire suppression would have slowed erosion, other management activities would have caused erosion. For instance, roads can account for 90 percent of the management-induced soil erosion, though only a percentage of the sediment gets transported to the stream system. Erosion related to construction of roads typically produces a relatively high amount of fine sediment initially, which declines to a persistent low level within several years. Extremely large amounts of sediment can enter streams from mass wasting of road fill material or hillslopes undercut by roads. Failures of culverts during floods can introduce large quantities of sediment from the road fill into streams.

Timber harvest and grazing also have contributed historically to management-induced erosion which has varied depending upon the amount of vegetation removed and area compacted, particularly within riparian zones and steep slopes. Since 1990, standards prescribed in the Umatilla Forest Plan have reduced such management-related erosion by placing limits on soil disturbance. The District Motorized Access and Travel Management Plan has also reduced management-related erosion by closing or obliterating unnecessary roads. In some areas, activities to suppress fires (such as the construction of tractor fire lines) have affected the rates of

infiltration and soil erosion, primarily through the compaction of soil and removal of vegetative cover.

FISH AND AQUATIC HABITAT

Since 1982 Forest Service teams have conducted stream surveys within the analysis area and each of the streams has been found to support fishes[6]. Results of these surveys suggest that the watersheds contain reaches (portions of streams) and entire streams that do not meet established criteria associated with healthy[7] streams. For example, North Fork John Day River/Bear, Granite and East Ten Cent Creeks exceed Oregon State water quality standards for maximum 7-day average stream temperature (Table 2.1).

Water temperature data for the analysis area is sparse at this time. Review of available data, summarized in Table 3.8, suggests that water temperatures in much of the North Fork John Day River/Bear, Lower Granite Creek basin currently do not conform to current water temperature guidelines during the summer months.

Table 3.8. Seven-day maximum temperatures, sub-watersheds 93A, 93B, and 94A.

Subwatersheds/Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Granite Cr. @ mouth[1]	88	X		70	71	71	72	70	74	74
Granite Creek, near East Ten Cent Creek[1]				70						
Granite Creek, near Lick Creek[1]				71						
Granite Creek #1	X									
Granite Creek #3						71				
Granite Creek #4						77				
Granite Creek #5						77				
Granite Creek #6						77				
NFJD above Big Cr.[1]	74	71			74	72		72	78 (est.)	77
Clear Creek	X									
Clear Creek #3	X									
Clear Creek #4	X									
Clear Creek >Lightning									63	63
Clear Creek <Ruby				X		62	65	56	66	66
East Ten Cent Creek[1]		64	72	65						
Lick Creek[3]								47-53[3]		
Lightning Creek >Clear Creek										
Lightning Creek at Claim										

6 Class 1 streams support Anadromous Fishes, Class 2 streams support native inland fishes, Class 3 streams are perennial non-fish bearing streams, and Class 4 streams are intermittent or ephemeral streams based on historical records and orthographic analysis.

7 "Healthy" refers to a stream's ability to support fishes native to the stream and region.

Subwatersheds/Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Rabbit Creek										
Squaw Creek[3]								51-61[3]		

Source: 1 - USFS Data Tables; 2 – Hydro Processes Reports; 3 – Opportunistic observations, not 7 day maximums; X - Instantaneous measurements available

Riparian zones in the analysis area range from "Properly Functioning" to "Functioning at Risk" to "Functioning at Unacceptable Risk" depending on the extent of historic activities and catastrophic fires in the watershed (Table 3.9). Riparian zones on the smaller streams (i.e., Indian, Lick, Buck and Squaw Creeks) can be classified as properly functioning where as East Ten Cent Creek and Granite Creek can be considered as functioning at risk with some reaches functioning at unacceptable risk as a result of historic mining activities. J.A. Hawkin (1965) conducted stream surveys of important streams (Granite, Clear, Beaver, Olive, North Fork Clear, Ruby, Lightning, Bull Run, Corral, Boundary, Deep and Boulder Creeks) within the Granite Creek Sub-watershed. However, because of the age of the data and because little quantitative data was collected, results of these surveys are not included in this analysis. Summaries of contemporary stream survey results follows.

Table 3.9 – Current status of streams in the analysis area for which current stream survey data is available.

Watershed	Riparian Zone Health[1]	Stream Functionality[2]	Stream Temperature[3] Meets standards	Sediment Load[4] Meets standards
North Fork John Day River/Bear	Functioning at Risk	Functioning at Risk	No	Yes
Lower Granite Creek	Functioning at Risk	Functioning at Risk	No	NI
Upper Granite Creek	Functioning at Risk	Functioning at Risk	No	NI
Ten Cent Creek	Functioning at Risk	Functioning at Risk	No	NI
Lick Creek	Functioning	Functioning	NI	Yes
Squaw Creek	Functioning	Functioning	NI	Yes
Rabbit Creek	Functioning at Risk	Functioning at Risk	NI	No
Boulder Creek	Functioning at Risk	Functioning at Risk	NI	NI
Lightning Creek	Functioning at Risk	Functioning at Risk	Yes	NI
Ruby Creek	Functioning at Risk	Functioning at Risk	NI	No
Clear Creek	Functioning at Risk	Functioning at Risk	Yes	Yes
Olive Creek	Functioning at Risk	Functioning at Risk	Yes	Yes
Beaver Creek	Functioning at Risk	Functioning at Risk	No	No
South Fork Beaver Creek	Functioning at Risk	Functioning at Risk	NI	No
Congo Gulch	Functioning at Risk	Functioning at Risk	NI	No

1. Based on level of historical habitat disruption.
2. Meets or exceeds PACFISH or ICBEMP criteria for pools/mile (for streams less than 5 feet wide, classification is based on a site examination by the author, these streams are expected to have lower numbers of pools/mile.
3. Yes = Meets Oregon Department of Environmental Conservation 7-day average maximum summer stream temperatures; No = Does not meet criteria.
4. Yes = Meets or exceeds PACFISH or ICBEMP criteria for suspended sediments using sediment embeddedness as a proxy; No = Does not meet criteria

NI = No Information

Riparian Management Objectives developed for PACFISH for key and high priority watersheds used seven parameters for stream habitat. The seven parameters are pool frequency, water temperature, large woody debris, substrate sediment, bank stability and width to depth ratio. Data are available for most streams on the Wallowa-Whitman portions of the Granite Greek Watershed, but much information is missing from streams on the Umatilla portion. Information was collected on the following stream parameters.

Pool Frequency - The Riparian Management Objective (RMO) for pool frequency is different for each stream. The RMO for the pools per mile of stream is a function of the channel wetted width with the frequency increasing with channel width. Within the analysis area, the number of pools per mile ranges from 9 to 96 pools/mile.

Water Temperature - The RMO for stream temperature is to maintain 7-day maximum water temperatures below 64° F for migration and rearing habitats and below 60° F for spawning habitats.

Large Woody Debris - The RMO for large woody debris is 20 pieces per mile. Large woody debris is defined as debris greater than 12 inches in diameter and greater than 35 feet in length.

Substrate Sediment - The RMO for fine substrate sediment is less than 20 percent for spawning habitat, or less than 35 percent in rearing habitat.

Width/Depth Ratio - The RMO for the width/depth ratio (mean wetted width divided by mean depth) is less than 10.

North Fork John Day Watershed

Much of the North Fork John Day River is managed as a Wild and Scenic River, a portion of the watershed adjacent to the project area is managed as Wilderness, and a small portion includes an inactive grazing allotment[8]. In terms of Riparian Zone Health, this watershed is considered functioning at risk due to historic mining activities and recent catastrophic forest fires.

In addition, the river is not fully functional with respect to gradient, sinuosity, pool riffle ratio, and pools per mile of stream. Stream temperatures (maximum 7-day average stream temperatures) do not meet established standards, and sediment transport processes appear to be functioning considering the low percentage of cobble embeddedness.

The North Fork John Day River and its tributaries support runs of spring chinook salmon and summer steelhead. Historically, bull trout, redband trout, and westslope cutthroat trout occupied the watershed. Populations of these fishes are currently below historic levels. Although species-

8 Trout Meadows Range Allotment

specific surveys have not been conducted, the system appears to meet the habitat requirements for California floater and margined sculpin.

Granite Creek Subwatershed

The Granite Creek subwatershed includes the following minor watersheds that are included in the Analysis area: Lower Granite Creek; Upper Granite Creek, East Fork Ten Cent Creek, Squaw Creek, Lick Creek, Rabbit Creek, and Boulder Creek. The subwatershed includes other small creeks such as Indian and Buck Creeks that are included in the analysis area but have not been surveyed and upon which mining claims have not been filed.

Lower Granite Creek

Granite Creek is a major tributary of the North Fork John Day River. Granite Creek has been heavily impacted by past management activities, most notably by placer and hydraulic mining. As a result of these activities, the riparian zone has been radically altered and therefore, is considered functioning at risk with some reaches that could be considered functioning at unacceptable risk. As a result of historic habitat modifications, the creek has less than 10 pools/mile compared to the standard of 28 to 59/mile. However, the creek contains a few reaches that are fully functional, but overall, stream surveys indicate that stream cover, stream bank stability, pools per mile and stream temperatures are limiting spawning and rearing habitat for anadromous fish species and bull trout.

The stream has failed to meet Oregon State water quality standards because of high summer temperatures. The elevated stream temperatures suggest that the creek no longer provides prime fish habitat. The creek appears to suffer from excessive sediment loads as suggested by elevated cobble embeddedness, probably resulting from historic mining activity. Early dredging operations (1920-1954) altered the natural stream systems and riparian areas. Historic mining combined with high road densities along riparian corridors have degraded the aquatic habitat, particularly in the lower reaches. Mining activities removed shade-producing riparian vegetation, lowered the water table, increased sedimentation rates and reduced stream bank stability. Much of the fish habitat has not recovered from this dredging activity. A portion of the area has been removed from mineral entry, but active mining is still present, but at a much reduced level of effort. There is also an elevated sheet/rill/gully erosion hazard rating in this watershed.

Spring chinook, steelhead, and bull trout annually spawn in this portion of the watershed. Redband trout are also found within this watershed as are westslope cutthroat. The creek appears to contain the habitat potential for supporting California floater and margined sculpin, although surveys have not been conducted in this watershed for these species.

A 5.5-mile portion of Granite Creek is surveyed annually for spawning chinook salmon. The upper headwaters of Granite Creek are steep (30%+) and have limited spawning habitat, but this area supports high populations of juvenile chinook salmon.

Upper Granite Creek

A portion of the town of Granite is located in this subwatershed, the Scenic Byway bisects this subwatershed north to south and access to the Baldy Lake trail head is via Forest Road 654. There is a very high fire occurrence, including human-caused. Some mining restoration is taking place and road densities are high. There is an increase in the sheet/rill/gully erosion hazard rating and this is a high recreation use area. Historic mining activities and numerous road crossings in the area have changed stream characteristics.

The riparian zone in this subwatershed ranges from fully functional to dysfunctional due in large part to historic mining activities. In general terms, the habitat improves up valley in direct proportion to the intensity of past mining activities. Again, on average, the riparian zone within this sub-watershed can be classified as functioning at risk.

A Hankin and Reeves Stream Inventory was conducted in1990 and 1991 for Granite Creek on approximately 6.5 miles of stream. The stream was surveyed from the confluence (T 08S, R 35E, Sec 18) to the headwaters. Granite Creek is a class 1 stream and a tributary to the North Fork of the John Day River.

Inventory results for this stream indicate the riparian habitat is in fair/good condition. However, it would be rated as dysfunctional to functioning at risk because of the long term effects of placer mining, road building, and logging activities. The streambed's dominant substrate is sand/gravel, the subdominant substrate is small boulders. There was cobble embeddedness present in one reach of the stream. Stream temperatures recorded during the survey were 59 degrees F on August 15, 1991. 7 day maximum average stream temperatures of 63° F were recorded in 1993, 71° F in 1994 and 67° F 1995.

Upper Granite Creek supports Chinook, steelhead, redband, and bull trout. Granite Creek has annual spawning surveys conducted for Chinook salmon by the ODF&W. The 5-year average for Granite Creek is 11.7 redds per mile.

Ten Cent Creek

Approximately one-third of the Ten Cent subwatershed is within the North Fork of the John Day River Wilderness (NFJD Unit). East Ten Cent Creek consists of four reaches, the lower eastern reach borders the project area and the remaining three reaches are included in the analysis area. Much of the East Ten Cent Creek watershed has been heavily impacted by past management activities, most notably by placer and hydraulic mining. As a result of these activities, the riparian zone has been radically altered and therefore is considered functioning at risk with some reaches that could be considered Functioning at Unacceptable Risk. For example, the creek averages less than 35 pools/mile compared to the standard of 39/mile, however, a few reaches are fully functional. In addition, the stream has failed to meet Oregon State water quality standards because of high summer temperatures. The elevated stream temperatures suggest that the creek no longer provides prime fish habitat. The creek appears to suffer from excessive sediment loads as suggested by elevated cobble embeddedness, probably resulting from historic mining activity.

Historic mining combined with high road densities in riparian corridors have degraded the aquatic habitat, particularly in the lower reaches. Mining activities removed shade-producing riparian vegetation, lowered the water table, increased sedimentation rates and reduced stream bank stability. The upper portion of the subwatershed, which has not been mined, shows the habitat restoration potential for the drainage.

Ten Cent Creek historically supported steelhead and chinook salmon spawning (at the mouth) during years of high stream flow, but does not appear to support redband trout. East Ten Cent Creek appears to have the habitat potential for supporting bull trout, westslope cutthroat trout, redband trout, California floater, and margined sculpin.

Squaw Creek

Squaw Creek is a small creek (<4' wide at the mouth) and drains directly into Granite Creek. The creek shows few signs of past management activities (mining, timber harvest, grazing, etc.), but signs of past fires are evident. A survey of this stream was conducted in 1998. The riparian area associated with this creek appears to be fully functional. The stream appears to be functioning properly as suggested by its gradient, pool riffle ratio, pools per mile[9] and cool stream temperatures. Although data on cobble embeddedness was not collected during the stream surveys, information on the proportion of fine sediments does not suggest excessive sediment loading of the stream.

The stream is classified as Class 1, and the 1998 survey revealed the presence of redband trout near the creek mouth. The physical size of this creek suggests that it can support a few rearing juvenile and adult fish but not large spawning populations. This subwatershed appears to meet habitat requirements for supporting margined sculpin, although a survey for this species has not been conducted.

Lick Creek

Lick Creek, like Squaw Creek, is a small creek (<4' wide at the mouth) that drains directly into Granite Creek. The creek shows few signs of past management activities (mining, timber harvest, grazing, etc.), but signs of past fires are evident. A survey of this stream was conducted in 1998. The riparian area associated with this creek appears to be fully functional. The stream appears to be fully functional as suggested by its gradient, pool riffle ratio, pools per mile and cool stream temperatures. Although information on cobble embeddedness was not collected during the stream surveys, information collected on the proportion of fine sediments does not suggest excessive sediment loading of the stream.

The stream is classified as Class 1, and the 1998 survey revealed the presence of redband trout near the creek mouth. The physical size of the creek suggests that it can support a few rearing

9 Considering the small size of the stream, this evaluation is somewhat subjective because existing criteria pertain primarily to larger streams.

juvenile and adult fish but not large spawning populations. This subwatershed appears to meet habitat requirements for supporting margined sculpin, although a survey for this species has not been conducted.

Rabbit Creek

Rabbit Creek, like Squaw and Lick Creeks, is a small creek (<4' wide at the mouth) that drains directly into Granite Creek. The watershed shows signs of past management activities (mining, timber harvest, etc). The riparian area associated with this creek appears to be functioning at risk to fully functional. The stream appears to be functioning at risk near the mouth as suggested by past management actons and high level of fine sediments and appears to be fully functional futher up stream as suggested by its gradient, pool riffle ratio, pools per mile and cool stream temperatures. Although data on cobble embeddedness was not collected during the stream surveys, information on the proportion of fine sediments suggests excessive sediment loading. The stream is classified as Class 1 and a tributary of Granite Creek. Stream surveys have documented the presence of steelhead, and westslope cutthroat and redband trout. The physical size of the creek suggests that it can support a few rearing juvenile and adult fish but not large spawning populations. This subwatershed appears to meet habitat requirements for supporting margined sculpin, although a survey for this species has not been conducted.

Boulder Creek

Boulder Creek, like Rabbit Creek, is a small creek (<4' wide at the mouth) that drains directly into Granite Creek. In 1993, a Stream Inventory was conducted on approximately 5.2 miles of stream. The stream was surveyed from the confluence (T 08S, R 35.5E.Sec. 34) towards the headwaters. Boulder Creek is a class I stream and a tributary of Granite Creek.

The stream has a history of mining, road building and grazing, however, the inventory report indicated that the riparian habitat was in fair/good condition (Table 2.1). Due in part to past management activities, as suggested by moderate level of large woody debris (15.3/m), moderate number of pools per mile (15.2) and presence of stream embeddedness, the stream is considered to be functioning at risk. Also, stream temperatures (7-day maximum average) ranged from 57 degrees F in 1994 and 69 degrees F in 1995. Results of stream surveys have revealed the presence of redband trout, and the stream appears capable of supporting margined sculpins, bull trout and westslope cutthroat trout.

Indian Creek and Buck Creek

Indian Creek and Buck Creek drain into Granite Creek. The creeks are small, less than 4 feet wide at their mouths, and for the most part show few signs of past management activities (mining, timber harvest, grazing, etc.). Signs of past fires are evident. Stream surveys have not been conducted on these two creeks; however, because they appear (based on anecdotal information) similar to the adjacent Squaw and Lick Creeks, they are assumed to share the same attributes as these creeks, i.e., functional riparian zones, functional streams, cool stream temperatures and appropriate sediment loads.

Clear Creek Subwatershed

The Clear Creek subwatershed includes the following minor watersheds that are included in the analysis area: Upper Clear Creek, Ruby Creek, Middle Clear Creek and Lower Clear Creek. A small portion of the NFJD Wilderness Unit overlaps this subwatershed's northern boundary. The subwatershed includes other small creeks such as Spring, and Salmon Creeks are included in the analysis area but have not been surveyed and upon which mining claims have not been filed.

Clear Creek

Historical mining activities on Clear Creek have changed the stream flow channel morphology and stream/riparian habitat. Historically, drainage from abandoned lode mines in the subwatershed drained into Clear Creek, thereby creating a chemical barrier to fish migration. In the 1980's, the US Forest Service channeled the effluent into side channels and ponds bordering the Creek. These efforts have removed the chemical barrier and fish are now migrating above the mines to spawn. In addition, Been & Nelson reported that a placer mining ditch across the stream diverted nearly all the flow from the creek. The authors reported that the stream above the ditch appeared to provide good fish habitat. The ditch has since been filled in and flow returned to the Creek.

As a result of historic management actions, the stream is considered to be functioning at risk. Clear Creek is a class 1 stream that supports populations of Chinook salmon, steelhead, redband trout, westslope cutthroat trout, dace, mountain whitefish, and sculpins. ODF&W conducts an annual Chinook salmon spawning survey up the first 4.0 miles of Clear Creek. ODF&W also report that bull trout have been recorded in 2.0 miles of the upper headwaters and cutthroat trout inhabit 4.25 miles of the Creek.

Lightning Creek

Lightning Creek is located in the upper watershed of Clear Creek. The Pete Mann Ditch diverts water from the stream, including Spring and Salmon Creeks, into the North Fork Burnt River. This suggests that anadromouus fish from Lightning Creek could be diverted into the North Fork Burnt River. However, the creek has been screened at Lightning Creek to prevent this from happening.

Historic management actions indicate that this stream is functioning at risk with the upper reaches fully functioning.

Survey results indicate the presence of steelhead, redband trout, westslope cutthroat trout, bull trout and chinook salmon. In addition, the stream appears to contain the habitat necessary for margined sculpins.

Ruby Creek

Ruby Greek is a tributary to Clear Creek. The North Fork and South Fork of Ruby Creek are in the NFJD Wilderness. As a result of historic road construction, mining, and timber removal, the

stream is considered functioning at risk. This is further supported by stream survey results that indicate high sediment loads (high levels of fine sediments in the stream) little large woody debris (9.3/mile) and few pools (17/mile). ODF&W has surveyed Ruby Creek for bull trout, steelhead, and rainbow trout.

Ruby Creek is a Class 1 stream and supports steelhead, spawning and rearing of redband trout and westslope cutthroat. In addition, the stream appears to contain the habitat necessary to support margined sculpins.

Olive Creek

Olive Creek is a tributary of Clear Creek. A stream survey was conducted on approximately 3.3 miles of Olive Creek in 1990. The stream was surveyed from the confluence (T 093.5 R 35E, Sec. 23) towards the headwaters. The stream has been impacted by past management activities including mining and road building and maintenance. The low level of instream cover (6-20%) along with a pool average of 19 per mile and a large woody debris average of only 2.05/mile and cobble embeddedness present in just two reaches suggest that the stream is functioning at risk

Olive Creek is a class 1 stream and supports steelhead and redband trout and appears to have the habitat necessary to support westslope cutthroat trout and margined sculpins.

Beaver Creek

Beaver Creek is a tributary of Clear Creek. A stream survey was conducted on approximately 5.5 miles of stream from its confluence (T 095, R35E, Sec. 24) towards the headwaters. The stream has been impacted by past management activities including road building and maintenance and grazing suggesting that the stream is functioning at risk. However, the system has moderate levels of in-stream cover (40-100 %), the number of pools per mile, 45.8 exceeds the standard of 39/mile, but there were only few pieces of large woody debris, 3.3/mile, in reach 1, the rate of cobble embeddedness exceeded 30 percent and maximum 7-day average stream temperatures (67 degrees F in 1993, 75 degrees F in 1994, 70 degrees F in 1995, and 67.0 degrees in 1996) exceeded established standards.

This is a class 1 stream that supports steelhead and redband trout and appears to offer the appropriate habitat to support margined sculpins, bull trout, chinook salmon, and westslope cutthroat trout. The ODF&W surveys the stream each year for steelhead.

South Fork Beaver Creek

The south fork of Beaver Creek merges with Beaver Creek, and about 2.8 miles (from the confluence at T 093, R 35.5E, Sec.21 towards the headwaters) have been surveyed for fish. The stream has been impacted by past management activities including road building, maintenance, and grazing suggesting that the stream is functioning at risk. The system offers little in stream cover (21-40 %), a moderate number (15.4) pieces of large woody debris per mile, a moderate number of pool per mile (19.34), and in reach 1, the rate of cobble embeddedness exceeded 30

percent. Potential migration barriers include a wooden, wire-wrapped culvert (NSO # 70 just inside of Forest boundary) and locations where the stream flows sub-surface (NSO #149).

This is a class 1 stream that supports redband trout and appears to offer the appropriate habitat to support margined sculpins, bull trout and westslope cutthroat trout.

Congo Gulch

Congo Gulch is a tributary to Clear Creek and flows through the Red Boy Mine claim. The headwaters are located on land occupied by the historic Fremont Power House. The headwaters have several springs that feed the main channel. Up until the late 1980s the Red Boy Mine was contributing mine waste into Congo Gulch. The stream was literally "red" from iron and other minerals. The Umatilla National Forest installed a pipe in the adit to capture seepage from the mine and divert the runoff into a pond. Since the pipe was installed, water quality has improved in Congo Gulch, and mineralized water is no longer being discharged into Clear Creek. However, because of past management activities, including mining, road building and maintenence, the stream is considered to be functioning at risk.

Congo Creek is a class 1 stream and supports steelhead and redband trout and appears to include habitat to support margined sculpins. However, a detailed survey of the stream has not been conducted.

Threatened, Endangered, and Sensitive Fish Species and Species of Concern

Important fish species occurring in the North Fork John Day River and Granite Creek watersheds include spring run chinook salmon (*Oncorhynchus tshawytsha*), Middle Columbia River steelhead (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), interior redband trout (*Oncorhynchus mykiss gairdneri)*, and westslope cutthroat trout (*Oncorhynchus clarkii lewisi*). Other fishes occurring in the watershed include torrent sculpin (*Cottus rhythmus*), margined sculpin (*Cottus marginatus*), dace (*Rhinichthys sp.)* and mountain whitefish (*Prosopium williansoni*). Of these species, Middle Columbia River steelhead and bull trout (Columbia River population) have been listed by the US Fish and Wildlife Service as Threatened Species and interior redband trout and westslope cutthroat trout have been listed as Species of Concern by the FWS and as Sensitive by the Forest Service. Two additional Species of Concern listed by the US Fish and Wildlife Service are the California floater (*Anodonta californiensis*), a fresh water mussel and the Blue Mountains cryptochian caddisfly (*Cryptochia neosa*). Results of a 1992 survey of potential cryptochian caddisfly habitat, including the analysis area, revealed the presence of large numbers of cryptochian caddisflies. Therefore, this species was eliminated from the Regional Forester's list of sensitive species and consequently has not been included in this analysis.

ODFW conducts annual chinook spawning surveys on streams in the analysis area. These data, along with historic annotations and habitat information were used to determine species occurrence. Definitive data are not available for all species in all stream systems.

Historically, salmon and steelhead were abundant (presumably so were bull, cutthroat and redband trout) in the analysis area. The John Day River is the last major stream in the Northwest to have free runs of chinook salmon and steelhead trout, presumably due to the lack of dams on the river itself. Anadromous fish have only to migrate past three hydroelectric dams on the Columbia River to reach spawning grounds within the analysis area. In spite of this, their numbers are greatly reduced from historic levels.

Chinook salmon-spring run

The John Day basin, including Granite Creek, supports the largest remaining stocks of native anadromous fish in eastern Oregon. The North Fork John Day River produces 70 percent of the spring chinook salmon returning to the John Day River. Spring chinook enter the drainage in early spring and reach resting pools near spawning grounds on the North Fork by late June. Spring chinook spawning occurs in late August and early September. Downstream smolt migration occurs the following spring from mid-April to mid July. Annual spawning surveys have documented the occurrence of spawning chinook salmon at the mouth of East Ten Cent Creek, Granite Creek, and in the North Fork John Day River. Their numbers have decreased from historic levels. Results from annual stream surveys (redd counts) made during the last few years show an increase in the number of spawners.

Salmon and trout habitat considerations include a stable and diverse (functional) riparian system that provides adequate cover for refuge and a diverse food source and spawning habitat that includes cool, well oxygenated water up-welling through larger sized gravel (1.3-10.2 cm) that is free of fine sediments. Good water quality is harder to achieve during late summer months due to low stream flow and higher stream temperatures associated with Functioning at Risk and Functioning at Unacceptable Risk riparian zones.

Redband Trout and Steelhead

Redband trout and steelhead are different life history forms of the same species, and share many similar life history attributes and habitat requirements; however, there are subtle life history and habitat differences between the two. For example, steelhead tends to be associated with larger streams and larger spawning gravel size (0.6-10.2 cm) than redband trout (0.6-5.2cm). Summer run steelhead, an anadromous fish, are known to spawn and rear in the North Fork John Day River and the mouths of its tributaries, including Granite and East Ten Cent Creek. Important habitat considerations include a stable and diverse riparian system that provides adequate cover for refuge and a diverse food source and spawning habitat that includes cool, well oxygenated water up-welling through medium sized gravel that is free of fine sediments.

Presently, fish populations are at low levels. Their numbers have been declining at a rate of about 15 percent a year since 1985. Since optimum steelhead spawning and rearing habitat coincides with fully functional riparian habitats, this reduction is assumed to be the result of the loss of quality habitat within the analysis area. For example, reduced riparian zone functionality in the larger streams (North Fork John Day River, Granite and Ten Cent Creeks), has likely led to high summer stream temperatures. The distribution of these fish within the analysis area will likely be limited until riparian conditions improve.

Redband trout is the interior (inland) resident form of this species. They are known to spawn and rear in the analysis area, but numbers have been reduced from historic levels. They currently exist within the analysis area as small, isolated populations. Detailed information on population status is not available due to lack of current survey data.

As with steelhead, redband trout habitat considerations include a stable and diverse riparian system that provides adequate cover for refuge and a diverse food source and spawning habitat that includes cool, well oxygenated water up-welling through medium sized gravel that is free of fine sediments. Redband trout, however, seem to tolerate higher stream temperatures than steelhead.

Based on historic information and habitat requirements, redband trout are expected to be found in reaches with fully functional riparian zones. It is assumed that population numbers have been reduced by the loss of quality habitat, i.e., reduced riparian zone functionality, as suggested by high summer stream temperatures in Granite and Ten Cent Creeks. However, because redband trout appear to be more tolerant of high water temperatures than steelhead it is assumed that they will occur more frequently in degraded aquatic habitat with higher stream temperatures related to Functional at Risk or Functioning at Unacceptable Risk riparian habitats than steelhead.

Bull trout

Bull trout were once widespread in the John Day River system, but now are restricted to about 25 percent of their former range (Buchanan and Gregory, 1997), occurring primarily in the higher elevation and upper headwater streams. Bull trout have been reported from the headwaters of the North Fork John Day River, and Granite and East Ten Cent Creeks in what appears to be less than optimum habitat. Adult bull trout habitat is normally associated with larger streams (6 to 30 feet wide) with fully functional riparian zones, abundant woody debris, overhanging banks, and debris jams and low water temperatures. Water temperature is one of the most important factors in limiting bull trout distribution.

The bull trout has been recently identified as the non-anadromous (interior) form of Dolly Varden. The bull trout exhibits a longer, broader head than does the coastal Dolly Varden, but otherwise, the two forms are similar in appearance. In Oregon, the Cascade Mountains separate the range of the coastal Dolly Varden from the interior bull trout.

Westlope cutthroat trout

Westslope cutthroat trout (distinct mid-Columbia Basin populations) occur in the John Day River (Behnke, 1992). Cutthroat trout occurring in the upper reaches of the analysis area are probably resident, whereas those found in the lower reaches are probably fluvial fish that move into the area to feed and spawn.

Westslope cutthroat tend to occupy cooler headwater streams than other trout species. Preferred westslope cutthroat trout habitat are those streams with medium (2-75 mm) sized gravel with little fine sediment, little embedded substrate, moderate stream flow (0.1 to 0.3 m/s), and

numerous small pools. In the analysis area, streams with fully functional riparian zones meet these criteria. The number of fish found in a stream appears to be related to the number of pools in the watershed.

California floater

California floater, a fresh water mussel, has been reported from the Blue Mountains of Washington and Oregon; however, little is known about its life history and distribution. No surveys of the analysis area have been conducted. For the purposes of this evaluation, it is assumed, but not known for certain, that its habitat requirements are similar to other freshwater mussels (Margaritifera) found in the region.

Freshwater mussels are usually found in cold, well-oxygenated waters with small to large gravel substrate. They prefer areas with stable bottoms free of silt. Water velocity appears to be an important habitat variable. Mussels were found in streams with an average gradient of 1.4 percent but were absent from streams with an average gradient of 2.4 percent (or fully functional mid-slope riparian zones) (Altnoder, 1926). Because these portions of East Ten Cent Creek and Granite Creek are functionally at risk or functioning at unacceptable risk, the mussel is expected to be absent from the project area or present only in very low numbers.

Margined Sculpin

Margined sculpin are found in the Blue Mountains of Washington and Oregon, (Tucannon, Walla Walla, and Umatilla Rivers); however, its historic distribution is unknown. According to McPhail and Lindsey (1986), the margined sculpin is the only fresh water fish species whose distribution is restricted to the Middle Columbia River drainage. The sculpin is locally common, but due to habitat degradation, its habitat appears to be restricted.

Systematic surveys for this species have not been conducted within the analysis area; however, considering the habitat requirements of this species, it is expected to be associated with fully functional riparian zones. These conditions tend to predominate in the upper reaches of the streams and, therefore, the sculpin is expected to be absent or in very low numbers in the reaches with Functioning at Risk and Functioning at Unacceptable Risk riparian zones, (the lower reaches of Ten Cent and Granite Creeks).

RECREATION

Non-Wilderness Recreation

Olive Lake Campground is the only developed campground within the planning area. It is a popular, high-use fee campground during the summer months and early fall. There are 26 campsites, 2 day use sites, a fishing platform, boat ramp/dock and a 2.5 mile hiking trail around the perimeter of the lake. Fishing, boating, picnicking, overnight camping, and hiking are popular activities at this site. Olive Lake was dammed in the early 1900's to supply water to the

Fremont Powerhouse. Portions of the wooden pipeline can still be seen while traveling along FS Road 10, between Olive Lake and the Fremont Powerhouse.

The Fremont Powerhouse Complex is located within the project area. The site consists of a turn-of-the-century powerhouse and caretaker house, three additional residences, numerous outbuildings and an interpretive sign. Although the powerhouse has not been operational since the 1960's, the site is used intermittently for administrative purposes and is currently under the last phase of a renovation project with the Oregon National Guard. Two of the residences are open to the public for cabin rental use and the site is also a popular location for visitors to learn more about the area's early mining history. Anticipated future plans will likely include on-site interpretive tours during the summer months and the inclusion of an additional residence into the cabin rental program. The site will continue to have occasional administrative use as well.

There are numerous dispersed camps, estimated at 40-50 sites, located along or near the open roads. This is a popular area for deer and elk hunters, and receives a lot of dispersed camping use during the fall season, along with some use during the summer months. A generic description of a dispersed campsite consists of a user-made area that is generally adjacent to a developed road. The site often has a meat pole in the tree, a rock fire ring and a hardened parking/camping surface for one to three families. In addition to dispersed camping and hunting activities, mushrooming, firewood gathering and sight seeing are other popular recreational pursuits in the area. The analysis area occurs within the Desolation Big Game Management Unit of Oregon Department of Fish and Wildlife. Hunting season typically begins in October and extends through November.

A portion (3,021 acres) of the Vinegar Hill/Indian Rock Scenic Area lies within the planning area. There are four non-motorized trails in this area; including: #3173 Ben Harrison Trail (.5 miles), #3022 Lost Creek Trail (1 mile), #3035 Saddle Camp Trail (2 miles), and #6141 Blue Mountain Trail (1.5 miles). The Saddle Camp/Lost Creek Trailheads is the only developed trailhead accessing the scenic area within the planning area. The trailhead is part of the Northwest Forest Pass fee system. Facilities include a graveled parking pad, signing and a bulletin board. The Scenic Area is managed for it's recreation and scenic values with no motorized access within the planning area. Primary use occurs during the fall big game hunting seasons, but summer recreational use continues to slowly increase due to outstanding scenic values. Sight-seeing, hiking and horseback riding are some of the most popular activities for this area.

There are no designated OHV (Off Highway Vehicle) trails in the area. However, OHV activity is permitted and does occur on open roads in the analysis area. This includes riding motorcycles (Class III) and four-wheelers (Class I) on these roads. With the exception of FS Road 10, all open roads within the planning area are open to OHV travel, per the 2001 Interim Program for ATV/OHV Strategy on the Umatilla National Forest. Additionally, the 1000460, 1000520, 1010370, 1035060, 1035080, 1038060, 7350050, 7350052 and 7350070 are forest road systems open seasonally to OHV use but closed to other motorized travel.

FS Road 10 is groomed for snowmobile use from the junction of Rd. 13 and Rd. 10 to Desolation Guard Station. All of FS Rd. 10 within the planning area serves as a groomed snowmobile trail during the winter months. A local snowmobile club grooms the trail (Rd. 10) when there is adequate snow coverage; typically between the months of December and March.

Wilderness Recreation

Legislative guidance for management of the wilderness resource administered by the Umatilla National Forest is contained in the Wilderness Act of 1964 (PL 88-577), which directs that the land be managed so it "generally appears to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable." Wilderness is further defined as "…in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled". Untrammeled means "not subject to human controls and manipulations that hamper the free play of natural forces."

The following trails are located within the North Fork John Day Wilderness: #3022 North Fork John Day River Trail (.2 miles), #3173 Ben Harrison (4.5 miles), #3018 Lake Creek Trail (2.5 miles), #3022 Lost Creek (4.1 miles), #3035 Saddle Camp (2.5miles), and #3016 Granite Creek Trail (2.4 miles and 1 mile in general forest area). The Granite Creek Trailhead is the only developed wilderness trailhead in the planning area. Features include a graveled parking pad, signing and a bulletin board.

While trail use is heaviest during the fall big game hunting seasons, there has been an increase in summer-time use by recreationists. Some of these activities include camping, hiking, horseback riding, huckleberry picking, sightseeing, fishing, and viewing remnants of the area's rich mining history. There are several high-use traditional campsites located along these trails within the planning area. These sites are monitored and encouraged for use due to the topography, river location and Leave No Trace principles, which encourages use at existing sites in order to minimize impacts to vegetation and stream banks.

Most of the wilderness within the project area is classified as semi-primitive (using the Wilderness Resource Spectrum), with a small portion to the north designated as primitive.

Although visitors are increasing every year, the North Fork John Day Wilderness gets relatively low use in comparison to other wilderness areas nearby, including the Eagle Cap Wilderness on the Wallowa-Whitman N.F. and the Wenaha-Tucannon Wilderness on the north half of the Umatilla N.F.

Trail locations are primarily in canyon bottoms, which coincides with most placer mine activity within the wilderness area.

WILDLIFE

Habitats within the analysis area include ponderosa pine, lodgepole pine, mixed conifer, and spruce – fir forest; a diversity of riparian habitat; shrub grasslands and meadows. Portions of the North Fork John Day Wilderness, the Vinegar Hill Scenic Area, and a Backcountry area (MA-6) occur within the watershed. Mining activity is a prominent fixture in the area, with evidence of extensive historic lode and dredge mining visible on the landscape. Examples of recent management efforts to reduce the effects of past mining activity include removal of dredge tailings, riparian planting, and creation of settling ponds at the Red Boy mine. Past, ongoing, and future foreseeable projects in the watershed include: other mining, roads, timber harvest, wildfires, underburning, riparian restoration, grazing, hunting, and other recreational use.

Management Indicator Species

Management Indicator Species were identified by the Forest Plan to represent a larger group of wildlife species presumed to share similar habitat requirements:

Rocky Mountain elk: Elk were selected to represent general forest habitat and winter ranges. Elk are common within the analysis area and numbers are above the desired population level, or "management objective" set by Oregon Department of Fish and Wildlife. The management objective is 1300 head in the Desolation Wildlife Management Unit, and the 2001 winter population was estimated at 1,890 elk.

Big game security can be measured by evaluating the density of open roads and the availability of hiding cover. Hiding cover is relatively plentiful throughout the area due to the understory regeneration and the rolling topography. Open road densities are low on the Umatilla portion of the watershed due to closures implemented over the last 10 years; most subwatersheds are within the desired condition of 2 miles per square mile forest wide (USDA 1990a). Open road densities on the Wallowa-Whitman National Forest portion are considerably higher and generally not within the desired condition of 1.5 miles per square mile (for MA 18, Fish Emphasis, which comprises the majority of the watershed) (USDA 1990b). Open road densities exclusive of wilderness and other roadless acres are presented in the last column (Table 3.10).

Table 3.10 – Road Densities

	Subwatershed	Square miles	Open road miles	Open road miles per square mile	Roaded square miles*	Open road miles per roaded* square mile
93A	Lower Granite Creek	15.1	10.8	0.7	8.3	1.3
93B	Ten Cent Creek	6.5	5.3	0.8	4.4	1.2
93C	Upper Granite Creek	16.9	77.5	4.6	15.9	4.9
93D	Lake Creek	18.8	11.9	0.6	8.7	1.4
93E	Rabbit Creek	7.6	5.6	0.7	3.5	1.6
93F	Lower Clear Creek	4.1	10.1	2.4	3.4	3.0
93G	Upper Clear Creek	10.0	0.1	0.0	0.2	0.6
93H	Ruby Creek	4.8	1.4	0.3	0.7	2.1
93I	Congo Gulch	2.3	5.0	2.2	2.3	2.2
93J	Middle Clear Creek	3.3	5.0	1.5	3.2	1.6
93K	Lightning Creek	7.5	7.7	1.0	2.5	3.0
93L	Olive Creek	7.4	50.8	6.9	7.4	6.9
93M	Beaver Creek	13.0	73.4	5.6	13.0	5.6
93N	Lower Bull Run Creek	15.8	61.6	3.9	14.9	4.1
93O	Upper Bull Run Creek	14.5	86.3	5.9	14.5	5.9

*Square miles in watershed exclusive of management areas designated as scenic, backcountry, and wilderness.

American marten: This species represents mature forests and riparian areas. Habitat is present along Granite, Clear, and other creeks, and particularly within the North Fork John Day Wilderness.

Pileated woodpecker represents dead/down tree habitat in mature and old growth mixed conifer stands, and other **primary cavity excavators** represents nearly 100 vertebrate species that depend upon dead standing trees and down logs for reproduction and/or food gathering. Dead standing tree and down wood densities vary within the analysis area. Wilderness areas and stands affected by insect or disease have relatively high snag densities. Private land and areas that have been harvested in the past have fewer large snags and down logs. Pileated woodpeckers have been observed in the analysis area. There appears to be adequate pileated woodpecker reproductive habitat in Dedicated Old Growth, in the North Fork John Day Wilderness, and in additional scattered patches in managed areas.

Northern three-toed woodpecker: This species represents dead/down tree habitat in mixed conifer stands dominated by mature and old growth lodgepole pine stands. This habitat type is somewhat uncommon in the analysis area, and no three-toed woodpecker observations have been recorded in this area.

Northern goshawk: This species represents mature to old conifer stands. Northern goshawk are present in the Granite Watershed. Surveys during the breeding season have not been done on the Umatilla NF portion of the watershed, and no known nesting territories are currently known. Habitat for goshawk is similar to that discussed above for pileated woodpecker and marten. A considerable amount of habitat occurs in the North Fork John Day Wilderness and in dedicated Old Growth areas.

Threatened, Endangered and Sensitive Wildlife Species

Threatened and Endangered species are managed under the Endangered Species Act to ensure that federal actions do not result in a downward population trend. Sensitive species are those recognized by the Pacific Northwest Regional Forester as needing special management to prevent being placed on Federal or State endangered species lists. Based on local studies, surveys and monitoring, as well as published literature regarding distribution and habitat use, the following Threatened, Endangered, and Sensitive wildlife species have the potential to occur in or adjacent to the analysis area:

Gray wolf (Endangered): The gray wolf could occur in the area, although use has not been documented. A radio-collared gray wolf dispersed to the Blue Mountains from Idaho in March 1999, and was captured on the District for relocation to Idaho. Another wolf was killed in October 2000, north of Ukiah. Other wolves have been reported in the Blue Mountain region. The Idaho wolf population has been increasing steadily, and dispersion into the Blue Mountains will likely continue. The Blue Mountains offer relatively high prey densities, large tracts of publicly owned land, and low human populations.

Northern bald eagle (Threatened): Bald eagles are occasionally seen in the Granite and Clear Creek areas, but are not resident. Winter use has not been documented in the analysis area, but does occur in outlying, lower elevation areas. Winter bald eagle use of the uplands would be limited to periods of low snow depths or snow-free periods, usually early fall. When present they likely feed on big game carcasses (hunting mortalities) and spawning chinook salmon. Nesting by the bald eagle is not known to occur on the District.

Canada lynx (Threatened): The Blue Mountains are considered to be on the fringe of the range of Canada lynx. Lynx are known to have occurred in the area historically, and several recent but unconfirmed sightings have been reported in the Blue Mountains. Surveys have been ongoing and to date no lynx have been detected. The majority of potential lynx habitat is found at higher elevations (>5000') in cool, moist habitat types. The only mining claim included in this EIS that occurs within mapped lynx habitat is the Magnolia claim; this area is classified as lynx foraging habitat. Work at the Magnolia claim involves occasional use of a backhoe or small cat to muck out the tunnel portal, and hand work in the tunnel.

The analysis area falls within the Granite Lynx Analysis Unit (LAU) on the Umatilla NF and within the Granite Creek LAU on the Wallowa-Whitman NF. Existing lynx habitat conditions in these LAUs are displayed below (Table 3.11). About 74 percent of the potential lynx habitat in the Granite LAU is currently suitable for foraging and denning. About 81 percent of the potential lynx habitat in the Granite Creek LAU is currently suitable for foraging and denning.

Table 3.11 – Current condition of lynx habitat in the Granite Watershed (acres).

LAU	Potential	Denning	Foraging	Unsuitable[1]	% Suitable	% Unsuitable[2]
Granite	38,033	12,854	15,165	10,015	74%	26%
Granite Creek	17,117	4670	9145	3302	81%	19%

California wolverine (Sensitive): Wolverines are wide-ranging carnivores that could be present in the analysis area at any time. Wolverines have not been detected on the District despite extensive surveys conducted in the last decade, but there have been unconfirmed reports of wolverine within the Granite Watershed. Wolverine habitat is primarily found in the North Fork John Day Wilderness and the Vinegar Hill Scenic Area.

Peregrine falcon (Sensitive): This species is not known to occur within the analysis area, but has been observed foraging on the district during the non-breeding season. Potential nesting habitats have been surveyed since 1991, and no peregrine nesting has been found.

Columbia spotted frog (Sensitive): Columbia spotted frogs (*Rana luteiventris*) are known to occur in upper Granite Creek and also in the far western portion of the watershed near Olive Lake. No spotted frogs have been observed at the mining claims included in the proposed action, although comprehensive surveys have not been done. Suitable habitat for spotted frogs occurs along creeks, wet meadows, springs and ponds throughout the watershed.

Other Species of Concern

The U.S. Fish and Wildlife service requested that we consider additional wildlife species of concern. These include the olive-sided flycatcher and the following bat species: big-eared bat, small-footed myotis, long-eared myotis, fringed myotis, long-legged myotis, and Yuma myotis. Neotropical migratory birds are also discussed in this section.

Olive-sided flycatcher: Breeding bird surveys conducted over many decades indicate that this species may be in decline throughout the West (Csuti et al. 1997). In the Blue Mountains, an increase in source habitat has occurred (Wisdom et al. 2000). It is particularly known to use tall snags left over from fires, and more open canopy forest. Considered "common" for the area, it likely occurs in the Granite watershed. Management recommendations in the Conservation Strategy for Landbirds (Altman 2000) focus on broad-scale landscape treatments such as prescribed burning. Mining activities may have altered a small percentage of olive-sided flycatcher habitat, but past fire suppression, livestock grazing, and timber management practices are of more concern.

[1] Lynx potential habitat in currently unsuitable condition.
[2] If more than 30% of potential habitat is currently unsuitable, the Lynx Conservation Assessment Strategy requires that no further reduction of suitable habitat shall occur as a result of vegetation management activities.

Bat species: The U.S. Fish and Wildlife Service consider these bats species of concern for this area: pale western big-eared bat, small-footed myotis, long-eared myotis, long-legged myotis, and Yuma myotis. The pale western big-eared bat was formerly referred to as the Pacific western or Townsend's big-eared bat. The pale subspecies generally occurs east of the Cascade crest, and the Pacific subspecies occurs west of the Cascade crest. The long-legged and long-eared myotis are considered relatively abundant, but the Yuma myotis is relatively scarce in eastern Oregon, and very little is known about the small-footed myotis (Verts and Carraway 1998). All of these bat species could occur in the watershed.

Potential habitat in the analysis area consists of mine adits for winter roosting, and hollow trees, snags, or rock crevices for temporary day or night roosts. A survey in the summer of 1995 near an abandoned adit mine revealed the possible presence (80-90 percent certainty) of a big-eared bat. Myotis species were also detected. However, these bats were not seen entering or exiting the adits, and so were thought to be coming from elsewhere. Only a few lode mines in the Granite watershed may be suitable for roosting bats. Two lode mines with tunnels or adits are included in this EIS: Magnolia and SW St. Paul. Magnolia has been inspected for potential bat use, and no evidence of bat use was found. The adits at SW Saint Paul are currently caved in and therefore unavailable for use by bats.

Neotropical Migratory Birds: Neotropical migratory birds occupy a wide variety of habitats. Most birds in eastern Oregon ponderosa pine forest are “foliage-gleaners”, which forage primarily by collecting insects or fruit from vegetation rather than from the ground (Sallabanks et al. 2001). Riparian vegetation is particularly important to Neotropical migratory songbirds (Sallabanks et al. 2001), and is the most impacted type of bird habitat with regards to these mining plans. Some of the larger creeks such as Granite, Clear, Lightning, Ruby, Olive, Beaver, and Lake Creeks comprise the bulk of the riparian habitat, but many smaller creeks, seeps, springs, and ponds are also important. Riparian habitat conditions are poor where mining, roads, and other activities have degraded it, and good in the wilderness and some other areas. Historic large scale dredge operations have caused a great deal of damage to riparian habitat in the watershed.

SOCIO-ECONOMIC

The placer mines of the North Fork John Day watershed have been worked since 1862. Following the gold rush in California, European and other immigrants prospected this area and established mines and settlements in accessible places within the North Fork John Day watershed where there was potential for economic growth based on mineral extraction. Early mining practices by both white and Chinese miners, use of water from ditches, hydraulic mining methods, installation of hardrock mills and later use of bucket line dredges and doodlebugs in the streams were conducted without much concern for environmental quality and the resource needs of further generations.

Placer mining in the North Fork John Day River watershed was the first type of mining practice. Placer production by both white and Chinese miners was at its peak during the period 1863–1866. Placer mining began to decline about 1890 as the richest placers were worked out. But placering had uncovered many rich veins, and about that time lode mining began in earnest. Ore

was first milled using primitive mills like arrastas. Later, stamp mills were erected and ore was pulverized using the heavy stamps, the gold was separated using gravity means and finally gold was amalgamated using mercury. By 1911, lode mining was on the decline, but a new gold rush bargain with the advent of bucket line dredges. Smaller streams were worked using "doodlebug" washing plants mounted on skids and operated on dry land. In Granite Creek, the Oro Plata Mining Company operated a floating washing plant with a capacity of 3000 yards daily. The company mined Granite and Clear creeks beginning in 1938. The Porter Dredge Company mined Granite, Clear, and Olive creeks. Their dredge had a capacity of 3800 cubic yards daily and operated beginning in 1939. Electrical power for this dredge and the Sumpter dredges was obtained from the Fremont Power plant.

The critical point in the downfall of gold mining was the onset of World War II. The U.S. Government ordered the shutdown of mining operations and many of the men working in such mines either enlisted or were drafted into the service. Also, the Administrative Order L-208, which was designed to stop the mining of gold, forced gold miners to seek employment in base-metal mines, especially copper, in which there was supposed to be a shortage of miners. The order failed essentially to accomplish its objective, but the final result was to deal a crushing blow to gold mining. Shutdowns, always a serious operating matter in an underground mine because of the maintenance problem, compounded the gold miners' difficulty. At the close of the wars, the several mines, which had been in operation prior to shutdown, were found in ruin. Many of the building structures had been destroyed by fire, the machines dismantled and sold for scrap metal. Water had filled many of the tunnels, which would be costly to remove. Large bucket dredge operations shut down in 1957. Between 1852 and 1964, Oregon produced an estimated 136 million dollars in gold and silver. Approximately 73 percent came from the mines of Baker and Grant counties.

Although inflation and high gold prices in the early 1980's caused a renewed interest in gold mining, currently there is little active mining activity occurring within the Granite watershed. The current income generated by mining in the area is unknown, but thought to be quite low.

NON-FOREST VEGETATION

Region 6 "Sensitive" Species

The Pacific Northwest Regional Forester has identified these species as needing special management to prevent being placed on Federal or State endangered species lists. An updated plant sensitive species list was released in May of 1999. The following sensitive species have the potential to occur or are documented within or near the analysis area.

Botrychium sp., Currently, within the Granite Mining Project EIS analysis area, five documented Region 6 Sensitive ***Botrychium*** populations exist. These five populations are represented by ***Botrycyhium minganense***, ***B. montanum***, ***B. lunaria***, and ***B. pinnatum***. No documented sensitive ***Botrychium*** populations are located within or adjacent to EIS proposed mining/exploration sites

Carex crawfordii and ***Carex interior*** are two species of sedges added to the Regional Forester's Sensitive Species List for Oregon in May 1999. Both species are suspected to occur on the District. Since these species were not sensitive at the time, surveys before 1999 may have not been optimal for locating and documenting these two sedges. Both ***Carex*** species grow in perennially wet clearings, usually with surface water present 6-8 months of the year.

Silene spaldingii, this species is listed as "Sensitive" and is being considered by the Fish and Wildlife Service for listing as "Threatened" under the Endangered Species Act. This species is known to occur o the Umatilla and Wallowa Whitman National Forest. ***Silene spaldingii*** primarily occurs in open areas of deep Palousian soils, often on north aspects.

Species of Concern

Additionally five species of concern have been identified by the U.S. Fish and Wildlife service. The USFW service has requested that the District consider these five species.

1. ***Botrychium ascendens***, is not known to occur on the Umatilla National Forest. The nearest documented site occurs on the Wallow-Whitman National Forest. ***B. ascendens*** is suspected to occur on the Umatilla due in large part to similar habitat requirements and sympatric nature with present ***Botrychium*** species. Habitat does not exist within proposed mining/exploration sites or immediately adjacent. Potential habitat does exist within the analysis area.
2. ***Botrychium crenulatum,*** occurs on the North Fork District but is located well outside of the proposed analysis area. Habitat does not exist within proposed mining/exploration sites or immediately adjacent. Potential habitat does exist within the proposed analysis area.
3. ***Botrychium paradoxum,*** occurs on the North Fork District but is located well outside of the proposed analysis area. Habitat does not exist within proposed mining/exploration sites or immediately adjacent. Potential habitat does exist within the proposed analysis area.
4. ***Botrychium pedunculosum***, occurs on the North Fork District but is located well outside of the proposed analysis area. Habitat does not exist within proposed mining/exploration sites or immediately adjacent. Potential habitat does exist within the proposed analysis area.
5. ***Pleuropogon oregonus,*** is not known to occur on the Umatilla National Forest. This species is known only from two areas in Union and Lake Counties, Oregon. Described as growing on perennially wet-swampy ground, generally emergent in perennial flowing streams. Due to past mining activities (dredging) good condition habitat does not exist within proposed mining/exploration sites. Limited disturbed habitat exists adjacent to proposed activities in less heavily disturbed areas. Potential habitat does exist within the proposed analysis area.

Noxious Weeds

Several categories are used in prioritizing treatments for the weed species on the Forest list: 1) "Potential Invaders" are noxious weed species that occur on lands adjacent to the Umatilla National Forest but which have not been documented on lands administered by the Forest; 2) "New Invaders" are noxious weed species that occur sporadically on the Umatilla National Forest and which may be controlled by early treatment; and 3) "Established" species are widespread across the Forest in large populations and containment strategies are used to prevent their further spread. In the last 2 years several species of noxious weeds have shown dramatic increases in distribution and population sizes across the Forest. This has necessitated splitting the "New Invader" category into two sub-categories: 1) Species of the "New Invaders/Established" subcategory are those species that are presently controllable but which are approaching "Established" infestation levels and which are prioritized for early treatment; and, 2) Species in the "New Invader" subcategory are of limited distribution and can probably be eradicated if early treatment can be implemented.

Weeds of the Granite mining analysis area and their respective treatment prioritizing categories on a Forest-wide level are presented in Table 3.12:

Table 3.12 – Granite area noxious weeds.

Noxious Weed Species	Treatment Prioritizing Category	Remarks
Centaurea diffusa (diffuse knapweed)	New Invader/Established	An annual or short-lived perennial; spread by animals, wind, vehicles; highly competitive.
Centaurea biebersteinii (*was Centaurea maculosa*) (spotted knapweed)	New Invader/Established	A short-lived perennial; tolerates shade; spread by animals, wind, vehicles; highly competitive.
Cynoglossum officinale (hound's tongue)	New Invader/Established	A biennial; tolerates shade; invades disturbed sites; spread by animals, clothing, water, logging equipment; persistent in clearcuts.
Cardaria draba (Whitetop)	New Invader	A creeping perennial; reproduces from root segments and seeds; highly competitive once established; often spread through hay and livestock; forms dense monocultures.
Linaria vulgaris (Yellow toadflax)	New Invader/Established	A creeping perennial; difficult to control because of extensive rhizomes; occupies moist to dry soil types; displaces desirable grasses; spread by water, animals, vehicles.
Euphorbia esula (Leafy spurge)	New Invader	An extremely persistent deep rooted perennial; spread by animals (including birds), water; vigorous rootstalks that readily produce new shoots; large nutrient reserves; extremely difficult to control.
Hypericum perforatum (St. Johnswort)	Established	A perennial; well established on roadsides; very slow in spreading off of roadside; difficult to control; currently under biological control on district.
Circium arvense (Canada thistle)	Established	A creeping perennial; established slowly; difficult to control because of rhizomes; prolific seed producer; seeds dispersed by wind/water in late summer and fall.

Noxious Weed Species	Treatment Prioritizing Category	Remarks
Circium vulgare (Bull thistle)	Established	Common in harvest units; persistent for about 2 years; not considered problematic by the silviculturists of the district.

There are 28 noxious weed sites within the general project area. There are six mining claims within the project area that are within close proximity to inventoried high priority "new invader/established" weed sites. There is one established weed of high priority, yellow toadflax, that has not yet been sufficiently inventoried, and undiscovered sites may be in or adjacent to project claims. Whitetop was recently discovered in the town of Granite and the possibility of undiscovered populations throughout the project area is a concern. A leafy spurge site is located along Clear Creek 1.5 to 2.5 miles above the project are in the Beaver Creek Meadows. Potential for this site to spread is very high. Leafy Spurge is an extremely adaptable plant with seed dispersal mostly by birds and water and invasion of this weed on the disturbed soil/gravels of the project area is a paramount concern as leafy spurge is documented as very difficult to control and virtually impossible to eradicate once established.

With the exception of the low priority weeds and yellow toadflax, the noxious weeds within the project area are small sites, usually occurring along roads. Though small, from these points of initial infestation, weed species become (opportunistic) in invading suitable microhabitats adjacent to the initial infestation site. Most of the noxious weed species of the Umatilla National Forest thrive in open full sunlight in disturbed soils in which native species have been diminished or displaced. As all claim activity involves at least some soil/gravel disturbance and some removal and movement of soil/gravel, there is definitely a likelihood of noxious weed invasion and further spread in these areas of disturbance.

With the exception of two of the mining claims, only the roads and a portion of the streams have been surveyed in the project area. No off road upland areas have been surveyed so there is a potential for invasion of undiscovered populations. However, the highest risk of infestation occurs along the streams and travel routes. Yellow toadflax is well established along Granite Creek with some spread occurring along the 1035 road and the mining road spur and continued spread is a concern. Treatment of the existing noxious weed sites has been effective within the treatment area and with the exception of the low priority weeds and yellow toadflax; these sites will receive continued effective treatment throughout the length of the project. Yellow toadflax will be treated as soon as a viable treatment is discovered.

HERITAGE RESOURCES

Within the Granite watershed, one large and several smaller cultural resource inventories have been completed in the past 12 years. These surveys were conducted in an effort to identify and gather sufficient information to evaluate historic properties listed on or determined eligible for listing on the National Register of Historic Places (NRHP) that may be affected by current and future proposed undertakings.

The earliest formal cultural resource inventories in the Granite area were conducted in the later part of the 1980's. Two cultural surveys were conducted on proposed timber sale areas. As a result of these earlier inventories,13 Euroamerican sites, 1 historic and 1 prehistoric isolate were identified. All of the sites are manifestations of the historic mining area. Later surveys found an additional 133 Euroamerican sites, 8 American Indian sites as well as 16 American Indian isolate finds and 14 Euroamerican isolate finds.

Most of the Euroamerican sites are associated with early gold prospecting within the Granite drainage and its associated tributaries. Site types include the remains of cabins and stamp mills, trash concentrations, numerous collapsed adits and mineral test pits, and tailing piles that attest to past placer and lode mining that occurred in the early 20th century. During the 1930's to 1950's, several dredges operated in the Granite, Clear, and Bull creek drainages, resulting in the large tailings piles that are visible today. The most noted structure associated with mining in the Granite area is the Fremont Powerhouse and its associated complex of features that was constructed by owners of the Red Boy Mine. Historic sites that are not associated with mining relate to early Forest Service administrative improvements including: stock driveways, telecommunication lines, and several blazed trail segments. All of the prehistoric sites consist of small, discrete, low-density lithic scatters. The predominant artifact of these sites is the waste flake indicative of stone tool manufacturing or maintenance that suggests short-term camping associated with upland resource utilization.

In addition to the above inventories, a review of two documents that contain information pertaining to areas of cultural interest were also reviewed for this project. Each of these documents is briefly described in the following narrative.

In 1974, Robert Suphan compiled an ethnographic report pertaining to the sociopolitical organization and land use patterns of the Umatilla Indians that occupied the Blue Mountains of northeast Oregon. Suphan used material published by several ethnographers and information gathered from Umatilla, Cayuse, and Walla Walla elders who participated in oral interviews and field survey trips undertaken in 1941. Also, in 1994, the Umatilla Indian Reservation (CTUIR) worked with the Umatilla and Wallowa-Whitman National Forests to produce Mits Qooi Nux Sa Kin Na Noon Im Watus Pa: A Partial Traditional Use Area Inventory of the Umatilla National Forest and the Wallowa-Whitman National Forest (Minthorn 1994). A review of these documents indicates that there are areas of cultural interest identified by CTUIR that are in close proximity to the area included within the Granite Area Mining Projects EIS.

TRANSPORTATION SYSTEM

There are approximately 477 miles of open and closed roads (Federal, State, County, and Private) within the Granite Creek watershed. Of this total, 412 miles (112 miles on Umatilla NF, 365 miles on Wallowa-Whitman NF) are open to motorized use and 59 miles are closed but maintained for administrative access (such as fire suppression, fence maintenance, etc.). The North Fork John Day District Motorized Access and Travel Management Plan, which was signed in 1990, discusses in detail management objectives and access needs for those roads located on the district.

Grant County maintains just over 14 miles of paved, two lane roads within the watershed. These are high standard roads having wide paved surfaces, good sight distance, and have no problem handling two-way traffic.

Forest Road 1000 and 7300 are the main arteries to access the watershed. They are high standard roads having wide surfaces, good sight distance and have no problem handling two-way traffic. They both contain ditches with relief culverts. The surface on the 1000 road is crushed gravel and the surface on the 7300 is asphalt. No problems with mass failures have occurred on these roads in the past. Most of the other Forest Service roads within the watershed that are opened for motorized use are maintained to class 2 standards. These roads are usually graveled and have a driving surface that is 1 to 1 1/2 lanes wide. They usually contain ditches with relief culverts although some are out-sloped.

A roads analysis was done on those roads within the watershed that are located in the North Fork John Day District since most of the claims are located there. This analysis indicated that the access needs and management objectives as stated in the Access and Travel Management Plan are still valid. However, there are a couple of road sections that are not needed and could be decommissioned. Both sections are currently closed and are located within the North Fork John Day wilderness. They total about 2.25 miles in length. In addition, the roads that currently access the Lower Granite Creek mining claims should be gated. The road is closed under the Access and Travel Management plan but enforcement of this closure is spotty at best. Gating the road and using it only for approved activities would eliminate this problem.