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Introduction

In many respects, the Desolation Watershed is one of the most diverse watersheds on the Umatilla National Forest.

Desolation Creek drains into the North Fork John Day River about 1 mile northeast of Dale, Oregon. The elevation at the bottom of the watershed is about 2800 feet. The watershed climbs toward the southeast to some of the highest points on the Umatilla Forest, over 7600 feet.

Geology and soils are complex. Some types found in Desolation are uncommon on the rest of the Umatilla National Forest.

Water is generally clear and cold, but Desolation Creek does not meet State Water Quality Standards for temperature. Even so, fish habitat is good, and streams in the Desolation watershed support a wide variety of fish species. The watershed's special importance to fish was recognized during development of the Forest Plan, when almost half of the watershed was selected to be managed under a strategy that emphasizes high quality fish habitat.

Forested vegetation patterns reflect a wide range in elevation, aspect, soils, and moisture conditions. For much of the south half of the Umatilla National Forest, vegetation is generally dominated by the dry forest types, but in the Desolation watershed, it is balanced well between dry, wet and cold potential vegetation groups. Fire is an important disturbance process in this watershed, and its influence on vegetation patterns is visible in many areas.

Unlike the remainder of the Forest, meadows are a significant component on the Desolation landscape, providing habitat for unique plants, and adding to the diversity of wildlife habitat.

A wide variety of habitats for wildlife is present. Well known for its large elk herd, habitat conditions are also present for potential occurrences of such rare species as wolverines, peregrine falcons and bald eagles.

Social values in the watershed are high. An abundance of both motorized and non-motorized recreation use occurs throughout the year. The Desolation watershed contains one of only two areas on the Umatilla NF managed as a scenic area. It is apparent why this area was selected to be managed as a scenic area, after experiencing the panoramic vistas from ridges along the southern end of the watershed.

Historically the watershed has been important in economic terms. It has supported grazing of domestic livestock since the early 1800s. Numerous mine locations are scattered throughout the area, indicative of mining activities dating back to the 1800s. Numerous timbers sales have occurred on the National Forest land in the watershed. About 18 percent of the watershed is in private ownership, and much of that land has been roaded and harvested.

Summary of Findings

The following summary is meant to provide a very brief listing of "key" findings of this ecosystem analysis.

1. Achievable target maximum standard water temperature for tributaries to Desolation Creek should be in the range of 55º to 60º F.

2. Desolation Watershed is a high-concentration area for sensitive plant species, especially *Botrychium* spp., one of which may be a new-to-science species.

3. Desolation Watershed contains some of the most significant meadow habitat found on the Forest. Non-native seeded grasses occupy a high proportion of cover in the meadows.

4. Riparian obligate plant species are under-represented, and the amount shrubs have been significantly reduced throughout the watershed.

5. Current noxious weed infestation rates are relatively low. Aggressive treatment of known sites now, coupled with prevention measures, and identification and treatment of new sites, could virtually eradicate noxious weeds from the watershed.

6. Opportunities for use of natural fuels treatments are limited in the moist and cold forest types.

7. Old forest structure is currently very much below historic levels.

8. The existing C1/C2 Old Growth network contains no old forest (as defined in the Desolation Vegetation Database).

9. Reproductive habitat for pileated woodpeckers and American martin has become so rare that the long-term persistence of local populations is uncertain; the watershed may no longer support a successfully reproducing population of northern three-toed woodpeckers.

I. Characterization

Characterization is the first step in a six-step process for Ecosystem Analysis at the Watershed Scale (EAWS) (Regional Ecosystem Office 1995). The purpose of Characterization is to identify the dominant physical, biological, and human processes or features of the watershed that affect ecosystem functions and conditions. Relationships between ecosystem elements and those occurring in the river basin or province are identified. The most important land allocations, plan objectives, and regulatory constraints influencing resource management in the watershed are identified.

General Information

The Desolation watershed comprises 69,672 acres of diverse landscapes, including both National Forest and private lands, located east and south of Highway 395, southeast of Dale, Oregon (Figure 1). Privately owned lands comprise about 18 percent of the total area, mostly at lower elevations at the western end of the watershed. Nine subwatersheds are recognized in this analysis, ranging in size from 4,455 to 10,815 acres (Figure 2, Table 1).

The Desolation Watershed Analysis Area encompasses a relatively large elevation gradient, from 7,765 ft. at the headwaters (Sunrise Butte) to 2810 ft. at the confluence of Desolation Creek and the North Fork John Day (NFJD) River. The NFJD subbasin (HUC# 17070202) is about 2,520 mi^2 in size and is important in terms of overall water quality and flow contribution to the John Day River. Desolation Creek, a northwest-flowing tributary, joins the NFJD near the town of Dale, Oregon (Figure 1).

The Integrated Scientific Assessment for Ecosystem Management for the Interior Columbia Basin (USDA-USDI, 1996) characterized the ecological integrity of the 164 subbasins in the interior Columbia River Basin. The North Fork John Day Subbasin ratings are as follows: **Forest Integrity - Low; Aquatic Integrity - Moderate; Hydrologic Integrity - Moderate; Composite Ecological Integrity - Low.** Integrity ratings reflect the relative level of ecological functions and processes that are present and operating within the subbasin, relative to the Basin (USDA-USDI, 1996). Moderate ratings for Hydrologic and Aquatic Integrity suggest that these resources, while not in dire straits, are certainly not in "optimal" condition. The low ratings for Forest Integrity and Overall Ecological Integrity imply definite problems, and suggest an initial direction for investigation of conditions at the watershed scale.

Table 1. Desolation Acres by Subwatershed

Watershed	Subwatershed (SWS)	Total Acres	Private Land (Acres)
Lower Desolation	36A	7,156	4,150
Lower Desolation/ Wassen	36B	8,731	4,832
Kelsay	36C	6,546	682
Middle Desolation/ Bruin	36D	10,815	2,916
Junkens / Beeman	36E	4,455	--
Upper Desolation/ Battle	36F	10,261	--
Upper Desolation/ Howard	36G	6,511	--
North Fork Desolation	36H	8,058	--
South Fork Desolation	36I	7,139	98
	Total	69,672	12,678

Figure 1. Desolation Ecosystem Analysis Area Map

NOTE: Some figures only appear in the hard copy document – not available electronically.

Figure 2. Desolation Subwatersheds

Forest Plan Management Areas and Land Uses

A variety of uses and values characterize the Desolation watershed, as evidenced by the number of Forest Plan Management Strategies assigned to the area (Table 2, Figure 3). A brief description of each Area designation and its management goals follows:

A3, Viewshed 1: Manage the area seen from a primary travel route, use area or water body, where forest visitors have a major concern for the scenic qualities, as a natural appearing landscape.

A4, Viewshed 2: Manage the area seen from a primary travel route, use area or water body, where forest visitors have a major concern for the scenic qualities, as a natural appearing to slightly altered landscape.

A6, Developed Recreation: Provide recreation opportunities that are dependent on the development of structural facilities for user conveniences where interaction between user and evidence of others is prevalent.

A7, Wild and Scenic Rivers: Manage classified wild and scenic river segments to appropriate standards as wild, scenic, or recreational river areas, as defined by the Wild and Scenic Rivers Act, and amended by the Omnibus Oregon Wild and Scenic Rivers Act of 1988.

A8, Scenic Area: Protect or enhance the unique natural characteristics of landscapes noted for their scenic beauty.

B1, Wilderness: Manage to preserve, protect, and improve the resources and values of the Forest Wildernesses, as directed by the Wilderness Act of 1964.

C1, Dedicated Old Growth: Provide and protect sufficient suitable habitat for wildlife species dependent upon mature and/or overmature forest stands, and promote a diversity of vegetative conditions for such species.

C2, Managed Old Growth: Provide and protect sufficient suitable habitat for wildlife species dependent upon mature and/or overmature lodgepole pine forest stands, and promote a diversity of vegetative conditions for such species.

C3, Big Game Winter Range: Manage big game winter range to provide high levels of potential habitat effectiveness and high quality forage for big game species.

C4, Wildlife Habitat: Manage forest lands to provide high levels of potential habitat effectiveness for big game and other wildlife species with emphasis on size and distribution of habitat components (forage and cover for elk, and snags and dead and down materials for all cavity users). Unique wildlife habitats and key use areas will be retained or protected.

C5, Riparian Fish and Wildlife: Maintain or enhance water quality, and produce a high level of potential habitat capability for all species of fish and wildlife within the designated riparian habitat areas while providing for a high level of habitat effectiveness for big game.

C7, Special Fish Management: Maintain and enhance water quality and produce high levels of anadromous fish habitat on an area-wide basis.

Table 2. Forest Plan Management Areas in the Desolation Watershed

MANAGEMENT AREA	ACRES	PERCENT
A3	257	0.4
A4	3133	4.5
A6	23	0.0
A7	36	0.1
A8	13,281	19.1
B1	777	1.1
C1	1,947	2.8
C2	1,043	1.5
C3	3,894	5.6
C4	171	0.2
C5	165	0.2
C7	32,066	46.2
Private	12,678	18.2
Malheur NF	200	0.3

The importance of the watershed to fisheries protection is evidenced by the high proportion of the area included in C7--Special Fish Management (46% of the watershed), and the absence of management areas emphasizing commodity production.

Portions of the Jumpoff Joe and Greenhorn Mountain* Roadless Areas (Numbers 14249 and 14350, respectively) are located within the Desolation analysis area. The Umatilla portion of these roadless areas encompass 9,948 acres, or approximately 14 percent of the total Desolation analysis area (Table 3, Figure 4).

A land exchange aimed at Forest Service acquisition of the privately owned lands at the west end of the drainage is pending (L. Vore, Wallowa-Whitman NF, pers. Comm. 12/98).

Table 3. Desolation Analysis Area Roadless Acres by Subwatershed

SUBWATERSHED	ROADLESS ACRES	% OF SWS IN ROADLESS
36E	1,076	24
36G	2,317	36
36H	99	1
36I	6,456	90
TOTAL	9,948	---

**Note: A discrepancy in acres between the GIS database and Forest Plan Appendix C for the Greenhorn Roadless area has yet to be resolved*

Federal Trust Responsibilities To Indian Tribes

In 1855, three treaties which affect the Umatilla National Forest were signed between the United States Government and several Indian tribes. The treaty with the Walla Walla, Cayuse, and Umatilla tribes, and bands of Indians in Washington and Oregon Territories (today referred to as the Confederated Tribes of the Umatilla Indian Reservation) was signed on June 9, 1855. On June 26, 1855, a treaty was signed with the Tribes of Middle Oregon (these groups are now known as the Confederated Tribes of the Warm Springs Indian Reservation).

In each of these treaties, the tribes ceded certain traditional lands to the U.S. Government. The Desolation Watershed is within the ceded lands of the Confederated Tribes of the Warm Springs Reservation. It is also within the area of interest of the Confederated Tribes of the Umatilla Indian Reservation, the Burns Paiute Tribe, and the Nez Perce Tribe (Interior Columbia Basin Ecosystem Management Project, Eastside Draft Environmental Impact Statement).

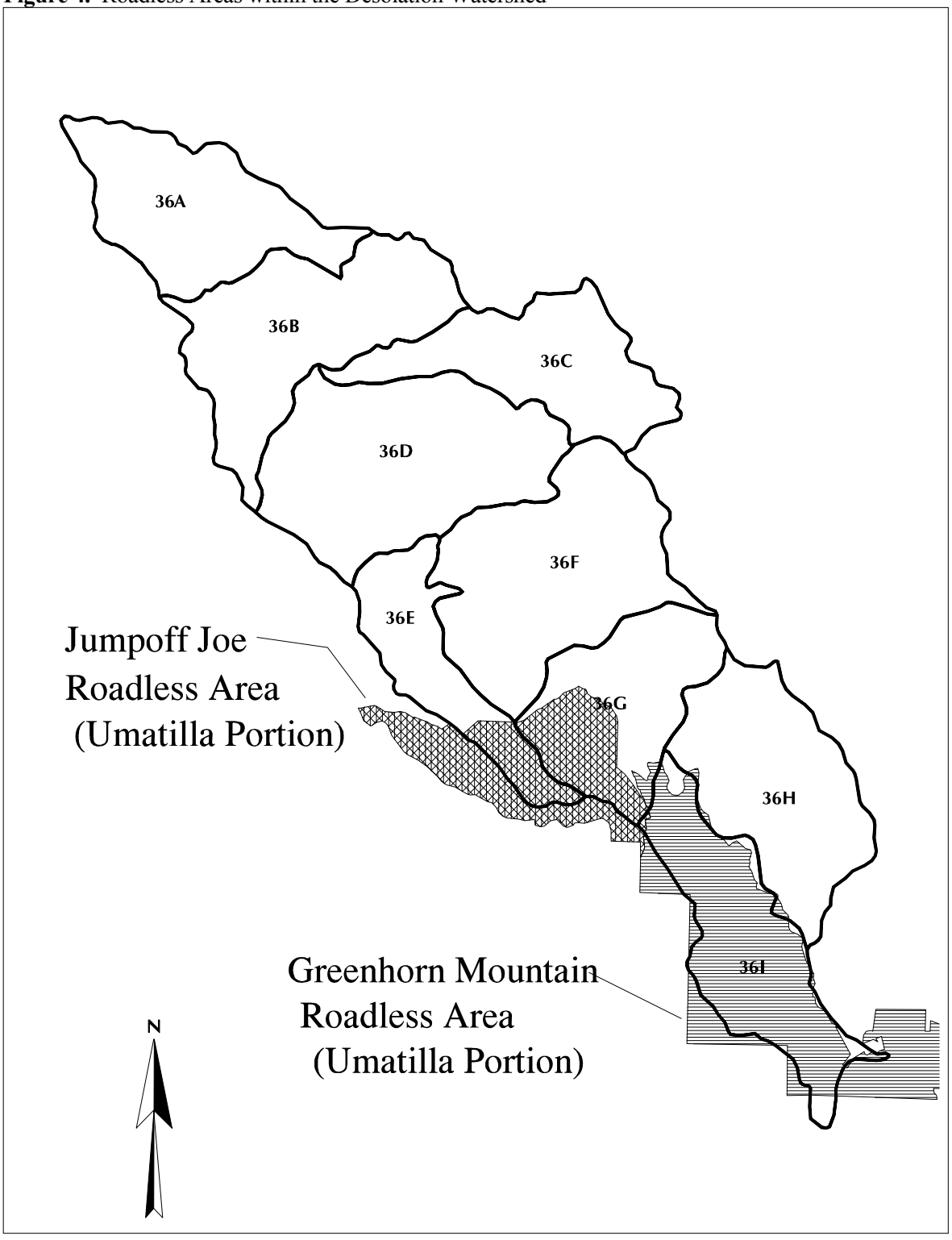
Reservation lands were retained by the tribes. The treaty also provided the Native Americans with exclusive rights to take fish in the streams running through and bordering the reservation, rights in common with citizens of the United States at all other usual and accustomed stations, and the right to erect suitable buildings for curing the fish. The privilege of hunting, gathering roots and berries, and pasturing their stock on unclaimed lands in common with citizens was also retained.

Treaties and executive orders after 1971 obligate the United States and its agencies to certain trust responsibilities. This responsibility has been generally referred to as the federal trust responsibility. In addition to obligations in treaties and statutes, the Forest Service has an obligation to consult with Federally recognized Indian Tribes on a Government-to-Government basis throughout our planning process.

Indian Tribes having rights to fish, hunt, gather, graze livestock or trap on National Forest Lands also have the implied right to have associated resources (habitat) protected from degradation. The Forest views this ecosystem analysis as the beginning of the consultation process at the technical level with local tribal governments. The identification of treaty rights, treaty protected resources and other tribal concerns is the first step. This information will be used when developing specific projects. When consultation with tribes indicates a concern or conflict with the proposed action and that conflict is related to treaty rights or other rights or interests, those issues will be addressed in the site specific NEPA analysis. Depending on the character of the issues, they may be addressed in several different ways. An issue may be used to develop alternatives to the proposal, to develop mitigation measures or could be used by the decision maker in selecting among the alternatives. In all cases, tribal governments will be involved throughout the planning process.

Figure 3. Desolation Management Areas

Figure 4. Roadless Areas within the Desolation Watershed



Soils and Geology

General

The Desolation drainage lies within portions of three subsections of the ecological unit hierarchy adopted by the Forest Service:

> Ukiah Mountain Slopes-- moderately dissected mountains on Grande Ronde and Picture Gorge Basalts; cool, dry and very dry forests dominated by ponderosa pine, Douglas-fir, and western larch; cool, moist forests dominated by grand fir; and cold, moist subalpine forest dominated by subalpine fir.
>
> Wallowa-Elkhorn Mountains-- high, ice-sculpted mountains dominated by granitic and diorite; cold and usually moist soils; subalpine coniferous forests and alpine meadows.
>
> John Day Clarno Mountains-- moderately dissected mountain slopes with coniferous forest on John Day and Clarno geologic formations.

Slopes in the Desolation watershed are dominantly gentle to moderate, with the relatively large alluvial/colluvial/glacial till meadow complexes as dominant features (Figure 5).

Geology

The geology of the Desolation area is some of the most complex on the Umatilla National Forest (Table 4 and Figure 6). It is dominated by volcanic massive flow materials, with metabasalts/andesites, tuffs and breccias from these materials, in the central portion of the drainage. The lower sections have extensive (old) landslide and debris flow deposits, much of it materials from the volcanic mass flows. The large area of geologic landslide contributes to the rolling topography that is more typical in this drainage.

A variety of other rock types occur in lesser amounts within the drainage including some granodiorite (granitics) in the headwaters region, and some bedded sedimentary units primarily of argillite, and some sandstone. Metamorphosed volcanics and sedimentary rock types are common throughout the water-shed. Serpentinite is exposed in some areas, primarily in the headwaters. Perhaps the most significant geologic material in the drainage are the fairly extensive glacial till deposits in the central and upper reaches of the watershed. This, in combination with associated alluvial deposits, provides significant volumes of unconsolidated rock material able to store large volumes of water. Mazama volcanic ash has been overlain, reworked and redeposited in footslope and drainage areas. The ash deposits further enhance the water-holding capacity of the soils and unconsolidated materials prevalent in the watershed.

Soils

Soils are moderately deep and of volcanic origin, both as residual parent material and from volcanic ash fallout, primarily from Mount Mazama. Considerable variety exists due to mixed geologic units, as indicated earlier, and erosional processes, including alpine glaciation moving and mixing materials (Table 5). The extensive deep alluvial and glacial till-derived soils are particularly important due to their water holding capacity and productive potential. These are most evident in the meadows in the watershed. Soils in Desolation are generally cold except for the lowest elevations which support Warm, Dry plant associations. Deep soils at upper elevations generally maintain adequate available soil moisture throughout most of the growing season while those at lower elevation in the drainage will usually dry enough to induce stress in trees and understory vegetation in late summer.

Figure 5. Slope Map of Desolation Watershed

Table 4. Geologic Types found in the Desolation Watershed.

GEOLOGIC TYPE	DESCRIPTION	ACRES	% OF TOTAL
Kji	Granitics	3,857	5.5%
Pzsv	Metasediments & Volcanics	47	0.1%
QTg	Terrace & Other Gravels	498	0.7%
Qal	Alluvial Deposits	1,412	2.0%
Qg	Glacial Till Deposits	2,928	4.2%
Qls	Landslide & Debris Flow	12,973	18.6%
TRPv	Massive Flow Volcanics	15,749	22.6%
TRPzg	Gabbro & Similar Rocks	319	0.5%
TRPzs	Sedimentary, Part Metamorphic	1,450	2.1%
TRPzu	Ultramafic Including Serpentinite	7,676	11.0%
Tca	Clastic Sed., Bedded Sed. & Andesite	11,860	17.0%
Tcg	Grande Ronde Basalt	1,207	1.7%
Tci	Imnaha Basalt	601	0.9%
Tcp	Picture Gorge Basalt	8,048	11.6%
Tcw	Wanapum Basalt	897	1.3%
Tsfj	John Day Volcanics	151	0.2%
	Total	69,673	100.0%

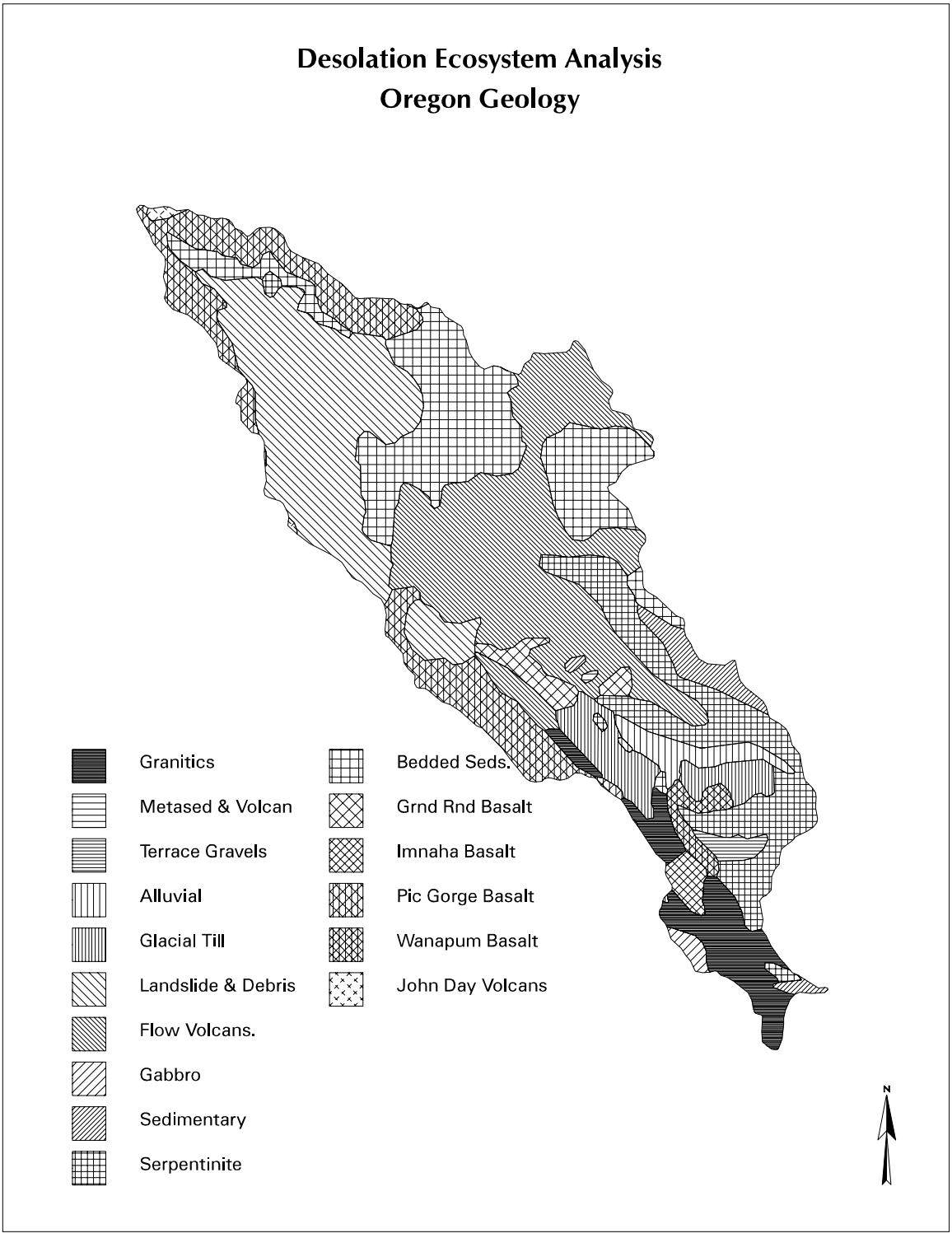
Source: State of Oregon Geology Map

Table 5. Dominant Soil Units & Key Characteristics.

UMATILLA SRI MAP UNIT #	DEPTH	SURFACE TEXTURE	MINERAL ASH (IN)	ACRES	WATERSHED %
Groups: 66, 67, 366, 367, 675, 662, 672	Deep	Silt Loam	12-40	13,967	20
Groups: 46, 48, 469, 348, 487	Mod. deep	Silt Loam	10-30	8,178	12

The largest acreage of soils are Udivitrands, mostly deep, which are typically volcanic ash over substrate of basalt, andesite or tuffaceous/pyroclastic sediments, and are found in the central portions of the drainage on the volcanics mentioned earlier. Subsoils developed in basalts (or andesites) are often a clay loam texture which tends to produce lateral water flow as water percolates downward through the soil profile. Moderately deep variations of these same soil types are also fairly extensive, but classification changes somewhat to Haploxeralfs, indicating drier conditions on southern aspects and/or lower elevations.

Figure 6. Desolation Geologic Types



Second in acreage are residual soils overlain with volcanic ash, shallow to moderately deep, formed in the metavolcanics and metasediments. These are Vitrixerands or Udivitrands depending on soil moisture regimes. The longer dry-season (Xeric) soils are at lower elevations and south and southwest aspects, with the (Udic; less than 90 days dry) somewhat more moist soils at higher elevations or north aspects. A smaller acreage of deep Haploxerolls or Haploudolls formed in the colluvium and alluvium typical of the meadow complexes and footslopes. Soils formed in tuffaceous sandstones and argillites are also found in relatively minor acreages in the central portions of the drainage. The granitic derived soils, most with considerable ash caps or mixed as colluvium, are found mostly in the headwaters of South and North Fork Desolation Creeks.

The soils formed in glacial till tend to be somewhat less extensive than the amount of till material since the till is often covered with alluvial sediments, particularly of volcanic ash. They tend to be deep and moderately well to somewhat poorly drained with thick, dark brown to black surface horizons. Subsoils will often have clayey horizons with gray, mottled colors.

Erosion Processes

The dominant erosion processes in the Desolation watershed result from interactions between climate, geology, topography, and land uses. Generally, surface erosion is considered the dominant erosion process, with mass wasting playing a secondary role; however, some unstable areas, prone to slumping and sliding, occur in the watershed (mostly in the Landslide and Debris Flow geologic type, found in subwatersheds 36A, B, D and E; see Figure 6). Surface erosion rates are highest on steeper slopes lacking vegetative cover, in unconsolidated or easily eroded deposits. Streambank erosion is also an important source of sediment to streams. Sediment concentrations in Desolation Creek are generally highest during spring snowmelt, however, occasional spring and summer storms increase sediment levels in streams.

The glacial tills and landslide materials are relatively young and are still establishing a drainage network. These processes tend to produce ongoing stream migration, adjustments and downcutting activity typical of geologically young landscapes.

Land uses including livestock grazing, roads, timber harvest, mining, and recreation trails and camps often accelerate natural erosion rates. Wildfires, especially in combination with runoff-generating storm events, may also contribute to increased erosion and sedimentation rates.

Watershed Hydrology

Climate

The Desolation watershed has a continental climate characterized by seasonal extremes of temperature and precipitation. Annual precipitation increases with elevation from less than 20 inches near the mouth of Desolation to over 40 inches in the headwaters (Figure 7). Most precipitation falls as rain and snow beginning in late fall, through winter (accumulating as snowpack), into spring (Figure 8). Convectional spring and summer storms produce isolated, often intense, thunderstorms. The pattern and occurrence of storms is affected by topography and the direction of prevailing winds. Temperatures follow general elevational and seasonal patterns with lower average temperatures at higher elevations. January is the coldest month and August the warmest month.

Hydrology

Few published streamflow records are available for Desolation Creek. Some summary data are available from a gaging station operated on Desolation Creek (near Dale) between 1949 and 1958; but apparently no data was collected between 1958 and the early 1980s. Streamflow data collected since 1980 has yet to be analyzed.

Monthly distribution of discharge shows a strong spring maximum reflecting the contribution of melting snow to overall water yields (Figure 9). Desolation Creek has slightly higher average unit discharge (0.9 $cfsm^2$) compared to average discharge at other nearby gages (the North Fork John Day near Dale and Camas Creek near Ukiah both have unit discharges of 0.8 cfsm).

Figure 7. Average Annual Precipitation.

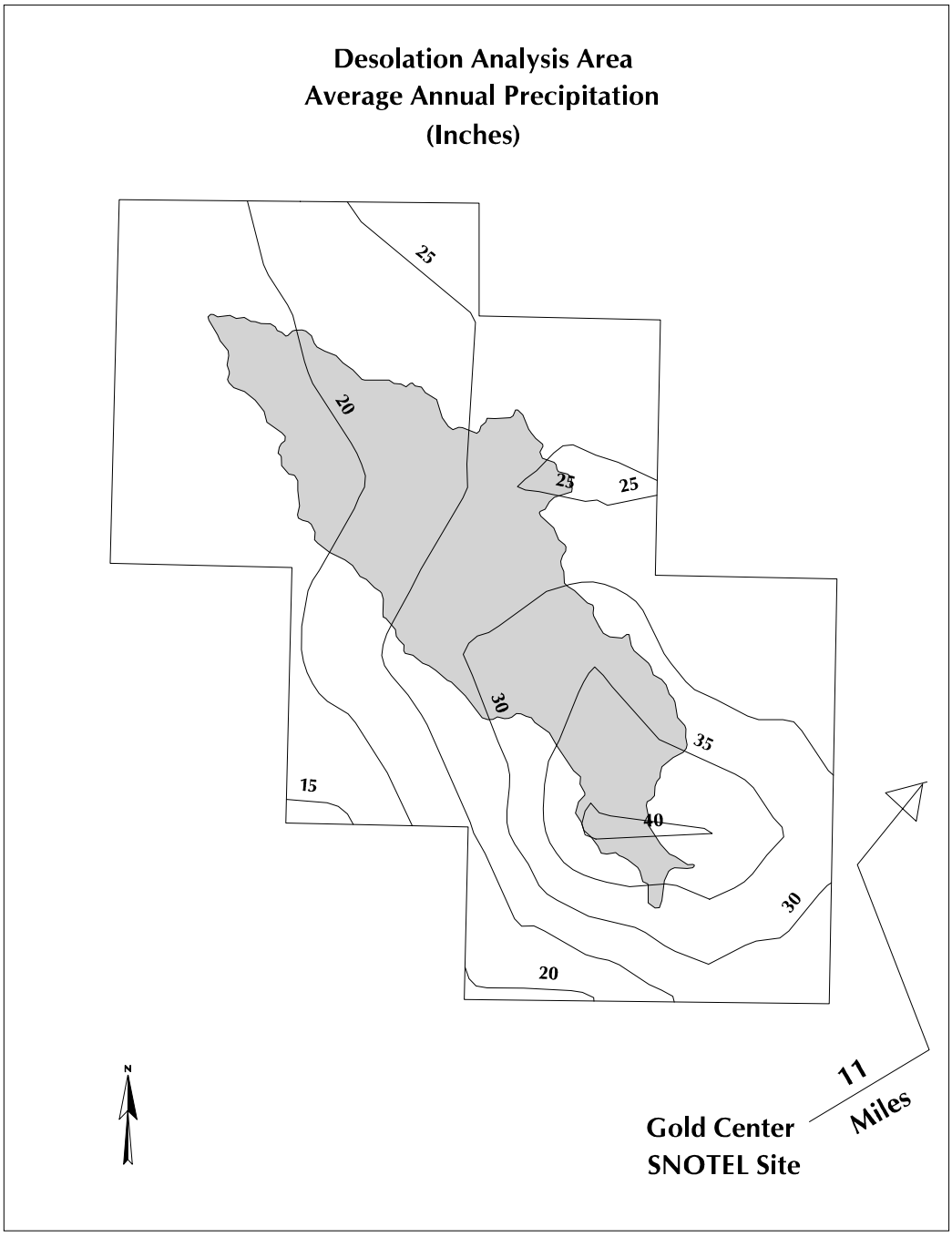
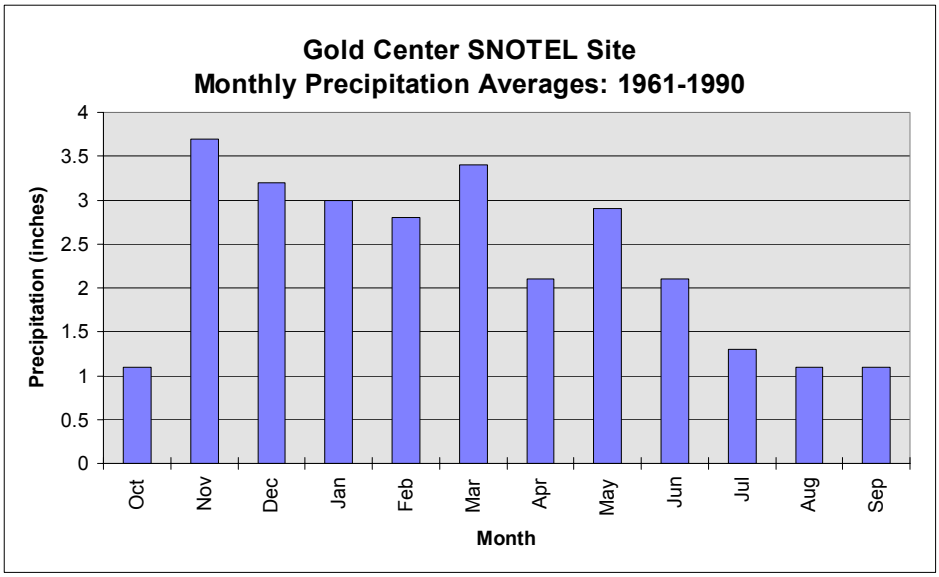


Figure 8. Gold Center SNOTEL Site - Average Monthly Precipitation.



Recorded maximum flows ranged from 414 cfs in 1959 to 1240 cfs in 1958 (Figure 10). Nine of the thirteen years with recorded peaks occurred in the months of May or June, during snowmelt runoff. Low flows ranged from 4.1 to 8.4 cfs, occurring between September and November.

Overall, Desolation Creek streamflows reflect the seasonal patterns of precipitation accumulation and temperature, with a winter snow accumulation, spring runoff peak, and fall baseflows.

Figure 9. Desolation Creek Average monthly streamflow.

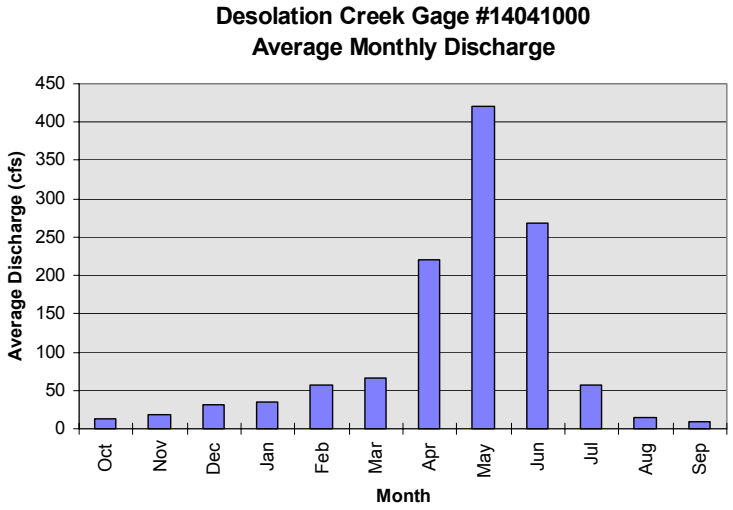
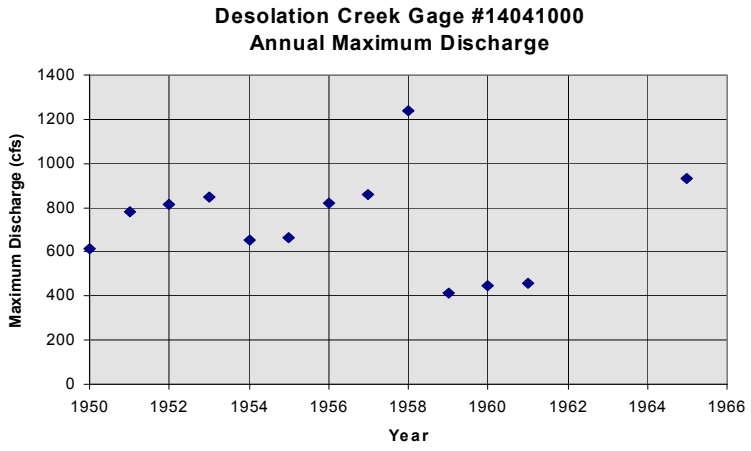


Figure 10. Desolation Creek Annual Maximum Streamflow.



Stream Channels and Riparian Areas

Desolation Creek flows from its origins in the Greenhorn Mountains, in a northwesterly-direction, to the North Fork of the John Day River (Figure 11). Major tributaries include the North and South Forks, Battle Creek, Junkens Creek, and Kelsay Creek. There are approximately 249 miles of stream, classified as follows:

> *Class 1*--streams that directly support anadromous fishery or public supply watershed;
> *Class 2* –support resident fish or important tributaries to a public supply watershed;
> *Class 3*--perennial streams that do not support fish or contribute to a public water supply; and
> *Class 4*--intermittent, seasonal streams

Compared to National Forest averages, Desolation Creek supports more miles of fish-bearing streams and has fewer miles of intermittent streams (Table 6). Some classification errors are apparent in the Bruin subwatershed. Overall, stream mapping and classification are at best an approximation of actual stream miles and fishery present.

Stream density, in miles per square mile of stream, is a measure of the degree of dissection of the watershed by the stream network. Stream density is related to runoff efficiency, that is, higher densities indicate more rapid collection and delivery of precipitation and runoff. The average stream density for the Desolation watershed is 2.3 miles per square mile which is low compared to other watersheds in the Blue Mountains. Low densities may reflect a real characteristic of the watershed, as in the case of recently glaciated landforms which have younger stream systems, or the data may underrepresent actual stream miles because of mapping assumptions.

Table 6. Miles of Stream by Stream Class, Compared to Forest Averages, Desolation Watershed.

Subwatershed	SWS#	Class 1	Class 2	Class 3	Class 4	TOTALS
Lower Desolation	36A	5.3		3.9	14.7	23.9
Wasson	36B	7.5		6.2	10.5	24.2
Kelsay	36C	13.3		1.2	11	25.5
Bruin	36D	9.6		36.1*	*	45.7
Junkens	36E	5.0		7.9	6.7	19.6
Battle	36F	12.0		6.0	17.4	35.4
Howard	36G	5.9	0.8	8.9	9.6	25.2
North Fork Desolation	36H	10.4	5.3	6.1	8.4	30.2
South Fork Desolation	36I	2.7		6.0	10.9	19.6
Watershed Totals		71.7	6.1	82.3	89.2	249.2
Percent		28.7	2.4	33.0	35.8	100
Forest Average (%)		11.0	4.0	24.0	61.0	100

* GIS data classification error

Stream channel morphology reflects climatic conditions, hydrology, landforming processes, and land uses occurring in the watershed. Channel morphology ranges from steep, confined headwater channels with coarse substrate (upper/lower South Fork Desolation, Battle, Junkens), to sinuous channels in glacially-modified U-shaped alluvial meadows (North Fork/South Fork Desolation), to mainstem Desolation Creek, a moderate gradient cobble-dominated stream. Riparian meadows in the upper watershed (North Fork and South Fork) are unique morphologic and biologic settings in the watershed (see Botanical discussion).

Water Quality

In general, the quality of water in the Desolation watershed is thought to be good, however, monitoring in recent years has detected water temperatures exceeding the state standard (1996) for bull trout. Streams in and downstream of Desolation Creek listed on Oregon's 1998 303(d) list:

- Desolation Creek, mouth to North/South confluence, temperature (bull trout)
- North Fork John Day River, Middle Fork to Granite, temperature (bull trout)

Sediment and aquatic habitat impairment may also be water quality concerns based on recent observations and data. Streamflow and water quality monitoring has been periodic; some streamflow records are available for the 1950's, and there has been a more recent emphasis on water temperature monitoring. Miscellaneous water quality sampling at these and other stations in the watershed occurred between 1972 and 1981, (data were input into STORET, the national water data bank maintained by the Environmental Protection Agency).

Figure 11. Desolation Streams

Water Rights and Uses

A variety of water rights and uses occur in the Desolation watershed. There are approximately 20 water rights (mostly spring and pond developments for livestock) on the National Forest filed with the Oregon Water Resources Department (OWRD). An additional 17 water sources (culvert outlets, ponds) have been identified by the Forest for road maintenance and fire protection needs. Three water rights are on file with OWRD for the Dale Work Center, which has its intake/source downstream from Desolation Creek, on the NFJD River.

There are two small lakes in the upper watershed; Lost Lake and Jump-Off Joe. Lost Lake was modified in 1991 to increase storage from 4 to 7.5 acres.

Forest Overstory Vegetation

Potential Natural Vegetation (PNV)

Mountainous areas such as the Desolation watershed have steep environmental gradients, which means that site conditions vary in response to changes in landform, elevation, climate, soils, slope exposure, geology, and a variety of other biophysical factors. Any unique combination of biophysical factors results in a slightly different environment, usually expressed as a change in temperature and moisture conditions. In the Desolation analysis area, temperature and moisture regimes vary with changes in elevation and aspect.

The climax plant community (i.e., the PNV) associated with a particular set of environmental conditions (temperature and moisture) is called a *plant association*. Sites that can support similar plant associations are grouped together as a *plant association group* (PAG). Similarly, closely related plant association groups can be aggregated into *potential vegetation groups* (PVG; cold forest, moist forest, dry forest). The ultimate result is a taxonomy or hierarchy of potential natural vegetation, ranging from plant associations at the lowest level to potential vegetation groups at the highest level (Tables 7 and 8). Figure 12a shows the location and distribution of upland forest PVGs in the Desolation watershed; Figure 12b provides the same information for PAGs.

Table 7. Selected characteristics of potential vegetation groups (PVGs) for upland forests for the Desolation Watershed.

PVG	AREA (ACRES)	DISTUR-BANCES	FIRE REGIME	PATCH SIZE	ELEVATION (FEET)	SLOPE (PERCENT)	TYPICAL ASPECTS
Dry Upland Forest	16,719	Harvest Fire Insects	Low	433 (4-12809)	4508 (2971-6792)	15 (1-57)	Southwest West South
Moist Upland Forest	24,705	Harvest Fire Insects Diseases	Mixed	473 (1-7216)	5424 (2984-7278)	15 (0-52)	North Northeast Northwest Level
Cold Upland Forest	23,449	Wind Insects Fire Diseases	High	655 (1-7888)	6125 (4395-7632)	17 (1-58)	Northeast North Southwest West

Sources/Notes: Areas, elevations, slope percents, and aspects were summarized from the 97veg database (see Appendix for more information). See Fire and Fuels section for description of fire regime ratings.

Table 8. PVGs, PAGs, and vegetation types for upland forests/woodlands of the Desolation area.

PVG/PAG	Abbreviation & Common Name of Vegetation Type (Association/Community Type)	Area
Cold Forest : Cold Dry		
	Grand Fir/Grouse Huckleberry	6,657
ABLA2/CAGE	Subalpine Fir/Elk Sedge	1,675
ABLA2 subalpine parks	Subalpine Fir subalpine parklands	641
ABLA2/VASC	Subalpine Fir/Grouse Huckleberry	10,091
PICO(ABGR)/VASC/CARU	Lodgepole Pine (Grand Fir)/Grouse Huck./Pinegrass	1,990
PICO(ABLA2)/VASC	Lodgepole Pine (Subalpine Fir)/Grouse Huckleberry	2,322
PICO subalpine parks	Lodgepole Pine subalpine parklands	61
Cool Dry		
ABLA2/CARU	Subalpine Fir/Pinegrass	12
Moist Forest: Cool Moist		
ABGR/CLUN	Grand Fir/Queen's Cup Beadlily	357
ABGR/LIBO2	Grand Fir/Twinflower	2,261
ABGR/VAME	Grand Fir/Big Huckleberry	9,119
ABGR/VASC-LIBO2	Grand Fir/Grouse Huckleberry-Twinflower	2,168
ABLA2/CLUN	Subalpine Fir/Queen's Cup Beadlily	102
ABLA2/LIBO2	Subalpine Fir/Twinflower	1,699
ABLA2/VAME	Subalpine Fir/Big Huckleberry	7,783
PICO(ABGR)/VAME	Lodgepole Pine (Grand Fir)/Big Huckleberry	746
PICO(ABGR)/VAME-LIBO2	Lodgepole Pine (Grand Fir)/Big Huck.-Twinflower	42
PICO(ABLA2)/VAME	Lodgepole Pine (Subalpine Fir)/Big Huckleberry	216
Warm Moist		
ABGR/BRVU	Grand Fir/Columbia Brome	212
Dry Forest : Warm Dry		
ABGR/CAGE	Grand Fir/Elk Sedge	1,669
ABGR/CARU	Grand Fir/Pinegrass	2,867
PIPO/CAGE	Ponderosa Pine/Elk Sedge	2,011
PIPO/CARU	Ponderosa Pine/Pinegrass	1,950
PIPO/CELE/CAGE	Ponderosa Pine/Mountain-mahogany/Elk Sedge	416
PIPO/PUTR/CAGE	Ponderosa Pine/Bitterbrush/Elk Sedge	61
PIPO/SPBE	Ponderosa Pine/Birchleaf Spirea	128
PIPO/SYAL	Ponderosa Pine/Common Snowberry	1,235
PSME/CAGE	Douglas-fir/Elk Sedge	1,448
PSME/CARU	Douglas-fir/Pinegrass	2,769
PSME/SPBE	Douglas-fir/Birchleaf Spirea	97
PSME/SYAL	Douglas-fir/Common Snowberry	842
PSME/VAME	Douglas-fir/Big Huckleberry	413
Hot Dry		
PIPO/AGSP	Ponderosa Pine/Bluebunch Wheatgrass	537
PIPO/PUTR/FEID-AGSP	Ponderosa Pine/Bitterbrush/Idaho Fescue-Bluebunch Wheatgrass	276
Moist Woodland		
Hot Moist		
JUOC/CELE/CAGE	Western Juniper/Mountain-mahogany/Elk Sedge	48
JUOC/FEID-AGSP	Western Juniper/Idaho Fescue-Bluebunch Wheatgrass	172

Sources/Notes: Adapted from Powell (1998). The "Area" column is the total acreage for the vegetation type in the Desolation area (summarized from the DesoPNV database). Area values will not sum to the total for the analysis area because non-forest types (grassland, herbland, shrubland) and riparian forests are not included in this summary.

Figure 12a. Potential vegetation groups (PVGs) for upland forests of the Desolation analysis area.

Figure 12b. Plant association groups (PAGs) for upland forests of the Desolation analysis area.

Insects and Disease

Populations of bark beetles in ponderosa pine and Douglas-fir have maintained high endemic levels for several years due to a number of factors favorable to the beetles: defoliator-weakened trees, moisture stress from prolonged drought, overstocked stands, several mild winters, and a series of stand-replacing fires that have provided abundant beetle habitat, among others.

Fire and Fuels

The frequency and intensity of wildfires that have resulted in today's forest landscape reflect the interaction of fire regimes, lightning frequency and forest stand condition (Figure 13). The three dominant fire regimes within the watershed are described below. Insect and disease conditions are characterized above. Finally, the Desolation Watershed Analysis Area is within the highest fire occurrence zone on the Forest in terms of number of fire starts.

Fire Regimes

Dry Forests
Low intensity-short return interval fires dominate dry forests. Fire sustains early seral species, such as ponderosa pine, and thins a large proportion of the seedlings and saplings that become established between fires. The result is that a majority of this forest type should be open, single storied stands.

Moist Forests
Fire regimes are complex in these forests, and are often referred to as a mixed fire regime, indicating that fires often burn with a combination of low to moderate intensity surface fire, and patches of high intensity fire. The patches of high intensity, stand replacing fire occur when changes in surface fuels; stand density, and/or topography come together to increase fire intensity. Because of the variation in these factors, patch sizes resulting from this type of fire regime is likely to be highly variable.

Cold Forests
The cold forest fire regime is characterized as high intensity-low frequency. Tree species in these forests show little resistance to fire, but, in the case of lodgepole pine, can quickly reclaim a site after a fire. The late seral species of these forests, such as subalpine fir and Engelmann spruce, are very susceptible to crowning and/or torching, which produces fires that spread rapidly via spotting or crowning runs.

Figure 13. Desolation Watershed Analysis Area

Understory and Non-Forest Botanical Resources

The Desolation Watershed encompasses a wide variety of habitat types ranging from hot, low elevation, south facing steppes and ponderosa pine forests in the northwest corner, to cooler subalpine fir, whitebark pine, and open, almost alpine meadow habitats at higher elevations in the southeast portion of the watershed.

The extent and ecological significance of its meadow habitat sets this watershed apart from all the other watersheds on the Forest. Chains of large and small meadows and spring/seep areas follow the upper half of the mainstem of Desolation Creek, and its north and south forks. Small meadows and seeps are found along most of the mid- to upper elevation, year-round creeks, and throughout mid- and upper elevation forests. The largest meadow area is Desolation Meadows (approximately 200 acres). The only other meadow area on the District (and possibly the Forest) of comparable size is the Trout Meadows area (located about 10 miles north of the town of Granite). That meadow system, however, is intensively grazed by sheep, with subsequently lower plant diversity.

The meadows and riparian complexes are potential habitat for all of the currently listed Sensitive plant species known to occur on the North Fork John Day Ranger District, as well as some Sensitive species not currently included on the Regional Forester's List. The meadows have been grazed by livestock for over 100 years, sometimes at extremely high stocking rates (eg., 20,000 sheep in Desolation Meadows, R. Fitzgerald, NFJD Ranger District., pers. comm.). Many of the meadows have been reseeded to non-native species to try to mitigate grazing and other resource damage. This has further displaced many native plant species.

Stocking rates for livestock have declined markedly since the 1950, and Condition and Trend studies initiated in the late 1950s show improvements in range condition (T. Thompson, NFJD Ranger District, pers. comm.). However, complete recovery of shrub and aspen communities has been prevented by the combination of continued grazing by livestock and increased browsing from elk and deer populations.

Floristic Richness

Based on botanical surveys of 56,265 acres (about 90 percent of the National Forest acres), 723 species of vascular plants are known to occur within the Desolation watershed. These include 16 trees, 67 shrubs, 509 forbs, 86 grasses, and 44 "grasslike" species (sedges and rushes). A complete listing is found in the Botanical specialist report in the Appendix.

The unsurveyed portions of the watershed are located in the scenic/roadless area in Subwatershed 36I: The area is mostly high elevation, with complex geology and soils (including pockets of serpentine). Species seldom found, or unknown to the rest of the District or Forest could be found there. Most of the unsurveyed area was burned in the Summit fire in 1996.

No “official” surveys have been conducted for fungus or bryophyte species, and our information on their presence and distribution is virtually nonexistent.

Culturally-significant Plants

Culturally significant food plants, as well as medicinal plants and other plants and products that could be classified as "Special Forest Products" (non-timber plants and products with commercial exploitation potential) are present in the watershed. The amount of use, plants utilized, and areas of utilization is undocumented.

Noxious Weeds

Currently being tracked and treated by the North Fork John Day Ranger District are 14 noxious weed sites, composed of spotted knapweed, diffuse knapweed, houndstongue, bastard toadflax, and tansy ragwort. The sites cover a total of 63 acres, and range in size from ¼ acre to 17 acres.

Historically-listed and Presently-listed Sensitive Plant Species

Occurring within the watershed are seven plants currently on the Regional Forester's List of Sensitive Plant Species. Two species are proposed for addition to that list when it is next updated.

Also found within the watershed are two species on the Oregon Natural Heritage Program (ORNHP) lists, but not on the Regional Forester's List, 14 historically listed sensitive species, and one (possibly two) new species that have not yet been described.

Most of the aforementioned species grow in meadow or riparian habitats. Four of the historically listed species grow in old, late seral forest habitats, two grow on high elevation, open habitats and one grows on predominantly serpentine rock outcrops.

Fish and Aquatic Habitat

Aquatic Species

Desolation Creek is a tributary of the North Fork John Day River, which is in turn a tributary of the John Day and the Columbia Rivers (Figure 14). The John Day River is the largest Columbia River tributary without major dams or reservoirs to act as passage barriers for migrating salmonids, and it supports the largest remaining wild stock of spring chinook salmon (*Oncorhynchus tshawytscha*) in the Columbia River Basin.

The North Fork John Day River and its tributaries account for about 70 percent of the salmon production in the John Day Basin. The John Day River Basin once supported substantial runs of both spring and fall chinook salmon and summer steelhead (*Oncorhynchus mykiss*). Fall chinook now appear extinct, and spring chinook runs have declined to between 2000 and 5000 fish (Northwest Power Planning Council, 1989). Recent steelhead runs have averaged from 15,000 to 40,000 fish. Other reports, based on steelhead spawning surveys in the John Day Basin, indicate that steelhead numbers have been declining by about 15 percent per year since 1985 (Federal Register, 1996).

Desolation Creek supports six species of salmonids. These include five of the seven species identified by the Interior Columbia Basin Ecosystem Management Project (ICBEMP) as key salmonids (fish viewed as important indicators of aquatic integrity). Desolation Creek appears to be centered in an area of ICBEMP Key Salmonid diversity in the John Day Basin (Figure 15). In addition to chinook salmon and steelhead (and the conspecific redband trout), Desolation Creek contains bull trout (*Salvelinus confluentis*), brook trout (*Salvelinus fontinalis*), west slope cutthroat trout (*Oncorhynchus clarki* ssp) and mountain whitefish (*Prosopium williamsoni*).

The U.S. Forest Service Region Six lists bull trout, mid-Columbia steelhead, mid-Columbia chinook salmon and redband as Sensitive species. On March 10, 1998, the National Marine Fisheries Service proposed listing steelhead as Threatened under the Endangered Species Act (Federal Register, 1998a). A decision is due in February of 1999. The United States Fish and Wildlife Service listed bull trout as Threatened under the Endangered Species Act on June 10, 1998 (Federal Register, 1998b).

The blue mountain cryptochian, *Cryptochia neosa*, classified in 1984 by the US Fish and Wildlife Service as a Category 2 candidate for the Federal Threatened and Endangered Species List, has been found in several tributaries of Desolation Creek. C*ryptochia* has recently been found to be more widespread than was previously thought. Some scientists have recommended that its status be changed from Category 2 to Category 3C (Betts and Wisseman 1995). Category 3C is for "taxa proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat" (Federal Register, 1984). The blue mountain cryptochian is a Region 6 Sensitive Species.

The Desolation Creek Watershed contains about 249 miles of streams (Figures 16 and 17). The Umatilla National Forest streams database indicates that perennial streams comprise about 160 of these miles, and 78 are fish-bearing. About 72 miles of Desolation Creek streams host anadromous fish during some part of their life cycle.

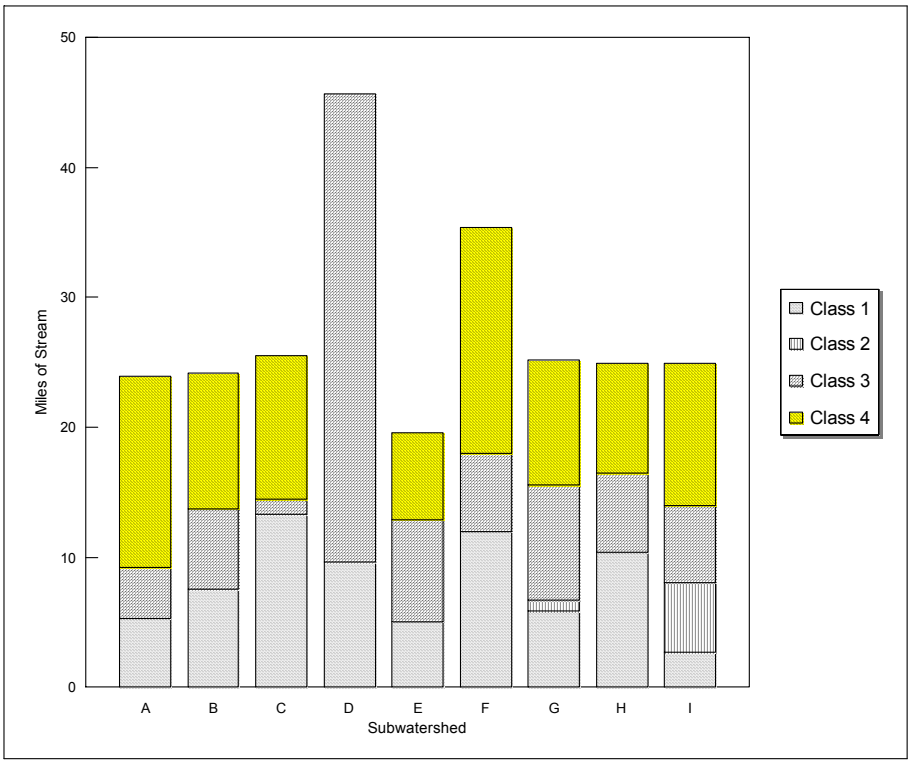
(Note: for one subwatershed (36D -- Bruin) the database shows surprisingly high mileage for class three (perennial, non-fish-bearing) streams and no class four (seasonally intermittent) streams. This is almost certainly a GIS error).

Figure 14. John Day Sub-basins and Aquatic Integrity.

Figure 15. North Fork John Day Tributaries and Key Salmonids.

Figure 16. The Desolation Creek Watershed

Figure 17. Distribution of Stream Classes Within Desolation Creek



Management Constraints

Excluding private lands, C2, C3 and C4 designations, 51,887 acres, or 74 percent of the Desolation drainage is included in some type of conservative management strategy, indicating the importance of the fisheries and scenic resources in this watershed.

In 1996, the Umatilla National Forest determined that Desolation Creek, including both its North and South Forks, was eligible as a Wild and Scenic River under the Wild and Scenic Rivers Act. Eligibility determinations begin a process which may or may not eventually culminate in designation of the stream as a Wild and Scenic River. However, once a stream is determined to be eligible, it must be managed to maintain its eligibility, pending Congressional approval. Its free flowing characteristics and all outstandingly remarkable values must be maintained. Wild and Scenic River eligibility could thus place additional constraints on the management of the Creek, particularly those stretches outside of the C7 or A8 management areas.

Regional requirements for PACFISH (1995) management strategies, and the presence of Sensitive aquatic species impose further scrutiny of activities in the Desolation Watershed. Most recently, the listing of bull trout as Threatened under the Endangered Species Act (ESA) introduces additional regulatory constraints on management options for the area, since any activity that could result in "taking" of a listed species is generally prohibited, or at minimum requires consultation with the listing agency.

Other regulatory constraints include the listing of Desolation Creek as "water quality limited" by The Oregon Department of Environmental Quality and parts of the following: The National Forest Management Act (NFMA), the Federal Land Policy Management Act (FLPMA), the Oregon and California Lands Act (O & C Act), the National Environmental Policy Act (NEPA), the Clean Water Act (CWA), and federal trust responsibilities to Indian tribes.

Past Management and Human Uses

Recent management activities in the Desolation Creek watershed have included timber harvest and regeneration, cattle grazing, road construction and use, mining, fire suppression, and prescribed fire.

Historically, the Umatilla and Warm Springs tribal groups used Desolation Creek at Desolation Meadows as a traditional fishing site.

The watershed supports some sport fishing, primarily at Jump-Off Joe and Lost lakes. Both developed and dispersed, user-created campsites are common within riparian corridors throughout the drainage.

Special Circumstances

Because: 1) the John Day River basin is the largest stream system without major dams or reservoirs in the Interior Columbia River Basin; 2) it is relatively low in the Columbia River system ("only" three dams between the mouth of the John Day and the ocean); and 3) it still retains runs of natural wild chinook salmon and steelhead; the North Fork John Day River probably represents the best hope for maintenance and restoration of natural salmon and steelhead runs of any managed stream system on the Umatilla National Forest (and perhaps the best hope for any stream in the Interior Columbia Basin). Although Desolation Creek is not currently, and may never have been, an important chinook salmon spawning stream, it does support chinook *rearing,* as well as year-round habitat for redband, steelhead and bull trout. Moreover, the quality of Desolation Creek's water affects downstream habitat in the North Fork and mainstem of the John Day River.

Terrestrial Wildlife

Habitat

Approximately 9 percent of the Desolation watershed is included in Management Areas having specific emphasis on habitats for terrestrial wildlife, including Management Areas C1-Dedicated Old Growth (1,947 ac; 2%), C2-Managed Old Growth (1,043 ac; 1%), C3-Big Game Winter Range (3,894 ac; 5%), C4-Wildlife Habitat (171 ac; <1%), and C5-Riparian (165 ac; <1%).

Habitats in the Desolation watershed range from subalpine forest, sheer rock faces and talus slopes at the upper elevations, through mid-elevation stands of true firs and mixed conifers to open pine stands and rocky scablands in the lower portion of the drainage. An abundance of water-influenced habitats; stream corridors, seeps, wet meadows, and occasional aspen stands, make the Desolation drainage especially valuable to terrestrial vertebrates. Desolation Meadows provides an uncommonly large expanse of wet meadow habitat for this area of the Blue Mountains.

Management practices (timber harvest, grazing, fire suppression, etc.) over the past 50 years, along with natural disturbances, have contributed to changes in forest structure and composition. Resultant changes in habitat quality and quantity include reductions in habitat patch size, distribution and connectivity. Late/old forest structure is almost gone.

Dead standing tree and down wood densities vary across the landscape. Densities range from very high in areas of insect or fire-induced mortality, to very low in the intensively-managed ponderosa pine stands in the lower drainage (mostly private).

The Desolation drainage provides extensive areas of habitat for Rocky Mountain elk, one of the Forest's Management Indicator Species. In the lower drainage, Case Ridge and Onion Flats provide important winter forage for large numbers of both elk and mule deer. Sharp's Ridge, which forms the southwestern boundary of the Analysis area, is a major migratory corridor for elk and deer in their seasonal movements between winter and summer ranges. Winter road closures and forage fertilization in high-use areas have enhanced the quantity and quality of winter range habitat. Calving habitat within the drainage is found in areas that provide abundant cover and forage. Numerous springs, seeps and wet meadows provide critical islands of green forage during the dry late summer/early fall months.

Approximately 11 percent of the watershed was burned by wildfire in 1996, changing the configuration and distribution of habitats. Some old forest stands, mostly in the South Fork Desolation drainage, were lost in the 1996 fires. While some areas within the fire boundary experienced stand-replacement fire, other areas were effectively underburned, and many islands of unburned, green forest remain. Expected changes in habitat composition and use resulting from wildfire are discussed in the Current Conditions section.

Species

A wide variety of terrestrial wildlife species occurs in the Desolation analysis area. Approximately 192 species of terrestrial vertebrates have the potential to occur within the drainage, including 5 amphibians, 7 reptiles, 122 birds, and 58 mammals (see Wildlife Specialist Report in the Appendix for a complete species list).

Approximately 47 percent of the bird species that nest within the drainage are Neotropical Migrants (species that winter in Central or south America). Several species of raptors, including the goshawk and great gray owl, occur in the drainage. Osprey nest in large snags along Desolation Creek.

Forest carnivores, including cougar, black bear, bobcat, coyote and marten, are present. Winter tracking surveys have not resulted in location of lynx or wolverine within the Desolation drainage; however, wolverine have recently been confirmed on the District (see TES discussion below).

Management Indicator Species

All Forest Management Indicator Species (MIS) (pileated woodpecker, pine marten, northern three-toed woodpecker, Rocky Mountain elk, and primary cavity excavators) have been observed in the Desolation watershed.

Threatened, Endangered, and Sensitive Species

One Threatened and one Endangered species have the potential to occur in the Desolation area: the bald eagle and the peregrine falcon. The area supports foraging habitat, as well as limited areas of suitable nesting habitat for the peregrine falcon. Bald eagles are common winter residents along Desolation Creek; nesting habitat is considered marginal.

The Region 6, Regional Forester's Sensitive Species includes several species which are known or have the potential to occur in the Desolation area (Table 9). A wolverine was recently observed in the nearby North Fork John Day Wilderness (Michael McVeigh, NFJD R.D., July, 1998). Habitat capable of supporting lynx (proposed for Threatened and Endangered Species listing) is present in the Desolation watershed. No tracks or observations of lynx have been recorded in the drainage, however, there have been sightings to the south of the Desolation drainage on the neighboring Malheur National Forest.

Table 9. Threatened, Endangered and Sensitive Species with potential to occur in the Desolation Analysis Area.

SPECIES	U.S. FISH AND WILDLIFE SERVICE	R-6 REGIONAL FORESTER'S SENSITIVE	STATE STATUS (OREGON)
western toad			Sensitive-Vulnerable
Columbia spotted frog	Candidate		Sensitive-Undetermined
tailed frog			Sensitive-Vulnerable
bald eagle	Threatened	Sensitive	Threatened
peregrine falcon	Threatened	Sensitive	Endangered
white-headed woodpecker			Sensitive-Critical
three-toed woodpecker			Sensitive-Critical
black-backed woodpecker			Sensitive-Critical
long-eared myotis			Sensitive-Undetermined
fringed myotis			Sensitive-Vulnerable
long-legged myotis			Sensitive-Vulnerable
western small-footed myotis			Sensitive-Undetermined
silver-haired bat			Sensitive-Undetermined
Townsend's big-eared bat		Sensitive	Sensitive-Critical
Marten			Sensitive-Vulnerable
Lynx	Proposed Threatened		
Wolverine		Sensitive	Threatened

Heritage Resources

Archaeological

American Indian artifacts occur in low density throughout the Desolation Watershed. Lithic artifacts found within the watershed include scrapers and projectile points, as well as a full range of stone flakes and cores. No artifact class is well represented in the watershed. No dense scatters of lithics have been noted in the watershed, with only one known Native American site having greater than 10 artifacts. The types and distribution of lithic artifacts fit within the patterns of hunting deposits from other areas, although none of the located sites are large enough to make definitive statements as to their function. No ground stone was found, although various plant processing activities would have been performed in conjunction with game procurement. No evidence indicates the area was inhabited on more than a seasonal basis.

Time relevant artifacts found thus far in the watershed indicate that the uplands were probably not occupied before the Middle Holocene. Based on the few time-marking projectile points identified, the heaviest use of the area occurred from approximately 4500 to 500 years ago.

Historical

Historic features and isolates within the Desolation Watershed are representative of many key themes in the region's history. Features relating to gold mining are the most heavily represented site type. In some cases, decades of historic use have resulted in superimposed features. Stock raising has been a longstanding activity in the area. Various U.S. Forest Service administrative sites are present, ranging from guard stations to telecommunications lines. Hunting camps are common in the area.

Recreation/Wilderness

Recreation

The analysis area is located in a relatively remote yet roaded portion of the North Fork John Day Ranger District. Recreation Opportunity Spectrum (ROS) categories include "Semi-Primitive Motorized", "Roaded Natural', "Roaded Modified", and "Semi-Primitive Non-Motorized".

A wide diversity of recreation activities such as snowmobiling, horseback riding, hiking, mountain biking, motorcycle/all terrain vehicle trail riding, hunting, fishing, and camping occur in this area. Welch Creek Campground/Trailhead serves as the primary developed camping and picnicking location during the summer months. This campground has five individual/group campsites with an estimated 2500 RVDs (Recreational Visitor Days) per year.

A portion of the Vinegar Hill-Indian Rock Scenic Area is located within the watershed.

Wilderness

A small area (777 acres) on the northeast boundary of the Desolation Watershed is within the North Fork John Day Wilderness.

Wild and Scenic Rivers

In 1996, the Umatilla National Forest completed a Wild and Scenic River eligibility determination for a number of rivers and streams. The eligibility of the rivers as a Wild and Scenic River was determined under the provisions found in Section 5(d) of the Wild and Scenic Rivers Act. Desolation and South Fork Desolation Creeks were found to be eligible. The Forest grouped the eligible streams into river systems for a suitability study. Desolation, including both South Fork and North Fork, is one of the river systems. The outstanding remarkable values identified for the Desolation System (headwaters of North Fork and South Fork Desolation to North Fork John Day River) are: fisheries, wildlife, recreation, botanical/ecological, and hydrologic. River segments found eligible are classified as either Wild, Scenic or Recreational, based on the level of development and access in the river corridor. The mainstem, north and south forks of Desolation Creek were found to meet minimum eligibility requirements in various classifications (Table 10).

Table 10. Wild and Scenic Rivers Classification Analysis Summary - Desolation Creek

ATTRIBUTE	SEGMENT 1	SEGMENT 2	SEGMENT 3	SEGMENT 4
Water Resource Development	Free of impoundment	Free of impoundment	Free of impoundment	Free of impoundment
Shoreline Development	Essentially primitive. Little or no evidence of human activity	Substantial evidence of human activity.	Evidence of timber harvest; forest appears near natural from riverbank	Some development. Substantial evidence of human activity.
Accessibility	Generally inaccessible except by trail.	Accessible in places by road. Roads generally inconspicuous.	Accessible in places by road.	Readily accessible by road.
Water Quality	Meets or exceeds federal criteria or approved state standards; waters unpolluted.	Meets or exceeds federal criteria or approved state standards; waters unpolluted.	Meets or exceeds federal criteria or approved state standards; waters unpolluted.	Meets or exceeds federal criteria or approved state standards; waters unpolluted.
Classification	**Wild**	**Recreation**	**Scenic**	**Recreation**

Administrative Sites

Two guard stations are located within the watershed. The Battle Creek Guard Station has been renovated through the cooperative efforts of the Desolation Riders. The Desolation Riders have an agreement with the Forest Service to use Battle Creek Guard Station while working on trails. Desolation Guard Station has received some maintenance work through the efforts of the Sumpter Snowmobile Club.

An 80-foot lookout tower is located on Desolation Butte. Visitors are allowed to climb the lookout when it is staffed.

Minerals

The North Fork John Day Ranger District encompasses 661 claims filed within the boundaries of the district. However, only about 40 claims have approved plans of operation that grant them authority to extract minerals. The remaining claims are either inactive or only involved with exploration and testing. Placer and lode claims are the two primary forms of mining activity on the North Fork John Day Ranger District. Most of the claims are recognizable visually with structures, equipment, adits, settling ponds, stamp mills, living quarters or other disturbances. Some claims have no trace of activity. As some claims become active, others are in the process of reclamation, therefore, the number of claims fluctuates from season to season. Moderate levels of activity have been observed in previous years, but due to increasing operation costs, it has become more difficult for many claim holders to continue operations. Substantial levels of activity exist on privately owned lands.

Evidence of historic placer mining is found in several areas of the Desolation drainage, especially in the Junkens Creek, Welch Creek, and Skinner Creek areas. The Donaldson Mine (T9S R34E, Section 30) in the South Fork Desolation drainage is still shown on the Umatilla National Forest Visitor Map but has been inactive for several decades. One active mining claim and three abandoned mines are located within the watershed.

Rangeland Resources

While the term "rangelands" may be interpreted to mean grasslands, shrublands or high desert (at least in Oregon), the term "Rangeland Resources", as used in this document, applies primarily to the forage resources available to domestic livestock. In Desolation, the bulk of these resources are found in forested settings. The Desolation drainage supports approximately 53,580 acres of useable forage for domestic livestock (and wild ungulates), and includes upland forests, wet meadows and riparian areas, and some areas of open grass/scabland (Table 11).

The Desolation Watershed contains portions of two grazing allotments for domestic cattle that are administered by the Umatilla National Forest: Central Desolation Cattle Allotment and Indian Creek Sheep Allotment. Acres by allotment within the watershed are shown in the following table.

Table 11. Range Allotment Acres in the Desolation Watershed.

RANGE ALLOTMENT/PASTURE	TOTAL ACRES	WITHIN DESOLATION WATERSHED
Central Desolation Cattle/Deep Canyon	3,765	371
Central Desolation Cattle/Case	1,528	56
Central Desolation Cattle/Outlaw	5,339	975
Central Desolation Cattle/Ridge	816	123
Central Desolation Cattle/Turner	5,561	2,773
Indian Creek Cattle/Bully Creek	18,541	6,620
Indian Creek Cattle/Indian Creek	21,058	5,479
Indian Creek Cattle/Battle Creek	24,069	20,178
Indian Creek Cattle/Meadow	18,338	17,006
TOTAL	99,015	53,581