

*Scientific Justification  
for the Proposed  
Columbia Mountains  
National Monument*



## *Credits*

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### *Photo Credits*

Photographs for this report were taken by Tim Coleman.

### *On the Cover*

Autumn fades into winter on Sherman Peak in the proposed Columbia Mountains National Monument

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## ***Introduction***

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The Columbia Mountains contain the largest area of pristine montane forests in northeastern Washington and some of the best remaining virgin forests in the United States. Extensive stands of late-successional and old-growth forests are found throughout the area and represent some of the best remaining examples of this imperiled ecosystem. This wild, mountainous landscape provides critical refugia for many species of conservation concern in the Pacific Northwest. The proposed Columbia Mountain National Monument would fill a large gap in the network of protected areas in the United States.



**Bald Peak in the Columbia Mountains is important habitat for lynx.**

The proposed Columbia Mountains National Monument consists of over 420,000 acres in the Kettle Mountain Range of northeastern Washington (Figure 1). The area is dominated by the Kettle Range, a ridge of gently rolling mountains rising from the arid lowlands of the Columbia River Basin and extending north into the Monashee Range of Canada. The Columbia Mountains merge with the Okanogan Highlands to the west, and are separated from the Selkirk Mountain Range to the east by the Kettle and Columbia River systems.

Today, virgin late-successional and old-growth forests blanket much of the landscape. Their grandeur bespeaks the ecological integrity and importance of this area. They are one of most important features of the proposed Columbia Mountains National Monument, providing refuge to a diverse flora and fauna.

However, the rich biological heritage of this area receives little protection. As a result, continued logging, road building, and motorized recreation threaten the integrity of the Columbia Mountains ecosystem.

## ***Significance of the Columbia Mountains***

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This report demonstrates the significance of the Columbia Mountains area and provides justification for its designation as a national monument under the Antiquities Act of 1906. Its warranting features are:

1. Extensive old-growth forests, listed as an endangered ecosystem by Noss et al. (1995).
2. Presence of extensive old-growth ponderosa pine forests – the most endangered old-growth forest type in the Pacific Northwest.

3. Occurrence of many old-growth-dependent plant and wildlife species such as several species of *Botrychium* (moonworts and grapeferns), fisher (*Martes pennati*), marten (*Martes americana*), several species of bats, and northern flying squirrels (*Glaucomys sabrinus*).
4. The endemic Okanogan fameflower (*Talinum sedifforme*).
5. Occurrence of large-ranging threatened and endangered species such as gray wolf (*Canis lupus*), grizzly bear (*Ursus arctos*), lynx (*Lynx canadensis*), and wolverine (*Gulo gulo*).
6. Occurrence of many other species of conservation concern.
7. Function as a reserve of biological diversity in Washington state that if protected would fill a large gap in the conservation network of North America.
8. Refuge for high elevation and forest species in an area of the Columbia Plateau dominated by low and middle elevation habitats.
9. Diverse and unique geology, a product of plate tectonics, volcanism and glaciation at the southern margin of continental glaciation.
10. Vulnerability to continued logging of old-growth forests, road building, and development.

Designation of the Columbia Mountains area as a national monument will preserve the essential character of this imperiled landscape. This report details the unique geology, landscape ecology, biology, archaeology, culture and history of the Columbia Mountains

## ***Proposed Area***

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The proposed Columbia Mountains National Monument is located in the western portion of the Colville National Forest and contains portions of the Republic and Kettle Falls Ranger Districts (Figure 2). The proposed monument follows the administrative boundary of the Colville National Forest within Ferry County, Washington. The northern border of the monument is the international boundary between the United States and Canada. Its eastern border follows the Colville National Forest Administrative Boundary west of the Kettle River and south along the Columbia River to the Colville Indian Reservation. The southern border of the proposed monument is the Colville Indian Reservation. The western border of the proposed monument follows the administrative boundary, lying just east of the Sanpoil River.

## ***Ownership and Management***

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The proposed Columbia Mountains National Monument is almost entirely Colville National Forest land (Table 1, Figure 2). There are small percentages of Bureau of Land Management ownership and private inholdings.

**Table 1. Land Ownership for the area of the proposed Columbia Mountains National Monument.**

<b>Ownership</b>	<b>Area in acres</b>	<b>Per cent of Total</b>
USFS Colville National Forest	411,985 ac	97.2%
Bureau of Land Management	2,666 ac	0.6%
Private	9,264 ac	2.2%

The area within the proposed national monument and the surrounding landscape is essentially unprotected from logging and road building (Table 2, Figure 3). The Columbia Mountains portion of the Colville National Forest was withdrawn from the north half of the Colville Indian Reservation in 1892, then opened for homesteading in 1890. In 1907, the remaining unsettled lands were set up as the Colville National Forest, which began management of range, merchantable timber, big game,

and recreation facilities (Kettle Falls Ranger District 1996). Approximately 337,000 acres (89.5% of total area) of the Columbia Mountains area is currently designated for logging and road building under management designations 3A, 3B, 5, 6, 7, 8, 10 (Table 2). In addition, almost all of northeastern Washington has little protection for the conservation of pristine ecosystems (Cassidy et al. 1997). The Colville National Forest Land and Resource Management Plan (1988c) recognized the need for protecting sensitive portions of the Columbia Mountains landscape by proposing the Fire Mountain, O'Brien Creek, and Thirteenmile ponds areas as Research Natural Areas, but these are very small areas. In order to preserve the ecological integrity of the region, all of the remaining wild areas of the Columbia Mountains need to be conserved.

**Table 2. Colville National Forest management designations for the area of the proposed Columbia Mountains National Monument (Colville National Forest 1988).**

Management Code	Description	Area in acres	Percent of Total
MA1	Provide essential habitat for wildlife species that require old-growth forest components.	11,716 ac	2.7%
MA3A	Provide roaded and unroaded recreation opportunities in a natural-appearing setting	21,279 ac	5.0%
MA3B	Provide semi-private motorized and non-motorized recreation in roaded and unroaded areas while meeting wildlife management objectives.	11,495 ac	2.7%
MA4	Research Natural Areas – Provide opportunities for research in ecosystems influenced only by natural processes.	2,753 ac	0.6%
MA5	Provide a natural-appearing foreground, middleground, and background along major scenic routes while providing wood products.	85,257 ac	20.0%
MA6	Provide a natural-appearing foreground, middleground, and background along major scenic routes while providing for winter range management.	11,785 ac	2.7%
MA7	Manage to achieve optimum timber production while protecting basic resources.	162,624 ac	38.2%
MA8	Provide for the winter habitat needs of deer and elk while managing for other resources consistent with fish and wildlife management objectives.	47,235 ac	11.1%
MA10	Provide opportunities for dispersed, motorized recreation.	13,562 ac	3.2%
MA11	Provide opportunities for dispersed, non-motorized recreation in an undeveloped environment.	43,786 ac	10.3%

Although logging and road building have altered portions of the Columbia Mountains, the majority of the area (72 percent [311,325]) still remains in a natural state. Eight US Forest Service inventoried roadless areas lie within the proposed national monument (Figure 4). These roadless areas total approximately 104,850 acres, or 24.4 percent of the area. There has been very little human-caused impact to these areas and they retain a high degree of natural integrity (Kettle Falls Ranger District 1996). An additional 206,475 acres of uninventoried roadless areas over 1,000 acres in size, mapped by Pacific Biodiversity Institute, exists within the proposed boundary. The uninventoried roadless areas account for 48.1 percent of the total proposed area. The combined inventoried and



uninventoried roadless areas account for 72.5 percent of the total and are well dispersed across the proposed area.

Roadless areas are critical to conservation of biodiversity across large areas. Because they have not been intensively managed, most roadless areas retain a high degree of natural integrity. For example, exotic, invasive species are much less common in roadless areas than in roaded landscapes (Trombulak and Frissell 2000). Also, the existing system of national parks, wilderness areas, and other reserves is heavily biased toward high-elevation and low-productivity sites (Scott 1999, Scott et al. unpublished manuscript). Roadless areas are essential to conservation efforts because they often contain under-represented ecosystem types with a high degree of natural integrity (Dellasala and Stritholt 2000).



**Park-like ponderosa pine forest in the Profanity Roadless Area on the west side of the Columbia Mountains.**

Roads have significant negative impacts on the biota of an area, and roadless areas are important for the ecological integrity of an area (Hourdequin 2000). Road-building activities impact the landscape in many ways. There is the obvious mortality to plants and animals associated with road building and the collisions of animals with vehicles, but there are also not so easily observed effects such as changes in animal behavior, alteration of the physical and chemical environment of an area, spread of exotic and generalist species, and increased use by humans (Trombulak and Frissell 2000). It is the accumulation of these latter effects that causes the most impact to an ecosystem. Many species (e.g., black bears [*Ursus americanus*; Brody and Pelton 1989], elk [*Cervus elaphus*; Grover and Thompson 1986]) shift their movements away from roads or experience

decreased reproductive success near roads (e.g., bald eagles [*Haliaeetus leucocephalus*; Anthony and Isaacs 1989]). Roads also alter the physical and chemical environment around them extending over 100 meters from the road cut by changing soil densities, light infiltration, temperatures, and water runoff patterns, and introducing heavy metals, salts, ozone, and nutrients to the surrounding areas (Forman 2000, Trombulak and Frissell 2000). Edges created by roads and forest clearing can entice birds to nest there through increased food availability and decreased competition; however, generalist predators and parasitic species are also attracted to these same areas, creating an “ecological trap” (Gates and Gysel 1978). The combined inventoried and uninventoried roadless land in the proposed Columbia Mountains area are of sufficient size and well dispersed to allow them to function as habitat for many species and provide landscape linkages across the proposed area (See Hudson 1991, Saunders et al. 1991).

## ***Geology and Geomorphology***

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The Columbia Mountains have a varied and long geologic history. The highlights of its geologic history are: “sedimentation in the Paleozoic, erosion with minor vulcanism in the Mesozoic, igneous

activity and erosion in the Tertiary, and continental glaciation in the Quaternary” (Umpleby 1985). The oldest rocks exposed in the area are a great assemblage of metamorphosed shales, sandstones, limestones, dolomites, greenstones and lava flows of the Paleozoic Era, possibly dating from the Carboniferous Period, 365-290 million years before present (mybp). The depositional phase that dominated the Paleozoic Era was followed by crustal deformation and metamorphosis, along with erosion and minor volcanic events that lasted most of the Mesozoic Era, 250-66 mybp (Umpleby 1985).

The Columbia Mountains are believed to have been part of an island micro-continent off of the western shore of North America during the period ca. 200-100 mybp. This Okanogan micro-continent collided with North America in the late Mesozoic Era, ca. 100 mybp, causing the uplift of the Okanogan Highlands (McKee 1972).

Great batholithic masses were intruded during the Tertiary Period creating the Kettle Dome, a granitic intrusion within a mantle of gneiss dated around 50 to 70 mmpb (Alt and Hyndman 1984) that forms the crystalline core of the Kettle Mountains today.

Shortly thereafter, ca. 51 to 52 mybp, the Sanpoil Volcanics covered the southwestern portion of the area. It is in these andesitic and rhyolitic flows that the internationally famous Eocene plant fossils were found in Republic near the proposed national monument. The rich fossil flora represents a very early stage in the evolution of modern temperate forests, which has contributed greatly to our understanding of past climates and ecology. The flora is exemplary for its diversity of modern and ancestral members of beautifully preserved members of the rose family.

Following the volcanic deposition, faulting forced the Sanpoil Volcanics into a tectonic depression, creating the Republic Graben, which crosses the southwestern part of the proposed national monument.

During the Pleistocene Epoch, which began 1.6 mybp, the Columbia Mountains experienced repeated glaciation (Frost 1994). Many surface features such as moraines, terraces, and lake basins are evidence of this activity. Frost (1994) notes, “The southern boundary of the Columbia Mountains coincides with the limit of continental glaciation, where the gentle, rolling topography descends into the arid lowlands of the Columbia Plateau.” The latest glaciation, the Fraser ice sheet, began approximately 120 thousand years ago and retreated around 9,000 years ago (Kershaw 1978, Stoffel et al. 1991). This left large deposits of till, forming terraces, deltas, and meltwater channels that characterize the lowlands today. High rates of wind and water erosion further modified that landscape until recolonization of plants occurred (Kershaw 1972).

## ***Hydrology***

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The Columbia Mountains area is characterized by hilly and mountainous terrain (Zulauf and Starr 1979). Repeated glaciation has rounded mountain summits into balds, broadened the lowland river valleys, and narrowed upper tributaries (Zulauf and Starr 1979, Colville National Forest 1994). The proposed national monument is bounded on the east and northwest by the Kettle River that separates the Kettle Range from the Monashee Range of the Columbia Mountains by a deep gorge just north of the international border. The southeast portion of the area drains toward the Columbia River, and the southwest portion drains into the Sanpoil River.



The climate of the area is primarily continental, with some maritime influences. Air masses originating in the Pacific Ocean bring moisture to the area and moderate the effects of continental air masses. The area is under the influence of an intense rainshadow formed by the North Cascades Mountains and receives 15 to 40 inches of precipitation annually. (Colville National Forest 1988a, Henjum et al. 1994). Much of the precipitation comes as snowfall (Wheeler 1973).

Generally, stream water quality is judged to be good to excellent throughout the area. Until 1999, the community of Orient drew its domestic water directly from East Deer Creek (Wheeler 1973).

## *Paleoecology*



**Looking north along the Columbia Mountains from Wapoloosie Mountain.**

The current vegetation of the Columbia Mountains is a product of a complex series of geologic events and biogeographical shifts (Kershaw 1978, Turner et al. 1980). Glaciers repeatedly covered the Columbia Mountains landscape, largely scouring the lowland areas of vegetation, leaving only the mountain peaks exposed (Waite and Thorson 1983, in Annable and Peterson 1988). Following retreat of the glaciers, plants that persisted south of the glaciated areas restocked the area.

Pollen records indicate that the glaciers left the area about 9,000 years ago, but that nonarborescent vegetation dominated the area for the first 1,000 years following deglaciation (Mack et al. 1978). Approximately 7,500 years ago the climate changed from a cool, moist climate dominated by lodgepole pine uplands and ponderosa pine valleys to a warmer, dry period (Kershaw 1978, in Turner et al. 1980). During this time, trees decreased while grasses and shrub-steppe vegetation increased in the Columbia Mountains. The eruption of Mount Mazama in

Oregon 6,600 years ago (creating Crater Lake) deposited a layer of fine, white volcanic ash in the Columbia Mountains. Since that time, there has been a series of climatic fluctuations. Birch, alder, and hazelnut species dominated moist periods; whereas, pines and spruces dominated drier periods. The last 1,500 years has been a relatively moist period.

The fossil beds in nearby Republic have produced an abundance of well-preserved plant specimens (Wolfe and Wehr 1991). More than 210 species of plants have been catalogued from these beds, many of which are found exclusively in this region and are known only from a few specimens. More new species are continually being discovered at this site that is part of a museum offering public collecting tours for a nominal fee. From these studies, we can gain insight into climatic conditions, and the evolution and biogeography of many groups of plants. Evidence from the fossil studies

suggests that the Republic area and the Columbia Mountains hosted the evolution of many current genera of temperate forest species – including the rose family.

## ***Vegetation and Land Cover***

The land cover of the proposed Columbia Mountains National Monument is primarily coniferous forest (Table 3, Figure 5). The mapped land cover types are generalizations of the actual land cover on the ground. Minor differences in tree density and microhabitat features (e.g., forest openings, small meadows, talus slopes) are not depicted in the data used in our analysis of land cover. Biologically rich middle and low elevation forests comprise 46.8% of the proposed national monument. Forests support a diverse, arboreal flora of Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), whitebark pine (*Pinus albicaulis*), Englemann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), grand fir (*Abies grandis*), western larch (*Larix occidentalis*), western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), quaking aspen (*Populus tremuloides*), mountain alder (*Alnus incana*), western water birch (*Betula occidentalis*), black cottonwood (*Populus trichocarpa*), and small amounts of western white pine (*Pinus monticola*) and Rocky Mountain juniper (*Juniperus scopulorum*) (Annable and Peterson 1988).

The western portion of the proposed area is dominated by with a historically frequent, low-intensity fire regime (Colville National Forest 1994). These fire conditions have produced park-like old-growth forest stands of ponderosa pine and Douglas-fir (Colville National Forest 1994).

**Table 3. General land cover types of the proposed Columbia Mountains National Monument**

<b>Cover Type</b>	<b>Acres</b>	<b>Percent</b>
Agriculture	1,763	0.5%
Douglas-fir	3,834	1.0%
Douglas-fir, Lodgepole Pine	52,869	14.0%
Grand Fir, Douglas-fir, Western Redcedar	35,255	9.3%
Grassland, Herbaceous Vegetation	3,604	1.0%
Lodgepole Pine, Ponderosa Pine	1,298	0.3%
Mesic Shrub	49,455	13.1%
Open Ponderosa Pine	37,983	10.1%
Open Ponderosa Pine, Lodgepole Pine, Douglas-fir	22,515	6.0%
Open Subalpine Fir, Lodgepole Pine, Whitebark Pine	26,719	7.1%
Ponderosa Pine, Lodgepole Pine, Douglas-fir	23,010	6.1%
Riparian	249	0.1%
Subalpine Meadow	11,069	2.9%
Subalpine fir, Lodgepole Pine	103,642	27.5%
Water	3,935	1.0%

The richest resource of the proposed Columbia Mountains National Monument is its extensive and diverse old-growth forests. The definition of old-growth forests given by the Forest Ecosystem Assessment Management Team (FEMAT; 1993) is forests that “differ significantly from younger forests in structure, ecological function, and species composition. Old-growth characteristics begin to appear in unmanaged forests at 175-250 years of age. These characteristics include (1) a patchy multi-layered canopy with trees of several age classes, (2) the presence of large living trees, (3) the presence of larger standing dead trees (snags) and downed woody debris, and (4) the presence of

species and functional processes that are representative of the potential natural community.” While the Columbia Mountains area lies outside of the FEMAT study area, many of the species reside in and most of the issues germane to late-successional and old-growth forest in the Columbia Mountains. Forests are generally considered late-successional once they reach approximately 80-110 years. However, tree productivity also decreases around this point for many Northwest conifers. Consequently, many managed stands never progress beyond this point before they are harvested. Late-successional forests are critical to conservation of old-growth forests. Because they share many of the same structural and functional components of true old-growth forests, they are inhabited by many of the same species. And while some old-growth characteristics may not peak until the stand reaches 500 years old (Spies and Franklin 1988), these relatively younger, late-successional forests have the potential to continue developing old-growth characteristics.



**The Twin Sisters Roadless Area as seen from Wapaloosie Mountain in the Profanity Roadless Area.**

The majority of the late-successional and old-growth forests in the Columbia Mountains are dominated by ponderosa pine, Douglas-fir, Englemann spruce, western hemlock, or western red cedar. An overlay of the Colville National Forest old-growth forest map onto digital ortho-photography from 1990 and 1998 indicated the maps were significantly in error. Therefore Pacific Biodiversity Institute (PBI) mapped old-growth forest conditions in the proposed Columbia Mountains National Monument from digital ortho-photographs taken in 1998. PBI used a combination of image processing algorithms and visual

interpretation to delineate late-successional and old-growth stands. Late-successional and old-growth forests were identified on 130,400 acres (42.5% of the total forested area, Figure 6). Only approximately 16.5% of the proposed national monument has been logged to some extent (estimate based on Colville National Forest harvest data and other cuts digitized by Pacific Biodiversity Institute) and large blocks of contiguous old forests still exist in the area (Figure 6 and Figure 7).

The Pacific Northwest has witnessed dramatic declines in its amount of late-successional and old-growth forests since pre-settlement times. Estimates of the losses range from 83 to 90 percent in the Douglas-fir region of Oregon and Washington (Spies and Franklin 1988, Norse 1990, Noss et al. 1995). The Eastside Forest Scientific Society Panel found a 92 to 98 percent loss of old-growth ponderosa pine forests in three national forests in Oregon (Noss et al. 1995). Noss et al. (1995), considered old-growth forests to be an Endangered Ecosystem (one that has experienced 85 to 95 percent decline). Almost all of the remaining virgin late-successional and old-growth forests are on federal lands (Norse 1990), but many of them do not receive protection. Norse (1990) estimated that at 1990 logging rates, all unprotected old-growth forests in Oregon and Washington would be gone by 2023. The political climate has changed since then and logging rates have dropped dramatically, but old-growth forests are still being cut down and remain in an imperiled state (See “Current Threats” below). The Columbia Mountains area has seen timber sales of over 21.7 million

board feet (mmbf) of timber being harvested this year with another 32,498 mmbf in sales proposed or planned (Colville National Forest).

Late-successional and old-growth forests are immense reserves of biodiversity. Biodiversity is the variety of living things. However, it is not just the number of species inhabiting an area (Noss 1994). There are three widely recognized levels of biodiversity: genetic, species, and ecosystem (Meffe and Carroll 1994). While species level biodiversity is the most widely known, genetic and ecosystem biodiversity are equally important (Norse 1990). Within each of these levels are components, structures, and functions that define that level.

Genetic variation is the parent of all other forms of biodiversity (Meffe and Carroll 1994) and is a primary reason for conserving late-successional and old-growth forests in the Pacific Northwest (Norse 1990). The importance of genetic diversity comes from three things (Rudolph 1990). First, genetic variability allows adaptation to local conditions such as microclimate, topography and competition. The US Forest Service has long been aware of this, evidenced by its efforts to use local seed sources to restock harvests. Secondly, genetic variation is a strategic defense against pathogens and insect pests. This is perhaps the most important aspect genetic diversity from a conservation standpoint. Rudolph (1990) points out that “trees in genetically uniform stands would be long-lived ‘sitting ducks’ for insect pests and pathogens, which have much shorter generation times and can therefore evolve much faster. But insects and pathogens faced with an array of trees, each differing unpredictably from its neighbors in defensive chemistry, might have difficulty evolving all-purpose ways to exploit such variable resources.” Patterns of western spruce budworm outbreaks in Douglas-fir fit this interpretation (Rudolph 1990). Third, genetic variation allows continuation of evolution and adaptation to changing environments. This is particularly germane in the context of global climate changes that are ongoing.

Old-growth forests are great reservoirs of species level biodiversity. The Pacific Northwest has more species of giant conifers than anywhere else on earth (Norse 1990). The wet, temperate conditions and high plant diversity promote the growth of a wide variety of fungi. Thomas et al. (1993) identified 667 species that were closely related to Pacific Northwest late-successional and old-growth forests in at least part of their range. The Northwest Forest Plan associates 234 rare and endemic species of fungi to old-growth forests in the Pacific Northwest (FEMAT 1993). Wildlife species found in Pacific Northwest old-growth forests are also very diverse (Bunnell and Kremaster 1990). The value of Pacific Northwest old-growth forests as wildlife habitat comes from the interaction of several key features (Norse 1990):

1. An exceptionally moist, moderate temperate climate with summer drought
2. Exceptional topographic and climatic diversity
3. An exceptionally diverse disturbance regime
4. Unequaled diversity of giant conifers
5. Exceptional longevity
6. Exceptional biomass of living plants, snags and downed logs
7. Exceptional vertical and horizontal spatial complexity.

Late-successional/old-growth characteristics such as multiple canopy layers, downed woody material, large-diameter snags, and canopy openings add three-dimensional structure to a forest stand. MacArthur and MacArthur (1961) discovered that habitats with more three-dimensional complexity contain more species. The public is most aware of the old-growth dependent species (e.g., the northern spotted owl). However, many species that can survive in other habitats do better in old-growth forests (Bunnell and Kremaster 1990). For example, Thomas (1992) found seven



species of myotis bats three times more abundant in old-growth forests. Snags, natural cavities, and downed woody material provide nesting and feeding opportunities for many species as well as protection from predators. Franklin et al. (2000) referred to these components as “structural legacies.” Additionally, these forests serve as refuges during hard times, ameliorating the effects of disturbances such as droughts, floods, storms, and food shortages. In summary, Morrison et al. (1991) noted, “Continued logging of the few remaining larger stands of ancient forest and the few fragments of ancient forest at lower elevations poses a significant threat to biological diversity. Loss of ancient forests at low elevations will also decrease the potential to recover the rare and threatened native species in the region.”



**Old-growth western red cedar forest in the Owl Mountain Roadless Area**

Natural ecosystems are combinations of species and interactions that have evolved together over time. As such, each represent a unique set of features that are worthy of conservation. The declines in late-successional and old-growth forests in the Pacific Northwest qualifies this ecosystem to be in danger of extinction (Norse 1990, Noss et al. 1995). The Columbia Mountains area, with its high proportion of late-successional and old-growth forests, should be protected as an example of an endangered Pacific Northwest ecosystem.

Late-successional and old-growth forests also provide a diversity of ecosystem services (Norse 1990). The prevalence of dead plant material and the unparalleled richness of fungi, and decomposing insects in late-successional and old-growth forests contributes to formation of soils. Multiple canopy layers, ground cover, and extensive root systems contribute to soil stabilization and minimize erosion. By uptake of carbon dioxide and the process of photosynthesis, late-successional and old-growth forests store massive amounts of carbon, helping to ameliorate the increase in atmospheric carbon dioxide and the resulting global warming (Norse 1990). Late-successional and old-growth forests have the highest average carbon per hectare of anywhere on earth (900-1,000 tons C/ha [Houghton 1990]).

While it is relatively easy to grow trees, recreating a late-successional or old-growth forest takes time. Though attempted, silvicultural treatments (e.g., logging) cannot replicate late-successional or old-growth forests (FEMAT 1993). Structural features may be able to be accelerated, but processes such as maturation of tree crowns, thickening of bark and decay of tree boles cannot be recreated through management (FEMAT 1993). Many species of lichens and bryophytes (mosses, liverworts, and hornworts) that participate in many of the ecosystem functions of late-successional and old-growth forests and serve as food for many old-growth dependent species do not become established in forests younger than 100 to 200 years (Norris 1987, Henderson et al. 1988, Lesica et al. 1991, McCune 1991). Norse (1990) summarizes this best saying, “That [natural and managed forests] share the same name reflects the inability to see the forest for the trees.”

It is impossible to preserve an individual species in the wild without protecting its environment and interactions. Thus conservation of ecosystems is necessary for preserving the species that inhabit them (Meffe and Carrol 1994). Ecosystems also provide a convenient unit for conservation since

protection of an ecosystem also confers some degree of protection to its components (Noss et al. 1995). Estimates of how much of an ecosystem to conserve vary widely, but commonly accepted figures range from 12 percent (World Commission on Environment and Development) to 25 percent (Noss 1992). This does not mean 12 to 25 percent of what is currently extant: this refers to that much of pre-settlement conditions (Figure 9). The fact that remaining late-successional and old-growth forests fall short of the suggested 12 percent conservation target heightens the need to protect our dwindling old-growth reserves.

Noss et al. (1995) comments, “Maintaining or restoring this much of each region to natural habitat would not be technically, financially, or politically easy. However, in most cases, protected areas need not be entirely off-limits to human activities.” This is the case with the Columbia Mountains area. National monument status would provide protection for the old-growth resources, yet still allow for limited, continued human use of the area.

## **Rare, Threatened and Endangered Species**

### ***Species Observations***

The Washington Natural Heritage Program (WNHP) and Washington Department of Fish and Wildlife (WDFW) maintain records of species of conservation concern for Washington State. They reported that the proposed Columbia Mountains National Monument has 156 records of 25 species (six birds, four mammals, one amphibian and 20 plants, Table 4, Table 5). These rare species have either state or federal status as endangered, threatened, sensitive or candidate species. All species listed here have declined below natural and historic levels and are adversely impacted by human activities (e.g., logging, road building, development, motorized recreation). Many of these species are dependent on habitat provided by the extensive late-successional and old-growth forests located in the proposed national monument.

**Table 4. Sightings of animal species of conservation concern on the proposed Columbia Mountains National Monument.**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Number of Sightings*</b>
<i>Accipiter gentilis</i>	Northern Goshawk	2
<i>Aquila chrysaetos</i>	Golden Eagle	3
<i>Canis lupus</i>	Gray Wolf	6
<i>Dendragapus canadensis</i>	Spruce Grouse	3
<i>Gulo gulo</i>	Wolverine	1
<i>Lynx canadensis</i>	Lynx	30
<i>Pandion haliaetus</i>	Osprey	1
<i>Picooides tridactylus</i>	Three-toed Woodpecker	1
<i>Rana luteiventris</i>	Columbia Spotted Frog	1
<i>Strix nebulosa</i>	Great Gray Owl	1
<i>Ursus arctos</i>	Grizzly Bear	2

\* Washington Department of Fish and Wildlife nongame database, ca. 1995



## Plants

The proposed Columbia Mountains National Monument hosts many species of threatened, endangered or sensitive (TES) plants and plant species of concern (table).

**Table 5. Rare plant species in the proposed Columbia Mountains National Monument.**

Scientific Name	Common Name	No. of sightings in WNHP* database	Status*
<i>Allium robinsonii</i> Hend.	Robinson's onion	many*	W
<i>Botrychium ascendens</i> W.H. Wagner	triangular-lobed moonwort	2	S, SC
<i>Botrychium crenulatum</i> W.H. Wagner	scalloped moonwort	19	S, SC
<i>Botrychium lanceolatum</i> (Gmel.) Angstr.	lance-leaved grape-fern	2	S
<i>Botrychium lineare</i> W.H. Wagner	slender moonwort	1	S
<i>Botrychium lunaria</i> (L.) Swartz	moonwort	9	S
<i>Botrychium minganense</i> Vict.	Victorin's grape-fern	31	2
<i>Botrychium montanum</i> W.H. Wagner	western goblin	0*	S
<i>Botrychium paradoxum</i> W.H. Wagner	two-spiked moonwort	0*	S
<i>Botrychium pedunculatum</i> W.H. Wagner	stalked moonwort	1	S, SC
<i>Botrychium pinnatum</i> St. John	St. John's moonwort	10	S
<i>Carex buxbaumii</i> Wahl.	Buxbaum's sedge	3	S
<i>Carex rostrata</i> Stokes	beaked sedge	0*	S
<i>Cypripedium parviflorum</i> Salisb.	yellow lady's-slipper	1	E
<i>Listera borealis</i> Morong	northern twayblade	5	S
<i>Phacelia franklinii</i> (R. Br.) Gray	Franklin's phacelia	many*	W
<i>Platanthera obtusata</i> (Banks ex. Pursh) Lindl.	small northern bog-orchid	0*	S
<i>Ribes oxycanthoides</i> L. ssp. <i>cognatum</i> (Greene) Sinott	Umatilla gooseberry	many*	W
<i>Sanicula marilandica</i> L.	black snake-root	0*	S
<i>Sisyrinchium septentrionale</i> E.P. Bicknell	blue-eyed grass	1	S
<i>Talinum sediforme</i> von Poellnitz	Okanogan fameflower	13	S

\* Washington Natural Heritage Program, from GIS map of TES species, ca. 1995 (note that species on the Watch list are not counted on this list). Recently sighted species or newly listed species may not have been entered into the database and are coded "0". Codes: FWS-SC - US Fish and Wildlife Service "species of concern", requiring additional status information for listing; E - WNHP (1997) endangered; S - WNHP (1997) sensitive; 2 = WNHP (1997) Group 2 (taxa with unresolved taxonomic questions); W = WNHP Watch list of species more abundant and/or less threatened in Washington than previously assumed.

The ten species of *Botrychium* (moonworts and grapeferns) found in the Kettle Range and adjacent study area is exceptionally high and indicates that this area is in a biological "hot spot" of *Botrychium* diversity in the world's flora, the foremost center of diversity being in the Wallowa Mountains, several hundred miles south (Wagner, 1992, p. 1). Many of these species are new to science, and were only first described recently (Wagner, 1993), e.g., *B. ascendens* W.H. Wagner (1986), *B. crenulatum* W.H. Wagner (1981), *B. lineare* W.H. Wagner (1994), *B. montanum* W.H. Wagner (1981), *B. paradoxum* W.H. Wagner (1981), *B. pedunculatum* W.H. Wagner (1986). The reasons for this unusual clustering of rare species is poorly understood, but may be related to a combination of factors related to soil, mycorrhizal associations, disturbance patterns and spore dissemination (Zika, 1992). The positive identification of *B. ascendens* in the study area is still in question (Kathy Ahlenslager, Colville National Forest Botanist, personal communication).

The beaked sedge, *Carex rostrata* Stokes, was the subject of a recent paper (Griffiths, 1989) describing its erroneous confusion with the widespread *Carex utriculata* Boott. Following this realization, a re-

evaluation revised its occurrence in Alberta from “common” to “rare”, with only five extant sites, all on quaking bogs. Its U.S. status appears to be similarly circumspect, and pending a thorough review, *Carex rostrata* may ultimately be deserving of threatened or endangered status worldwide.

The yellow lady’s slipper, *Cypripedium parviflorum*, is a northern temperate species with a broad range, but extreme rarity within the range, and generally declining throughout the U.S. (WNHP, 1997). With only a handful of sites in Washington, it is designated endangered by the WNHP. The study area population is also unique for its presence on public land.

The Okanogan fameflower, *Talinum sediforme* (= *T. okanoganense* English), is an endemic species with an interesting background. Its world range is strictly limited to shallow, well-drained soils near erosional margins of lava beds derived from highly friable, brecciated volcanic rocks of the Republic graben (Goward and Knight, 1990). Its occurrence is noteworthy because these sites were all apparently buried under glaciers during the last ice age, leaving to speculation the whereabouts of its putative Pleistocene refuge. Early authors knew the plant as *Talinum okanoganense* English, based on a garden specimen collected from near the study area in 1933.

The world range of the fameflower covers approximately 8,000 sq. km. in Washington and southern British Columbia, however it is limited to only a couple dozen populations within this range.

*Ribes oxycanthoides* ssp. *cognatum* is a northwest endemic species that has been extirpated from its primary range in the Palouse farming region of Washington (Sinott, 1985). Since the discovery of large populations in the Okanogan Highlands, it is now considered secure.

*Allium robinsii*, *Carex buxbaumii*, *Botrychium minganense*, *Listera borealis* and *Phacelia franklinii* are peripheral to their main range or more widely distributed than previously thought. *Teucrium canadense* ssp. *viscidum* (woodsage) was historically known near the study area from a sighting in the early 1920s by Washington State University botanist Harold St. John, however the species is apparently extirpated. Reports of *Ribes oxycanthoides* ssp. *irriguum* (Idaho gooseberry) are now attributed to *Ribes oxycanthoides* ssp. *cognatum* (Kathy Ahlenslager, Colville National Forest Botanist, personal communication).

Several of these rare species have been documented to be closely associated with late-successional or old-growth forests (FEMAT, 1993), e.g., *Botrychium minganense*, *B. montanum*, *Listera borealis* and *Platanthera obtusata*.

## **Fish**

Several outstanding populations of westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and redband rainbow trout (*O. mykiss gairderi*) have been surveyed in the proposed Columbia Mountains National Monument (McMillan 1999). These populations are wild, resident fish that have not hybridized with stocked hatchery fish. Redband trout is considered a sensitive species by the Forest Service (Kettle Falls Ranger District 2000). The westslope cutthroat was recently petitioned for listing as threatened under the Endangered Species Act, but at the time it was deemed not warranted. It is a state sensitive species. In 1999, the Headwaters Species Project found “...the most distinctive-appearing population of westslope cutthroat we sampled ... in the uppermost headwaters of the South Fork Sanpoil River near the crest of Sherman Pass... Of several redband rainbow populations sampled in ’99, the Lone Ranch Creek population of the Kettle River drainage stood out in its distinctive

coloration” (McMillan 1999). The Deadman Creek, Little Boulder Creek and East Deer Creek are streams that have also been determined to contain pure, native strains of redband.

Bull trout (*Salvelinus confluentus*) have been reported in many drainages of the Sanpoil River both upstream and downstream from natural barriers (Honeycut and Shuhda 1999). They have also been found in the lower reaches of Boulder Creek and the Kettle River and are suspected in lower Deadman Creek (T. Coleman, pers. comm.)

### ***Forest Carnivores***

Grizzly bears (*Ursus arctos*), gray wolves (*Canis lupus*), lynx (*Lynx canadensis*), wolverine (*Gulo gulo*), fisher (*Martes pennanti*), and marten (*Martes Americana*) have been documented in the Columbia Mountains area. Wolves and grizzly bears have persisted in the Columbia Mountains when they were extirpated from almost all other places in the United States. Wolf sightings have been recorded in the area consistently from 1914 to the present (Republic Ranger District 1995). Wolverines, while rare, inhabit the boreal forests and subalpine areas throughout the Colville National Forest, which has several recent sightings recorded (Kettle Falls Ranger District 1996, Colville National Forest 1998). Lynx, a USFWS threatened species, inhabit higher elevation forests. They require several forest and nonforest habitat types for optimum viability to provide for foraging, travel, denning and rearing young. Lynx numbers appear to have fluctuated greatly over the past 40 years (Ruggiero et al. 1999). Track surveys from 1991 to 1996 yielded only 2 sets of tracks.

Lyon et al. (1994) found fragmentation of late-successional and old-growth forests to be the most important factor in limiting dispersal for lynx, fisher and marten. For these species, physical structure of the environment appears to be more important than the vegetation species composition. Lyon et al. (1994) also notes, “The arrangements and linkages between stands are even more important for species like the marten and fisher that exhibit great reluctance to cross openings or venture very far from overhead cover. For these species, fragmentation of continuous forest cover may have negative consequences.” Indeed, habitat fragmentation is the most important isolating mechanism for lynx and marten and continued clearcutting of contiguous forests may preclude conservation of forest carnivores. This underscores the need to protect the undisturbed areas and old-growth forests of the Columbia Mountains region.

### ***Caribou***

The mountain caribou (*Rangifer tarandus montanus*) was emergency-listed as an endangered species under the Endangered Species Act in 1983. Caribou were observed in small numbers in the Columbia Mountains from the 1920’s through the 1950’s. Caribou have not been sighted recently in the Columbia Mountains area, but this area may be able to support a population through recolonization or reintroduction, as they are in the northeastern Colville National Forest.

### ***Fish***

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The proposed Columbia Mountains National Monument harbors a wide diversity of fish species. Six species of resident fish have been found within the boundary (Table 6, Figures 8, 9, and 10 [Source: Washington Department of Fish and Wildlife Streamnet data]). Eleven fish species are known to occur in rivers running adjacent to the proposed national monument, exclusive of the Columbia River. Fish surveys within the proposed national monument have been limited, thus species estimates are conservative. While these species may not directly inhabit the proposed area,

its tributaries contribute significantly to the flow of those rivers. Thus, land management practices within the proposed Columbia Mountains National Monument could affect the quality of habitat for those fish species occurring in adjacent waterways (Wissar et al. 1994).

**Table 6. Fish species recorded within and in waterways adjacent to the proposed Columbia Mountains National Monument (Source: Washington Department of Fish and Wildlife Streamnet).**

Common Name	Occurs within boundary (X)
Bull Trout	X
Brown Trout	X
Rainbow Trout	X
Bridgelip Sucker	
Largescale Sucker	
Redside Shiner	
Northern Squawfish	
Mountain Whitefish	
Longnose Dace	X
Kokanee Salmon	X
unidentified Sculpin	X

## ***Wildlife***

In addition to the rare, threatened and endangered species, many other wildlife species occur in the Columbia Mountains. Layser (1971) listed six amphibians, eight reptiles and 56 mammals. Species detected included many associated with late-successional and old-growth forest characteristics such as rubber boas (*Charina bottae*), hoary bats (*Lasiurus cinereus*), silver-haired bats (*Lasionycteris noctivagans*), northern flying squirrel (*Glaucomys sabrinus*), and red-backed voles (*Clethrionomys gapperi*).

Beaver (*Castor canadensis*) are found throughout many streams and rivers in the area. Beaver dams and their resulting wetland complexes are critical to hydrologic function in the area. They serve to mediate the fluctuation of stream flows that could damage fisheries with extreme lows (Kettle Falls Ranger District 2000).

Large mammals in the area include cougar (*Felis concolor*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*) and elk (*Cervus elaphus*). Elk and moose populations have recently increased (T. Coleman, personal communication). At least one mountain goat (*Oreamnos americanus*) has been seen in the Kettle Range.

The Columbia Mountains area has a great diversity of bird species. Many species of raptor have been observed on the area including osprey (*Pandion haliaeetus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), goshawk (*Accipiter gentiles*), and peregrine falcon (*Falco peregrinus*). Two species of neotropical migratory warblers, the American redstart (*Setophaga ruticilli*) and the northern waterthrush (*Seiurus noveboracensis*) are limited in their Washington distribution to the northeastern part of the state (Smith et al. 1997), where they occur in alder thickets and mid-elevation riparian hardwood communities, an important, but neglected, habitat for which the area is notable (A. Stepniewski, October, 2000, personal communication). In the face of declining populations of all neotropical birds, the Columbia Mountains serves as a habitat stronghold for at least these two species. Black-backed woodpeckers (*Picoides arcticus*), white-winged crossbills (*Loxia leucoptera*), and pine grosbeaks (*Pinicola enucleator*) are among the other rare forest birds observed on the area (A. Stepniewski, pers. comm.).

## ***Historic and Cultural Attributes***

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The Columbia Mountains area was inhabited by four native American tribes: Sanpoil, Colville, Okanogan, and (Arrow) Lakes (Mourning Dove 1990). The Sanpoil tribe is most closely associated with the area, as originally documented in 1811 by the first white explorer in the area, David Thompson of the Northwest [fur] company (Raufer 1996), who observed the Indians harvesting salmon at Kettle Falls, near the southeast corner of the area.

The language spoken in the area is classified as an Interior Salish division of the Salishan family (Turner et al. 1980). Trading routes brought northwest tribes together on a regular basis, and trade goods such as Indian hemp fiber (*Apocynum cannabinum*), a species of dogbane, formed the basis of a healthy economy between the Sanpoil Indians and other tribes as far away as the Pacific coast (Teit 1930, in Turner et al. 1980).

Native American usage of the Columbia Mountains area was varied and widespread (Republic Ranger District 2000a). The Native Americans erected rock cairns in special places to worship or seek enlightenment. Some cairn sites in the proposed national monument are on the National Register of Historic Places. Campsites and trails used by Native Americans for hunting, fishing and trade became the basis for modern routes into the area (Kettle Falls Ranger District 1996; Mourning Dove, 1990). Native Americans in the area placed high significance in the powers (both healing and spiritual) of plants, naming many places after plant species found there. A cedar grove in the Swan Lake and Scatter Creek drainage was a supply of basket material, evidenced by “peeled cedars” in the area (Republic Ranger District 2000a). A lithic scatter/quarry site has been documented in the Scatter Creek area (Republic Ranger District 2000a). A petroglyph was recently discovered along Highway 21. Many other archaeological sites undoubtedly exist, but the area has not been systematically surveyed.

The native tribes were assigned to the Colville Indian Reservation, created originally in Stevens County in 1872 and moved by President Grant three months later to Ferry and Okanogan County. The US government withdrew the north half of the original reservation in 1892. Native Americans retained rights for hunting, fishing and gathering on these lands. A report by the Confederated Tribes of the Colville Reservation (2000) explains, “These rights were upheld by the Supreme Court Decision in *Antoine v. State of Washington*, February 19, 1975 that maintained that Colville Reservation tribal members may exercise their rights to hunt, fish and gather roots and berries on the North Half Reservation. These rights to hunt, fish and gather are not viewed by tribal members as sport or recreation, but as cultural, ceremonial and spiritual sustenance.”

## ***Current Threats***

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Because most of the area is open to logging and road building (See “Ownership and Management” above), the late-successional and old-growth forests and roadless areas that contribute to the Columbia Mountains’ natural integrity will continue to decline. In 2000, timber sales amounting to almost 22 mmbf were being logged (Table 7). Sales of an additional 32.5 mmbf are either proposed or being planned (Table 8). Much of this timber is coming from inventoried and uninventoried roadless areas in the proposed national monument. The Colville National Forest, Land and Resource Management Plan (LRMP), proposes to log and otherwise develop 58,025 acres, or 55.5

percent, of the total US Forest Service Inventoried Roadless Areas (Colville National Forest 1988a, Appendix C, pp. 1-5). An additional 206,700 acres of uninventoried roadless areas over 1,000 acres in size are all proposed for development under the LRMP.

**Table 7. Timber sales that have had *active logging* during summer of 2000: (acres and board feet from STARS Report 6, printed 03/03/00 by the Colville NF)**

<b>Name</b>	<b>District</b>	<b>Total Acres (roadless &amp; roaded)</b>	<b>Board Feet (MBF)</b>	<b>Roadless Area</b>
Nancy	Kettle Falls	382	2,419	RARE II <sup>1,2</sup>
Fritz <sup>3</sup>	Kettle Falls	330	1,936	RARE II <sup>1,2</sup>
North Sherman <sup>3</sup>	Kettle Falls	1,016	5,817	RARE II <sup>1,2</sup>
Fritz Demo <sup>3</sup>	Kettle Falls	631	5,123	RARE II <sup>1,2</sup>
Eagle Rock	Republic	1,498	6,481	RARE II <sup>1,2</sup> , Thirteenmile
<b>TOTAL</b>		<b>3,857</b>	<b>21,776</b>	

<sup>1</sup> RARE II areas: Hoodoo, South Huckleberry, Bald-Snow and Bangs Mountain.

<sup>2</sup> Includes uninventoried roadless acres that are contiguous with RARE II.

<sup>3</sup> Part of North Sherman & Fritz Timber Sales EIS, October 1996

**Table 8. Proposed or planned timber sales (from STARS Report 6, printed 03/03/00 by the Colville NF)**

<b>Name</b>	<b>District</b>	<b>Total Acres (roadless &amp; roaded)</b>	<b>Board Feet (MBF)</b>	<b>Roadless area</b>
Deadman	Kettle Falls	4,300	10,000	Twin Sisters, Hoodoo <sup>1,2,3</sup>
North Kettle	Kettle Falls	2,700	15,000	Owl Mountain, Togo Mountain <sup>3</sup>
Lone Deer	Republic	1,000	2,999	Day Creek, Lone Ranch, Boundary Mt., Togo Mt. <sup>3</sup>
Swansong	Republic	1,000	3,999	Scatter Creek <sup>3</sup>
Deer Creek	Republic	600	500	Profanity <sup>1,3</sup>
<b>TOTAL</b>		<b>9,600</b>	<b>32,498</b>	

<sup>1</sup> RARE II area

<sup>2</sup> Includes uninventoried roadless acres that are contiguous with RARE II.

<sup>3</sup>. Uninventoried roadless area

Increasing recreational use of the Columbia Mountains area may have detrimental effects on sensitive plant and animal species. Backcountry recreation in the area is increasing as much as 25% per year (K. Wakefield, USFS, pers. comm.). Goward and Knight (1990) determined that off-road vehicle use was the most serious threat to endemic populations of the Okanogan fameflower.



## ***Conclusions***

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**Sherman peak in the proposed Columbia Mountains National Monument**

This report provides scientific evidence demonstrating the need for the Columbia Mountains area to be protected and preserved as a national monument under the Antiquities Act due to its extensive representation of rare ponderosa pine old-growth forests and other late-successional forest types as well as its unique geology, geomorphology, landscape ecology, biology, and cultural history.

The proposed Columbia Mountains National Monument will contribute to the preservation of all levels of biodiversity. Protection of the area's late-successional and old-growth forests will bolster the conservation of diminishing Pacific Northwest old-growth forests, contributing to preservation of this endangered ecosystem. Protection will also come to the flora and fauna that inhabit this diverse and unique landscape. Finally, protection of the entire area insures

internal landscape integrity and adds robustness to the regional conservation network and aiding in the flow of genes between populations. The designation of the Columbia Mountain National Monument will also fill a large gap in the conservation of significant ecosystems in the Pacific Northwest

Franklin et al. (2000) described "biological legacies" as organisms, or ecosystems that survive through a disturbance. The late-successional and old-growth forests and roadless areas of the proposed Columbia Mountains National Monument and the species that inhabit them should be considered biological legacies. They have survived a century that has seen much of the Pacific Northwest logged, developed, or otherwise altered. To protect this valuable yet dwindling resource, the Columbia Mountains should be granted protection as a national monument.

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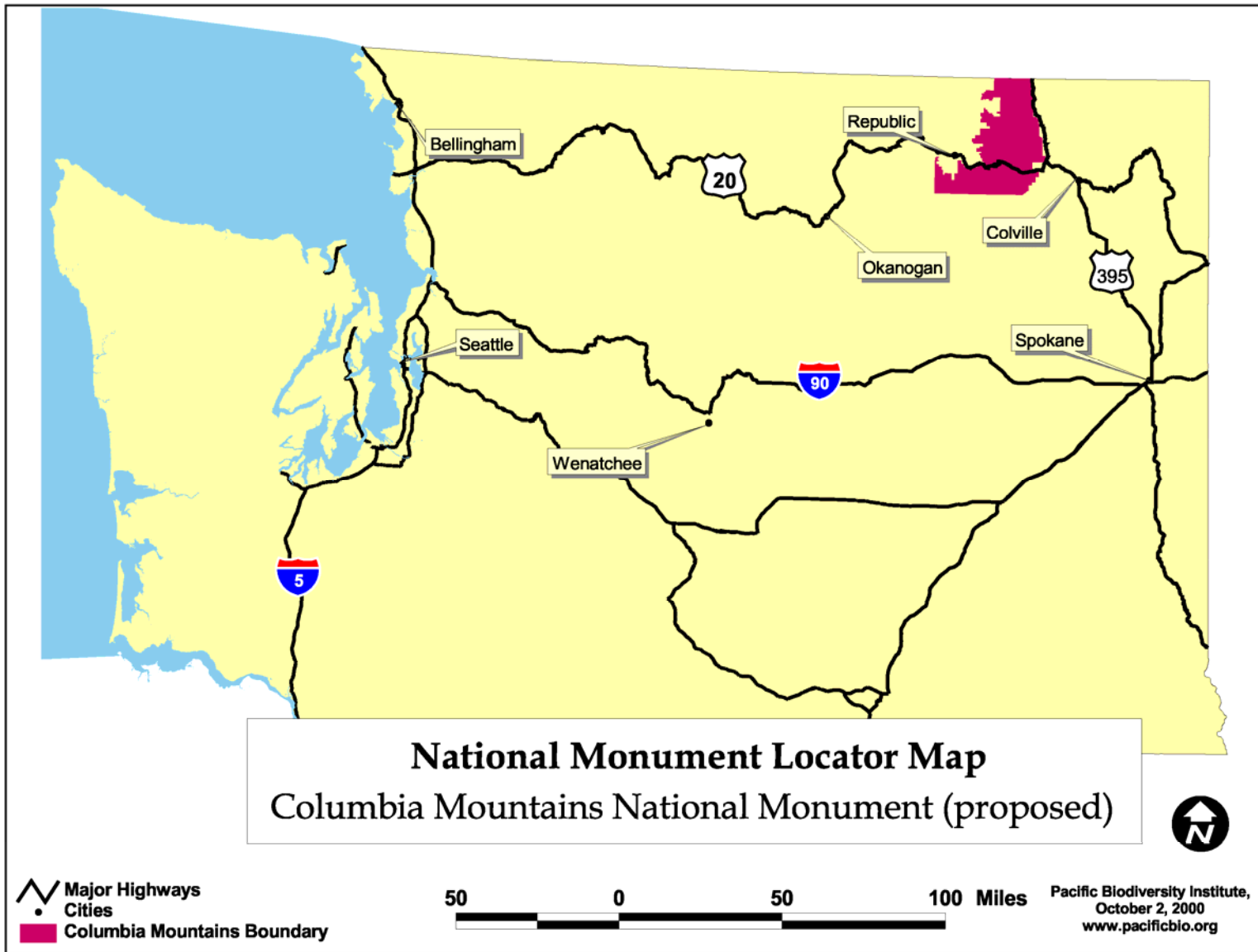


Figure 1. The proposed Columbia Mountains National Monument in northeast Washington State

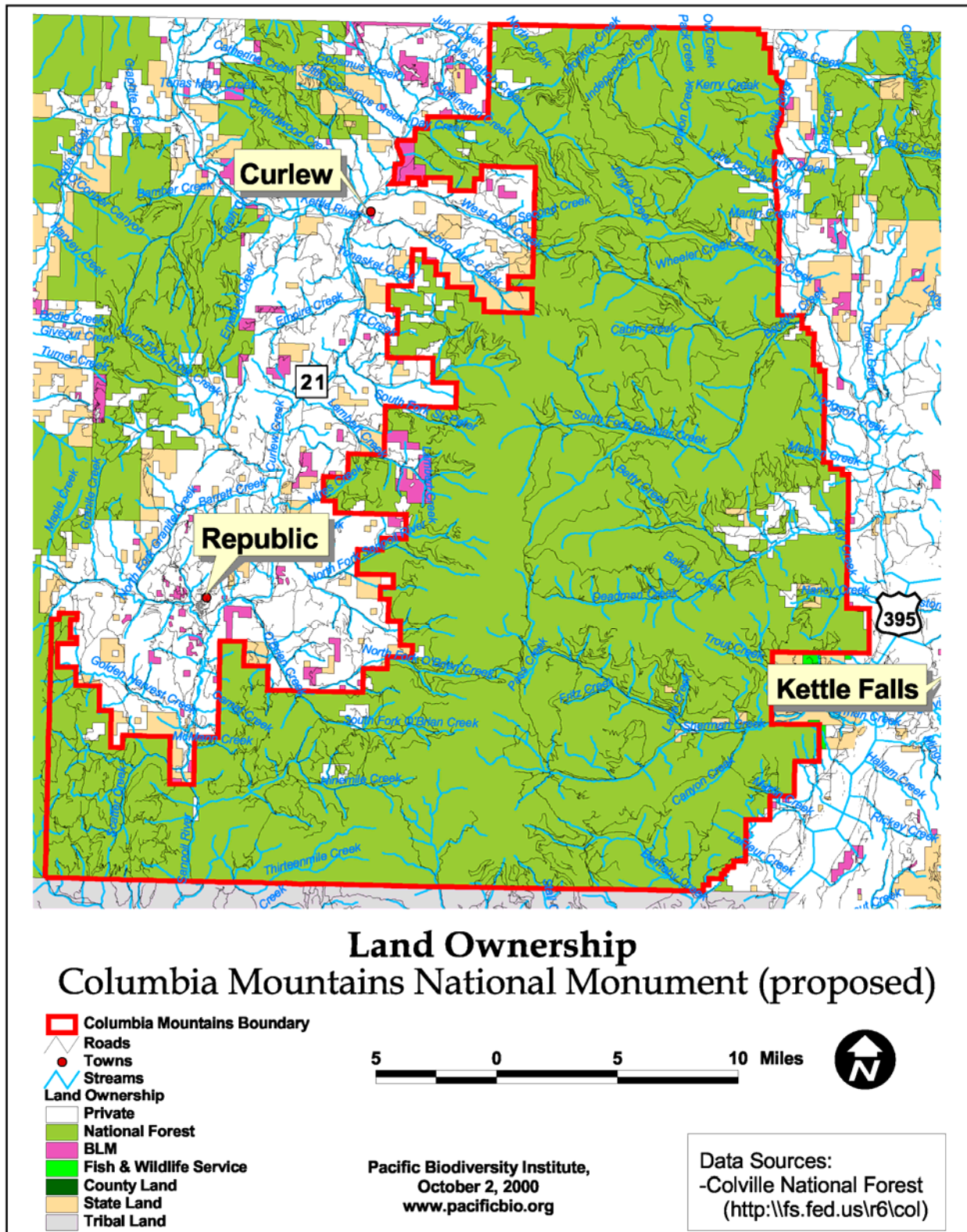


Figure 2. Land ownership for the proposed Columbia Mountains National Monument.

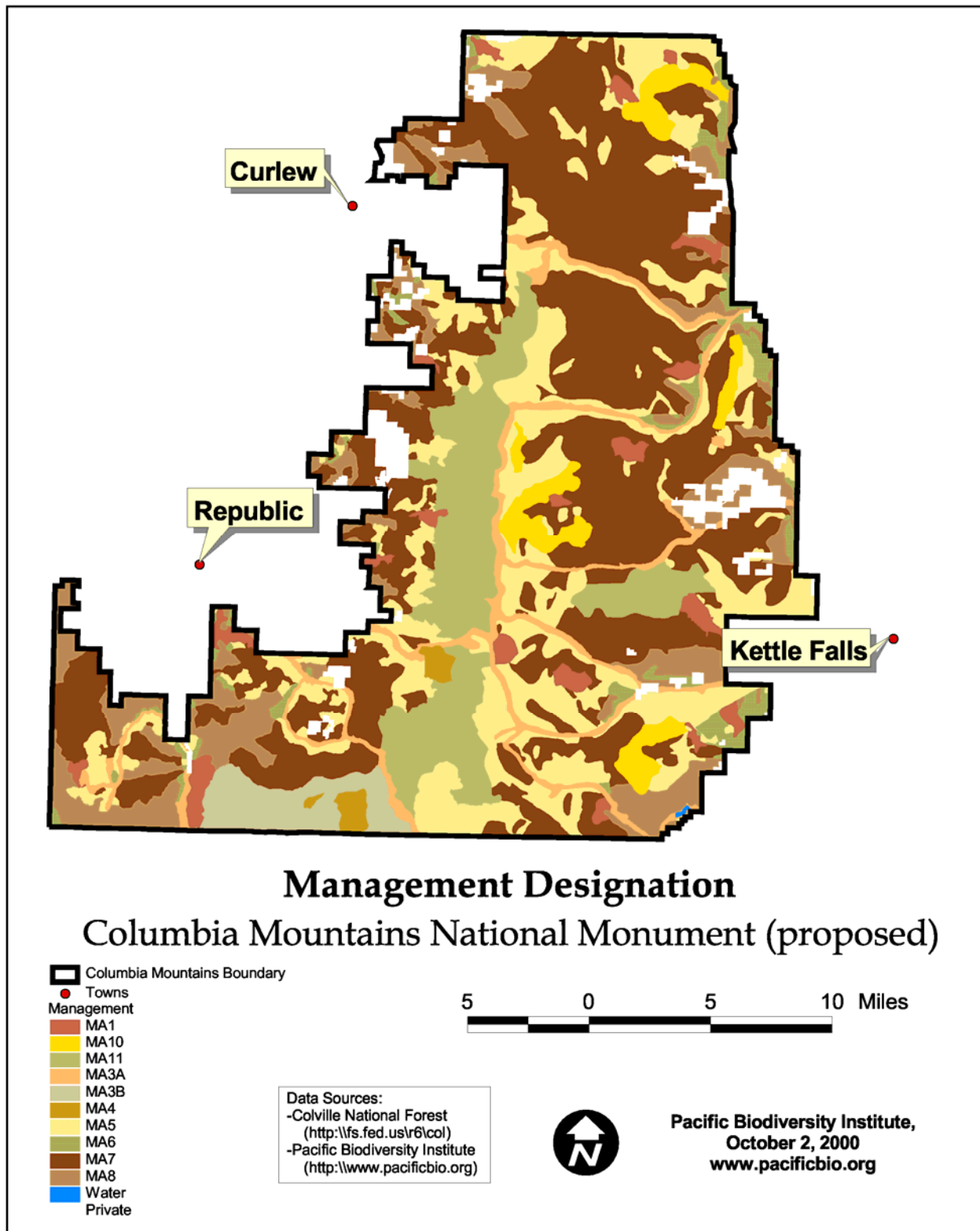


Figure 3. Colville National Forest management designations for the proposed Columbia Mountains National Monument. See Table 2 for management code descriptions.



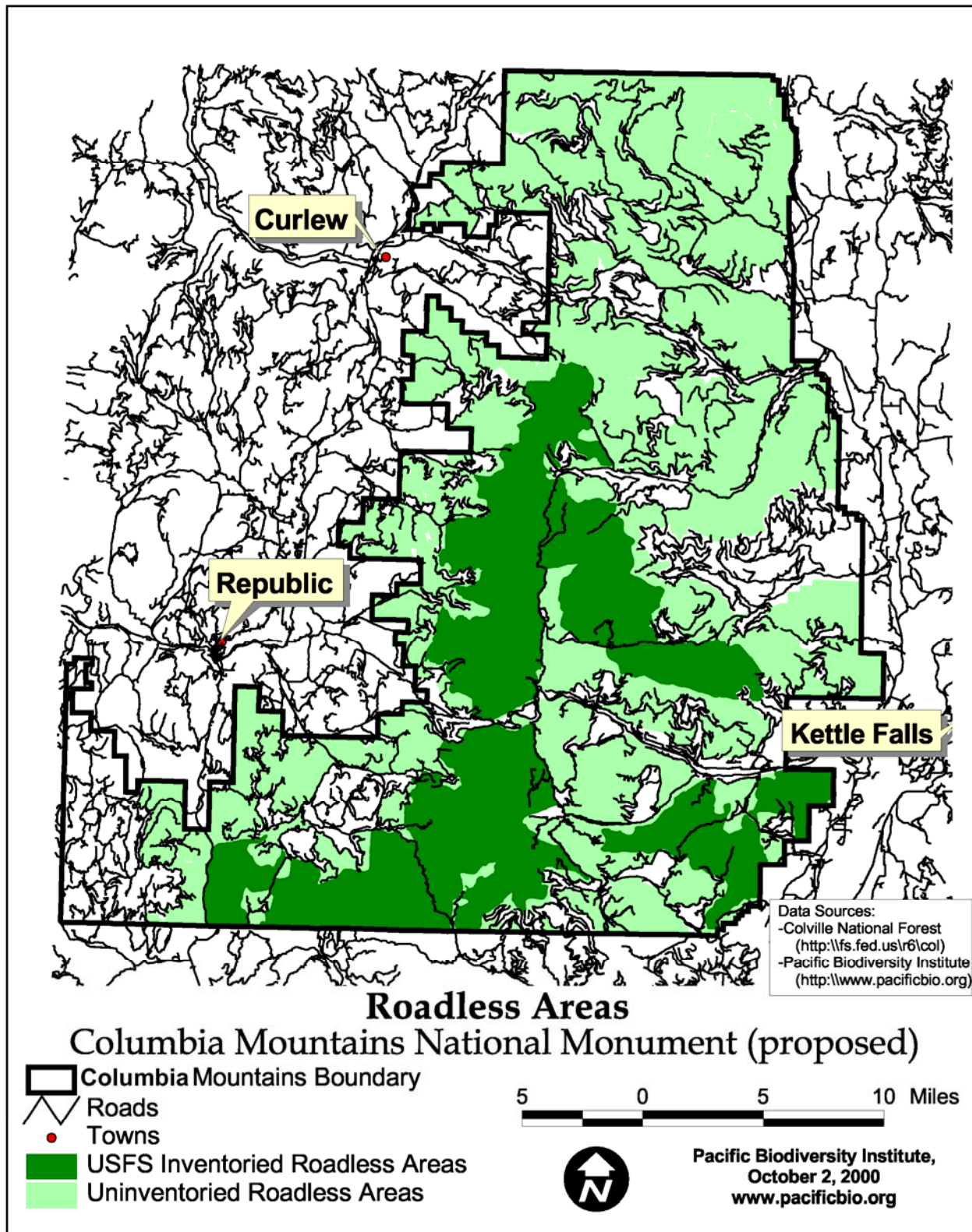


Figure 4. US Forest Service inventoried roadless areas and uninventoried roadless areas in the proposed Columbia Mountains National Monument.

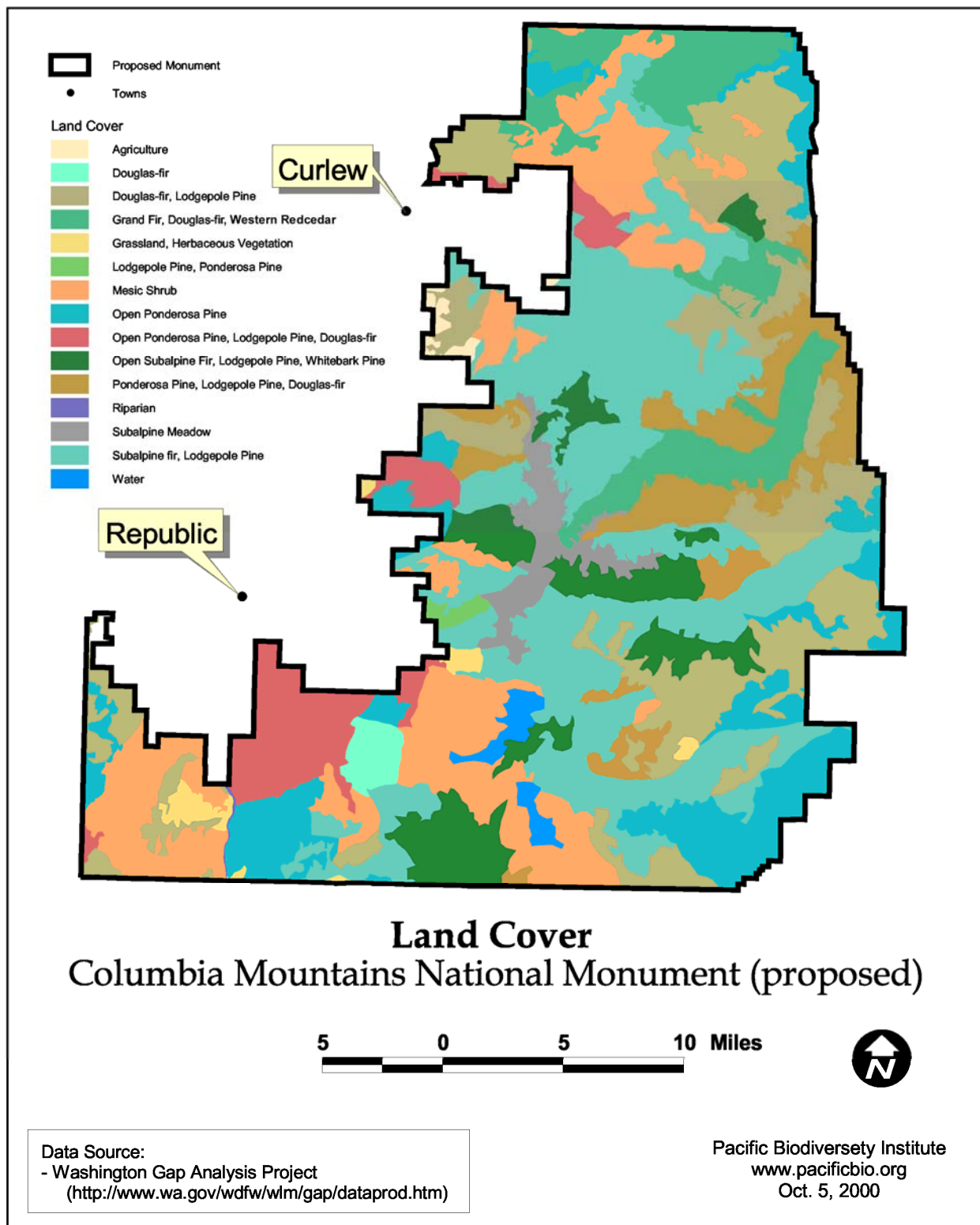


Figure 5. Vegetation and land cover for the proposed Columbia Mountains National Monument.

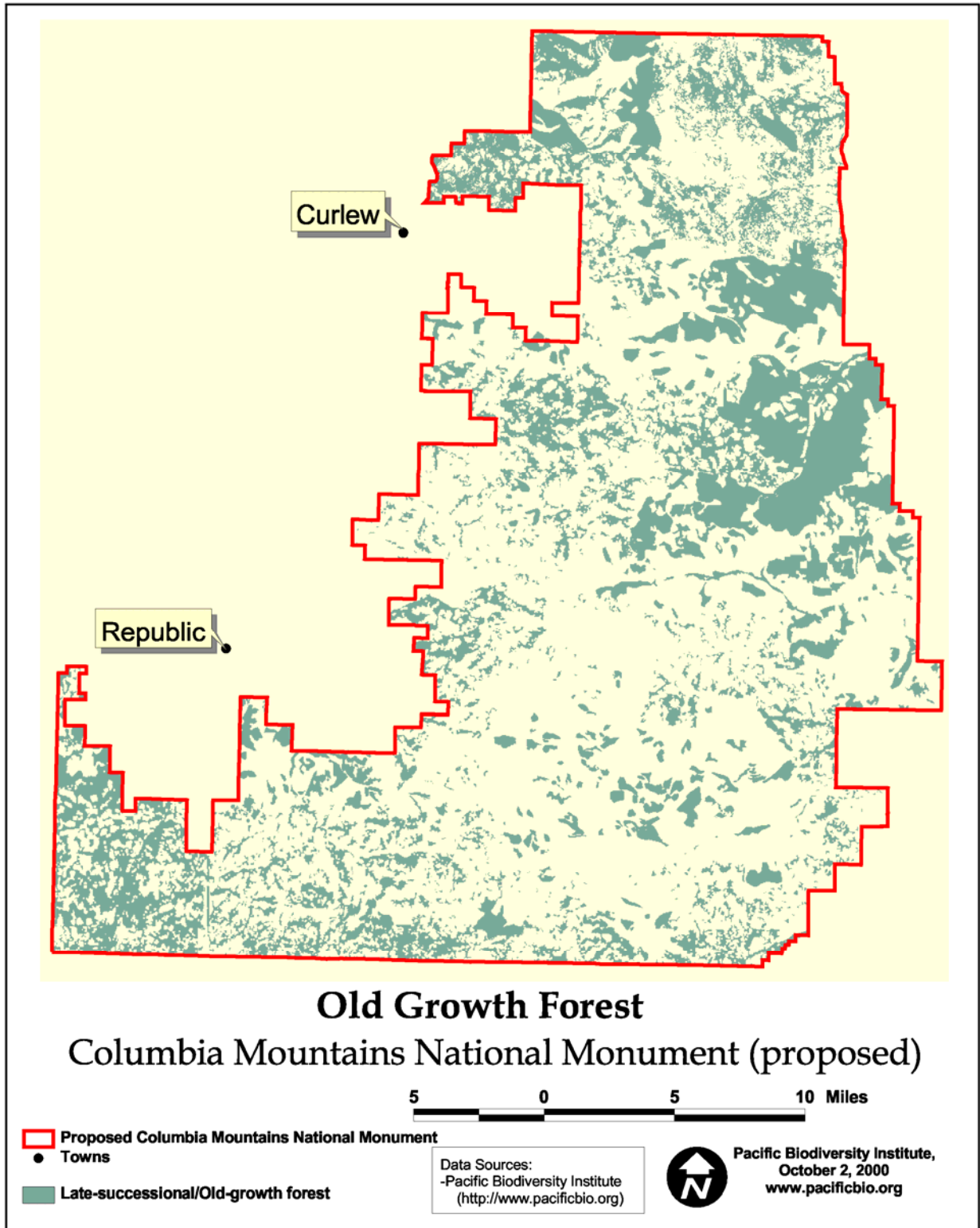
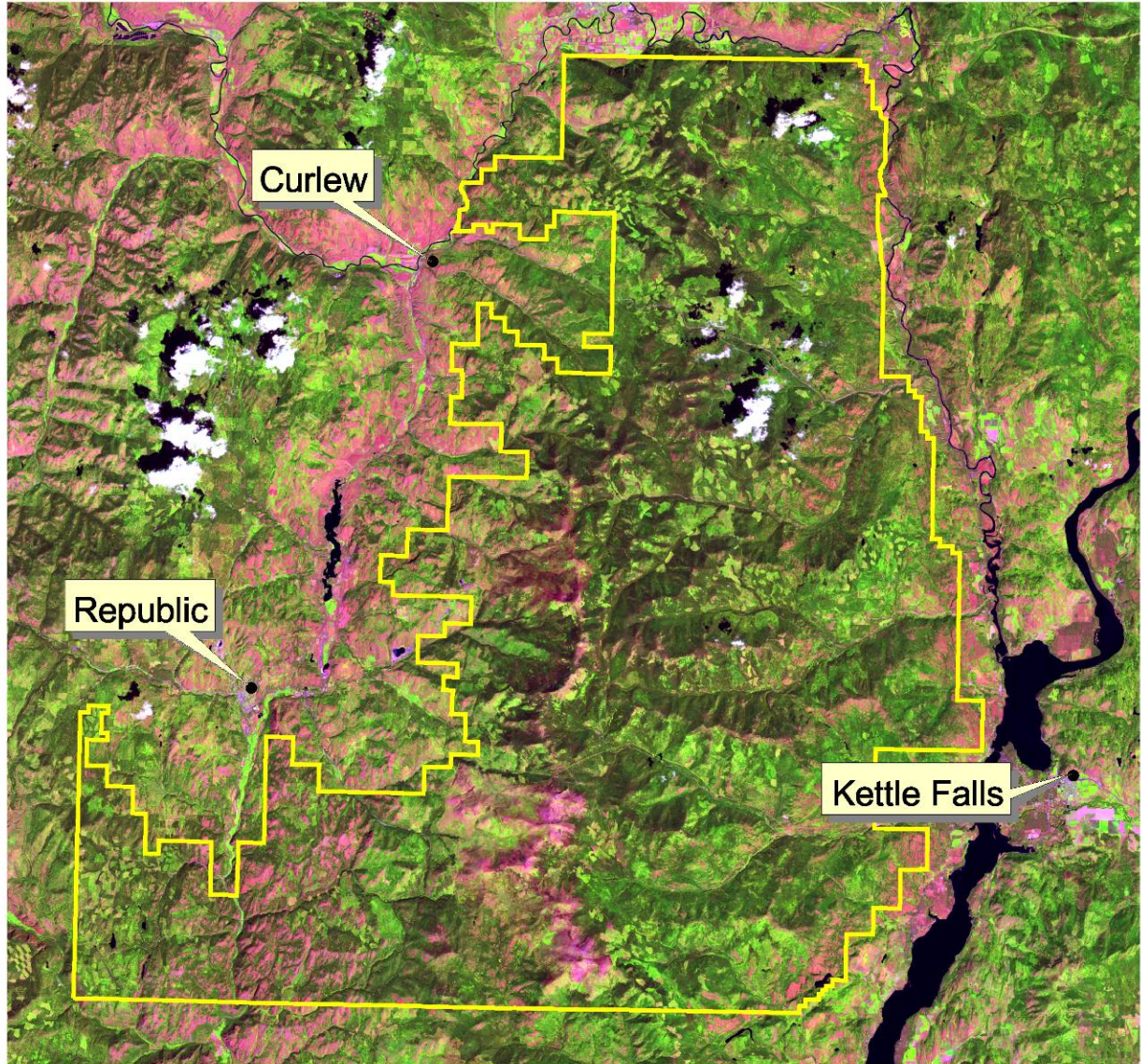


Figure 6. Mapped late-successional and old-growth forests in the proposed Columbia Mountains National Monument.





## Landsat 7 Enhanced Thematic Mapper Satellite View Columbia Mountains National Monument (proposed)

This map shows a Landsat Enhanced Thematic Mapper (TM7)-NOCA view of the Kettle Range area as of 1999. The TM7 satellite sensor records the reflection of infrared and near-infrared light off of the earth's surface. In this depiction, three of the recorded wavelengths are displayed in a red-green-blue color pattern. Bare ground or rock reflects a lot of light and will appear pinkish. Recent clearcuts will also appear pinkish due to soil disturbance. Photosynthetically active vegetation (e.g., meadows, shrubby clearcuts) appear as bright green. Mature and old-growth forests show up as a drab-green. Water reflects very little light, appearing black.



Data Sources:  
-USGS EROS Data Center  
(<http://edcwww.cr.usgs.gov>)

**Pacific Biodiversity Institute,**  
**October 2, 2000**  
**[www.pacificbio.org](http://www.pacificbio.org)**

Figure 7. A 1999 satellite image view of the proposed Columbia Mountains National Monument.



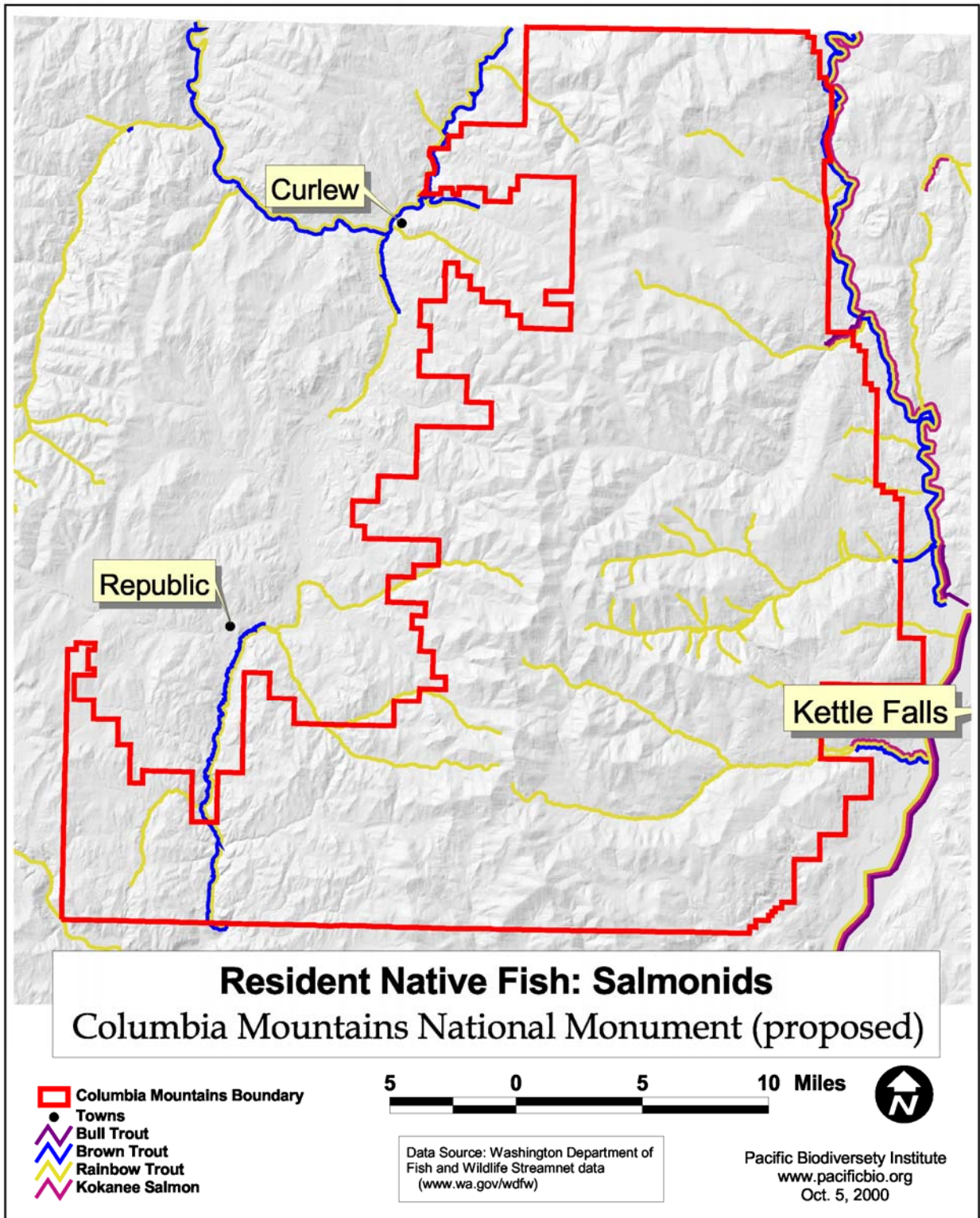


Figure 8. Stream segments with recorded observations of resident, native salmonids. Lack of occurrence of fish in a stream segment does not indicate absence.

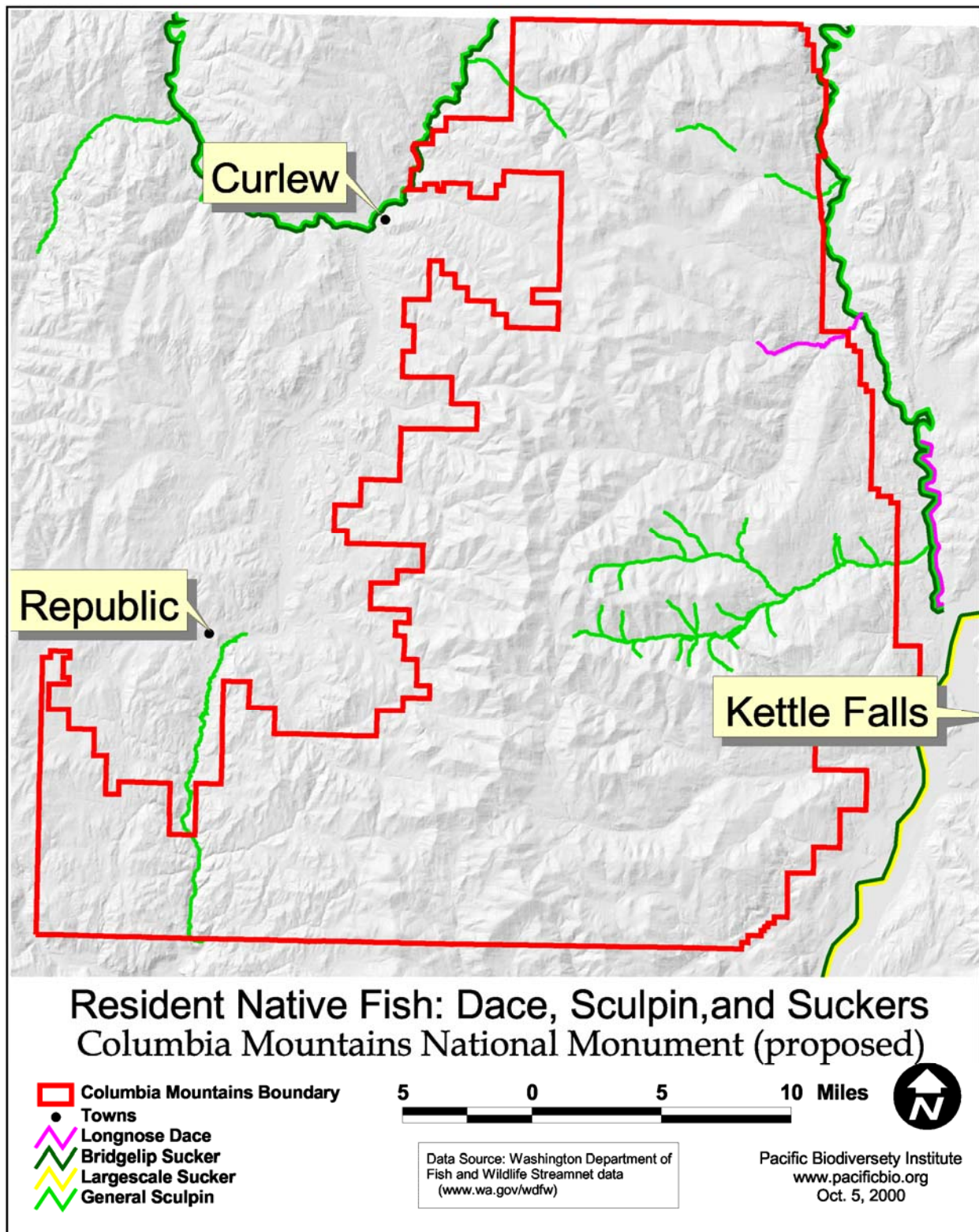


Figure 9. Stream segments with recorded observations of resident, native dace, sculpin and suckers. Lack of occurrence of fish in a stream segment does not indicate absence.



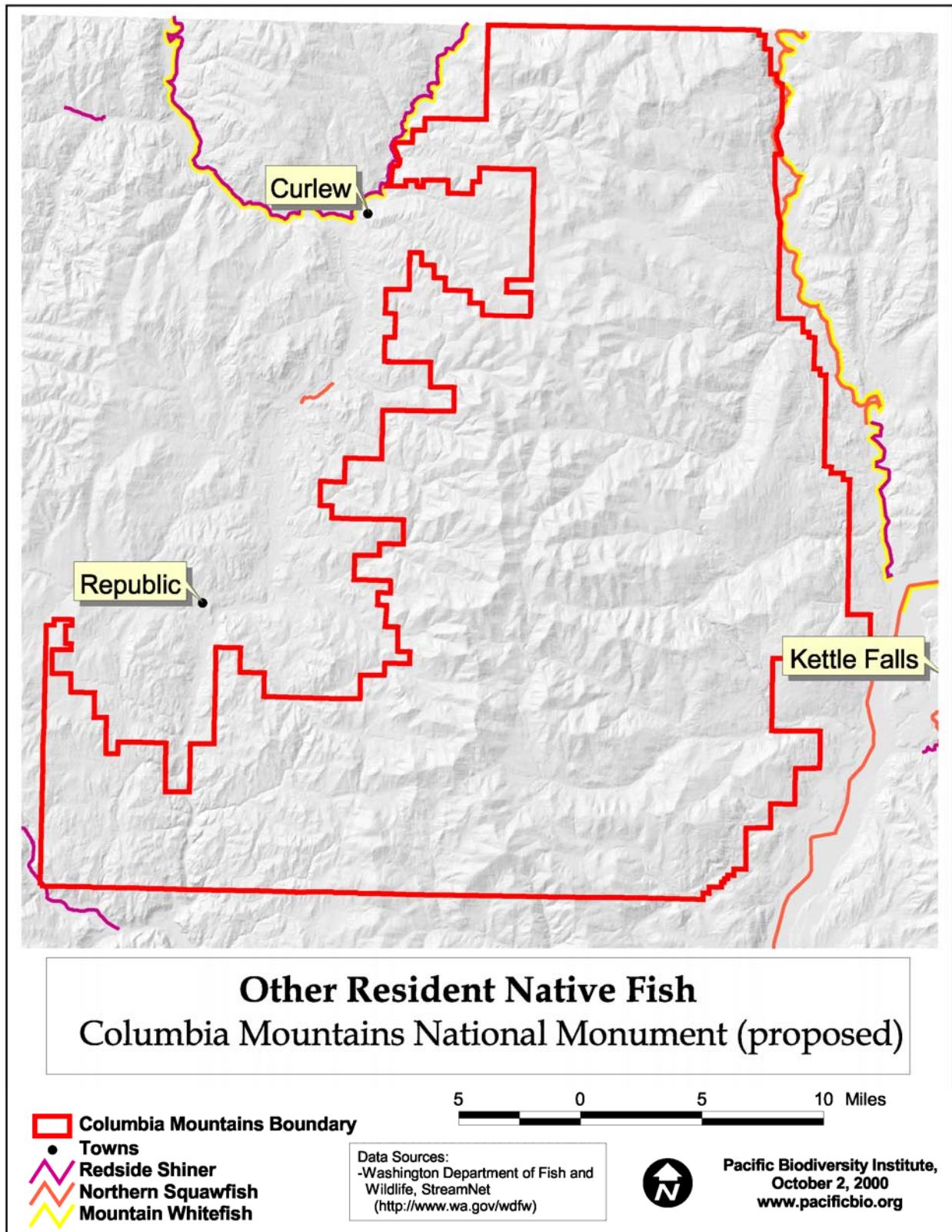


Figure 10. Stream segments with recorded observations of resident, native whitefish, squawfish and shiner. Lack of occurrence of fish in a stream segment does not indicate absence.

## ***Appendix A. Objects of Scientific and Historic Interest***

### **General, Climate, Topography, Scenic, Recreational**

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**Description:** “The area is characterized by a hilly to mountainous topography and narrow stream valleys. For the most part, the stream valleys are oriented in a north-south direction. The Kettle River Range, a part of the Okanogan Highlands, divides the area into two parts. This range rises to an elevation of 1,400 to more than 7,000 feet and is crossed by the highest all-weather road in the State. Copper Butte, the high point of this range rises to an elevation of 7,135 feet.”

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**Location:** entire area

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**Source:** Zulauf and Starr, 1979, p. 1

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**Description:** “The area is part of the Okanogan Highlands landform province, which is characterized by moderate slopes with broad rounded summits as a result of repeated continental glaciation. The broader valley bottoms are characterized by outwashed terraces.”

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**Location:** entire area

---

**Source:** Colville National Forest, 1988a, p. C-41

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**Description:** “The area has a climate with both maritime and continental characteristics because air masses from the continent and the Pacific Ocean cross this region. The north-south trending mountain ranges and narrow valleys also create variation in the climate (Phillips and Durkee, 1972). The western portion of the Forest is under the influence of an intense rainshadow formed by the North Cascades, while the eastern portion has a moist near-maritime climate caused by the westerly air flow being forced over the 5,000-7,000 foot peaks of the Kettle River and Selkirk ranges. Throughout the year, maritime air from the Pacific exerts a moderating influence on temperatures while more extreme temperatures come with drier air from the interior.”

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**Location:** entire area

---

**Source:** Colville National Forest, 1988a, p. 3

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**Description:** “The western portion of the Colville has a dry continental climate, with valleys receiving 15-25 inches of rain per year. Rainfall increases to the east, averaging 30-40 inches per year in the Kettle Range and as much as 55 inches in the Selkirk Mountains.”

---

**Location:** entire area

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**Source:** Henjum et. al., 1994, p. 52

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**Description:** “The area is located 30 miles west of Colville, Washington. The nearest large population center is Spokane, Washington ... The Profanity, Twin Sisters, Hoodoo, and Bald-Snow

Roadless areas [are] in the north central portion of the Kettle Range and lies on both sides of the hydrologic divide between the Columbia River and the Curlew and Sanpoil Valleys.”

---

**Location:** Kettle Range roadless areas

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**Source:** Colville National Forest, 1988a, pp. C-41, 53, 63, and 75

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**Description:** “A prominent feature is the Kettle Range dividing the Columbia River from the Curlew Valley and is an extension of the Monashee Mountains in British Columbia, Canada. The highest elevation within the area, 7,135 feet, occurs on Copper Butte. The lowest elevation occurs at 4,250 feet where South Boulder Creek crosses the east boundary.”

---

**Location:** Profanity roadless area

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**Source:** Colville National Forest, 1988a, p. 41

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**Description:** “Copper Butte is the highest peak at 2175 m (7135 ft) and Snow Peak is the second tallest at 2165 m (7103 ft).

The climate of the Kettle Range is continental. Winters are long and cold, and snow is usually on the ground from early December until March (Zulauf and Starr, 1979). Frequent weather changes in the winter are due to Pacific weather systems and occasional invasions of arctic air masses from Canada. Summers are generally sunny, warm, and dry with occasional hot days.”

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**Location:** entire area

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**Source:** Annable and Peterson, 1988, p. 62

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**Description:** “Elevation [of East Deer Creek] ranges from just under 1,4000 feet, m.s.l., to 5,978 feet, m.s.l., at Marble Mountain ... The estimated mean annual precipitation for the drainage is 37 inches of which over 60 percent occurs as snow. Precipitation ranges from less than 20 inches at the mouth to over 45 inches at Marble Mountain. The watershed yields over 14,000 acre feet annually with over 70 percent coming during the months of April, May, and June.”

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**Location:** East Deer Creek watershed

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**Source:** Wheeler, 1973, pp. i-2

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**Description:** “The rain-shadow effect of the Cascade Range, immediately west of the area, is striking and drastic along the river valleys and bottomlands of the Okanagan Highlands and in the Columbia Basin.”

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**Location:** entire area

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**Source:** Turner et. al., 1980, p. 3

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**Description:** “Within the Kettle Range, the Hoodoo Roadless Area occupies a portion of the divide between Sherman Creek and Deadman Creek. The highest elevation occurs at 5,947 feet on Graves Mountain. The lowest elevation is 3,000 feet where the Roadless area boundary approaches Deadman Creek.”

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**Location:** Hoodoo roadless Area

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**Source:** Colville National Forest, 1988a, p. C-63

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**Description:** “The Kettle Crest Trail is designated as a National Recreation Trail by the U.S. Forest Service.”

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**Location:** Kettle Range

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**Source:** Kettle Range Conservation Group, 1982, p.1

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**Description:** “The Kettle Crest National Recreation Trail, which bisects the entire length of the Bald-Snow area, is classified as a semi-primitive, non-motorized trail.”

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**Location:** Kettle Crest

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**Source:** Kettle Falls and Republic Ranger Districts, 1993, p. 15

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**Description:** “Originating in the mountains of southeastern British Columbia, the Kettle flows 220 miles before joining the Columbia River near Kettle Falls, Wash. ... The final 25 miles of river, from Laurier to the Columbia River, long have been proposed for protection under the U.S. Wild and Scenic Rivers Act.”

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**Location:** Kettle River

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**Source:** Hansen, 1999

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**Description:** “There are also scenic views of Lake Roosevelt and the Curlew and Kettle River valleys from the higher ridges. The area provides a backdrop for the Colville, Curlew, Kettle and Columbia River.”

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**Location:** Profanity roadless area

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**Source:** Colville National Forest, 1988, p. 42

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## History

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**Description:** Aside from French-Canadian trappers, the first white explorer to enter the Kettle Range area was David Thompson of the Northwest Company of Montreal, a rival in the fur trade with the Hudson’s Bay Company. Thompson came down the Columbia River in the spring of 1811 and arrived at the Kettle Falls while people were busy with harvesting the salmon run.

In 1846, Canada and the U.S. signed the treaty designating the 49<sup>th</sup> Parallel as the international boundary.

On March 2, 1853, Washington Territory was separated and ceased to be a part of “Old Oregon”.

On April 9, 1872, President U.S. Grant ordered the formation of the Colville Indian Reservation, east of the Columbia River to the Pend O’Reille River, between the Spokane River and the 49<sup>th</sup> Parallel. Grant changed this boundary on July 2 of the same year, and moved the Reservation *west* of the Columbia River as far as the Okanogan River, between the Columbia River and 49<sup>th</sup> Parallel.

In 1882, Lieutenant Henry Pierce led a “scientific exploring party” over the Kettle Range, as part of explorations in the North Cascades.

In 1883, General William Tecumseh Sherman of Civil War fame made a historic crossing of the Kettle Range over Boulder Creek (then called Deadman Creek). Army Lieutenant George Washington Goethals, builder of the Panama Canal, also traversed the Kettle Range this year, in reconnaissance for, and later accompanying, General Sherman.

On July 1, 1892, 1,500,921 acres of the north half of the reservation comprising the Kettle Range was restored to U.S. land ownership, in payment of \$1,500,000 to the Indians.

On October 10, 1890, the land was opened up for homesteading.

On March 1, 1907, President T.R. Roosevelt created the Colville National Forest from the remaining unsettled lands in northeastern Washington.

Some of the land ownerships and treaties remain controversial, and lack agreement as to the authority of the signers.

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**Location:** entire area  
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**Source:** Raufer, 1996, pp. 136-150; other history texts.

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**Description:** “In 1846 a treaty was signed between America and Canada, but their common border was not surveyed until 1857, when a large group of officials and Canadian soldiers arrived at Fort Colville ...Unfortunately, these Canadians were thirty miles too far south according to the 1859 American Boundary Commission with George McClellan. These soldiers cut a swath through the thick virgin forest without asking the Colville, leaving an open space sixty feet wide, running east to west through the center of our lands. Wherever a trail crossed this space, piles of rock were left to mark the line.”

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**Location:** Kettle Falls area and adjacent mountains east and west  
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**Source:** Mourning Dove, 1990, p. 154

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**Description:** “I have the honor to invite your attention to the Necessity for the setting apart by Executive order of a tract of country herinafter described, as a reservation for the following bands of Indians in Washington Territory, not parties to any treaty ...”[these included a total of 4200 Indians from eight main tribes in northeastern Washington.]

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**Location:** entire area

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**Source:** Winans, 1871, in Raufer, 1996, p. 136

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**Description:** “Old Indians remember that the frame church was put up soon after the great 1872 earthquake ...My father was eight then, and he said the earth began to tremble and rock violently, sounding like big trees cracking. Boulders rolled down hillsides, fissures opened in the ground, and some tipis collapsed.”

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**Location:** entire area

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**Source:** Mourning Dove, 1990, p. 152

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**Description:** “After crossing three small creeks [which show on present-day maps], the trail quitted the Columbia, and wound up and over a spur of the hills, in a southwesterly direction, until it struck the Sin-pail-hu [Sherman Creek] a strong and rapid stream, following whose northern banks over the rolling bench-lands at an elevation of 150 feet, and crossing one of whose branches [Trout Creek], it led, after a march of 10½ miles, to our camp for the day near some excellent springs tributary to the Sin-pail-hu, and rising at a point perhaps 300 feet above it. On the opposite side of the stream runs a lofty range of mountains [Kettle Range] ...At an elevation of 5,450 feet above sea level we reached the summit of the divide, marked by a rude wooden cross, doubtless the site of an Indian grave.”

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**Location:** Sherman Pass

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**Source:** The Official Report of Lt. Henry H. Pierce, in Marshall, 1967, p. 15

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**Description:** “The trail we were using cuts across the bend 30 miles and is known as the Little Mountain Trail [an old Indian Route over Boulder Creek, then called Deadman Creek] ...The intricacies of the trail were such as to keep each individual on the alert for his own personal safety and it was in silence that we scrambled on our way. The descent for about 2,000 feet was even worse than the ascent, but after that the trail grew better; there was less of the fallen timber, underbrush and rocks and fewer steep places.”

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**Location:** Boulder Creek

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**Source:** Excerpted from notes of General Sherman’s Aide-de-camp, Tidball in Marshall, 1967, pp. 10-13

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**Description:** “In this northern country, the Indian trails connecting two points are usually the shortest and best way to travel, and excepting in certain places, the grades throughout their entire lengths are good ...I knew of three trails in the area ...the third across the ‘Little Mountain’ [the Boulder Creek route over Kettle Crest], and called the Little Mountain Trail”

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**Location:** Kettle Range

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**Source:** Lt. Goethals in Marshall, 1969, p. 26

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### **Cultural Heritage and Ethnography**

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**Description:** “Four tribes made up what is known as the Okanogan grouping: the Colville (Swhy-ayl-puh), the Sanpoil (Snpo-i-il), the Lakes (Si-na-aich-kis-tu), and the Okanogan. (All of them belong to the Interior Salish division of the Salishan language family) and speak closely related tongues, with dialect variations chiefly in pronunciation. The Okanogan had two main divisions, the Upper or Lake Okanogan of British Columbia and the Lower or River Okanogan, now on the Colville Reservation of north-central Washington State, where Colville and Sanpoil still occupy ancestral lands. Most Lakes have also moved to this reservation, although a handful remain in British Columbia. Before whites arrived, all four tribes had an estimated population of ten thousand or more.”

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**Location:** entire area

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**Source:** Mourning Dove, 1990, p. 145

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**Description:** “Okanogan-Colville territory comprises an area of the Southern Interior of British Columbia and the Northern Interior of Washington.”

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**Location:** entire area

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**Source:** Turner et. al., 1980, p. 1

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**Description:** “The Okanogan-Colville language is classified in the Interior Salish division of the Salishan Language family ...*Sanpoil-Nespelem*—only the Sanpoil subgroup is still in existence. Sanpoil territory traditionally extended along both sides of the Columbia River from Grand Coulee to Rogers Bar and included the Sanpoil River drainage system upriver to Republic ...*Lakes*—along both sides of the Columbia River from near Kettle Falls north to Revelstoke, including the Arrow Lakes and Slocan Lake areas.”

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**Location:** entire area

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**Source:** Turner et. al., 1980, pp. 1-2

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**Description:** “Walter Cline and others in an ethnographical study made during July and August, 1930, divide the Okanogan tribes into the Northern and Southern Okanogans. The Okanogan tribes of the South are called here by the name they used, ‘Sin Equai’tku’ ...Early historians did not divide the Upper and the Lower Okanogans.”

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**Location:** entire area

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**Source:** Raufer, 1966, p. 17

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**Description:** “The tribes who are distinct but often grouped together, the Nespelems and the Sanpoels, lived about 30 miles apart, separated by the Sanpoil Mountains ... According to David Thompson they were different tribes ...” They are a finer people, several of the Men were six feet in height, the face rather oval, the eyes black, the nose straight and prominent, the cheek-bones moderate, teeth and mouth good, the chin round, on the whole their appearance is manly, mild, open, and friendly. The men were ornamented with a few shells, the women more profusely.”

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**Location:** entire area

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**Source:** Raufer, 1996, pp. 18-19

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**Description:** “In his study of Columbia Plateau aboriginal cultures, Ray considered the Sanpoil to be the best exemplars of traits that he saw as central to Plateau culture. These were pacifism and equalitarianism (Ray 1932). The Sanpoil people followed a seasonal round similar to other Plateau groups, being mobile enough to take advantage of the salmon runs in the summer, upland hunting in the fall, root foods in the spring and berries in the late summer.”

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**Location:** Sanpoil River area

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**Source:** Republic Ranger District, 2000a, Heritage Overview, p. 2

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**Description:** “Ethnographer Verne F. Ray recorded camp sites of the Salish speaking Sanpoil people from the mouth of the Sanpoil into the middle of the analysis area. These were not the substantial settlements he calls “villages” and probably included few, if any, features that would be visible on the ground surface today.”

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**Location:** Sanpoil River area

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**Source:** Republic Ranger District, 2000a, Heritage Overview, p. 2

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**Description:** “Eventually these Interior Salishans were assigned to two reservations by presidential executive order. The Sanpoils, whose particularly conservative and inhospitable stance toward the government was encouraged by their prophet Kolaskin, became the nucleus for the Colville Reservation.”

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**Location:** entire area

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**Source:** Mourning Dove, 1990, p. xxix

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**Description:** “One trip that my parents seldom failed to make each year [in the late 1800s] was from the Colville winter village at Kettle Falls to S’oo-yoos Lake, British Columbia, in the country of the Upper Okanagan ... The well-trodden trail took us over the pass of Deadman Creek (so-called because an Indian killed a miner there; later it was known as Boulder Creek) up Kettle River ...”

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**Location:** Boulder Creek

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**Source:** Mourning Dove, 1990, p. 20

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**Description:** “Ethnographic information tells us that the Sherman Creek corridor was used as a transportation route by Native Americans traveling to the Columbia River. Verne Ray (1933 [1932?]) shows the area designated Sherman Watershed as part of the Colville Indian’s territory with the San Poil adjacent on the west and the Lakes Indians on the north.”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 38

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**Description:** “In any given area, the Okanagan-Colville [Indian tribes] had easy access to at least one, and, more often, two or three of the major vegetation zones, and to numerous habitats (e.g. swamps, meadows, talus slopes, river banks and rocky outcrops) within these zones. The economic potential of a plant in any locality was certainly affected by its availability and abundance. However, the direct dependence on locally available flora was modified somewhat by the development of a systems of exchange of plants and plant products, both among the various groups speaking the Okanagan-Colville language and with other Plateau groups, including the Flathead-Kalispel-Spokane, the Moses-Wenatchee-Chelan, the Thompson and the Shuswap. Such plant products as dried Saskatoon berries, hazelnuts, bitter-roots, camas bulbs, Indian hemp fibre, and tobacco were popular items of commerce (Teit 1930:253-254).”

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**Location:** entire area

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**Source:** Turner et. al., 1980, p. 5

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**Description:** “The cedar stands in the Swan Lake area and Scatter Creek drainage may also be of importance for tribal members as a supply for material for cedar baskets. There is evidence of “peeled cedars” near Swan Lake (Perry, 1998).”

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**Location:** Sanpoil River area

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**Source:** Republic Ranger District, 2000a, Heritage Overview, p. 11

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**Description:** “Evidence of aboriginal activity in the analysis area includes several former Indian allotments along the Sanpoil, a “prayer rock” beside the Knob Hill-Trout Creek Road inside Republic’s city limits near an old trail junction, and a stand of cedars, partially peeled for basketry material, near Swan Lake. There is a documented aboriginal archaeological site near the mouth of Thirteenmile Creek, and a lithic scatter/quarry site overlooking Scatter Creek inside the analysis area. The only known petroglyph in Ferry County’s “North Half” was recently discovered along Highway 21. Other aboriginal sites probably exist along the Sanpoil and its major tributaries but the area has never been systematically surveyed for archaeological material.”

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**Location:** south part of area

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**Source:** Republic Ranger District, 2000a, Heritage Overview, p. 2

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**Description:** Mourning Dove (1990) describes a two-week long hike made by herself and a medicine woman in the early 1900s, covering 30 miles to the summit of Pak-kum-kin on the Kettle Crest (White Top or Mount Baldy). The pair camped at the site of a summit sweat lodge, and after a lengthy purification ritual, prepared a love charm from a sacred plant growing there.

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**Location:** Bald Mountain

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**Source:** Mourning Dove, 1990, pp. 84-87

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**Description:** Mourning Dove (1990) describes an early 1900s Indian hunting trip into on horseback into the Mountains near Boulder Creek (formerly called Deadman Creek). The group included men and women from several different tribes, and covered 30-40 miles along Boulder Creek over a period of two months, eventually crossing the range by the onset of snow to spend the remainder of the winter at their camp near Curlew Lake.

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**Location:** Boulder Creek area

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**Source:** Mourning Dove, 1990, pp. 115-119

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**Description:** “A large mountain basin about 29 kilometres (18 miles) northwest of Inchelium is called “stexsenúla7xw” (“tiger lily ground”) because it has so many of these [*Lilium columbianum*] plants.”

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**Location:** Thirteenmile area

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**Source:** Turner et. al., 1980, p. 48

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**Description:** “In the old days a large bundle of prepared Indian hemp [*Apocynum cannabinum* L.] fibre was worth a horse (Spier 1938:77). The Thompson obtained it from the Southern Okanagan in exchange for salmon and animal skins during trading expeditions made to Okanagan country every other year (Spier 1938:76-77). In the early 1800’s Alexander Ross of the Pacific Fur Company noted that the Southern Okanagan undertook a fifteen-day journey to the coast where they traded Indian hemp for dentalia shells and trinkets (Ross 1849:291).”

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**Location:** entire area

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**Source:** Turner et. al., 1980, p. 73

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**Description:** “A certain mountain basin northwest of Inchelium, between Grizzly Mountain and White Mountain, is called “n\_xwuxwtl’milhp” (ML), or “a7klh-xwuxwtl’milhp” (AL) after this species [*Ledum groenlandicum* Oeder].”

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**Location:** White Mountain area

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**Source:** Turner et. al., 1980, p. 102

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**Description:** “A valley on the west side of the Kettle River, northeast from Republic, is called “nskwekwewílhp̄m” (‘having wild rose bushes’) (ML).”

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**Location:** northeast of Republic

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**Source:** Turner et. al., 1980, p. 131

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**Description:** “In 1907, the north half of the Colville Indian Reservation was withdrawn from entry and set up as a National Forest. The Forest Service began managing the land to develop range land, preserve merchantable timber from fire and develop game and recreation facilities. The area north of Sherman Creek and near the center of the planning area was used by sheep herders from at least the 1920’s. A Forest Service guard station was also located along the Sherman Highway near the fork at some time before 1918.”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 38

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**Description:** “In 1934 the Civilian Conservation Corps (CCC) set up a permanent camp, Camp Growden, on Sherman Creek near where the South Fork of Sherman Creek branches off from the main part of Sherman Creek.”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 38

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**Description:** “Many of the higher peaks in the planning area at one time were used as fire lookouts. The Columbia Mountain lookout, on the extreme west edge of the watershed, was built in 1914, making it one of the oldest lookouts in the northwest.”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 38

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**Description:** “The Colville National Forest Plan (Forest Plan) has identified a proposed RNA in the North Fork O’Brien Creek area. This entire area of the North Fork O’Brien Creek RNA burned in the White Mountain Fire Complex in the late summer of 1988 ...Forest Service lookouts used to be located on both White Mountain and Barnaby Buttes. The White Mountain Lookout was destroyed around 1950 with very little evidence remaining to show that a lookout was in the area. The Barnaby Buttes lookout was abandoned / destroyed in 1974 and only the cement foundation remains at the summit ...”

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**Location:** O’Brien Creek area

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**Source:** Kettle Falls and Republic Ranger Districts, 1993, pp. 11-14

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**Description:** “The North Fork O’Brien Creek Research Natural Area (Proposed) is located in the area north of the Snow Peak Trail, west of the crest of the Kettle Range, south of Highway 20, and its western boundary is approximately one mile from the crest of the Kettle Range. Other special features include large talus slopes and rocky outcroppings on the majority of the mountain peaks. Cultural sites include reportings of Native American Vision Quest sites on White Mountain and areas on peaks south. Unique wildlife species include Lynx (identified as primary lynx habitat by the State of Washington Dept. of Wildlife), Gray Wolf, and Wolverine.”

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**Location:** O’Brien Creek area

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**Source:** Kettle Falls and Republic Ranger Districts, 1993, p. 15

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**Description:** “Several sites have been identified in the planning area as a result of cultural resource survey efforts. A total of 28 sites have been identified and recorded. Of these, six are lookout sites, five are high elevation rock cairns, five are associated with CCC era activities, two with homesteading, four with lumber harvest, two with possible bootlegging, three with early freighting or transportation activities, and two possibly with sheep grazing.”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 39

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**Description:** “Two interpretive sites are located within the watershed. The Log Flume Interpretive trail (on Highway #20 near the east edge of the area) and the Sherman Pass interpretive kiosk. A historic homestead near the top of Bangs Mountain was at one time a part of the Bangs Mountain Auto Tour.”

**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 39

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**Description:** “The site of the J.H. Avery Homestead is within the roadless area. This site now part of the Colville National Forest is one of the interpreted spots on the Bangs Mountain Auto Tour.”

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**Location:** Bangs roadless Area

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**Source:** Colville National Forest, 1988a, p. 111

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**Description:** “Swan, Fish, Ferry and Long lakes, today the district’s most heavily used recreation areas, have long been a focus of local leisure activity. From the ‘teens of this century through the 1940’s special use permits allowed construction of several summer cabins at Swan Lake. Modern campground improvements have obliterated all evidence of both these structures and the Swan Lake Guard Station, all of which were located in the present campground area. The occupant of the Guard Station was responsible for local fire surveillance. Following lightning storms he used the high ground of both Swan Butte and Sheep Mtn. for his observations. There was apparently never a structure on Swan Butte but the foundation blocks and guy wires of the Sheep Mtn. Lookout are still visible on the mountaintop.”

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**Location:** southwest part of area

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**Source:** Republic Ranger District, 2000a, Heritage Overview, p. 4

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**Description:** “Almost all of the analysis area which is now part of the Colville National Forest became part of the Forest Reserve System, precursor of the National Forests, by presidential proclamation in 1907 and has been under Federal administration since. While roads, fire lookouts, and the results of timber sales are the most visible and most numerous results of Federal activity, the “New Deal” programs of the 1930’s also left traces in the analysis area. Economic recovery programs such as the Civilian Conservation Corps (CCC) produced some of the district’s most used structures. Those located within the analysis area are the Community Kitchen, changing room foundation, and stone walkway at Swan Lake, and three residential buildings, one outbuilding, a warehouse known as “the Stockade”, and a rock wall on the Republic RD compound. The former Forest Supervisor’s residence in Republic is now privately owned and the log bridge and other CCC built improvements in the Tenmile Campground have all been replaced. Unrecorded concrete structures in the campground may be the remains of some of these improvements. The CCC also built or greatly improved the Scatter Creek Road which is now the main route to the popular Swan Lake Campground.”

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**Location:** Scatter/Granite Watershed

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**Source:** Republic Ranger District, 2000a, Heritage Overview, p. 4

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**Description:** “Traditional Native American management practices maintained the forest in park-like stands by periodic low intensity burning.”

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**Location:** entire area

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**Source:** Colville National Forest, 1994, Heritage, p. 24

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**Description:** “The Scatter Creek Watershed Assessment project area lies within the what the Tribes call the North Half Reservation. The original Colville Reservation created by Executive Order of April 9, 1872 was bordered by the Columbia River and Spokane River to the south, the Pend Oreille River to the east, the Okanogan River to the west, and the International Boundary to the north. In 1891 the Colville Tribes and the United States entered into an Agreement in which the Tribes ceded the northern portion (roughly 1.5 million acres between the present northern reservation boundary and the International boundary) to the United States which then put the land into public domain. In addition, the Agreement reserved Tribal rights to hunt, fish and gather plant materials throughout the North Half.”

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**Location:** entire area

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**Source:** Confederated Tribes of the Colville Reservation, 2000, p. 5

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**Description:** “As part of the agreement to the opening of Reservation lands to public domain, the Tribes reserved hunting, fishing and gathering rights on the North Half Reservation. These rights

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were upheld by the Supreme Court Decision in Antoine v. State of Washington, February 19, 1975 that maintained that Colville Reservation tribal members may exercise their rights to hunt, fish and gather roots and berries on the North Half Reservation. These rights to hunt, fish and gather are not viewed by tribal members as sport or recreation, but as cultural, ceremonial and spiritual sustenance.”

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**Location:** entire area

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**Source:** Confederated Tribes of the Colville Reservation, 2000, p. 5

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**Description:** “The following is an abbreviated list of species of cultural importance:

<u>Tribal Name</u>	<u>Common Name</u>	<u>Scientific Name</u>
Huckleberry	Big huckleberry	Vaccinium membranaceum
Sarviceberry	Saskatoon serviceberry	Amelanchier alnifolia
Chokecherry	Chokecherry	Prunus virginiana
Foamberry	Russet buffaloberry	Sheperdia Canadensis
Black moss (a lichen)	Moss	Bryoria spp.
Indian carrot	Yampah	Perideridia gairdneri
Indian potato	Spring beauty	Claytonia lanceolata

**Location:** Scatter Creek Watershed

**Source:** Confederated Tribes of the Colville Reservation, 2000, p. 5

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**Description:** “Rock cairns built by Columbia Plateau Indians seeking enlightenment on top of White Mountain and Thirteen Mile Mountain - submitted to National Register of Historic Places.”

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**Location:** south part of area

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**Source:** Kettle Range Wilderness, p.3

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**Description:** “Early History: The Deadman Watershed falls within what was historically the use area of both the Colville and the Lakes Indians. A campsite has been identified in the vicinity of Deadman Creek. This would have been within the vicinity of the great salmon fishery at Kettle Falls in which both the Colville and the Lakes participated. Several references have been found that describe an old Indian trail that existed up Deadman Creek. One report describes the trail as starting at the Kettle Falls fishing grounds, proceeding up the Kettle River to the present site of Boyds, and then turning west up Deadman Creek. From there it was said to run north to the saddle between Copper Butte and Midnight Mountain and west from there”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, p. 52

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**Description:** Reservation Era: The entire Deadman Creek Watershed was part of the North Half of the Colville Indian Reservation when it was created in 1872 and remained such until the North Half was opened to homesteading in 1900.”

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**Location:** entire area



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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, p. 52

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**Description:** Homesteading: In 1900, any land in the North Half of the Colville Indian Reservation that had not already been claimed as an allotment was open to homesteading and to timber and stone act claims. Between 1906 and 1911 over thirty homesteads were established on Sherwood Creek and Jackknife Mountain. By 1911 the State Road was becoming lined with little homestead houses with each farm averaging about 40 acres in size.”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, p. 52

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**Description:** “There was a trail along the north side of Deadman Creek from the time when the Native Americans were the only ones using it. It was subsequently used by the Hudson’s Bay Company and by early explorers and trappers in the area. The Old State (Stage) Road, begun in 1893, extended up this old trail. Planning and construction of the road were plagued with problems from the beginning. In the end it was abandoned in favor of better existing routes to the south.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, p. 53

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**Description:** “The earliest mining to occur in this area was placer mining. The earliest indication of mining activity comes from a local resident who remembers there was some placer mining on Tie Camp Creek before 1938. The evidence of hard rock mining in this area seems to date from the 1930’s and later.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, p. 53

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**Description:** “President Theodore Roosevelt created the Colville National Forest on March 1, 1907. It reserved over 700,000 acres of forestlands lying between the Okanogan and Columbia rivers and between the Colville Indian Reservation and the Canadian border. In the earliest days of the Colville National Forest, the headquarters was at Republic. Temporary to semi-permanent camps were set up throughout the forest from which to administrate this land. Near the intersection of the North Fork and the main Deadman Creek was the location of one of these Forest Service Ranger Stations.”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, p. 53

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**Description:** “Early Forest Service activity in the watershed included a ranger station at the location of the CCC Camp and lookouts on Graves, Jackknife, and Twin and later on Copper Butte.

Benefield Station was a cabin used by Forest Service crews that were working on foot trails and fire suppression efforts.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, p. 53

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**Description:** “Nine sites have been identified that reflect the homesteading era.”

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**Location:** Deadman Creek watershed

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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, Management Recommendations, p. 54

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**Description:** “Wash Cabin is the only recorded site in the watershed that is representative of the mining theme. It has been designated to be managed under prescription 1.”

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**Location:** Deadman Creek Watershed

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**Source:** Kettle Falls Ranger District, 2000, Heritage Resources, Management Recommendations, p. 54

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**Description:** “The Togo Mountain Lookout has been previously recorded in the northwest corner of the project planning area, a cabin site in section 6, T39N, R36E and a trail which followed the north side of little Boulder Creek as far as the junction between the middle and south fork of Little Boulder Creek. The Orient Guard Station was previously recorded in section 15, T39N, R36E.”

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**Location:** Little Boulder area

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**Source:** Kettle Falls Ranger District. 1995b, p. 4

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**Description:** “When a large body of high grade iron ore was discovered in the vicinity around 1897, the Belcher Mountain Mining Company began operations soon after. By 1906 the camp was the complete mining camp, relying only on its own resources. With a population of between 60 and 75 people it was centered around a post office, a large bunkhouse for single miners, a general store, five or six houses – and a railroad – built initially to haul ore from the Belcher mine to ore bunkers just north of Karamin, this little narrow gauge line only eight miles long, soon doubled as a passenger carrier”

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**Location:** Belcher Mountain area

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**Source:** Barlee, 1988, p. 61

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**Description:** “The Talismine mine, notable in having Chromium, Tantalum, and Columbium, has an interesting history which includes an aerial tramway on a high cliff, the cable of which still remained suspended above the cliffs in the 1970s, and remains on maps today.”

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**Location:** northeast part of area

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**Source:** Bill Swartz, Hydrogeologist with the Colville National Forest (personal communication)

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### Geology and Hydrology

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**Description:** "Geologically, the Columbia Mountains include a mix of igneous, sedimentary, and metamorphic rocks, with formations dating from the Paleozoic era to recent. Predominant bedrock types are Proterozoic and Paleozoic sedimentary and metamorphic rock, gneiss of igneous origin, late Paleozoic and Mesozoic sedimentary and volcanic rocks, granitic intrusions and batholiths of Cretaceous and Tertiary ages (Holland 1976, Douglas et. al., 1970). In the southern part of the region, much of the terrain is composed of rocks from the Late Precambrian age, known as the Belt and Purcell Supergroups (McKee 1972)."

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**Location:** entire area

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**Source:** Frost, 1994, p. 4

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**Description:** The Columbia Mountains complex is older than the ranges of the Continental Divide, and the longer period of erosion of the tilted and faulted Precambrian and Paleozoic sediments has exposed granitic cores and later igneous intrusions. Virtually the entire region above 2,000 m. was repeatedly covered by glacial ice during the Pleistocene epoch, and there are many characteristic surface features such as moraines, terraces, and lake basins. Alpine glaciers persisted on the high peaks long after continental ice receded, and still cover significant areas in the north. The southern boundary of the Columbia Mountains coincides with the limit of continental glaciation, where the gentle, rolling topography descends into the arid lowlands of the Columbia Plateau."

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**Location:** entire area

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**Source:** Frost, 1994, p. 4

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**Description:** "General Statement. The geologic history of the Republic district has as its great features sedimentation in the Paleozoic, erosion with minor vulcanism in the Mesozoic, igneous activity and erosion in the Tertiary, and continental glaciation in the Quaternary.

The oldest rocks exposed in the district are the metamorphic equivalents of a great series of shales, sandstones, limestones and lava flows which are of Paleozoic age, and are provisionally assigned to the Carboniferous. After the deposition of this series, the area passed through a long period of crustal disturbance which, although not developing sharp folds, metamorphosed the beds and raised the area far above sea level. Either during this period of crustal disturbance or shortly thereafter great batholithic masses of granodiorite were intruded into the Paleozoic series.

From the time of the granodiorite intrusions, which are probably of early or middle Mesozoic age, to middle Tertiary times, there was a great period of erosion which may be divided into two parts; a first, during which the entire area was reduced probably to base level (Eocene surface); and a second which was introduced by decided elevation and during which broad valleys at least 2,500 feet deep were developed.

The next rocks in order of formation are of Oligocene age, and occupy one of these broad, deep valleys. They are dacite flows, including great quantities of stream gravels. Overlying these, unconformably, are andesite breccias, lake beds, and andesite flows, all of which occur within the old erosion valley. Next in order of age are intrusive latite porphyries with which the ore deposits are thought to be genetically related.

From the time of the latitic intrusions to the Pleistocene, erosion was the dominant process although during this time there was a short period of basaltic eruption. In the Pleistocene period, the Cordilleran ice sheet covered the entire area.”

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**Location:** entire area

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**Source:** Umpleby, 1985, p. 231

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**Description:** “Between Wauconda and the area just east of Republic, the road crosses the Republic graben. Rocks in this area are andesite and rhyolite, which erupted from volcanoes about 50 million years ago. The best exposures along the highway are in large roadcuts of glaring white rhyolite ash near the town of Republic. The volcanic rocks in the Republic graben have the same chemical composition as some of the granites nearby, and formed at the same time.”

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**Location:** east part of area

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**Source:** Alt and Hyndman, 1984, p.50

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**Description:** “Between Republic and Kettle Falls, the highway crosses the Kettle dome, another large mass of intrusive granite enclosed within a mantle of gneiss. It is generally similar to the Okanogan dome, also 50 to 70 million years old, and also formed after the Okanogan micro-continent joined North America.”

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**Location:** Sherman Pass west to Kettle River

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**Source:** Alt and Hyndman, 1984, p. 51

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**Description:** “Radioactive age dates on both granites and gneisses between Tonasket and Wauconda give times of intrusion which we interpret as being between 50 and 70 million years ago. Therefore, the gneiss dome formed long after the Okanogan micro-continent docked. It was sinking through the Okanogan trench until 50 million years ago. Basalt magma and steam rising from the sinking slab melted rocks deep in the continental crust to create granite magma, which rose dragging hot, but unmelted, gneiss with it.”

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**Location:** Sherman Pass west to Kettle River

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**Source:** Alt and Hyndman, 1984, p. 50

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**Description:** “This is an area of great geological diversity. Lying along the western boundary of the structural depression known as the “Republic Graben”, it is cut longitudinally by the Bacon Creek

Fault and the Scatter Creek Fault Zone, and smaller faults near Republic. The southeastern part of the analysis area lying between the Sanpoil River and the Scatter Creek Fault Zone is dominated by the Sanpoil Volcanics, including interbedded sedimentary rocks, tuffs, and local intrusives. On the lower part of Tenmile Creek these rocks have eroded into pinnacles or “hoodoos”. The northwestern part of the area near Storm King Mtn. (Shown on old maps as “Granite Mtn.”) is dominated by Cretaceous granodiorite which appears again at the head of a tributary of Scatter Creek northeast of Swan Lake. Maps of the extreme northwest, west of the Sheridan road are not available at the District office. The greatest geological diversity occurs in a band running from just north of Mud Lake to Long Lake. This area includes the sedimentary tuff and conglomerate of the O’Brien Creek Formation. East of Republic and along Scatter Creek there are smaller outcrops of greenstone, graywacke, argillite, phyllite, and other complex metamorphics near Golden Harvest Creek and gneiss, marbles, schists, and phyllite near Scatter Creek and the Swan Lake chain. Low lying areas, including the narrow bottom of the Sanpoil River Valley and much of the Scatter, Golden Harvest, and Granite Creek valleys, are covered with Pleistocene glaciofluvial and glaciolacustrine sediments and Holocene alluvium. The geothermal gold deposits and fossil-bearing Eocene lakebed sediments for which this area is internationally known appear to be confined to a small area immediately surrounding Republic, most of which is privately owned.”

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**Location:** Sanpoil River area

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**Source:** Republic Ranger District, 2000a, Heritage Overview, p.1

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**Description:** “A unit of volcanic flows and breccias is present over much of the Republic area; it is known as the Sanpoil Volcanics. These rocks have been radiometrically dated at about 51 or 52 Ma (Pearson and Obradovick, 1977).

Following deposition of the Sanpoil Volcanics, wide-spread faulting associated with tectonic upwarping resulted in the creation of fault-bounded depressions or grabens. The sediments deposited in these grabens are now the rocks known as the Klondike Mountain Formation. The lacustrine beds in which the plant fossils are found at the three Republic sites are all in the lower part of the Klondike ...The Sanpoil Volcanics lie unconformably below the Klondike Mountain Formation, and we believe the flora is probably closer in age to 49 Ma than to the age of the underlying unit (Wolfe and Wehr, 1987). This age places the flora in the middle Eocene.”

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**Location:** east part of area

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**Source:** Wolfe and Wehr, 1991, p.19

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**Description:** “The fossiliferous beds in and near Republic, WA, continue to provide abundant, well-preserved plant specimens. Paleobotanists have already recognized about 210 species from these beds. Many of these fossil plants have been found only at Republic and are known from only one or two specimens. Moreover, species new both to the Republic flora and to science are still being discovered.

...From the flora, we can deduce what the climate was like and what the elevation of the area must have been when the plants were accumulating in the sediments. Further, these fossils tell us much

about the evolution and biogeography of many groups of plants that now grow in temperate climates.”

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**Location:** entire area

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**Source:** Wolfe and Wehr, 1991, p.18

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**Description:** “A middle Eocene flora from British Columbia (Arnold, 1955) indicates that similar environmental conditions existed there; this leads us to believe that the Republic area was part of a large upland ... We conclude that the lake beds were formerly at about 2,300 m (7,500 ft, or about 5,000 ft higher than today.”

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**Location:** east part of area

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**Source:** Wolfe and Wehr, 1991, p.20

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**Description:** “After Republic time, other genera of poorly represented families were added to the highland temperate flora—Oregon grape, willow, redbud, and ash. Therefore, we believe the Republic flora represents a very early stage in the evolution of modern temperate forests ... Among the Republic specimens there are tens of species of the rose family, including members of all four subfamilies ... The arrangement of veins in one type of Republic rose leaf is probably a primitive type for the family ... And still others seem to combine characters that are found in more than one modern genus, which suggests that Eocene species gave rise to these genera or they have characteristics that are intermediate between the original rose ancestor and a modern genus.”

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**Location:** east part of area

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**Source:** Wolfe and Wehr, 1991, p. 21

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**Description:** “Soils within the area are derived from volcanic ash, loess deposits, and glacial till. They are generally coarse-textured with rapid drainage ... Soils generally have a moderate to severe hazard of erosion due to steepness of slope. Metamorphic Gneiss, schist and quartzite dominate the geology of the northern half of the area. Younger granite occurs in the southern portion of the area. Rock outcrops occur on many of the granitic knobs and ridges within the southern part of the area. Heavy dissection of the terrain occurs in the east side of the area. There is a moderate amount of water occurring on the surface at mid-elevation from high elevation percolation. Annual precipitation of this area is 35 inches.

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**Location:** entire area

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**Source:** Colville National Forest, 1988a, p. C-41

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**Description:** “The area is characterized by extensive shallow soils and rock outcrops. Soils within the area are primarily derived from weathered andesite, quartzite, granite, glacial till, volcanic ash, and loess deposits.”

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**Location:** Thirteenmile roadless Area

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**Source:** Colville National Forest, 1988a, p. C-87

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**Description:** "Steeper south and west aspects have less evidence of ash deposition due to past erosion. The ash material overlies rocky glacial till on uplands. Outwash and lakebed deposits are common adjacent to streams. Granitic bedrock dominates forested sites where the more recent glaciation and ash falls have resulted in relatively undeveloped soils. More developed soils with a dark surface layer occur on south and west aspects and alpine and subalpine sites dominated by grass understory. Colder soils at high elevations limit tree growth while the rest of the area is moderately productive."

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**Location:** Twin Sisters area

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**Source:** Colville National Forest, 1988a, p. C-53

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**Description:** Extreme variability in parent materials combine with effects of extensive glaciation to produce a soil pattern in the Columbia Mountains that is bewildering in complexity; at least 100 types (soil series or subgroups) have been described (Lacelle 1990, Valentine et. al., 1978). Most soils are derived from mixed glacial, colluvial, and fluvial deposits. The most common subgroups at lower and middle elevations are Orthic Dystric Brunisols, Brunisolic Gray Luvisols where parent materials are fine textured, and Orthic Eutric Brunisols on calcareous parent materials. At higher elevations, Orthic Humo-Ferric Podzols and Podzolic Gray Luvisols dominate, along with exposed bedrock. Regional distribution of bedrock types and soil subgroups are more fully described by Lacelle (1990), Ryder (1981), Wittneben (1980), and Jungen (1980)".

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**Location:** entire area

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**Source:** Frost, 1994, p.4

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**Description:** "Soils on Uplands and Mountains - The three associations in this group are on ridges and mountainsides. They make up about one-third of the survey area."

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**Location:** Kettle Range

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**Source:** Zulauf and Starr, 1979, p. 6

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**Description:** "*Moderately steep to very steep, well-drained soils at elevations above 3,000 feet* - This association is on uplands. The landscape is one of mountain ridges, knobs, and mountainsides. The ridges are gently rounded, and andesite bedrock is exposed in places. North-facing slopes are steeper and are not so long as south-facing slopes. The vegetation is mainly bunchgrass and scattered Douglas-fir and ponderosa pine on southern exposures and ridgetops. Western larch and Douglas-fir dominate the northern exposures. Elevations range from 3,000 to 6,500 feet. The annual precipitation is 15 to 35 inches. This association makes up about 6 percent of the survey area. It is about 42 percent Vallan soils, 21 percent Bamber soils, 17 percent Tenas soils, and 20 percent Rock land and Manley and Scar soils. Vallan soils are on the rocky ridges, hilltops, and knobs; Bamber and Tenas soils are on the hillsides (fig.3). Vallan soils have a surface layer of brown loam and a subsoil of yellowish-brown loam and are 6 to 20 inches deep over andesite bedrock. Bamber soils have a surface layer of

light brownish-gray loam and a subsoil of pink gravelly or very gravelly loam. They are 40 to 60 inches deep over fractured andesite bedrock. Tenas soils have a surface layer of very dark gray loam and a subsoil that is dominantly reddish gray extremely stony clay loam. They are 20 to 40 inches deep over andesite bedrock."

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**Location:** entire area

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**Source:** Zulauf and Starr, 1979, p. 6

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**Description:** "*Growden-Leonardo-Rock land association - Moderately steep to very steep, well-drained soils and Rock land at elevations above 5,500 feet* - This association is on ridges and uplands in mountainous areas. The tops of ridges are mostly rounded. Many of the sides have nearly vertical outcrops of rock. Many of the steep sides are highly dissected. The vegetation is mostly ponderosa pine, Douglas-fir, and an understory of Idaho and rough fescue, bluebunch wheatgrass, and forbs. Elevations range from below 5,500 to over 6,500 feet. The mean annual precipitation is 25 to 40 inches. This association makes up 7 percent of the survey area. It is about 70 percent Growden soils, 15 percent Leonardo soils, 5 percent Rock land, and 10 percent Bamber, Inkler, and Aits soils. Rock land and the Growden and Leonardo soils, which are moderately steep to very steep, are on the warmer, drier slopes, dominantly the south-facing slopes. Growden soils have a surface layer of dark grayish-brown fine sandy loam and underlying material of yellowish-brown extremely stony sandy loam. Rock land is mainly andesite and granite outcrop and less extensive areas of very shallow soil."

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**Location:** entire area

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**Source:** Zulauf and Starr, 1979, pp. 6-7

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**Description:** "*Togo-Manley-Scar association - Nearly level to very steep, well-drained, cold soils at elevations above 3,000 feet* - This association is on ridges and mountainsides. The main drainage channels tend to be narrow and are oriented in an east-west direction. North-facing slopes are steep. They break abruptly from the ridges into the drainage channels. South-facing slopes are longer and less steep. The ridges are gently rounded. The vegetation is mostly mixed stands of subalpine fir, Engelmann spruce, larch, and Douglas-fir. Elevations range from 3,000 to about 6,500 feet. The mean annual precipitation is 20 to 40 inches. This association makes up 16 percent of the survey area. It is 30 percent Togo soils, 18 percent Manley soils, 13 percent Scar soils, and 30 percent Rock land and Nevine, Pepoon and Vallan soils. The moderately steep to very steep Togo soils are on northern exposures. Manley and Scar soils are on the nearly level ridgetops and the steeper sides, mainly on northern exposures. Togo soils have a thin surface layer of gray loam, a subsoil of dark-brown loam or gravelly loam, and a substratum of brown gravelly or very gravelly sandy loam. Manley soils have a thin surface layer of light-gray loam, a subsoil of light-brown and light-yellowish-brown gravelly silt loam, and a substratum of light yellowish-brown gravelly sandy loam. Scar soils have a thin surface layer of gray very fine sandy loam, a subsoil of strong-brown sandy loam and loamy fine sand, and underlying layers of light-gray loamy sand and sandy loam. Rock land is mainly andesite and granite outcrop."

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**Location:** entire area

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**Source:** Zulauf and Starr, 1979, pp. 6-7



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**Description:** "The area is characterized by extensive shallow soils and rock outcrops. The eastern part of the area, in particular, is dominated by rockland with little or no soil development."

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**Location:** Hoodoo roadless area

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**Source:** Colville National Forest, 1988a, p. C-63

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**Description:** "a. Volcanic Uplands (ponderosa pine/Douglas fir biophysical environment): Uplands formed in hard andesitic flow rocks comprise most of the ponderosa pine/Douglas fir biophysical environment which is at lower elevations in the analysis area. These volcanic uplands are a mosaic of glacially scoured ridges or balds, with deeply incised tributaries and slightly incised draws."

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**Location:** Thirteenmile area

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**Source:** Colville National Forest, 1994, Soil Resources and Erosional Processes, p. 12

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**Description:** "The structural and bedrock geology of the area was set during the formation of the Kettle Metamorphic Core Complex between 50 and 70 million years ago."

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**Location:** Deadman Creek

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**Source:** Kettle Falls Ranger District, 2000, Geology and Soils, p. 47

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**Description:** "Merkel Canyon is a unique geological feature of the landscape that runs north towards Alligator Ridge from the narrow valley along North Fork Deadman Creek."

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**Location:** Merkel Canyon, Deadman Creek areas

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**Source:** Kettle Falls Ranger District, 2000, Scenery and Recreation, p. 51

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**Description:** "Metamorphic Gneiss, schist and quartzite dominate the geology of the northern half of the area. Younger granite occurs in the southern portion of the area. Rock outcrops occur on many of the granitic knobs and ridges within the southern part of the area. Heavy dissection of the terrain occurs in the east side of the area. There is a moderate amount of water occurring on the surface at mid-elevation from high elevation percolation. Annual precipitation for this area is 35 inches."

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**Location:** Profanity roadless area

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**Source:** Colville National Forest, 1988a, p. 41

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**Description:** "(Geology) On the lower part of Tenmile Creek, Sanpoil Volcanics have eroded into pinnacles or 'hoodoos'."

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**Location:** south part of area

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**Source:** Republic Ranger District, 2000b, p. 14

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**Description:** “Republic Graben: Age – early and middle Eocene; Volcanic and sedimentary rocks [Evs] – Andesitic to rhyolitic volcanic and volcanoclastic rocks; continental clastic sedimentary rocks; Intrusive Rocks [Ez] – Epizonal calc-alkalic and alkalic intrusive rocks; Metamorphism and Deformation – Regional east-west extension; rapid uplift of the Swakane block and Okanogan, Kettle, Lincoln, and Priest River metamorphic core complexes accompanied by low-angle, normal (“detachment”) faulting (both ductile and brittle deformation) and broad folding; formation of volcano-tectonic depressions (“grabens”) by high- and low(?) -angle, normal faulting, strike-slip faulting, and broad folding(?). Tectonic / Depositional Setting – Transition from compressional magmatic arc to North American intracontinental, block-arc extensional basin.”

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**Location:** entire area

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**Source:** Stoffel et. al., 1991, Sheet 3 (Summary of Geologic History)

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**Description:** [Metasedimentary and Metavolcanic Rocks] “Pmm: Unnamed metasedimentary rocks north of Kettle Falls contain Permian brachiopods, pelecypods, gastropods, scaphopods, crinoid stems, and plant fragments (Mills and Davis, 1962; B.J. West, 1976; Mills, 1985)...Age assignment of the rocks northeast of Curlew and along the West Fork Sanpoil River (T35N, R30-32E) is based on tentative correlation with the Anarchist Group (Rinehart and Greene, 1988).”

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**Location:** Boundary Mountain area

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**Source:** Stoffel et. al., 1991, p. 15

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**Description:** [Ordovician marine metasedimentary rock units] “Omm: The unit contains middle to late Early Ordovician conodonts, trilobites, and brachiopods (Snook and others, 1981; R.J. Ross, Jr., Colorado School of Mines, written commun., 1988).”

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**Location:** South Huckleberry Mountain area

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**Source:** Stoffel et. al., 1991, p. 16

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**Description:** [Eocene intrusive rocks] “Eimd: The Kettle Crest pluton has yielded K-Ar biotite and hornblende ages of 45-48 Ma (Atwater and Rinehart, 1984).”

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**Location:** Kettle Range

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**Source:** Stoffel et. al., 1991, p. 16

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**Description:** [Intrusive rocks] “Eig: The granite of Deadhorse Creek has yielded a K-Ar biotite age of 50 Ma (Atwater and Rinehart, 1984)...The Fire Mountain pluton granite Intrudes Fire Mountain pluton quartz monzonite (50-53 Ma) (Holder, 1985; Pearson and Obradovich, 1977)...The Long Alec Creek pluton has yielded a K-Ar biotite age of 53 Ma (Stoffel, 1990)”

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**Location:** Kettle Range

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**Source:** Stoffel et. al., 1991, p. 17

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**Description:** [Metamorphic Rocks] “pTog, pTam, pTsc, pTqz, pTmb, pThm, pTbg: Protolith ages of metamorphic rocks in the Kettle and Okanogan metamorphic core complexes (gneiss domes) are unknown. ‘Specific correlation of the ...rocks with sequences elsewhere in the Cordillera is difficult because the rocks in the domes are highly metamorphosed and deformed and cannot be traced out of the core into lower grade equivalents’ (Orr and Cheney, 1987, p.61). The quartzofeldspathic composition of the layered metamorphic rocks in the complexes suggests that they may be correlative with Precambrian metasedimentary rocks in the region (Cheney, 1980; Orr and Cheney, 1987). Upper Cretaceous (?) to middle Eocene plutons (units TKia, TKig, Eimd, Eiqm, and Eig) cut the metamorphic rocks in the complexes, establishing a minimum age for the metamorphic rocks (Holder and Holder, 1988; Holder and others, 1989). K-Ar biotite and hornblende ages reported from the metamorphic rocks in the core complexes range from 46 to 67 Ma (Fox and others, 1976; Engles and others, 1976; Atwater and Rinehart, 1984), indicating that uplift and cooling of the complexes occurred during the latest Cretaceous and early Tertiary. U-Pb zircon ages of 87-100 Ma from a single sample of the Tonasket Gneiss are the only U-Pb ages reported from the metamorphic rocks in the complexes (Fox and others, 1976); it is not clear whether these ages represent protolith or metamorphic ages.”

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**Location:** Kettle Range

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**Source:** Stoffel et. al., 1991, p. 25

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**Description:** “Metamorphic Gneiss, schist and quartzite dominate the geology of the northern half of the area. Younger granite occurs in the southern portion of the area. Rock outcrops occur on many of the granitic knobs and ridges within the southern part of the area. Heavy dissection of the terrain occurs in the east side of the area. There is a moderate amount of water occurring on the surface at mid-elevation from high elevation percolation. Annual precipitation for this area is 35 inches.”

---

**Location:** Profanity roadless area

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**Source:** Colville National Forest, 1988a, p. 41

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**Description:** “A series of andesite flows overlies the lake beds with apparent conformity...The andesites have, in places, as on Gibraltar and Copper Mountains, a total thickness of 1,000 to 2,000 feet.”

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**Location:** southwestern half of area

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**Source:** Umpleby, 1985, p. 237

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**Description:** “The low angle growth fault that separates the brittlely deformed rocks of the Republic Graben from the crystalline rocks of the Kettle Dome has a sinuous trace across the

eastern third of the area. The breccia in this detachment gives rise to many springs along the fault trace...There are numerous scarps and depositional cones of large (>1 X 10<sup>5</sup> M<sup>3</sup>), early Holocene landslides. These are particularly numerous in the North Fork of Lone Ranch Creek...The bulk of unconsolidated material that flanks West Deer Creek, below 3,600 feet elevation is drift that has been redeposited as earliest Holocene debris flows.”

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**Location:** Lone Ranch Creek area

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**Source:** Swartz, 1997a, North South area report, Geology

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**Description:** “The secondary erosion process, in the Lone Ranch Creek Watershed, is mass wasting. Four major (> 1,000 M<sup>3</sup>) contemporary mass wasting events of varying character were identified in the watershed.”

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**Location:** Lone Ranch Creek area

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**Source:** Swartz, 1997a, North South area report, Geology

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**Description:** “The bedrock consists of three packages. To the east from Granite Mountain, and through the Kettle Range is a terrane of orthogneiss and intermediate to granitic intrusive rocks. The intrusive rocks are of Middle Eocene age and are in part foliated contemporaneously with retrograde metamorphosis of the gneiss. From Bear Mountain and Eagle Rock toward the west are volcanic rocks and volcanic related rocks that range from early, tuffaceous conglomerate to late, glassy flows. Between these two areas is a belt of latest Paleozoic, carbonate rocks.”

---

**Location:** Southeastern part of area

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**Source:** Swartz, 1997b, General Description

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**Description:** “The Republic 1:100,000 –scale quadrangle contains six generalized rock packages (Fig. 4): (1) Carboniferous(?)–Proterozoic miogeoclinal rocks; (2) Jurassic–Ordovician eugeoclinal rocks; (3) Mesozoic igneous intrusions; (4) amphibolite-facies metamorphic rocks of unknown age; (5) Tertiary igneous intrusions; and (6) Tertiary sedimentary and volcanic rocks.”

---

**Location:** south half of area

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**Source:** Stoffel, 1990, p. 7

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**Description:** “The second distinguishing feature is bedrock geology. In the western part of the watershed, the volcanic features dip and plunge steeply in proximity to a major eruptive center located on Seventeenmile Creek.”

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**Location:** Thirteenmile Creek area

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**Source:** Swartz, 1997b, Thirteenmile Creek

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**Description:** “The Eocene strata have been subdivided into three formations, which are, in ascending order: the O’Brien Creek Formation, Sanpoil Volcanics, and Klondike Mountain Formation (Muessig, 1962, 1967; Pearson and Obradovich, 1977). The O’Brien Creek Formation is composed of conglomerate, sandstone, and siltstone, and siltstone intercalated with tuffaceous sandstone and tuff. The Sanpoil Volcanics is a thick series of porphyritic hornblende-biotite dacite, andesite, and trachyte flows intercalated with minor tuff, tuff breccia, and volcaniclastic rocks. The Klondike Mountain Formation is a heterogeneous package of shale, volcanic sandstone and conglomerate, tuff, tuff breccia, and minor porphyritic hornblende-biotite dacite and andesite flows that is overlain by a thick pile of vitrophyric and microcrystalline pyroxene dacite and andesite flows.”

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**Location:** south half of area

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**Source:** Stoffel, 1990, p. 9

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**Description:** “This [O’Brien Creek Formation] is the oldest Tertiary stratified rock unit in the area.”

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**Location:** south half of area

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**Source:** Stoffel, 1990, p. 17

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**Description:** “Triassic-Permian metavolcanic and meta-intrusive(?) rocks also crop out in the vicinity of Granite Mountain and along Lone Ranch Creek in the Republic Graben (Parker and Calkins, 1964; Pearson, 1977)”

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**Location:** east part of area

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**Source:** Stoffel, 1990, p. 20

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**Description:** “Metasedimentary rocks near Swan Lake (Paleozoic)(?)—Thinly bedded, dark greenish-gray phyllite and schist (Pzmm<sub>3</sub>) composed of quartz, sericite, biotite, and chlorite ... The metasedimentary rocks near Swan Lake are tightly folded into a series of south-plunging structures.”

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**Location:** south half of area

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**Source:** Stoffel, 1990, p. 21

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**Description:** “Porphyritic dacite plugs and dikes cover many tens of square square kilometers in the map area.”

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**Location:** south half of area

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**Source:** Stoffel, 1990, p. 29

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**Description:** “The Kettle metamorphic core complex is a 25-km-wide, north-trending complex that forms most of the eastern half of the Republic 1:000,000-scale quadrangle and extends north into British Columbia and south into the Nespelem 1:000,000-scale quadrangle (Figs. 4 and 7).”

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**Location:** Kettle Range

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**Source:** Stoffel, 1990, p. 34

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**Description:** “Foliation, lineation, and mylonitic fabrics in the [Kettle Crest] pluton are parallel to those in the gneisses, which indicates that the Kettle Crest pluton was emplaced during the waning stages of ductile deformation in the Kettle Metamorphic core complex”

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**Location:** Kettle Range

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**Source:** Stoffel, 1990, p. 34

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**Description:** “Also in 1897, copper, gold, lead, and silver were discovered 9 miles northeast of Republic in the Belcher district”

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**Location:** Belcher Mountain area

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**Source:** Moen, 1976, p. 15

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**Description:** “Since 1903, several mines in the Belcher district had been shipping gold-silver-copper-bearing ore to smelters in Canada. The total copper production in the county, from 1911 to 1918, amounted to \$428,351, which represents 88 percent of the county’s copper production from 1903 to 1950.”

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**Location:** entire area

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**Source:** Moen, 1976, p. 25

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**Description:** “In the eastern part of the Okanogan Highlands silver is associated with lead, zinc, copper, and gold, which is found in fissure veins, shear zones, and disseminated deposits ... In Ferry County the richest silver deposits fall within the Republic graben, which is a major north-northeast-trending structural feature of western Ferry County ... The age of most silver deposits in Washington appears to be Late Cretaceous-early Tertiary, as are most of the intrusive granitic rocks of the state. An exception to this is the gold-silver deposits of the Republic district, which are of Oligocene-Miocene age.”

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**Location:** entire area

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**Source:** Moen, 1976, pp. 47-50

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**Description:** “Kettle Falls gets its name from a waterfall now drowned beneath the Franklin D. Roosevelt Lake. From that area north, the highway follows a line very close to the eastern margin of the Okanogan subcontinent. Rocks along the road and in the hills west of the road are massive granites and ancient streaky gneisses that belong to the Kootenay arc. An ocean formerly separated the rocks along the road north of Kettle Falls from those in the hills visible in the eastern distance.”

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**Location:** Sherman Pass west to Kettle River

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**Source:** Alt and Hyndman, 1984, p. 46

**Description:** “The latest glaciation, which is correlative with the Fraser glaciation in western Washington and the late Wisconsin glaciation in the mid-continent, began approximate 120 ka and ended approximately 10 ka. Older glaciations, which are correlative with pre-Fraser glaciations in western Washington and with early Wisconsin and/or older glaciations in the mid-continent, occurred before 38 ka; some are at least old as 800-900 ka (Blunt and others, 1987).”

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**Location:** entire area

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**Source:** Stoffel et. al., 1991, p. 12, footnote 1

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**Description:** “The Fraser ice sheet retreated in the region of the Okanagan River Valley some 9,000 years ago. It left the large deposits of outwash materials, terraces, deltas, and meltwater channels that are characteristic of the area today. Until the colonization of the uplands and valley sides by vegetation, a process that probably took several centuries, high rates of wind and water erosion, and sedimentation, further modified the landscape. Depositions of alluvial fans and deltas (such as those at Penticton, Kelowna and Vernon) were made and silts and sands accumulated along parts of the floors of the river valleys (Kershaw 1978).”

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**Location:** entire area

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**Source:** Turner et. al., 1980, p. 3

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**Description:** “These glaciers that entered Washington from British Columbia reached their maximum extent some 100 km south of the 49<sup>th</sup> parallel in the Sanpoil River area (Richmond et. al., 1965) and retreated from Washington within 9000 years ... The pollen record at Simpsons Flats implies that vegetation with a substantial nonarboreal component prevailed for at least the first 1000 years after deglaciation in the Sanpoil River Valley.”

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**Location:** Sanpoil River area

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**Source:** Mack et. al., 1978, p. 1644

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**Description:** “The direction of ice movement, together with the distribution of the drift at all altitudes in the area, clearly indicates that the [Republic mining] district was entirely covered by glacial ice, and therefore that it is a part of that great area extending north to Alaska, and west to the coast, which was covered to a great depth by the Cordilleran ice sheet in Pleistocene times.”

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**Location:** entire area

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**Source:** Umpleby, 1985, p. 239

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**Description:** “This study found firm evidence of continental glaciation only within two miles of the San Poil River and to the north of Edds Mountain, Iron Mountain and Eagle Rock. Evidence

permissive of a continental ice tongue was found at 4,100' elevation in section 13 T35, R33 in the Ninemile Creek watershed. Evidence of alpine glaciation is abundant in North Fork Hall Creek and the headwater areas of Ninemile and Thirteenmile Creeks. Meltwater scouring and outwash deposition were the dominant processes in Refrigerator and Ponce De Leon Canyons and the lower reaches of Ninemile and Thirteenmile Creeks. A pediment terrace, not covered or scoured by glacial processes, is present along Thirteenmile Creek.”

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**Location:** Southeastern part of area

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**Source:** Swartz, 1997b, General Description

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**Description:** “The lower Deadman section flows through a deep V-shaped valley. Boulders are the dominant structural components and woody debris is subdominant.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Aquatic Resources, p. 43

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**Description:** “Streamwater quality is judged good to excellent. Available water quality data indicate that East Deer Creek appears to meet the State water quality standards for Class ‘AA’ streams, but does not meet drinking water standards. . . Use of this stream for domestic purposes dates back to the turn of the century, at least to 1908 when the first special use permit was granted.”

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**Location:** East Deer Creek watershed

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**Source:** Colville National Forest, 1976, p. 5.

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**Description:** “East Deer Creek is the primary source of culinary and domestic water for the community of Orient . . .The 12,525 acre East Deer Creek Watershed . . .flows southeasterly to the Kettle River, 11 miles south of the International Boundary.”

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**Location:** East Deer Creek watershed

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**Source:** Wheeler, 1973, pp. i-2

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**Description:** “Sediments in the Sanpoil arm area (Fig. 1) are interpreted as back-flooding deposits related to drainage events from Glacial Lake Missoula..”

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**Location:** Sanpoil River area

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**Source:** Shaw et. al., p. 606.

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**Description:** “The entire area drains southeast into the Sanpoil River via Granite, Golden Harvest (formerly “Copper”), and Tenmile creeks and many nameless seasonal streams. There are many small poorly drained valleys containing more or less permanent ponds or wetlands. The larger and more complex of these wetlands are located south of Granite and Golden Harvest creeks.”

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**Location:** Sanpoil River area

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**Source:** Republic Ranger District, 2000a, Heritage Overview, p. 1

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**Description:** “The drainage is primarily a northwest flowing trellis, nearly at right angle to the trend of regional geologic structure. Most of the northwest trending ridges have narrow passes that are lacking established channels. Those passes are relicts of late-Pleistocene melt water drainage that were abandoned as the drainage returned to northwest flowing in the early Holocene. The Boulder-Deer Creek divide, at 4,6000 feet elevation, was a passage for outwash in both directions.”

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**Location:** Lone Ranch Creek area

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**Source:** Swartz, 1997a, North South area report, Introduction

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## Botany

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**Description:** “The vascular flora of the Kettle Range consists of 61 families, 215 genera, and 439 species and infraspecific taxa (Table 1). A numerical summary shows that the four largest families are: Poaceae (54 taxa), Asteraceae (53), Cyperaceae (27) and Rosaceae (23). The largest genus is *Carex* with 24 taxa.

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**Location:** Kettle Range

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**Source:** Annable and Peterson, 1988, p. 62

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**Description:** “Changing climatic and geological conditions affect the continual sorting and redistribution of plant species. Each species responds individually to climatic changes. Approximately 15,000 BP the Cordilleran ice sheet advanced southward during the Fraser glaciation. In the Kettle Range the Sanpoil River sublobe and the Columbia River lobe covered the slopes with ice below 1500-2000 m leaving the mountain peaks exposed (Waitt and Thorson, 1983). This glacial event removed the vascular plants from the lower elevations.

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**Location:** entire area

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**Source:** Annable and Peterson, 1988, p. 62

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**Description:** “In recent geological times the Kettle Range has been floristically re-stocked. The present flora of the Kettle Range was re-established by plants that persisted largely to the south of the glacial boundaries.”

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**Location:** Kettle Range

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**Source:** Annable and Peterson, 1988, p. 64

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**Description:** “Table 2. Floral elements in the Kettle Range. Abbreviations are used in the annotated list.

<u>Phytogeographic unit</u>	<u>Abbreviation</u>	<i>Percent of taxa</i>
Rocky Mountain region	RMR	33%
Rocky Mountain Province	RMP	11%
Vancouverian Province	VP	1%
Circumboreal Region	CR	5%
Western North America	WNA	17%
North America	NA	10%
North America and Eurasia	NA/Eurasia	12%
Cosmopolitan	COS	2%
Introduced	I	9%

**Location:** Kettle Range

**Source:** Annable et. al.1988, p. 65

**Description:** “Abstract: The Fameflower *Talinum sediforme* [*Talium okanoganense* English] is a member of the Portulacaceae known to occur in Canada only in the southern interior of British Columbia. Thirteen localities are recorded for this western North American endemic, seven of which were turned up during the course of field work. Of the rest, five localities are either based on recent collections or have been confirmed by the authors, while the sixth—the type locality still remain to be relocated ...The authors recommend a status of vulnerable for *Talinum sediforme* because of its rather scattered distribution, its specialized habitat ecology, its proximity to major urban centers, and because it is one of the few western North American endemics having the greater part of its range in Canada.”

**Location:** Thirteenmile area

**Source:** Goward and Knight, 1990, p. iii

**Description:** “Biological and Economic Significance. Biological: *Talinum sediforme* is a Pacific Northwest endemic of unusually limited range (see Figure 4). It is also one of Canada’ most drought-tolerant and drought-dependent native vascular plants, and is, moreover, the only Canadian member of its genus.”

**Location:** Thirteenmile area

**Source:** Goward and Knight, 1990, p. 5

**Description:** “*Talinum okanoganense* Occurrence: Found on south and southeast facing slopes on ridges, knobs, and hilltops above Thirteen Mile Creek.”

**Location:** Thirteenmile area

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**Source:** Annable and Peterson, 1988, p. 76

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**Description:** “Distribution. Summary: Although Hitchcock et.al. (1955-1969) described the American range of this species as ‘the lower mountains of Okanogan Co., Washington’, it is now known to also extend eastward to adjacent Ferry County (Burke 1989). John Gamon, botanist with the Washington Natural Heritage Program, in Olympia, Washington, has advised the authors that his files contain records of approximately six localities for *Talinum sediforme* in these two counties (Gamon 1989, in litt.). Thus, the total known range of this species in the Unites States is about 1000 square kilometers (see Figure 4).”

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**Location:** Thirteenmile area

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**Source:** Goward and Knight, 1990, p. 5

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**Description:** “Biogeographic and Phylogenetic History of the Species...Doubtless *Talinum sediforme* has over evolutionary time migrated north from the latter center. It is interesting that the modern range of *Talinum sediforme* was entirely ice-covered at the height of the Fraser (= Wisconsin) glaciation. (Compare, for example, Figure 4 with the map on page 42 of Highsmith and Kimerling (1979). This suggests that it passed much of the Fraser glaciation in refugia entirely south of its present range, and that it has subsequently altogether disappeared from those refugia. Just why a species of dry, warm, open exposures did not persist in at lease scattered populations farther south is not clear. Perhaps it is related to *Talinum sediforme*'s poor competitive abilities.”

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**Location:** Thirteenmile area

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**Source:** Goward and Knight, 1990, p. 11

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**Description:** “Physiographic and Topographic Characteristics: *Talinum sediforme* has a total elevation range in British Columbia of between 880 m and 1500 m, through a majority of populations occur between 1000 m and 1200 m. In all cases, it favours either hilltop sites or escarpment edges, often of a southerly or southwesterly exposure. Such outcroppings are invariably composed of brecciated volcanic rock (Hickson 1989), and represent remnants of a vast, heterogeneous, volcanic sheet which covered most of the Interior Plateau during the early to middle Tertiary (Jones 1959), probably the Eocene (Hickson 1989).

It is the distribution of such rock which, in combination with the appropriate climate, determines the occurrence of *Talinum sediforme* throughout the Pacific Northwest. In British Columbia the appropriate conditions are met only in the drainages of the Thompson and Okanogan Rivers, i.e. in the Thompson Plateau subdivision of Holland (1964).

More specifically, the sites favoured by *Talinum* are located at or near erosional margins of the flat-lying lavas where the land surface shifts from level to precipitous: *Talinum* occupies the slopes of low relief dividing these two topographic extremes. Elsewhere, the Thompson Plateau tends to be overlain by a thick mantle of glacial debris (Fulton 1975); this favours colonization by other plant species, and effectively excludes *Talinum* through competition.”

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**Location:** Thirteenmile area

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**Source:** Goward and Knight, 1990, p. 14

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**Description:** “Edaphic Factors: *Talinum sediforme* seems to be restricted entirely to shallow, well-drained soils that have derived from highly friable, brecciated volcanic rock. Hickson (1989) has demonstrated that the rocks in question are chemically heterogeneous. This suggests that *Talinum* is more critically affected by the weathering properties of the parent material than it is by bedrock chemistry... In some regards, these dry, barren, volcanically derived regosols are reminiscent of the serpentine outcrops discussed by Kruckeberg (1969), and it is interesting to note that other *Talinum* species are apparently adapted to growing on serpentine.”

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**Location:** Thirteenmile area

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**Source:** Goward and Knight, 1990, p. 15

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**Description:** “*Talinum sediforme* is today restricted entirely to landscapes that were ice-covered during the Fraser Glaciation; apparently it has disappeared from its earlier glacial refugia farther south. Perhaps it was excluded there by competition from various reinvading succulents, including species of *Lewisia*, *Eriophorum*, *Phlox*, and various cacti. Few of these extend northward into Canada, and so here *Talinum* is able to persist.”

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**Location:** entire area

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**Source:** Goward and Knight, 1990, p. 25

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**Description:** “Though this [recreational use] appears to pose little immediate threat to the survival of *Talinum* over most of its range, a potential does exist for damage to at least the more vulnerable populations. In our opinion, the activities of recreationists, especially [all-terrain vehicle] ATV users, constitute the greatest long-term threat to this species.”

Secondarily, disturbance by cattle might also be important in certain sites, though the associated grazing could actually favour *Talinum* by excluding competing vegetation.”

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**Location:** Thirteenmile area

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**Source:** Goward and Knight, 1990, p. 28

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**Description:** “The following list includes all the species collected or seen by the authors in the Kettle Range. Over 1,000 collections of the vascular flora were made between May and August of 1985 and 1986. These are housed at the Marion Ownbey Herbarium, Washington State University.”

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**Location:** Kettle Range

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**Source:** Annable and Peterson, 1988, p. 76

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**Description:** “Three species (*Listera borealis*, *Phacelia franklinii*, and *Ribes cognatum*) are considered sensitive by the Washington Natural Heritage Program (1984) ...Five species (*Allium robinsonii*, *Carex raynoldsii*, *Castilleja cervina*, *Cypripedium montanum*, and *Talinum okanoganense*) are begin monitored but have no proposed status at this time. Each of these eight species has been evaluated in terms of occurrence, habitat, associated species, and status in the Kettle Range.”

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**Location:** Kettle Range

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**Source:** Annable and Peterson, 1988, p. 73

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**Description:** “*Allium robinsonii* Occurrence: Found on south and southwest facing slopes on ridges, knobs, and hilltops above Thirteenmile Creek.”

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**Location:** Thirteenmile Creek

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**Source:** Annable and Peterson, 1988, p. 75

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**Description:** “*Carex raynoldsii* Occurrence: Frequent on open slopes of Columbia Mt., Edds, Mt., Midnight Mt., Copper Butte, and Wapaloosie Mt.”

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**Location:** Kettle Range

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**Source:** Annable and Peterson, 1988, p. 75

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**Description:** “*Castilleja cervina* Occurrence: Balds on south and southeast facing slopes above Thirteenmile Creek, 0.5 miles north of Jungle Hill, and ridge south of Wapaloosie Mt.”

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**Location:** Thirteenmile Creek, Wapaloosie Mountain areas

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**Source:** Annable and Peterson, 1988, p. 75

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**Description:** “*Cypripedium montanum* Occurrence: One plant found near the Hall Creek Ponds.”

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**Location:** Hall Creek Ponds

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**Source:** Annable and Peterson, 1988, p. 75

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**Description:** “*Listera borealis* Occurrence: Small population found 0.5 miles north of Jungle Hill at 1830 m.”

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**Location:** Jungle Hill

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**Source:** Annable and Peterson, 1988, p. 76

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**Description:** “*Phacelia franklinii* Occurrence: South facing slopes 0.5 miles northwest of Lambert Mt., trail junction between Midnight Mt. and Copper Butte and east of Copper Butte near road at 1645-1830 m.”

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**Location:** Lambert Mountain, Midnight Mountain and Copper Butte areas

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**Source:** Annable and Peterson, 1988, p. 76

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**Description:** “*Ribes cognatum* Occurrence: Small population found at the upper pond (1295 m) in the Thirteenmile drainage.”

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**Location:** Thirteenmile drainage

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**Source:** Annable and Peterson, 1988, p. 76

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**Description:** “During surveys in this planning area, we found *Botrychium crenulatum*, *B. lanceolatum*, *B. minganense*, *B. montanum*, *B. pinnatum*, and *Phacelia franklinii*.”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 30

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**Description:** “*Botrychium lunaria*, *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium montanum* and *Botrychium minganense* were found while conducting plant surveys in the timber sale area.”

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**Location:** Deer Creek watershed

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**Source:** Kettle Falls Ranger District, 1992, p. WL-20

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**Description:** “*Botrychium paradoxum* is ‘one of the rarest species in the genus’ (Wagner et. al., 1984).”

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**Location:** undisclosed

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**Source:** Zika, 1994, p. 20

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**Description:** “A sensitive plant, *Botrychium lanceolatum*, found in moist or wet places in mountains, sometimes at higher elevations (Hitchcock, et al., 1969), has been reported by the Washington Natural Heritage Program along the South Fork of Deadman Creek at the north edge of this Roadless area. The diversity of habitats within this Roadless area lends a strong probability of finding other sensitive plants here that are known for the Kettle Range and elsewhere in northeastern Washington.”

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**Location:** Hoodoo roadless Area

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**Source:** Colville National Forest, 1988a, p. C-64

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**Description:** “*Ribes cognatum* (Umatilla gooseberry) a plant mostly of riparian areas, was reported from Thirteen mile Creek about a mile outside of this roadless area, and in Refrigerator Canyon about four miles north. *Ribes irriguum* (Idaho gooseberry), which grows along streams and on canyon walls, was reported from the South Fork of O’Brien Creek ... Other sensitive plant species in the area, *Talinum okanoganense* (Okanogan fameflower) and *Allium robinsonii* (Robinson’s onion) which grow on the andesite rocks and soils.”

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**Location:** Thirteenmile Creek area

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**Source:** Colville National Forest, 1988a, p. C-88

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**Description:** “*Botrychium species* - *Botrychium* populations appear to be dependent upon the availability of late structural stage cedar stands.”

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**Location:** Thirteenmile area

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**Source:** Republic Ranger District, 2000a. Reference conditions, current conditions, synthesis, and recommendations for issues and key questions, p.10.

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**Description:** “*Cypripedium parviflorum* - *C. parviflorum* populatons appear to be dependent on riparian areas with a strong limestone component in the soils.”

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**Location:** Thirteenmile area

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**Source:** Republic Ranger District, 2000a. Reference conditions, current conditions, synthesis, and recommendations for issues and key questions, p.11

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**Description:** “Current Conditions : Mature, mesic plant species - *Botrychium species* - Approximately 25 acres of potential *Botrychium* habitat occurs outside, but directly adjacent to the analysis area.”

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**Location:** Thirteenmile area

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**Source:** Republic Ranger District, 2000a. Reference conditions, current conditions, synthesis, and recommendations for issues and key questions, p.11

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**Description:** “Wetland/riparian plant species Approximately 2,260 acres of potential habitat exists within the analysis area for TES species dependent on wetland/riparian habitats (See Map 7). Limited plant surveys in the analysis area have located one population of a TES plant species: *Sisyrinchium septentrionale*. A single population of *Cypripedium parviflorum* is located outside of, but directly adjacent to, the analysis area. - *Sisyrinchium septentrionale* - The population occupies approximately 2 acres and is located on private lands and along a small portion of County road right-of-way. While no populations have been found to date on National Forest administered lands within the analysis area, many acres of potential habitat does exist. - *Cypripedium parviflorum* - Currently, there are two known populatons of *C. parviflorum* on the Colville National Forest. The population which occurs within the analysis area is extremely small in size (3 to 6 individuals in most years) and occurs

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on a restricted microsite near a developed hiking trail. It is isolated from the next nearest population by approximately 36 miles.”

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**Location:** Thirteenmile area

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**Source:** Republic Ranger District, 2000a. Reference conditions, current conditions, synthesis, and recommendations for issues and key questions, p.11

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**Description:** “The area contains *Botrychium* habitat and lady slipper populations (within the Long Lake region) which require protection. *Botrychium* populations in the Scatter Watershed are unique as they appear to be an isolated, island population.”

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**Location:** Thirteenmile area

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**Source:** Lembcke, 1999, p. 1

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**Description:** “Mature mesic plant species (*Botrychium* sp., and *Listera borealis*) - Several *Botrychium* (*B. minganense* and *B. pinnatum* and *Listera borealis* populations are documented in the analysis area, both are unique for the “north half” of the Sanpoil subbasin. Management of these plant species is likely to be a critical watershed analysis issue.”

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**Location:** Thirteenmile area

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**Source:** Lembcke, 1999, p. 2

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**Description:** “Wetland and riparian plants (*Carex buxbaumii* and *Sisyrinchium septentrionale* and *Cypripedium parviflorum*) - All of these species have been documented *within or directly adjacent to* the analysis area. *Carex buxbaumii* is unique to the analysis area, and 1 of only three known on the Republic Ranger District. Documented *Sisyrinchium septentrionale* population is on private lands, but other populations may be found on Forest administered lands in future surveys. The *Cypripedium parviflorum* population, located adjacent to the analysis area, is unique to the Republic Ranger District and one of only two known populations on the Colville National Forest. Due to the extreme rarity of this species and it’s close proximity to the analysis area management of this species will be considered as part of this analysis. Management of these plant species is likely to be a critical watershed analysis issue.”

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**Location:** Thirteenmile area

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**Source:** Lembcke, 1999, p. 3

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**Description:** “*Botrychium lunaria*, *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium montanum* and *Botrychium minganense* were found while conducting plant surveys in the timber sale area.”

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**Location:** Deer Creek watershed

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**Source:** Kettle Falls RD, 1992, p. WL-20

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**Description:** “Locations of *Botrychium* species on the Kettle Falls District have been restricted to riparian areas or moist forest areas. Field work was conducted with positive results as this species (*Botrychium lanceolatum*) was sighted along South Boulder Creek. This species (*Botrychium lunaria*) has been found in small openings in dense mature cedar stands ...Fieldwork (plant surveys) was conducted in the planning area with positive sightings (for *Botrychium minganense*) in 7 separate locations throughout the timber sale ...Fieldwork was conducted with positive results (July 1991). This species (*Botrychium pinnatum*) was found with other sensitive *Botrychium* spp. near Slide Creek ...”

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**Location:** Jack-knife roadless Area

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**Source:** Colville National Forest, 1991, p. 21

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**Description:** “Habitat present in riparian areas of various streams throughout the Gatorson sale (for *Carex flava*, *Carex lystricina*) ...potential habitat exists in the riparian areas next to various streams or lakes (for *Cypripedium calceolus* var. *parviflorum*) ...potential habitat is found along various streams in the sale area (for *Dryopteris cristata*) ...Potential habitat for this species (*Geum rivale*) is found along various streams of the sale area ...Proposed units # 1, 10, 13 and 24 have some of this type of upper elevation open, non-forested slopes with the potential of being *Phacelia franklinii* habitat ...Since this species (*Ribes oxycanthoides* ssp. *cognatum*) inhabits the lower portion of hillsides adjacent to riparian areas, the Gatorson sale is considered potential habitat ...There is potential habitat (for *Ribes oxycanthoides* ssp. *irriguum*) along selected streams that do have steep rocky canyons within the Gatorson sale ....This species (*Sanicula marilandica*) has been found on the Kettle Falls RD in riparian areas so there is potential habitat for this species in the planning area ...potential habitat in the various riparian areas is found for this species (*Sisyrinchium septentrionale*) ...Riparian areas along various streams is potential habitat for this species (*Teucrium canadense* ssp. *viscidum*).”

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**Location:** Jack-knife roadless Area

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**Source:** Colville National Forest, 1991, p. 21

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**Description:** “The habitat for several species of sensitive plants is present within the area. Ground surveys indicated that several species in the *Botrychium* family are present in the area.”

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**Location:** Little Boulder area

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**Source:** Kettle Falls Ranger District, 1995c, Threatened, Endangered & Sensitive Plants and Animals, p. 43

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**Description:** [Rare mosses and liverworts with suspected ranges located on or near the study area.]

“Liverworts:

*Barbilophozia barbata* ...rock outcrops ...

*Barbilophozia lycopodioides* ...peaty soil ...

*Chiloscyphus gemmiparus* ...cold water streams ...

*Harpanthus flotovianus* ...wet places, often with *Sphagnum* ...

*Scapania obscura* ...always growing close to flowing water ...

*Tritomaria exsecta* ...on organic substrates ...

Mosses:

*Antitrichia curtispindula* ...cool, moist coniferous forests ...  
*Buxbaumia piperi* ...rotten logs, peaty soil and humus ...  
*Buxbaumia viridis* ... see under *Buxbaumia piperi* ...  
*Calliergon trifarium* ...in calcareous fens ...  
*Funaria mühlenbergii* ...rocks or on cliff ledges ...  
*Helodium blandowii* ...in montane fens ...  
*Poblia sphagnicola* ...montane sphagnum mires ...  
*Polytrichum strictum* ...on top of *Sphagnum* hummocks ...  
*Racomitrium aquaticum* ...on shaded, moist rocks and cliffs ...  
*Rhizomnium nudum* ...on moist but not wet organic soil ...  
*Rhytidium rugosum* ...dry, exposed rocks ...  
*Schistostega pennata* ...in dark places ...  
*Scouleria marginata* ...spray zone of streams and waterfalls ...  
*Splachnum ampullaceum* ...old dung of herbivores ...  
*Tayloria serrata* ...old dung of herbivores ...  
*Tetraphis geniculata* ...well-rotted stumps and logs ...  
*Tetraplodon mnioides* ...old dung, or soil and rotten wood enriched by dung ...  
*Tripterocladium leucocladulum* ...rocks, cliffs and bark of hardwoods ...  
*Ulota megalospora* ...epiphytic ...”

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**Location:** entire area

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**Source:** Christy and Wagner, 1996, distribution maps, pp. V-2 – V-62, VII-1-VII-90

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## Ecology

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**Description:** “Although different systems of vegetation classification prevail on either side of the British Columbia-Washington border (cf. Krajina 1969; Franklin and Dyrness 1973), the vegetation itself is similar and continuous, with the main difference being an increasing area of upland forest vegetation.”

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**Location:** entire area

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**Source:** Turner et. al., 1980, p. 4

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**Description:** “The major zones are summarized as follows (after Krajina 1969:2-41; Franklin and Dyrness 1973:160-233):

1. Steppe Zone – a non-forested zone, mainly in the lowlands of the Columbia Basin in the southernmost portion of Okanagan-Colville territory. It is the driest, warmest zone ...
2. Ponderosa Pine Zone – a lowland forested area adjacent to the steppelands, extending along the dry valleys of the Okanagan, Similkameen and lower Kettle rivers; typified by open, park-like stands of ponderosa pine (*Pinus ponderosa*) with some Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) ...
3. Interior Douglas-fir zone – an upland forested zone found generally in the cooler, moister areas above the Ponderosa Pine Zone, ranging from about 300-1500 metres (1,000-4,500 feet). Douglas fir is the dominant tree ...

4. Interior Western Hemlock Zone – the forested region in the lower elevations of the Interior wet belt ...
5. Subalpine Fire Zone – a montane forest zone occurring at higher elevations throughout the Okanagan Highlands ...”

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**Location:** entire area

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**Source:** Turner et. al., 1980, pp. 4-5

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**Description:** “Generally, the north and east portions of the Forest receive the most precipitation and the southwest portion the least. Lands west of the Kettle Crest are drier than east of the Crest. On the west half of the Forest, the stands of mid to low elevation are mainly Douglas-fir with western larch and ponderosa pine. These stands are often fairly open with pinegrass, huckleberry, ninebark, twinflower, queencup beadlily, and snowberry. Engelmann spruce, subalpine fir, Douglas-fir, and western larch with common shrubs of huckleberry and Cascade azalea generally dominate the moist sites and higher elevations. Lodgepole pine dominates many of the areas burned by previous wildfires. Western red cedar is occasionally found in moist sheltered locations, especially northward near the Canadian Border. East of the Kettle Crest, higher moisture increases the occurrence of species such as western red cedar, western hemlock, grand fir, and western white pine. Typical understory species include ninebark and pinegrass on drier sites; huckleberries, bunchberry dogwood, queencup beadlily, twinflower, oak fern, Cascade azalea, and five-leaved bramble are common on wetter sites. Very wet sites usually have ladyfern or devil’s club present.”

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**Location:** entire area

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**Source:** Colville National Forest, 1988a, Vegetation, p. 25

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**Description:** “Vegetation in the area is dominated by climax forests of Douglas-fir, subalpine fir and western red cedar. Forest species which occupied the areas after fire have resulted in extensive stands of pole-sized western larch, lodgepole pine, and ponderosa pine. Other vegetation present is bunchgrass and forbs on the drier southern exposures and hardwood brush and forbs on the northern exposures. Stream courses and other wet areas contain western red cedar, Engelmann spruce, quaking aspen, cottonwood, and birch trees.”

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**Location:** Kettle Range

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**Source:** Colville National Forest, 1988a, pp. 42-110

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**Description:** “The nine vegetation types in this study...are very similar to those used by Williams and Lillybridge (1985) who described the forested plant associations of the Colville National Forest.”

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**Location:** entire area

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**Source:** Annable and Peterson, 1988, p. 66

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**Description:** “*Erigonum douglasii* / *Poa secunda* Association (Douglas’ buckwheat / Sandberg’s bluegrass Association)...Soils are typically shallow, between 15-50 cm in depth, with patches of exposed andesite bedrock common. The association is most prevalent between 900-1500 m and is restricted to south and southwest facing slopes on mountain ridges, knobs, and hilltops above Thirteenmile Creek.”

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**Location:** Thirteenmile area

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**Source:** Annable and Peterson, 1988, p. 66

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**Description:** *Calamagrostis rubescens* - *Festuca idahoensis* - *Pseudoroegneria spicata* Association (Pinegrass - Idaho fescue - Bluebunch wheatgrass Association)...At higher elevations near Wapaloosie and Edds Mts., *Festuca scabrella* is a major dominant. *Festuca scabrella* is a large bunchgrass resembling the tussock fescues of South America and New Zealand. Perhaps these stands of *Festuca scabrella* are relicts of moister periods during the Holocene when this species was more widespread.”

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**Location:** Wapaloosie and Edds mountains

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**Source:** Annable and Peterson, 1988, p. 67

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**Description:** “*Artemisia tridentata* / *Festuca idahoensis* - *Pseudoroegneria spicata* Association (Big sagebrush / Idaho fescue - Bluebunch wheatgrass Association)...South facing slopes of Wapaloosie and Columbia Mts. exhibit well developed stands of this association between 1645 and 2015 m (Fig 4).”

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**Location:** Wapaloosie and Columbia Mountains

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**Source:** Annable and Peterson, 1988, p. 69

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**Description:** “*Pinus albicaulis* - *Abies lasiocarpa* / *Juncus parryi* - *Lupinus sulphureus* Association (White bark pine - Subalpine fir / Parry’s rush - Sulfur lupine Association) ...The association occurs above 1900 m and is well developed on most of the higher peaks and ridge tops (Copper Butte, Wapaloosie Mt., Columbia Mt., Snow Peak, and White Mt.) in the study area (Fig. 6). Daubenmire and Daubenmire (1968) recognized the *Pinus albicaulis* - *Abies lasiocarpa* habitat type and described it as having a discontinuous ground cover between the trees or groves dominated by *Vaccinium scoparium*, *Carex* spp., *Luzula spicata*, and *Erigeron peregrinus*.”

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**Location:** higher peaks in the Kettle Range

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**Source:** Annable and Peterson, 1988, p. 72

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**Description:** “Unusual plants associated with this condition include rough fescue and big sagebrush.”

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**Location:** Profanity roadless area

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**Source:** Colville National Forest, 1988a, p. C-42

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**Description:** “Hall Creek Ponds and Creek, Thirteenmile Ponds and Creek, Wapaloosie Pond, and Sherman Pond are sites where this [riparian] community is well developed (Fig. 7). Sediments of the Hall Creek, Wapaloosie, and Sherman Ponds are formed from alluvial and colluvial deposits from surrounding granitic fragments and glacial till. Sediments of Thirteenmile Ponds and Creek are formed, in addition to granitic fragments and glacial till, from alluvial and colluvial deposits from surrounding andesitic fragments. This community can occur at any elevation within the study area.”

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**Location:** Hall Creek and Thirteenmile areas, Wapaloosie Pond, and Sherman Pond

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**Source:** Annable and Peterson, 1988, p. 73

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**Description:** “A unique characteristic within the Kettle Range is the common occurrence of *Lonicera involucrata* (black twinberry) in the subalpine fir / white rhododendron plant community and the absence of *Menziesia ferruginea*. Labrador tea is also unique in this area as it has not been found elsewhere on the forest.”

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**Location:** Bald-Snow roadless area

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**Source:** Colville National Forest, 1988a, pp. C-42, 76

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**Description:** “Evergreen Ceanothus is a dominant shrub on the granitic slopes of Fire Mountain.”

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**Location:** Thirteenmile area

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**Source:** Colville National Forest, 1988, p. 88

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**Description:** “Hoodoo Roadless Area: There has been very little alteration to the natural integrity of the area. The Hoodoo Canyon trail and several dispersed campsites at Emerald Lake are the only on-site alterations to the natural integrity of the area . . . South Huckleberry Roadless Area: Except for the jeep trail, there has been very little alteration to the natural integrity of the area . . . Bald Snow Roadless Area: Except for the hiking trail, there has been very little alteration to the natural integrity of the area . . . Bangs Roadless Area: There has been very little alteration to the natural integrity of the area”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, pp. 63-65

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**Description:** “Post-glacial re-vegetation took many centuries. Evidence from pollen studies indicates that the valley sides of the Okanogan were populated by pine, fir, spruce and western hemlock by about 8,900 years ago. Up to about 7,500 years ago, conditions were apparently cooler and moister than they are today in the valley. Lodgepole pine was the major species of upland sites and ponderosa pine dominated the relatively drier valley bottom. A warmer, drier period followed, characterized by a decrease in tree species and corresponding increase in grasses and sagebrush-type vegetation. This period lasted until about 6,600 years ago, around the time when Mt. Mazama in

Oregon (at Crater Lake) erupted, depositing a layer of whitish volcanic ash throughout Okanagan-Colville territory. From that time to present, there has been a series of climatic fluctuations. There have been three relatively moist periods, when birch, alder and hazelnut were dominant arboreal species, each followed (at least in the case of the first two), by a relatively dry period, with a relative increase in the number of pine and spruce. The last 1,500 years constitute the third relatively moist period (Kershaw 1978:37-39).”

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**Location:** entire area

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**Source:** Turner et al., 1980, p. 3

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**Description:** “Labrador tea is also unique in this area as it has not been found elsewhere on the forest.”

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**Location:** Bald-Snow roadless area

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**Source:** Colville National Forest, 1988a, p. C-76

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**Description:** “The riparian vegetation was generally large spruce and cedar trees with a very small alder zone.”

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**Location:** Scatter Creek watershed

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**Source:** Honeycutt and Shuhda, 1999, p. 7

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**Description:** “This disturbance cycle is repeating itself. The 1988 White Mountain fire reverted stands back to early structural stage around Edds Mountain and burned a total of 20,050 acres.”

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**Location:** Thirteenmile area

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**Source:** Colville National Forest, 1994, Vegetation and Disturbance, p.15

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**Description:** “The Dollar Mountain Fire of 1929 created large openings in the preexisting forest cover across large portions of the upper watersheds.”

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**Location:** Deadman Creek watershed

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**Source:** Kettle Falls Ranger District, 2000, Aquatic Resources, p. 44

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**Description:** “The Dollar Mountain Fire of 1929 burned approximately 70 percent of the watershed.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 23

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**Description:** “The large-tree component of western redcedar biophysical environments is a mixture of western redcedar, western larch, grand fir, Douglas-fir, and occasional Engelmann spruce. Understory vegetation may include pachistima, twinflower, big huckleberry, honeysuckle, baldhip rose, violet, queencup beadlily, Oregon grape and other species.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 24

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**Description:** “Fire regimes within these biophysical environments (*western redcedar*) were generally infrequent (100-150 years), and intense. Generally, these fire regimes were of the stand-replacement nature.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 24

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**Description:** “Similar to A (*very moist western redcedar/western hemlock bottoms*), this biophysical environment (*very moist Engelmann spruce/subalpine fir bottoms*) generally exists at higher elevations than the moist western redcedar type”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 24

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**Description:** “Some of the moist site forbs may include reedgrass, horsetail, oak fern, twistedstalk, lady-fern, and false bugbane. Dogwoods, currents, and alder tend to dominate the shrub layer. The large trees within this biophysical environment tend to be Engelmann spruce, subalpine fir, and western larch.”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 24

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**Description:** “At climax conditions, this biophysical environment (*cold dry subalpine fir shrub*), is dominated by subalpine fir. Western larch and Douglas-fir may be present as older relics in the stands.”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 24

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**Description:** “(*Cold dry subalpine fir shrub*) Shrubs such as big huckleberry, pachistima, prince’s pine, spirea and honeysuckle dominate most of the understories. Pinegrass, violet, and white hawkweed may be the dominate herbs.”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 24

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**Description:** “The larger trees in the Douglas-fir biophysical environment are generally Douglas-firs, western larch, and in the lower elevations, ponderosa pine.”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 24

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**Description:** “(*Douglas-fir biophysical environment*) Understory vegetation including ninebark, serviceberry, spirea, Oregon grape, oceanspray, snowberry, pinegrass, strawberry, and heartleaf arnica are among the most common. These stands were maintained in generally park-like conditions by frequent (25 years or more often) ground fires of low intensity.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 24

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**Description:** “The dominant overstory trees in this biophysical environment (*Cool mesic Douglas-fir/grand fir forb-shrub*) are the Douglas-fir. Grand fir dominates in only a small elevation band within the watershed, but is present throughout this environment, along with western larch. ”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 25

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**Description:** “(*Cool mesic Douglas-fir/grand fir forb-shrub*) Common understory plants include pachistima, spirea, twinflower, serviceberry, pinegrass, hawkweed, strawberry, oceanspray, and baldhip rose.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 25

---

**Description:** “The five main overstory species found in this biophysical environment (*Cold mesic subalpine fir forb-shrub*) are lodgepole pine, subalpine fir, western larch, Engelmann spruce and Douglas-fir. These stands may have limited understories due to dense shade that is created by the canopy, particularly in spruce dominated stands. Understory shrubs and herbs typically found include sidebells pyrola, twinflower, pachistima, bearberry, serviceberry, pinegrass, beadlily, and honeysuckle. Fire intervals shorter than 200 years may result in lodgepole or larch dominated stands. This is thought to be the case over part of the Deadman watershed.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 25



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**Description:** “Generally these are upland or terrestrial cedar sites as opposed to the wet riparian types. These sites contain the driest land capable of supporting western redcedar. ...late succession western redcedar dominates the site.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 25

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**Description:** “(*Cool mesic western redcedar/western hemlock forb-shrub*) Most frequently found shrubs and herbs are big huckleberry, pachistima, baldhip rose, twinflower, Oregon grape, honeysuckle, and round-leaved violet.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 25

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**Description:** “An analysis of the current condition of structural stages within stands in the Deadman Project Analysis Area reveals that approximately eleven percent of the forested area is in late structural stages, fifty-five percent is in middle structural stages and thirty-four percent is in early structural stages. The majority of the stocking in the watershed dates from the fire of 1929.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 25

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**Description:** “Stands that appeared to have attributes of large, older trees were intentionally inventoried to determine if they met standards for old growth or late structure. Eighteen out of the 123 stands examined (a total of 982 acres) qualified under North Idaho Zone Definitions as old growth within the Deadman Project Planning Area. It is unknown whether any old growth stands exist on other ownerships.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, Vegetation, p. 26

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**Description:** “Currently, there are two Research Natural Areas (RNA’s) on the Colville National Forest. In this round of planning, opportunities for six additional proposed RNA’s, plus an anticipated possible need for more areas in the future, were recognized. The additional proposed areas are: Roundtop Mountain (part of which is administered by the Idaho Panhandle National Forests), North Fork of O’Brien Creek (which was burned over in the 1988 fire season), Bunchgrass Meadows, Fire Mountain, Thirteenmile Ponds, and Halliday Fen.”

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**Location:** Fire Mountain, O’Brien Creek, Thirteenmile ponds

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**Source:** Colville National Forest, 1988c, p. 117

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**Description:** “The western redcedar throughout the drainage (main stem Little Boulder Creek) is mature to old-growth (greater than 30” DBH).”

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**Location:** East Deer Creek area

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**Source:** Kettle Falls Ranger District, 1995a, p. 4

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**Description:** “Vegetation in the area is dominated by climax forests of Douglas-fir, subalpine fir and western red cedar. Forest species which occupied the areas after fire have resulted in extensive stands of pole-sized western larch, lodgepole pine, and ponderosa pine. Other vegetation present is bunchgrass and forbs on the drier southern exposures and hardwood brush and forbs on the northern exposures. Stream courses and other wet areas contain western red cedar, Engelmann spruce, quaking aspen, cottonwood, and birch trees.”

---

**Location:** entire area

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**Source:** Colville National Forest, 1988a, pp. 42-110

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**Description:** “The western part of the area is dominated by ponderosa pine and Douglas-fir with a frequent, lower intensity fire regime.”

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**Location:** entire area

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**Source:** Colville National Forest, 1994, p. 9

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**Description:** “The predominant fire disturbance pattern has created a background matrix of parklike stands conditions with small openings caused by individual tree mortality or fire flareups.”

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**Location:** entire area

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**Source:** Colville National Forest, 1994, p. 9

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**Description:** “The eastern portion of the area is higher in elevation and is dominated by lodgepole pine and subalpine fir vegetation. Fire disturbance patterns tend to be of moderate length, every 100 to 250 years, and of higher intensity.”

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**Location:** entire area

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**Source:** Colville National Forest, 1994, p. 9

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**Description:** “Evergreen Ceanothus is a dominant shrub on the granitic slopes of Fire Mountain.”

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**Location:** Thirteenmile area

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**Source:** Colville National Forest, 1988a, p. 88

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**Description:** “Several large fires occurred between the years, 1909 and 1929. These were stand replacing events that varied in size from several hundred acres to approximately 32,000 acres. One area of 500 acres, which burned in 1910, was burned again in 1929 during the Dollar Mountain Fire.”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Fire and Fuels, p. 56

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**Description:** “For the period from 1946 to 1996, 36 fires occurred on National Forest System lands in the watershed. Twenty-eight percent of these fires were human-caused while the remaining were lightning-caused. The majority of the fires were less than one-quarter of an acre in size.”

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**Location:** entire area

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**Source:** Kettle Falls Ranger District, 2000, Fire and Fuels, p. 56

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## Wildlife

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**Description:** “Checklist:

- Long toed salamander (*Amblystoma macrodactylum*) ...under rocks and logs in the riparian zone.
- Northwest tiger salamander (*Amblystoma tigrinum melanostictum*) ...under rocks, logs, etc. in the riparian zone.
- Northwestern toad (*Bufo boreas boreas*) ...Found throughout a wide range of zones.
- Pacific tree frog (*Hyla regilla*) ...in the riparian zone at low elevation.
- Western leopard frog (*Rana pipiens brachycephala*). Generally common in the riparian zone at lower elevations.
- Western spotted frog (*Rana pretiosa pretiosa*). A common species from moderate to high elevation in the mountains in the riparian zone.
- Painted turtle (*Chrysemus picta belli*) ...on logs or rocks in ponds...
- Skink (*Eumeces skiltonianus*) ...found underneath objects or rock piles at edges of forest where there is considerable herbaceous cover.
- Western rubber boa (*Charima bottae plumbea*) ...Moist forest-humid transition zone.
- Northwestern garter snake (*Thamnophis elegans vagrans*) ...Generally associated with water and the western spotted frog, one of its principle prey.
- Common garter snake (*Thamnophis sirtalis fitchi*) ...Less common than the preceding species, but with a wide range also...
- Western yellow-bellied racer [blue racer] (*Coluber constrictor mormon*) ...Arid transition zone, especially dry grassy areas.
- Gopher snake (Bull snake) (*Pituophis melanoleucus deserticola*) ...Arid transition zone.
- Pacific rattlesnake (*Crotalus viridis oreganus*) ...Local in occurrence...Dry rocky areas in the arid transition zone.
- Masked shrew (*Sorex cinereus*). Humid Transition and Canadian Zones.

Vagrant shrew (*Sorex vagrans*). Typically found in the transition zones, although may frequent the Canadian also.

Dusky shrew (*Sorex obscurus*). Canadian and hudsonian.

Water shrew (*Sorex palustris navigator*). Riparian. Prefers fast moving mountain streams.

Pygmy shrew (*Microsorex boyi washingtoni*) ...Arid transition.

Little brown bat (*Myotis lucifugus*). Common and widely distributed in a variety of habitats.

Yuma brown bat (*Myotis yumaensis*). Similar to preceding species, but less common.

Long-eared brown bat (*Myotis evotis*). Secretive and uncommon. Occur from lowlands to upper elevation

Long-legged brown bat (*Myotis volans*) ...under the bark of dead trees. Uncommon.

California brown bat (*Myotis californicus*). Generally near water.

Silver-haired bat (*Lasiorycteris noctivagans*). Widespread, preferring forested areas, from low elevation up to timberline.

Big brown bat (*Eptesicus fuscus bernardinus*). Forested areas.

Hoary bat (*Lasiurus cinereus cinereus*) ...Occurs as a spring and fall migrant or occasional summer visitor.

Townsend's big-eared bat (*Plecotus townsendi*) ...throughout the state.

Pika (*Ochotona princeps*) ...Canadian and Hudsonian.

Eastern cottontail (*Sylvilagus floridanus*)...introduced along the Columbia

Nuttall's cottontail (*Sylvilagus nuttalli nutalli*) ...Peripheral range for this species in the Columbia River Valley here.

Snowshoe hare (*Lepus americanus*) ...From low elevation forests to near timberline...

Yellow pine chipmunk (*Eutamias amoenus*). Common. Open to semi-open coniferous forest.

Red tailed chipmunk (*Eutamias ruficaudus simulans*). Dense montane forest.

Yellow-bellied marmot (*Marmota flaviventris avara*). Rocky habitats in the transition zone.

Columbian ground squirrel (*Citellus columbianus*) ...Arid transition.

Golden-mantled ground squirrel (*Callospermophilus lateralis*). Rocky subalpine areas.

Red squirrel (*Tamiasciurus hudsonicus*). Common throughout all zones.

Northern flying squirrel (*Glaucomys sabrinus*) ...Coniferous forest.

Northern Pocket gopher (*Thomomys talpoides*) ...generally common in occurrence.

Great Basin pocket mouse (*Perognathus parvus*) ...Arid transition. Periphery of range.

Beaver (*Castor fiber*[=*Castor Canadensis*]) ...

Deer mouse (*Peromyscus maniculatus*) ...found in all zones.

Woodrat (Packrat) (*Neotoma cinerea*). Common throughout all zones...

(Red backed mouse [Gapper's=red-backed vole] (*Clethrionomys gapperi*) ...Often in subalpine meadows.

Heather mouse [=Heather vole] (*Phenacomys intermedius*) ...in the Canadian and hudsonian zone.

Pennsylvania meadow mouse (*Microtus pennsylvanicus*) ...Riparian.

Long-tail vole (*Microtus longicaudus*) ...Transition zones, often near moist places.

Muskrat (*Ondatra zibethicus*) ...Low elevation riparian zones.

Norway rat (*Rattus norvegicus norvegicus*) ...About human habitation.

House mouse (*Mus musculus*) ...Human habitation sometimes in nearby fields.

Western jumping mouse (*Zapus princeps*) ...arid transition to the hudsonian zone.

Porcupine (*Erethizon dorsatum*).

Coyote (*Canis latrans*).

Red fox (*Vulpes vulpes*) ... Uncommon. Subalpine areas in rockslides. The silver phase has been reported from this area.

Black bear (*Ursus americanus*) ...

Raccoon (*Procyon lotor*). Riparian, and below the mid-montane area.

Marten (*Martes americana*). Population status unknown? Canadian and hudsonian.

Short-tailed weasel (Ermine) (*Mustela erminea*) ... low elevations.

Long-tailed weasel (*Mustela frenata*) ... in mountainous areas.

Mink (*Lutreola lutreola*). Riparian zone.

Badger (*Taxidea taxus neglecta*) ... Arid transition.

Striped skunk (*Mephitis mephitis*). Widely distributed, except for higher mountains.

Wolverine (*Gulo gulo*). Rare. Reported from White Mountain and Lake Ellen, where one was taken in 1969.

Cougar (*Felis concolor*).

Lynx (*Lynx lynx canadensis*). Population status unknown. Canadian and hudsonian.

Bobcat (*Lynx rufus*).

Mule deer (*Odocoileus hemionus*). Migrates altitudinally. Canadian and hudsonian summer and fall; arid transition in winter.

White-tailed deer (*Odocoileus virginianus*).

Elk (*Cervus elaphus*) ... Occasional wandering animals. Apparently no residents. [Documented elk occurrences are increasing rapidly in the area – *Tim Coleman*, personal communication].”

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**Location:** entire area

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**Source:** Layser, 1971, pp. 25-33

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**Description:** [Note: the following wildlife reports are 20 years old, and may no longer be representative. Documented elk and moose presence is increasing rapidly, and reports of grizzly bear sightings continue to be recorded in the Kettle Range area, e.g., a report of 7 grizzlies sighted together just northeast of the area in British Columbia in 1999 – *Tim Coleman*, personal communication.]

“Grizzly bear (*Ursus arctos*). Present in this locale up to the 1920s. Track reports as recent as 1965 in the S. Fork Sherman Creek. Rare and endangered in contiguous U.S.

Mountain caribou (*Rangifer tarandus montanus*). Occasional in small numbers in the Kettle Range and ‘Wedge’ until c. 1920. Reports of caribou in the late 1950s from Sherman Pass and the ‘Wedge’. Rare and endangered in contiguous U.S.

Mountain goat (*Oreamnos americanus*). A single animal reported from Pierre Lake in 1969. Other reports from the Bowen Mountain area.

Moose (*Alces alces*). Rare. Infrequent wandering individuals.

Gray wolf (*Canis lupus*). Rare. Infrequent wandering animals. Tracks and sightings reported for Deadman Creek, Coyote Mountain and Sherman Creek in the past decade. Rare and endangered in contiguous U.S.”

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**Location:** entire area

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**Source:** Layser, 1971, pp. 33

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**Description:** "Step # 1 of Risk Assessment for Wildlife in Cabin Planning Area. Threatened or Endangered Species with Habitat present in the Pre-Field Review: bald eagle, grizzly bear, woodland caribou, gray wolf, North American lynx, wolverine, redband trout, bull trout."

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**Location:** Boulder Creek watershed

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**Source:** Kettle Falls Ranger District, 1994, p. WL-31

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**Description:** "On the U.S. side, the number of species at risk of extinction is even higher. Seven vertebrate species in the Columbias are formally listed as threatened or endangered by the U.S. Fish & Wildlife Service, including grizzly bear, gray wolf, and woodland caribou. Many other species, including lynx, wolverine, and Pacific fisher, are currently being considered for listing. An additional 174 species across a broad range of taxonomic groups are considered vulnerable or at risk of extinction (WA Dept. of Wildlife 1991, Mosely & Groves 1992, MT Natural Heritage Program 1993). Available evidence suggests that populations of many songbirds and raptors have declined significantly in recent years (Sharp 1992, Paulson 1992)."

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**Location:** entire area

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**Source:** Frost, p. 8

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**Description:** "Documented Lynx Occurrences per LAU: Zones 4 & 5 - Documented recently and in past, Zones 2,3,6,7,8 & 9 - Documented in past, not recently, Zone 10 - No documented occurrences."

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**Location:** Kettle Range

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**Source:** Washington Department of Fish and Wildlife, 1999

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**Description:** "In Washington, lynx live in boreal-type forests that occur in north central Washington along the east slope of the Cascade Mountain range and the Thompson-Okanogan Highlands."

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**Location:** Kettle Range

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**Source:** USDI - FWS, 1988, p. 36998

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**Description:** "The area contains important habitat for the Canada lynx, cougar, and marten."

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**Location:** Twin Sisters area

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**Source:** Colville National Forest, 1988a, p. C-54

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**Description:** “East of the Okanogan River [lynx] habitat use includes the same [lodgepole pine and Engleman Spruce / Subalpine Fir] forest types, but Western Redcedar and Western Hemlock forests are also heavily used.”

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**Location:** Kettle Range

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**Source:** Johnson and Cassidy, 1997, p. 252

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**Description:** "Washington has designated six "Lynx Management Zones" across north central Washington (Washington Department of Natural Resources 1996a). Currently, lynx occupy five of these zones: Okanogan, Kettle Range, the Wedge, Little Pend Oreille, and Salmo Priest."

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**Location:** Kettle Range

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**Source:** USDI - FWS, 1988, p. 36998

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**Description:** “During the peak harvest of 1969, 26 of the 31 lynx taken were from the Kettle Range in Ferry County.”

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**Location:** Kettle Range

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**Source:** Ruggiero et. al., 1999, p. 22

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**Description:** “ ...the lynx population in the Kettle Range appears to have undergone several dramatic increases and decreases in number from 1961 to 1977. Snow-tracking surveys conducted from 1992 to 1996 in the Kettle Range resulted in only two sets of tracks: one in 1991-1992 and one in 1995-1996 (Washington Dept. of Fish & Wildlife, unpublished data).”

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**Location:** Kettle Range

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**Source:** Ruggiero et. al. 1999, p. 22

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**Description:** "*Rocky Mountain/Cascades Region* - Lynx currently are thought to be present in the western mountains of the contiguous United States in the Cascades Range of Washington, the Thompson-Okanogan Highlands of northern Washington, and the Blue Mountains of Oregon, and the Rocky Mountains in Idaho, Montana, Wyoming, Utah and Colorado."

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**Location:** Kettle Range

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**Source:** USDI – FWS, 1988, p. 36998

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**Description:** “Potential lynx habitat and lodgepole pine thickets are found within the (Gatorson) planning area. Wildlife sighting records include reports of lynx on or near the Kettle Crest.”

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**Location:** Jack-knife roadless area

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**Source:** Colville National Forest, 1991, p. 21

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**Description:** “The Washington Department of Wildlife Habitat Biologist lists the Gatorson planning area as being an important travel corridor between the Deadman Creek and Boulder Creek drainages.”

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**Location:** Jack-knife roadless area

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**Source:** Colville National Forest, 1991, Appendix E (Effects on Management Indicator Species Report), p. 12

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**Description:** “The Cabin Planning Area lies within the Kettle Range Zone, an area of prime lynx range covering about 223,013 acres along the Kettle Crest . . . [current] population estimates range between 11 and 23 animals.”

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**Location:** Boulder Creek watershed

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**Source:** Kettle Falls Ranger District, 1994, p. 30

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**Description:** “Wolves have long been reported in the vicinity of what is now the Colville National Forest. Available records date back to 1914 (Hansen, 1986) and continue to the present. Within the last few years several wolf sightings have been reported on the Republic District, primarily in the Kettle Range.”

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**Location:** Eagle Rock area

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**Source:** Republic Ranger District, 1995, p. 5

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**Description:** “Reports of wolverine sightings have come from the Kettle Crest on the west side of the Sherman Planning Area”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 29

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**Description:** “(1) *California Wolverine* (USFWS Category 2) - The wolverine is very rare in this area but is found throughout the Forest. The species is a resident of boreal forests and is particularly fond of marshy areas. They den in rocks, under wind-thrown trees and under the snow. Home ranges are from 155 to 772 square miles, the females using much smaller areas than the males. (2) *North American Lynx* (USFWS Category 2) - Lynx generally use areas of higher elevation dominated by lodgepole pine and spruce/subalpine fir forests. They hunt in thickets, feeding mostly on snowshoe hares and tree squirrels, and den in mature and old growth stands with a high number of blown-down trees. Home ranges average 16 to 26 square miles for females and males respectively. Lynx are found in the upper elevations of all the mountain ranges on the Forest.”

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**Location:** entire area

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**Source:** Colville National Forest, 1998, Wildlife. p. 42

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**Description:** “Much of the Gatorson planning area is currently unroaded and is considered potential (wolverine) habitat. Reports of wolverine sightings have occurred throughout the Kettle Falls Ranger District, one as recently as March 1991.”

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**Location:** Jack-knife roadless area

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**Source:** Colville National Forest, 1991, p. 21

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**Description:** “Woodland caribou (*Rangifer tarandus caribou*) – Federally listed as endangered (U.S. Fish and Wildlife Service (July 15, 1999), Federal Register 18/28/99 and 10/25/99”

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**Location:** Kettle Range

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**Source:** Interior Columbia Basin Ecosystem Management Project, p. 119

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**Description:** “The woodland caribou (*R. t. caribou*), restricted to North America, is further broken down into 2 ‘ecotypes’: *mountain* and *northern* (Scott 1985), Stevenson and Hatler 1985) ...The Selkirk Mountains caribou ecosystem (Appendix A) is within the range of the *mountain ecotype*. The Selkirk Mountains woodland caribou population (Selkirk caribou), to which this recovery plan pertains, was emergency-listed as endangered under the Endangered Species Act of 1973 (in the Federal Register) on January 14, 1983.”

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**Location:** Kettle Range

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**Source:** USFWS, 1992, pp. 1-3

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**Description:** “In 1971, eight California Bighorn Sheep were released in the vicinity of the Republic Ranger District. In 1985, the estimated population was 80. In 1981-83, three hunting permits were issued for three-quarter curl or larger rams, and in 1984-85, two permits were issued. All permits have been filled.”

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**Location:** Republic Ranger District

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**Source:** Colville National Forest, 1998, Wildlife, p. 25

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**Description:** “Peregrine Falcon have been reported in the vicinity of the Forest during the fall migration three times in the past ten years. No nesting is known to occur on the Forest or near vicinity.”

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**Location:** entire area

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**Source:** Colville National Forest, 1998, Wildlife, p. 41

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**Description:** “Scatter Creek and Golden Harvest Creek have Brook and/or Rainbow Trout and the Sanpoil River supports Brook and Rainbow Trout, Dace spp., Redside Shiner, Sculpin, and Suckers.”

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**Location:** Thirteenmile area

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**Source:** Honeycutt and Shuhda, 1999, p. 1

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**Description:** “Bull Trout habitat exists in the analysis area. Tribal elders used to fish for bull trout in the Sanpoil River before Grand Coulee Dam was constructed.”

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**Location:** Thirteenmile area

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**Source:** Honeycutt and Shuhda, 1999, p. 1

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**Description:** Swan Lake, Ferry Lake, and Fish Lake are the three lakes within the analysis area. Long Lake lies just outside of the analysis area boundary. These four lakes provide a unique recreational fishing opportunity. Swan Lake is a 56.1 acre lake with a maximum depth of 95 feet. This lake is stocked with eastern brook trout and rainbow trout. Ferry Lake is a 19.3 acre lake with a maximum depth of 61 feet. This lake is stocked with rainbow trout. Fish Lake is a 5.7 acre lake with a maximum depth of 25 feet. It has rainbow trout, largemouth bass, and perch. Long Lake is a 24.7 acre lake with a maximum depth of 24.7 feet. It is stocked with cutthroat trout.”

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**Location:** Thirteenmile area

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**Source:** Honeycutt and Shuhda, 1999, pp. 2-3

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**Description:** “Genetic testing of the redband trout in the North and South Forks of Deadman Creek has revealed that the population is a pure redband trout population. Redband trout are on the Regional Forester’s Sensitive Species list. The population is competing with eastern brook trout for food and habitat throughout most of the watershed. The fifth and sixth reach of the North Fork Deadman Creek do not have brook trout, since the culvert at the 6114 road crossing does not allow fish passage. These reaches provide a stronghold for redband trout.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, p. 42

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**Description:** “The watershed contains about 65 miles of perennial and 134 miles of intermittent streams. Due to a combination of geologic uplifting and glaciation, historical fisheries were limited to the lower portions of Ninemile and Thirteenmile Creeks below the falls. Historical species were steelhead, rainbow and chinook salmon.”

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**Location:** Thirteenmile area

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**Source:** Colville National Forest, 1994, p. 9

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**Description:** “During the last period of glaciation (15,000 ybp), the Sanpoil and Kettle River flowed as a south flowing master stream. The Lake Missoula floods were occurring at the same time as the last glaciers were retreating (Breckenridge, 1989). The portions of the Sanpoil not under ice may have been providing a refugia for salmonids. Glacial Lake Columbia was not established, so salmon may have had access to the Sanpoil-Kettle master south flowing stream. When the last glacier receded, the North and South Forks of the Sanpoil cut down and deposited material on its alluvial fan, the Sanpoil-Kettle River connection was blocked and the current flow has remained since. (Muessig, 1967).”

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**Location:** Sanpoil River area

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**Source:** Honeycutt and Shuhda, p. 6

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**Description:** “In the recent past, the Curlew/Sanpoil rivers may have been connected by the North and South Forks of the Sanpoil. As stated above, the Curlew/Sanpoil divide is the alluvial fan of North and South Forks of the Sanpoil. The Sanpoil at the divide splits in high water periods with one branch flowing north to the Kettle and the other flowing south to the Sanpoil (Wolcott 1973). Therefore fish in the branches of the Sanpoil may have had access to both the lower Sanpoil and the Kettle River. Westslope cutthroat populations were present in the Columbia as early as 30000 to 60000 years ago. Bull trout have been found with cutthroat trout in many inland drainages both upstream and downstream from natural barriers, which means that they were early colonizers of those waters (Stolz, 1991). They have also been reported to be in the Sanpoil River by Colville Tribe members (Hunner and Jones, 1997).”

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**Location:** Sanpoil River area

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**Source:** Honeycutt and Shuhda, p. 6

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**Description:** “Testing of the native strain may prove that the Little Boulder is a host watershed for the sensitive redband trout.”

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**Location:** Little Boulder Creek area

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**Source:** Kettle Falls Ranger District, 1995a, p. 4

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**Description:** “The Headwaters Species Project is an attempt to identify and document the status, characteristics, and distribution of indigenous wild resident trout populations in headwater streams throughout the Mid-Columbia Basin ... In 1999 the project focused its collections in Northeastern Washington, particularly on streams in the Colville National Forest ... the project sampled 19 streams within the Forest boundaries ... However, the most distinctive-appearing population of westslope cutthroat we sampled was in the uppermost headwaters of the South Fork Sanpoil River near the crest of Sherman Pass ... specimens displayed untypical spotting, resembling Yellowstone cutthroat. We expect, though, that DNA analysis will likely determine they are westslopes, as was found in the Yakima drainage ... Of several redband rainbow populations sampled in '99, the Lone Ranch Creek population of the Kettle River drainage stood out in its distinctive coloration ... The physical characteristics of individuals will be compared to the analysis of their DNA samples to help

future scientists in the field identifications of westslope cutthroat and redband rainbow in Washington state.”

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**Location:** Kettle Range

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**Source:** McMillan, 1999, p. 9

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**Description:** “Two species of fish were found above the culvert (2 June 92): westslope cutthroat and a native strain of rainbow trout.”

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**Location:** East Deer Creek area

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**Source:** Kettle Falls Ranger District, 1995a, p. 4

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**Description:** “Approximately 1,630 acres of potentially good and 8,535 acres of potentially fair goshawk nesting habitat were identified. In addition, about 8,480 acres of good and 4,790 acres of fair Cooper’s/sharp-shinned hawk nesting habitat were identified. Some of these habitat types overlap. Nesting surveys were done in 1995 through 1998. In 1997 one nest was found.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, p. 42

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**Description:** “On May 29, 1990, Wayne Merritt field verified the (goshawk) nest and determined that it was an active nest. The nest i(s) located in a large Douglas Fir, 20-24 DBH, approximately 35 (feet) up in the tree. The surrounding habitat is a mixed stand of timber with small class IV streams. A Goshawk was seen in the vicinity of the nest.”

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**Location:** Jack-knife roadless area

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**Source:** Colville National Forest, 1991 (Internal agency letter) p. 1

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**Description:** “As the name implies, the planning area contains a large cliff utilized by golden eagles for nesting. This cliff is also of the appropriate height and structure to provide potential peregrine falcon nesting sites.”

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**Location:** Eagle Rock area

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**Source:** Republic Ranger District, 1995, p. 8

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**Description:** “Several Goshawk pairs, red tail hawks, and golden eagles have been sighted in the planning area.”

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**Location:** Boulder Creek watershed

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**Source:** Kettle Falls Ranger District, 1991, p. 15

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**Description:** “I have observed pine grosbeaks, white-winged crossbills and black-backed woodpeckers in the Kettle Range.”

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**Location:** Kettle Range

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**Source:** Andy Stepniewski, October, 2000, Ornithologist (personal communication)

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**Description:** [Northern waterthrush (*Seiurus noveboracensis*)] “Locally uncommon in swampy wetlands and bogs of moist forests in northeastern Washington. Breeding is limited to Okanogan, Ferry, Stevens, Pend Oreille, and northern Spokane Counties.”

---

**Location:** entire area, in alder thickets and mid-elevation riparian hardwood communities

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**Source:** Smith et. al., 1997, p. 426

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**Description:** “[American Redstart (*Setophaga ruticilli*)] “The Redstart stronghold in Washington is certainly along the rivers of the four northeastern counties: Okanogan, Ferry Stevens, and Pend Oreille.”

---

**Location:** entire area, in alder thickets and mid-elevation riparian hardwood communities

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**Source:** Smith et. al., 1997, p. 424

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**Description:** “Good raptor habitat diversity within the analysis area. Documented osprey nesting activity and suspected goshawk nesting stands are found in the Swan and Ferry Lakes area.”

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**Location:** Swan and Ferry Lakes area

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**Source:** Lembcke, 1999, p. 4

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**Description:** “Common Loon - Loon sightings are frequent during the spring and summer months at Swan and Ferry Lakes. In 1998, a pair of loons were observed at Swan Lake. In 1999, a pair of loons was confirmed to have successfully nested at Ferry Lake. In previous years, only individual loons were observed. It has not been noted in previous years that loon pairs have made nesting attempts.”

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**Location:** Thirteenmile area

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**Source:** Republic Ranger District, 2000a, p.12

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**Description:** “The major drainages in the Deadman watershed are Main and North Fork Deadman Creeks. Beaver inhabit both creeks and several tributaries. Aspen, willow and cottonwood trees do not dominate overstories along the most of the banks of the creeks, though several sections contain good stands of these trees and shrubs.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, p. 38

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**Description:** “Between 1826 and 1834, [Hudson’s Bay Company Colville] district trappers killed an average of about 3,000 beavers per year, but by 1850, after fifteen years of steady decline, the trappers could find only 438 beavers.”

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**Location:** entire area

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**Source:** Lichatowich, 1999, p. 55

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**Description:** “Beaver-constructed wetlands are considered a critical element of the hydrologic system because they mitigate the tendency toward extreme low flows that could put the fishery at risk of damage during droughts.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, p. 43

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**Description:** “Historic beaver areas in the lower section (1/4 mile above N. Fk. Confluence) provide deciduous pockets of dogwood, larch, devilsclub, gooseberry, serviceberry, alder, and thimbleberry. Despite no damming present, there were signs of current beaver activity (alder peelings).”

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**Location:** East Deer Creek area

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**Source:** Kettle Falls Ranger District, 1995a, p. 4

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**Description:** “Beaver inhabit both creeks and several tributaries.”

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**Location:** Sherman Creek watershed

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**Source:** Kettle Falls Ranger District, 1996, p. 33

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**Description:** “The watershed is home to many wildlife species, including beaver. There are signs of beaver activity within the project reach of North Fork Boulder Creek.”

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**Location:** Boulder & Deer Creek watersheds

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**Source:** Colville National Forest, 1998b, p. 6

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**Description:** “Taxon: *Amblyscirtes vialis*, the roadside skipper ...Rarity: Not uncommon, but colonies very spotty and local in E WA ...Key Sites: Canyon Creek, Ferry Co.”

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**Location:** Canyon Creek, a tributary of Sherman Creek

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**Source:** Pyle, 1989, p. 40

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**Description:** “Taxon: *Polygonia oreas*, oreas anglewing ...Rarity: The rarest of the anglewings, widespread but never numerous; perhaps dispersed rather than colonial; fewer than fifty total occurrences over 100 years ...Key Sites: ...canyons east from Curlew Lake, Ferry Co. ...J.A. Scott (13[1987]), in reshuffling American anglewings, lumped this species with the more widespread, boreal *P. progne*. Under this interpretation our Okanogan and Blue Mtns populations should be called *P. p. nigrozephyrus* and the rest *P. p. silenus*, and the name ‘oreas’ subsumed, according to JPP [Johnathan P. Pelham, Curator of Lepidoptera, Burke Museum, Univ. Wash.]. I feel that the situation is far too unclear, Scott’s evidence entirely too meager, and the butterflies in the field much too equivocal to accept this sweeping conclusion, especially in view of the small number of specimens known. I am therefore inclined to retain the oreas anglewing as an entity to include the ventrally very dark-to-black, *Ribes*-feeding *Polygonia* in Washington.”

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**Location:** canyons east from Curlew Lake (e.g., North Fork Sanpoil, Bracken Creek)

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**Source:** Pyle, 1989, p. 178

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**Description:** “In Washington these butterflies are rare and have limited geographic distributions which include Ferry and/or Okanogan County, the Kettle Range ... (Hinchliff, 1996):

Ferry County

- Garita skipperling (*Oarisma garita*)
- Long dash (*Polites mystic* ssp.)
- cedar hairstreak (*Mitoura grynea rosneri*)
- obscure elfin (*Incisalia polia obscura*) [1 site, southeast part of area]
- dark anglewing (*Polygonia progne* ssp. [*P. oreas*, oreas anglewing]) [1 site near Republic]
- Compton tortoiseshell [*Nymphalis vaualbum watsonii*] [1 site, southeast part of area]

Kettle Range

- Peck’s skipper (*Polites peckius*)
  - tawny-edged skipper (*Polites themistocles*)
  - Clodius Parnassian (*Parnassius clodius gallatinus*)
  - northern blue (*Plebejus idas atrapraetextus*)
  - meadow fritillary (*Boloria bellona toddii*) [3 sites, southwest part of area]
  - chryxus arctic (*Oeneis chryxus*) [4 sites, southwest part of area]”
- 

**Location:** entire area

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**Source:** Hinchliff, 1996, pp. 14, 19, 22, 23, 29, 73, 76, 86, 102, 119, 120, 138; list compiled by Ann Potter, Wildlife Biologist, Washington Department of Fish and Wildlife, October 20, 2000.

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**Description:** “Near Republic in Ferry County, in 1975, I found a disjunct population of *Boloria bellona*, a part of a rich butterfly fauna in an area with no dedicated reserves. ...Perhaps the outstanding opportunity for Lepidoptera conservation and nature conservation on the whole in this region would be for the enactment of wilderness legislation officially dedicating some of these tracts to roadless purposes.”

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**Location:** entire area

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**Source:** Pyle, 1982, p. 18

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**Description:** “A unique observation of a northern hawk owl was recorded in the White Mountain fire are about two years after it burned. The hawk owl has some preference for burned habitats in nearby Canada.”

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**Location:** Kettle Range

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**Source:** Andy Stepniewski, Ornithologist (personal communication)

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**Description:** “A bat survey conducted by J. M. Perkins in 1988 on the Kettle Falls District listed only one documented Western big-eared bat location.”

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**Location:** Jack-knife roadless area

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**Source:** Colville National Forest, 1991, p. 21

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**Description:** “The Gatorson planning unit is an important north-south travel corridor (for) deer between the Deadman Creek and Boulder Creek drainages. It is also an important reproductive area for both mule and white-tailed deer.”

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**Location:** Jack-knife roadless area

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**Source:** Colville National Forest, 1991, Analysis File, Wildlife Input Report, p. 6

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**Description:** “Over 100 wildlife species in northeastern Washington are dependant in full or in part on mature/old growth forests.”

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**Location:** Jack-knife roadless area

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**Source:** Colville National Forest. 1991. Gatorson Environmental Assessment, Analysis File, Wildlife Input Report, p. 6

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**Description:** “Of the 14 Management Indicator Species (MIS) listed in the Forest Plan, 12 may be found within the Cabin Planning Area. The planning area contains potential grizzly bear habitat, and effects of the proposed activities on this habitat are detailed in the Cabin Biological Evaluation.”

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**Location:** Boulder Creek watershed.

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**Source:** Kettle Falls Ranger District, 1994, p. 29

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**Description:** “Almost the entire contains travel cover and can be considered corridors for marten movement.”

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**Location:** Boulder Creek watershed.

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**Source:** Kettle Falls Ranger District, 1994, p. WL-3

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**Description:** “...field personnel heard barred owls and saw pine marten in the proposed area [Gatorson] planning area.”

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**Location:** Jack-knife roadless area

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**Source:** Colville National Forest, 1991, Analysis File, Wildlife Input Report, p. 6

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**Description:** “Of the 14 Management Indicator Species listed in the Forest Plan, 13 might be found within the Deadman Creek Watershed.”

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**Location:** Deadman Creek area

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**Source:** Kettle Falls Ranger District, 2000, p. 35

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