

Evaluation of Mount Howard - East Peak, Wallowa County, Oregon



**For its Merit in Meeting National Significance Criteria as a National
Natural Landmark to Represent Montane Grasslands in the
Columbia Plateau Biophysigraphic Province**

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Executive Summary

The National Natural Landmarks (NNL) Program encourages the preservation of exceptional examples of the nation's biological and geological features. To qualify for NNL designation, a site must be one of the best examples of a geological or biological feature within a biophysiographic province. Mount Howard - East Peak represents a high quality, representative example of this the Montane Grasslands Sub-Theme, within the Grasslands theme in the Columbia Plateau Biophysiographic Province. The site is in exceptional condition, is extremely diverse, including montane grasslands from 2,100 – 2,800 m (6,900 – 9,200 feet) in elevation.

The Mount Howard – East Peak proposed National Natural Landmark also is an accessible area of spectacular beauty. The top of Mount Howard can be reached by a tram from the south end of Wallowa Lake, a large lake formed by a large and characteristic glacial moraine, which the site overlooks. The area supports populations of rare plants, subalpine forests, mountain big sagebrush, subalpine parklands, whitebark pine, and examples of all of the alpine and montane grasslands which occur within the Columbia Plateau Biophysiographic Province. It also supports populations of bighorn sheep, reintroduced Rocky Mountain goats, and large numbers of raptors.

The Potential Mount Howard - East Peak National Natural Landmark (PNNL) occurs at the edge of the Eagle Cap Wilderness Area, a major recreational focal point. The north part of the landmark, including Mount Howard, is outside of the wilderness area. Because of the tramway and the spectacular views, the area receives over 27,000 visitors each year. The higher elevation grasslands on the south and west slopes of East Peak are located inside the wilderness area, accessible by a trail from Mount Howard.

The initial report recommended the site as the best remaining example of the montane grasslands subtheme, although many sites were evaluated and many sites contain high quality and relatively representative examples of this theme. This report recommends that the Mount Howard – East Peak PNNL meets the national significance criteria required for the NNL Program. The proposed site has the best, most representative, diverse and accessible examples of montane grasslands, and contains many other features making it perfect for NNL designation.

After additional research and inventory, and collaboration with subject matter experts, the Mount Howard – East Peak PNNL still contains the requisite biological and geologic features necessary to support listing as a National Natural Landmark. A map of the proposed landmark boundary, encompassing 1,012 acres (410 hectares) is included, along with maps showing the vegetation and ownership.

Introduction

Source of Site Proposal

In the initial Potential National Natural Landmarks assessment of the Columbia Plateau (Daubenmire 1975), only a single grassland theme was recognized. The Grassland Theme study was updated by the Oregon, Washington and Idaho Natural Heritage Programs, first in 1985 (Kagan et al 1985) in the Classification Report, and again in 1986 (Kagan 1986) in the site identification report, both of which identified a Montane Grasslands Theme. The classification of the Montane, Subalpine and Alpine themes also recognized montane grasslands as a significant ecosystem type in the evaluation of the Montane, Subalpine and Alpine Themes of the Columbia Plateau (Crawford 1989a). The phase 2 report analyzed the known montane grasslands sites in the region and identified Mount Howard - East Peak as the best site (Crawford et al 1989b) and a draft NNL establishment report was completed later that same year (Kagan 1989).

Mount Howard - East Peak has a large and one of the most natural and diverse example of montane grasslands remaining in the Columbia Plateau Biophysigraphic Province (Kagan 1989). It has a wide array of communities, including forested parklands, montane grasslands, alpine grasslands, montane shrublands, and some wet meadows. It includes a small montane valley basin, ridgetops, two mountain peaks, cliffs, and gentle sloping grasslands. The combination of numerous variations in substrate, aspect, and slope provide for additional diversity. It is also exceptionally accessible for a montane grasslands site, being very close to the town of Joseph, Oregon, and having a tram providing access to the site.

Most montane grasslands sites have been altered by historic heavy grazing from domestic livestock, most commonly sheep. This grazing still continues in many of the large examples of this subtheme. Due to its location and heavy recreational use, the Mount Howard - East Peak site has received less recent historic grazing by domestic livestock, is currently not being used by domestic livestock, and is the only known site which shows little evidence of past disturbance.

The site includes the entire range of diversity contained within the montane grasslands subtheme (Crawford et al. 1989b). It has large slopes dominated by alpine fescue (*Festuca brevifolia*), green fescue (*F. viridula*), and montane sedges (*Carex hoodii*, *C. geyeri* and *C. microptera* among others). The green fescue dominated areas include examples of all three plant associations described in the literature (Johnson and Simon 1987). In addition to the large grassland and sedge-dominated areas, Mount Howard - East Peak proposed landmark has a large example of other montane vegetation, including mountain big sagebrush (*Artemisia tridentata* ssp. *viscidula*), subalpine fir-whitebark pine (*Abies lasiocarpa*-*Pinus albicaulis*) parklands as well as some alpine communities with pink mountain-heather (*Phyllodoce empetrifomis*), Mertens' mountain-heather (*Cassiope mertensiana*), and montane forbs.

Evaluator

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Institute for Natural Resources, Portland State University.

Scope of Evaluation

As described above, Mount Howard - East Peak was first proposed in the Phase II, National Natural Landmarks Project final report (Crawford et al 1989b) as the best example of the Montane Grasslands Theme. The initial evaluation recommended a 1,000-acre NNL, although upon re-evaluation, a larger area has been recommended.

This document updates information on the status of the site, and incorporates information from the earlier theme studies. Additional field visits to the site were completed, new photographs are included, and new references in published literature were added.

Characterization of the Primary Natural Features of the Columbia Plateau Grasslands Themes and the Montane, Subalpine and Alpine Themes

In the 1975 theme study of the Columbia Plateau Biophysiographic Province, Daubenmire included all Grasslands and Sagebrush Shrublands within a "Grassland and Desert: Steppe Zone". By steppe, Daubenmire was referring to the grasslands and grass dominated shrublands which dominate much of the Intermountain west. He also included all of the alpine and high montane non-forested types in a Tundra or Alpine Zone Theme. In the revision of the Columbia Plateau themes and subthemes (Crawford et al 1987, Kagan et al 1985), all of the grassland types were evaluated together. Grasslands are a major feature of the Columbia Basin, and a large number of diverse grassland types are represented in this natural region. To adequately represent the diversity of the grasslands in this region, the following types were proposed (Crawford 2004):

Grass Steppe

1. Lowland and Valley Grassland Theme
2. Palouse and Plateau Grassland Theme
3. Canyon Grassland Theme
4. Montane Grassland Theme

These four themes are easy to identify and correspond fairly well to the major zones in Daubenmire's (1975) theme study and to other classifications of the vegetation of the Columbia Basin. They are inclusive of all of Daubenmire's associations addressed in the theme study, as well as all the grasslands occurring in the Columbia Basin Biophysiographic Province. These are outlined below in Table 1 from Crawford, 2004 which describes the different Grassland Themes and Subthemes from the Columbia Plateau Biophysiographic Province.

The description of Montane Grassland Theme is included below. This grassland type had been originally included as a subtheme in the classification of the “Montane, Subalpine and Alpine Themes (Crawford et al 1989a). In 2004, Crawford revised the classification (Crawford 2004), and included Montane Grasslands as one of the four full grassland themes in the Biophysiographic Province (Table 1). This revised classification is recognized in this study.

Table 1. Grassland Themes and Subthemes from the Columbia Plateau Biophysiographic Province.

Grassland Theme	Sub-theme	Landscape	Slope length (feet)	Elevation (feet)	PPT (inches)	Primary associations
Lowland and Valley						
	Lowland	wide river basins, sand dunes	0 - 100	300 - 2000	6 -15	thickspike wheatgrass - needle-and-thread grassland needle-and-thread - curly bluegrass grassland
	Valley	wide river basins, alkali basins	0 - 10	2000 - 4000	6 -15	inland saltgrass, basin wildrye – saltgrass Nebraska sedge
Palouse and Plateau						
	Northern Palouse	rolling deep loess hills in Steppe zone	10-100s	1500 - 3000	20 - 30	Idaho fescue - common snowberry Idaho fescue - wild rose rough fescue – Idaho fescue
	Central Palouse	rolling deep loess hills in Steppe zone	10-100s	1100 - 3000	15 - 20	bluebunch wheatgrass - Idaho fescue palouse, bluebunch wheatgrass - arrowleaf balsamroot - curly bluegrass
	Plateau	undulating basalt residium with loess plain within lower forest zone	1-10s	4000 - 6000	20 - 25 (Snow)	Hood's sedge - Idaho fescue Idaho fescue – prairie junegrass Idaho fescue – parsnip-flower wild buckwheat Idaho fescue – hawkweed
	Canyon	steep open slopes residium/alluvium	100 - 1000s	300 - 5000	Snow	Bluebunch Wheatgrass - Idaho fescue Canyon Bluebunch Wheatgrass - Prickly-pear - (Curly Bluegrass)
	Montane	Mountainous	0 - 1000s	6300 - 8400	Snow	Green fescue grassland Idaho fescue-Montane fescue grassland

Theme Description

Montane Grasslands of the Columbia Basin Biophysiographic Province

The Montane Grasslands Theme include the widespread, upland montane grasslands in the Columbia Plateau including a number of types described by Daubenmire (1975):

Festuca viridula (green fescue) park, *Carex geyeri* (elk sedge) park, and *Achnatherum nelsonii* var. *nelsonii* (Columbia needlegrass) - forb park. It includes other montane grassland types described by Hall (1973) in his classification of Blue Mountain plant communities, and Johnson and Simon (1987) in their classification of the Wallowa-Snake Province. It occurs on the higher elevation mountain slopes and ridgetops throughout the Ochoco, Blue, Seven Devils and Wallowa Mountain Ranges.

Primary Geological Features

The Montane Upland Grassland Subtheme can be found in all of the mountainous areas of the Columbia Plateau Biophysiographic Province. These areas include a wide diversity of geologic types. The granitic, limestone, sedimentary, and basaltic substrates in the different parts of the Wallowa and Seven Devil Mountains have a dramatic effect on the character and identity of the vegetation of the areas. These substrates weather quite differently, with the granitic bedrock forming sands and silts, the sedimentary rocks forming all types of soils, while the basalts form a substrate often supporting heavy clay soils. In some areas, loess silts have been deposited in various depths throughout the montane areas of the basin – and this can be a major factor in the nature of the grassland vegetation.

Elevations range from 1,900 to 2,750 meters (6,000-9,000 feet). Precipitation is extremely variable in this subtheme, although most falls as snow, with a little spring rainfall, and some summer thunder showers. Some areas are maintained as grassland due to the droughty conditions of soils - while others are due to cold or extreme wind conditions. Many sites include mountain and ridge tops.

Primary Biological Features

Montane upland grasslands are found throughout the higher elevation areas of the Columbia Plateau Biophysiographic Province. They represent a small but significant component of the vegetation of the Blue, Strawberry, Wallowa and Seven Devil Mountains. Examples of montane upland grasslands have been described primarily on public lands in the Ochoco, Umatilla, Malheur, Wallowa-Whitman, Payette, and Nez Perce National Forests.

The montane upland grasslands include a number of communities, each dominated by fescue (*Festuca*) or sedge (*Carex*) species. The most important species are green fescue (*Festuca viridula*), alpine fescue (*Festuca brachyphylla*), Hood sedge (*Carex hoodii*), and elk sedge (*Carex geyeri*). Older reports often refer to the alpine fescue as the alpine form of Idaho fescue (*Festuca idahoensis*), but it is now recognized as a valid taxon and a full species.

Johnson and Simon (1987) have described three communities from the Columbia Plateau Biophysiographic Province which are dominated by green fescue (*Festuca viridula*). The most widespread of these is the green fescue-spurred lupine (*Festuca viridula*-*Lupinus laxiflorus*) association, which is described as being common throughout the high elevation areas in the Wallowa Mountains. It occurs on all aspects and slopes (ranging

from 5-65%), from 2,000-2,600 meters (6,300-8,400 feet) in elevation, usually in areas with some loamy soil development. It is dominated by green fescue but has significant cover of spurred lupine (although the lupine cover decreases with the condition of the sites). The only other important indicator species in this community is western needlegrass (*Achnatherum occidentale*), which occurs at low cover but high frequency in these grasslands.

Two other minor communities are found in the Wallowa Mountains. One, an indicator of wetter sites, is the green fescue-Hood sedge (*Festuca viridula-Carex hoodii*) community which is composed primarily of these two graminoids. Other species in this association include Cusick bluegrass (*Poa cusickii*), western needlegrass and spurred lupine. The green fescue-Parry's rush (*Juncus parryi*) association occurs on drier, shallow or scabbier-soiled areas.

Other researchers (Daubenmire 1968, Cole 1982, Hall 1973, and Reid et al. 1980) have described green fescue communities. Most have a single green fescue type. However, most of the green fescue areas were greatly modified in the late nineteenth and early twentieth century by sheep grazing. Outside of the high Wallowa Mountains, it is still difficult to find even fair condition examples of green fescue grasslands. The other important group of upland montane grasslands is the alpine fescue grassland alliance which is widespread in the higher montane areas of the Columbia Plateau Biophysiographic Province; however many of the occurrences can be relatively small, in the order of 10-100 hectares.

Johnson and Simon (1987) described three types of montane Idaho fescue grasslands as well, all dominated by what they called high elevation forms of Idaho fescue (now recognized as Alpine fescue) and sedges: the Alpine fescue-Hood sedge (*Carex hoodii*) association, the Alpine fescue-elk sedge (*Carex geyeri*) association and the Alpine fescue-timber oatgrass (*Danthonia intermedia*) - sedge association. The Alpine fescue-Hood sedge type is the most abundant, occurring in the Seven Devil and Wallowa Mountains, as well as in montane areas of Hells Canyon. It occurs on all aspects but most often on gentle slopes (15% average) with good soil development averaging 38-66 cm (15-22 inches) of loess. The Alpine fescue-timber oatgrass-sedge association is also described from high elevation ridges in Oregon and Idaho. It is dominated by Alpine fescue, timber oatgrass and long-stolen sedge (*Carex pensylvanica*). Other species which occur within the PNNL include many ribbed sedge (*Carex multcostata*), Hood sedge and ballhead sandwort (*Arenaria congesta*). The Idaho fescue-elk sedge association occurs on high elevation, steep slope, clearings in subalpine forests, and primarily in the Seven Devils Mountains.

Hall (1973) describes an alpine fescue community, which is the Blue Mountain variant of all of the above types. It includes alpine, green and Idaho fescue as dominants. This community also contains Ross sedge (*Carex rossii*) and western needlegrass. The type was found on high elevation, exposed ridges and in openings in subalpine fir and whitebark pine forests.

Cole (1982) describes two other types which are part of this theme. The first, which is part of his High Elevation Grasslands Community, is described from primarily metamorphic (sedimentary) rocks. It is dominated by elk sedge and bluebunch wheatgrass (*Pseudoroegneria spicata*), occurring with western needlegrass, small-winged sedge (*Carex microptera*) and Nuttall's linanthus (*Leptosiphon nuttallii*). The second occurs on avalanche slopes, usually below 2,100 meters (7,000 feet) in elevation. These are usually dominated by Hood sedge, blue wildrye (*Elymus glaucus*), and California brome (*Bromus carinatus*) on granitic substrates, or by western needlegrass with slender wheatgrass (*Elymus trachycaulus*) or either bluebunch wheatgrass or western wheatgrass (*Pascopyrum smithii*), elk sedge and by shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*) on calcareous rocks.

The last type of montane grassland is the alpine sedge community (Hall 1973). This type was described from the Blue and Strawberry Mountains in Oregon and Washington. It is composed of a dense, closed sod of elk sedge with Hood sedge occasionally being codominant. In areas altered by grazing, pokeweed fleecflower (*Polygonum phytoloccoefolium*), western needlegrass and squirreltail (*Elymus elymoides*) become important species. It occurs on high elevation openings and exposed ridgetops.

Distribution and Context

The montane grasslands theme occurs only at the higher elevations, which in the Columbia Plateau Biophysigraphic Province are restricted to areas with peaks and ridges with elevations greater than 2,200 meters (7,000 feet). The greatest concentration of examples of this theme occurs throughout the high elevation areas of the Wallowa Mountains of northeastern Oregon, and in the adjacent Seven Devil Mountains, across the Snake River Canyon in Idaho. However, montane grasslands are also found in smaller occurrences throughout the Blue Mountains of northeastern Oregon and southeastern Washington on the Umatilla National Forest. In addition, a few small examples of this theme can be found on the higher peaks and ridges of the Ochoco and Strawberry Mountains of central Oregon and in the Elkhorn Mountains west of Baker City, Oregon.

In almost all of these areas, the montane grasslands occur as islands in forests and woodlands, generally with Grand fir (*Abies grandis*), Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and sometimes western larch (*Larix occidentalis*) or Ponderosa pine (*Pinus ponderosa*) forests occurring below these grasslands, while subalpine woodlands of subalpine fir (*Abies lasiocarpa*) and whitebark pine (*Pinus albicaulis*) occur in and around them. They also grade into other subalpine meadow, shrubland and barren vegetation at higher elevations.

In spite of the frequent lightning storms in summer, the fire frequency or the importance of fire in these montane grassland communities is not well-understood. The patterns of and the age of the subalpine woodlands of all of the known sites indicates that most of the lightning-caused fires are probably local and somewhat restricted. The high number of small barrens, snow beds and alpine habitats keep much of these areas green and not very flammable throughout most of the year, limiting fire frequency and spread. At the lower

elevations, the montane green fescue and Idaho fescue grasslands become more fire prone, although the natural fire frequencies in these areas have not been documented.

Regional Variation

The variations in the theme are due to both variations in geology and differences in regional floras. In particular, the variation in the Wallowa Mountains substrates, which include limestones, sedimentary soils, granitic and basalt substrates; as well as in floristics, with plants from the Rocky Mountains, the Pacific Northwest and the Northern Great Basin, combine to create a particularly diverse range of species and habitats. Green fescue grasslands tend to be less important in the southern and western portions of the biophysigraphic province, which also have fewer endemic species occurring in the montane grasslands.

Significance

Native grasslands are among the most depleted ecosystems in the United States. Throughout the northwest, native grasslands are dominated by bunchgrasses and forbs that evolved without the presence of large numbers of grazing ungulates; and are adapted to the usually severe summer drought, rather than sheep, goats and cattle that the European settlers brought with them. In particular, the montane grasslands supported very large numbers of sheep from the turn of the 20th century through the 1950s. In most of the mountains, domestic sheep grazing remains a significant impact to montane grasslands, and to the native bighorn sheep which historically used these areas, although at much lower densities. However, currently, the majority of montane grasslands in the Columbia Plateau are included in Wilderness Areas managed primarily by the U.S. Forest Service, which provides some protection; although sheep continue to use many of these areas.

Distinguishing Features

This subtheme grades into the Alpine and Subalpine Parkland Theme at the higher elevations and into the Plateau Grassland Subtheme of the Palouse and Plateau Grasslands Theme at the lower elevations. In general, most upland grassland above 1,900 meters (6,000 feet) will be representative of this subtheme. In addition, all areas dominated by green fescue (*Festuca viridula*) or montane sedges (*Carex geyeri* or *C. hoodii*) will also be part of this theme.

In the truly alpine areas, open tundra or fell-fields are part of the Alpine Parkland Theme, in spite of areas which are dominated by grasses such as downy oat-grass (*Trisetum spicatum*) or alpine bluegrass (*Poa alpina*). Alpine fescue (*Festuca brachyphylla*) can be found both in the Alpine Parkland Theme and the Montane Grasslands Theme. The Montane Grasslands Theme is easily distinguished from the Montane Meadows and Wetlands Theme by its occurrence on upland, dry site areas such as slopes, ridges, mountain tops and plateaus. The Montane Meadow and Wetlands Theme include only valley and moist site areas.

Mount Howard - East Peak Site Description

Overview

Mount Howard - East Peak has the largest, undisturbed and natural example of montane grasslands remaining in the Columbia Plateau Biophysiographic Province (Crawford et al. 1989b). It has a diverse array of communities, including forested parklands, montane grasslands, montane shrublands, and some wetlands. It includes a small montane valley basin, ridgetops, two small peaks, cliffs, and gentle sloping grasslands. The combination of numerous variations in substrate, aspect, and slope provide for additional diversity.

The site includes the entire range of diversity contained within the montane grasslands subtheme (Crawford et al. 1989b). It has large slopes dominated by alpine fescue (*Festuca brevifolia*) and by green fescue (*Festuca viridula*), the two most significant species in this theme. It also has areas dominated by sedges (*Carex* sp.) and many other native montane and subalpine grass species. The green fescue dominated areas include examples of all three plant associations described in the literature (Johnson and Simon 1987).

In addition to the large grassland and sedge-dominated areas, Mount Howard - East Peak proposed landmark has a large example of other montane vegetation, including two mountain big sagebrush/bunchgrass patches, examples of subalpine fir-whitebark pine (*Abies lasiocarpa*-*Pinus albicaulis*) parklands as well as some subalpine communities with dwarf shrubs such as pink mountain-heather (*Phyllodoce empetriformis*), Mertens' mountain-heather (*Cassiope mertensiana*), and shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*); along with an array of native montane forbs.

Natural History Theme Represented

Mount Howard - East Peak is representative of the Montane Grasslands Theme in the Columbia Plateau Biophysiographic Province. This subtheme is quite distinct from any other subthemes in the region, and Mount Howard - East Peak both characterizes and defines the subtheme.

Montane grasslands are an especially depleted subtheme, since most sites have been altered or destroyed by historic heavy grazing from domestic livestock. This grazing still continues in most of the large examples of this subtheme. The Mount Howard - East Peak site is the only known site which is not currently grazed by domestic livestock and is the only known site which shows little evidence of past disturbance.

Primary Natural Features

The proposed Mount Howard - East Peak NNL occurs at the northeastern edge of the Eagle Cap Wilderness Area in the Wallowa Mountains. These are the most diverse, spectacular representative of Oregon's Blue Mountains, and are the furthest western extent of the Rocky Mountains in the lower 48 states. The proposed natural landmark has a number of diverse geological and ecological values.

The NNL includes an array of varied montane and alpine grasslands, alpine and montane shrublands dominated by heaths (*Phyllodoce empetrifolia* and *Cassiope mertensiana*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and shrubby cinquefoil (*Dasiphora fruticosa*), cliffs, snowbeds, alpine scree and subalpine forests dominated by whitebark pine (*Pinus albicaulis*) and subalpine fir (*Abies lasiocarpa*). This includes all aspects and slopes and an elevational range of 6,500 to 9,000 feet (2,000 to 2,750 m).

Primary Biological Features

The proposed national natural landmark area includes two small peaks along the northern edge of a major ridge in the Wallowa Mountains. It is characterized by open grasslands dominated by bunchgrasses (Figure 3, page 8). Between the grasslands on the northern and western exposures, are some open subalpine forests and parklands dominated by whitebark pine and subalpine fir. At the southeastern edge of the landmark, is a small, montane basin which contains an excellent example of montane parkland. The lower slopes above the basin, and further north along the eastern boundary, are characterized by codominance of mountain big sagebrush and bunchgrass.

The most significant aspects of the proposed Mount Howard-East Peak Potential National Natural Landmark are the extensive bunchgrass-dominated slopes and ridges. These are quite variable, and include the entire range of communities known from the montane grasslands subtheme (Crawford et al. 1989a). They have been classified into two major groups (series) based on the dominant bunchgrass: the green fescue series and the Idaho fescue (*Festuca idahoensis*) series (Johnson and Simon 1987). The Idaho fescue types at the proposed landmark include communities dominated by Idaho fescue, alpine fescue and bluebunch wheatgrass (*Agropyron spicatum*).

One of the most extensive areas of montane grasslands in the proposed landmark is the east-west ridgeline and south facing slopes below the peak of Mount Howard, located along the northern boundary of the site. This area is dominated by alpine fescue and alpine forbs. It is most similar to the Idaho fescue-Hood's sedge (*Festuca idahoensis*-*Carex hoodii*) community described by Johnson and Simon (1987), and dominated by Idaho fescue, Hood's sedge, and alpine fescue. The community is characterized by exposed rocks between widely spaced bunchgrasses, and a high diversity of often endemic alpine and subalpine forbs including: *Arenaria congesta*, *Ivesia gormanii*, *Erigeron compositus*, *Penstemon spathulatus*, *Lomatium greenmanii*, *Oxytropis campestris*, and *Eriogonum flavum*. In parts of these grasslands, timber oatgrass, downy oatgrass (*Trisetum spicatum*) and western needlegrass become codominant.

On Mount Howard, this alpine fescue community is similar to a type described by Cole (1982) generally as "high elevation grasslands" of the Wallowa Mountains, which also included areas dominated by bluebunch wheatgrass, green fescue, elk sedge (*Carex geyeri*), and junegrass (*Koeleria macrantha*). As mentioned above, this is a forb-rich vegetation type, with most of the same forbs from the Idaho fescue-Hood sedge community, as well as some other more unusual forbs (*Erigeron chrysopsidis* ssp. *brevifolius*, *E. bloomeri*, *Lupinus laxiflorus*, and *Achillea millefolium* var. *alpicola*).

Alpine fescue was ignored in the classifications of Johnson and Simon (1987) and Cole (1982) due to confusion with the non-native varieties of sheep fescue (*Festuca ovina*) and some taxonomic disagreements. Alpine fescue is found throughout the proposed landmark, completely dominating many areas. Alpine fescue can occur with an alpine grass species called Rocky Mountain fescue (*Festuca saximontana* ssp. *purpusiana*), and in many areas in the proposed NNL these species are difficult to distinguish. Both of the vegetation types described above have Rocky Mountain fescue and alpine fescue-dominated areas.

The sites with Hood's sedge tend to be found on the ridgetops and flatter areas, while the steeper slopes have more bluebunch wheatgrass, junegrass, and western needlegrass. Various authors (Pickford & Reid 1942, Hall 1973, Reid et al. 1980) suggest that western needlegrass is an increaser species which replaces other native bunchgrasses following heavy grazing by domestic sheep. There is no evidence that the majority of western needlegrass occurred in areas as a result of sheep grazing in the proposed national natural landmark. This area is one of the very few sites which has not been heavily grazed by sheep for many years. Western needlegrass does occur more abundantly in microhabitats with open soil due to steep slopes, loose soils and natural erosion. However, it is found in areas of the proposed landmark which show very little disturbance.

The other significant grasslands described from the montane grasslands subtheme are those of the green fescue series. Two green fescue plant associations have been described (Johnson and Simon 1987), and are present in the proposed landmark. They include the green fescue-spurred lupine association and the green fescue-Hood sedge association. The best development of these green fescue communities occur on the eastern slopes and ridges (south and east facing slopes), below the unnamed, twin peak between Mount Howard and East Peak. At the lower elevations on the slope, these communities have been invaded by mountain big sagebrush, creating mountain big sagebrush/green fescue communities which have not been described from other areas.

The most important of these green fescue associations in overall extent and in area with the proposed landmark is the green fescue-spurred lupine community. This occurs on the southeast facing slopes below the ridge of the unnamed peak. Both green fescue and spurred lupine are codominant, comprising over 50% of the vegetation cover. Although this association has less bare ground than does the other grassland community types, bare ground and rock represents almost 30% of the cover. Other common plants from this community include nodding microseris (*Microseris nutans*), yellow buckwheat (*Eriogonum flavum*), Nuttall's sandwort (*Arenaria nuttallii*), Payson sedge (*Carex paysonis*), squirreltail (*Elymus elymoides*) and yarrow (*Achillea millefolium*).

Examples of the green fescue-Hood sedge association occur at slightly higher elevations than the other green fescue associations. It is found on the saddle between the unnamed peak and East Peak, as well as the saddle between Mount Howard and the unnamed peak. It is also found on some gentle northwest facing slopes and ridges. The association is dominated by green fescue, Hood sedge, and sheep fescue. Other graminoids include Ross' sedge, junegrass, and western needlegrass. Forbs (*Sedum lanceolatum*, *Trifolium*

multipedunculatum, *Erigeron bloomeri*, *Penstemon globosus*, *Solidago multiradiata*, and *Ivesia gordonii*) are quite important and variable in this association.

On the ridges with shallow soils, a variation of both green fescue communities can be found. It has plant species from both communities, as well as other graminoids and forbs which are often codominant with the green and alpine fescue. These include slender wheatgrass, timber oatgrass, Oregon catchfly (*Silene oregana*), prairie smoke (*Geum triflorum*), and tailcup lupine (*Lupinus caudatus*). This assemblage of plants tends to have much greater cover of moss and lichen between the grasses and forbs, and therefore less bare soil and rock. This type, as well as the two described green fescue associations, are found in a number of small patches located between the isolated patches of whitebark pine trees, which make up the montane parkland.

The last important non-forest plant community from the proposed landmark is found on the lower, primarily east and southeast facing slopes of both Mount Howard and the ridge north of East Peak. This is a mountain big sagebrush/bunchgrass plant association. Mountain big sagebrush is the only shrub, making up from 20-40% of the vegetation cover. Green fescue and Idaho fescue are the dominant grasses, but Hood sedge, western needlegrass and Columbia brome (*Bromus vulgaris*) are also common. The forbs include prairie smoke, lupine species, ballhead sandwort (*Arenaria congesta*), western hawkweed (*Hieracium albicaulis*), globe penstemon (*Penstemon globosus*), and Rocky Mountain butterweed (*Senecio streptanthifolius*).

Although most of the proposed landmark includes dry meadows, grasslands and forests, there are three very moist areas with different vegetation. Two are found at almost 8,000 feet (2,440 meters) on north slopes below East Peak, near the southern boundary of the landmark. These include montane wetlands dominated by high elevation mesic grasses and sedges (*Deschampsia atropurpurea*, *Eleocharis pauciflora*, *Carex scopulorum* and *C. nigricans*), dwarf shrubs (*Salix arctica*, *Phyllodoce empetrifomis* and *Cassiope mertensiana*) and forbs (*Potentilla flabellifolia*, *Symphyotrichum spicatum* var. *spicatum*, *Oreostemma alpigenum* var. *haydenii*, *Solidago multiradiata*, *Veronica cusickii* and the endemic *Castilleja chrysantha*). These wetlands often form below or around snowfields, so they are often characterized by large areas of bare soil. The third site is a small, north-northeast facing basin just south of Mount Howard. This area has many of the same plants described, but also has a perennial snowfield. The area around the snowfield has characteristic vegetation of modest buttercup (*Ranunculus verecundus*), black alpine sedge (*Carex nigricans*) and lousewort (*Pedicularis*) species.

Above these wetland sites are some good-sized patches (1-2 ha or 3-5 acre) dominated by mountain heather species. This type has been described as the pink mountain heath (*Phyllodoce empetrifomis*) community type by Cole (1982), and includes a number of associated forbs similar to the wetland and alpine mesic forb dominated sites (*Potentilla flabellifolia*, *Castilleja chrysantha*, *Ligusticum tenuifolium*, *Antennaria lanata*, and *Veronica cusickii*).

All of the grassland, shrubland, and wetland sites described above occur in a matrix with whitebark pine and subalpine fir forests and subalpine parklands. The forests are found primarily on the north facing and northwest facing slopes, or in protected sites below saddles or ridges. Most of these forests are found above 2,300 meters (7,500 ft.) in elevation and have been described in the literature as the whitebark pine-subalpine fir habitat type (Cole 1982, Steele et al. 1981, Cooper et al. 1987). These are open forests with an understory dominated by graminoids (*Carex hoodii*, *C. rossii*, *C. geyeri*, *Juncus parryi*, *Festuca viridula*, *F. brachyphylla*, and *Luzula hitchcockii*) and forbs (*Lupinus latifolius*, *Arnica cordifolia* and *Polemonium pulcherrimum*). Shrubs occur in patches, mainly grouse huckleberry (*Vaccinium scoparium*) in moist, partly shaded sites and mountain juniper (*Juniperus communis*) on exposed areas.

These forests are dominated by whitebark pine at higher elevations and on metamorphosed soils which are typical of this site. Subalpine fir becomes more dominant lower, in moister areas. At the lowest elevations in the proposed landmark, whitebark pine disappears altogether. These areas, which are very limited in extent in the proposed landmark, have typical subalpine fir forests. The only described plant community represented is the subalpine fir/grouse huckleberry/skunk-leaved polemonium (*Abies lasiocarpa*/*Vaccinium scoparium*/*Polemonium pulcherrimum*) habitat type, and the associated lodgepole pine seral state, called the lodgepole pine-(subalpine fir)/grouseberry/skunk-leaved polemonium community (Johnson and Simon 1987).

Wildlife

The proposed Mount Howard - East Peak area also has some significant wildlife values, the most important of which are populations of Rocky Mountain bighorn sheep (*Ovis canadensis*) and Mountain goats (*Oreamnos americanus*). The bighorn population was fairly large in the 1980's, but has declined recently, apparently due to increases in diseases acquired from domestic sheep. The mountain goats were introduced into this area by the Oregon Department of Fish and Wildlife, and have recently begun to expand. Peregrine falcons (*Falco peregrinus*) are also often seen at East Peak. However, the high visitation rates from the tram, and the Wallowa Tramway's visitors feeding the ground squirrels and chipmunks have significantly altered the wildlife dynamic at the site.

At-Risk Plants

The Mount Howard - East Peak Potential National Natural Landmark (PNNL) provides very important habitat for a number of local endemic and at-risk plants (plants potentially at risk of extinction). The most significant of these is the occurrence of Greenman's desert-parsley (*Lomatium greenmanii*). This local endemic is only known from three locations, the Mount Howard-East Peak area, Redmont Peak, and Ruby Peak, and has been listed as threatened by the Oregon Department of Agriculture under the State of Oregon's Endangered Species Act. All individuals of this species, aside from the approximately 2,000 plants found at Redmont Peak and the approximately 4,000 plants at Ruby Peak, occur on or immediately adjacent to the proposed landmark - and the plant is an important component of the alpine fescue communities. The site also has populations

of three other Wallowa Mountain endemic plant species (*Erigeron chrysopsidis* ssp. *brevifolius*, *Penstemon spathulatus* and *Castilleja chrysantha*), and two other regional endemic distributed desert-parsley species (*Lomatium oreganum* and *L. cusickii*). The alpine desert parsley plants, particularly Greenman's, are of small stature and low growing, but abundant enough in many areas that they are easily seen both in flower and in fruit (Figure 1).



Figure 1. Greenman's desert-parsley in flower at Mount Howard. Approximately life size photo, with the plants about 3 inches across and less than two inches tall.

Primary Geological Features

The Mount Howard - East Peak Potential National Natural Landmark comprise two mountain peaks on the edge of the Wallowa Mountains. A major reason for the biological diversity of this area is the geologic diversity of this part of the Wallowa Mountain range. While the majority of the Columbia Plateau mountains were formed as Columbia River basalt or rhyolite flows or other volcanic activity, the eastern part of the Wallowa Mountains include large ridges of sedimentary rocks, including pure limestones and marble, greenstones and some unusual basic sedimentary rocks known as Hurwal, named for the divide between two main drainages feeding into the Wallowa Valley, Hurricane Creek and the Wallowa River.

The potential landmark occurs at a mixing point of most of the major rock types in the region. To the south and west, are the northern Wallowa Mountains, primarily composed of uplifted sedimentary rocks, which have been classified as Hurwal (reddish, limy sedimentary rocks named after the ridges between Hurricane Creek and Wallowa River) or Martin-Bridge Limestone formation. To the north and east are primarily basaltic rocks, which are typical of the Columbia River Plateau Basalts. Also, at the southern end of the proposed landmark, there is a small intrusion which marks the extreme eastern edge of a large granitic area (classified as granodiorite) of the central Wallowa Mountains.

The geologic studies (Smith and Allen 1941, Weiss et al. 1976) show the majority of the proposed landmark as Clover Creek Greenstone. This is a group named by Gulluly (1937) for rock exposed along Clover Creek, a tributary of the Powder River located about 65 km (40 miles) southwest of the site. It is described as a mix of Permian or Triassic, altered (metamorphosed) volcanic and pyroclastic rocks, mixed with small amounts of (often tufaceous) sedimentary rock (Baldwin 1964). The rocks exposed at the site look very much like the basalts which are prevalent to the east of the site, with reddish coloration and volcanic texture. However, they weather much more like metamorphosed rock, and are somewhat more neutral than the typical basalts. The majority of the site does not have significant limestone content. The geology on East Peak at the southern end of the proposed NNL includes more of the Hurwal sedimentary rocks integrating into volcanic basalts as the area drops into the Prairie Creek drainage. Mount Howard and the northern part of the NNL are composed of a unique mix of a sedimentary substrate called Clover Creek Greenstone and Grande Ronde basalts (Wallowa-Whitman National Forest 1999).

The proposed landmark, like many of the geologically diverse areas of the Wallowa Mountains, has diverse mineral resources. The site has an abandoned silver and gold mine, called the Transvaal Mines on the U.S.G.S. Topographic Map. Topographically, the site is quite diverse. It includes steep slopes of all aspects, vertical cliffs facing north and west, and gentle slopes and terraces facing east, south, and north. The site has two small saddles, two long ridges, two small stream drainages, and a small montane cirque basin at only 7,000 feet (2,130 m) in elevation.

The soils on the proposed national natural landmark site, like those of most steep montane and alpine areas in the eastern Wallowa Mountains, are quite diverse. Around the snowfields and at higher elevations, there are coarse sandy silts from granitic, basaltic and sedimentary substrate. Elsewhere the site has silty loams and even small areas of wind-deposited loess silts. Overall, the site has little clay, peat or organic soil development, due primarily to the steep slopes. The intrusions of Martin-Bridge limestone and granitic are limited in the landmark, and are marked by different vegetation, more typical of the alpine areas of the Wallowa Mountains.

The climate is montane. The nearest large weather station is in Enterprise, which is about 10 mi (16 km) northeast of the landmark and about 4,500 feet (1,350 m) lower in elevation, although Mount Howard does have its own small station. The larger area receives about 23 inches (59 cm) of precipitation each year (NOAA 1984), much of

which occurs in the form of snow. There are occasional spring rains, but the site has the typical Pacific Northwest's summer drought. The average January temperature is minus 20 degrees F (7 degrees C), July temperature is 61 degrees F (16 degrees C) and annual temperature is 40 degrees F (4.5 degrees C), summarized in Figure 2 below.

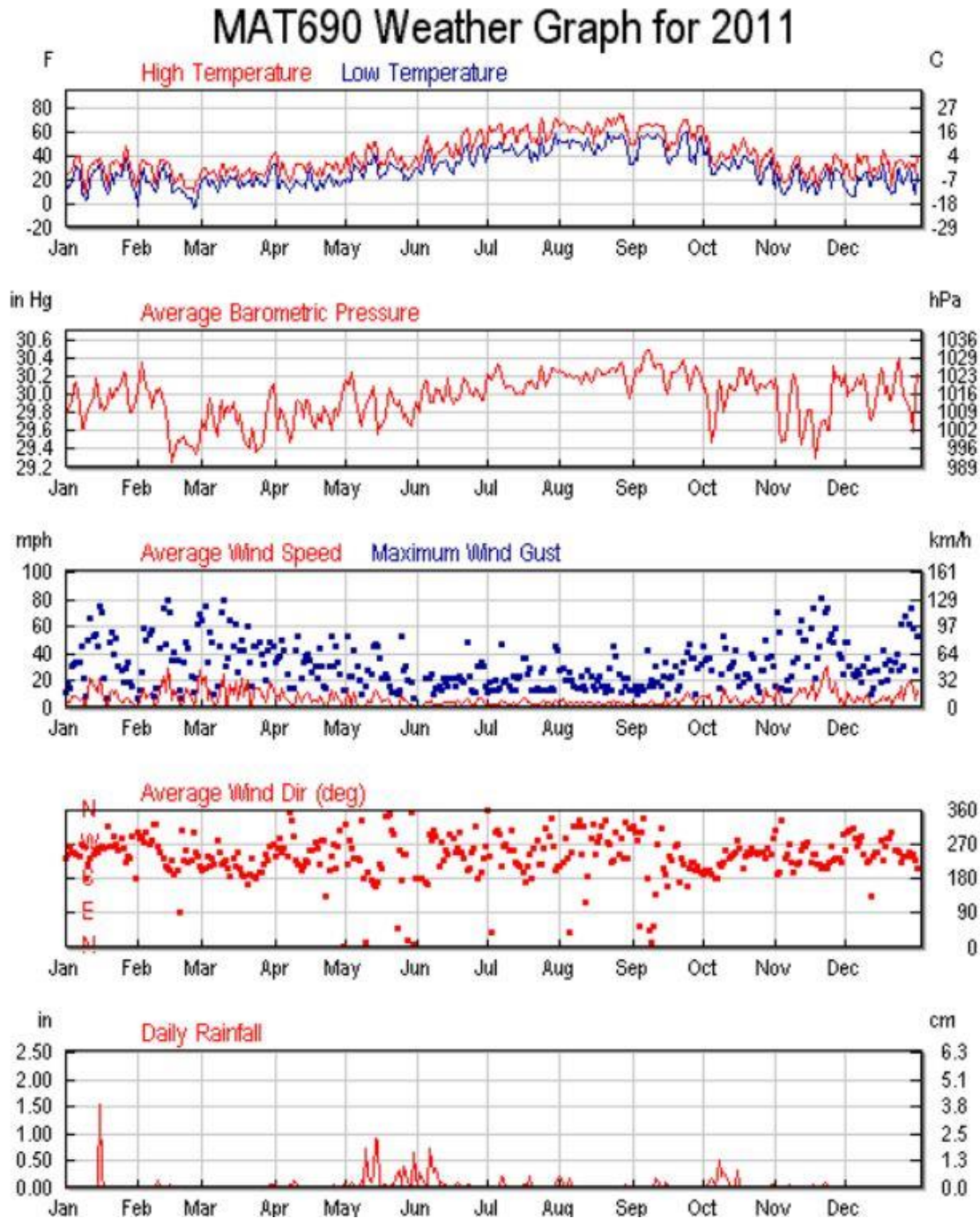


Figure 2. Data from Mount Howard Weather Station.

Also from the Mount Howard Weather Station, the annual summaries for high and low temperature, wind and precipitation are shown in Table 2 below. The weather station has only been publishing data since midyear in 2010, so the 2011 summary is most informative. The majority of the winter precipitation comes in the form of snow, but the spring and summer are from rainstorms.

Table 2. Summary of 2011 Weather from Mount Howard weather station.

	High:	Low:	Average:
Temperature:	74.0 °F	-4.0 °F	34.2 °F
Dew Point:	50.0 °F	-99.9 °F	17.6 °F
Humidity:	99.0%	1.0%	64.7%
Wind Speed:	44.0mph from the SW	-	6.3mph
Wind Gust:	81.0mph from the SSW	-	-
Wind:	-	-	WSW
Pressure:	30.52in	29.16in	-
Precipitation:	16.51in		

Physical Setting

Mount Howard - East Peak are two small peaks located on the northeastern edge of the Wallowa Mountains, the largest mountain range in eastern Oregon and the Columbia Plateau Biophysiographic Province. The two peaks look out over the Wallowa Valley to the north and the Sheep Creek and Imnaha River canyons to the east, both of which represent the western edge of Hells Canyon and the Hells Canyon Wilderness. To the south is a major ridge which heads south to include Aneroid Peak and Cusick Mountain, then west to Eagle Cap. This ridge divides the Wallowa River Drainage, which feeds into the Grande Ronde River, and the Imnaha River Drainage, major features in the eastern edge of the Wallowa Mountains.

Location and Access

Mount Howard - East Peak is located just south of the town of Joseph, Oregon, at the south end of Wallowa Lake, at the very end of Oregon State Highway 82. The proposed NNL can be easily reached by the Wallowa Lake Tramway, a gondola that takes visitors from the south end of the lake to the grassland just below the summit of Mount Howard (<http://wallowalaketramway.com/information/about/>). The tram operates during the summer, generally June – September. The daily 2013 round-trip rates ranged from \$17 for children to \$26 for adults, with discounts for multiple day trips. The tramway can be easily found by bearing left at the first opportunity upon reaching the south end of the lake.

The Mount Howard – East Peak proposed NNL can also be reached by hiking up from the McCully Creek trailhead on the Wallowa-Whitman National Forest Road 3920-812, which comes off of Tucker Down Road. Head east from Joseph on the road to Imnaha (Wallowa Avenue in the middle of Joseph) for 5.4 miles, and turn right onto Tucker Down Road that becomes USFS road 3920, and right again on USFS Road 3920-812 to the trailhead. However, reaching the proposed NNL this way involves an almost 1,250 meter (4,000 foot) elevation gain on foot.



Figure 3. General Location of Mount Howard - East Peak NNL in the Columbia Plateau.

The area can also be reached from the Eagle Cap Wilderness Area by hiking the East Fork of the Wallowa River trail until it reaches the Aneroid Peak ridge, and walking north along the ridge for approximately 4.5 km (2.8 miles). However, parts of this ridge are steep and lack a designated trail. Only experienced hikers should attempt this approach.

To reach the site by car, take State Highway 82 east (southeast) from Enterprise for 11 km (7 mi), to Joseph, and continue straight through town for 10 km (6 mi) to the south

end of Wallowa Lake. Bear left, staying on the paved road following signs to the Wallowa Lake Tramway and to wilderness trails for about 2 km (1.2 mi) to the tramway parking area on the left. The proposed landmark is to the south, and the central portion can be reached by a good (but unmarked trail) heading down (south) from the east side of the summit of Mount Howard.



Figure 4. Topographic map showing locations of Mount Howard and East Peak.

Ownership

The entire proposed NNL is part of the Wallowa Whitman National Forest, managed by the U.S. Forest Service. The southern portion of the area is located in the Eagle Cap Ranger District, while the northern part is outside the wilderness boundary, managed as part of the Wallowa Whitman National Forest's Wallowa Valley Ranger District. Both the Eagle Cap and Wallowa Valley Districts share a District Ranger, who has the primary management authority. Figure 4 above shows the general location of the proposed NNL, as well as the Wilderness and National Forest Boundaries. Figure 5 shows the more detailed boundaries of the proposed landmark. Figures 6 and 7 show the tax lot boundaries for the two townships in which the proposed NNL occurs.

Because the area is part of a large public ownership designated primarily for conservation and recreation, there are no fences, and few roads, trails or other management constraints or barriers that help identify natural boundaries. As a result, the boundary generally

follows section lines in the wilderness, and trails, roads and ridges outside of it. More details are included in the boundary justification section below.

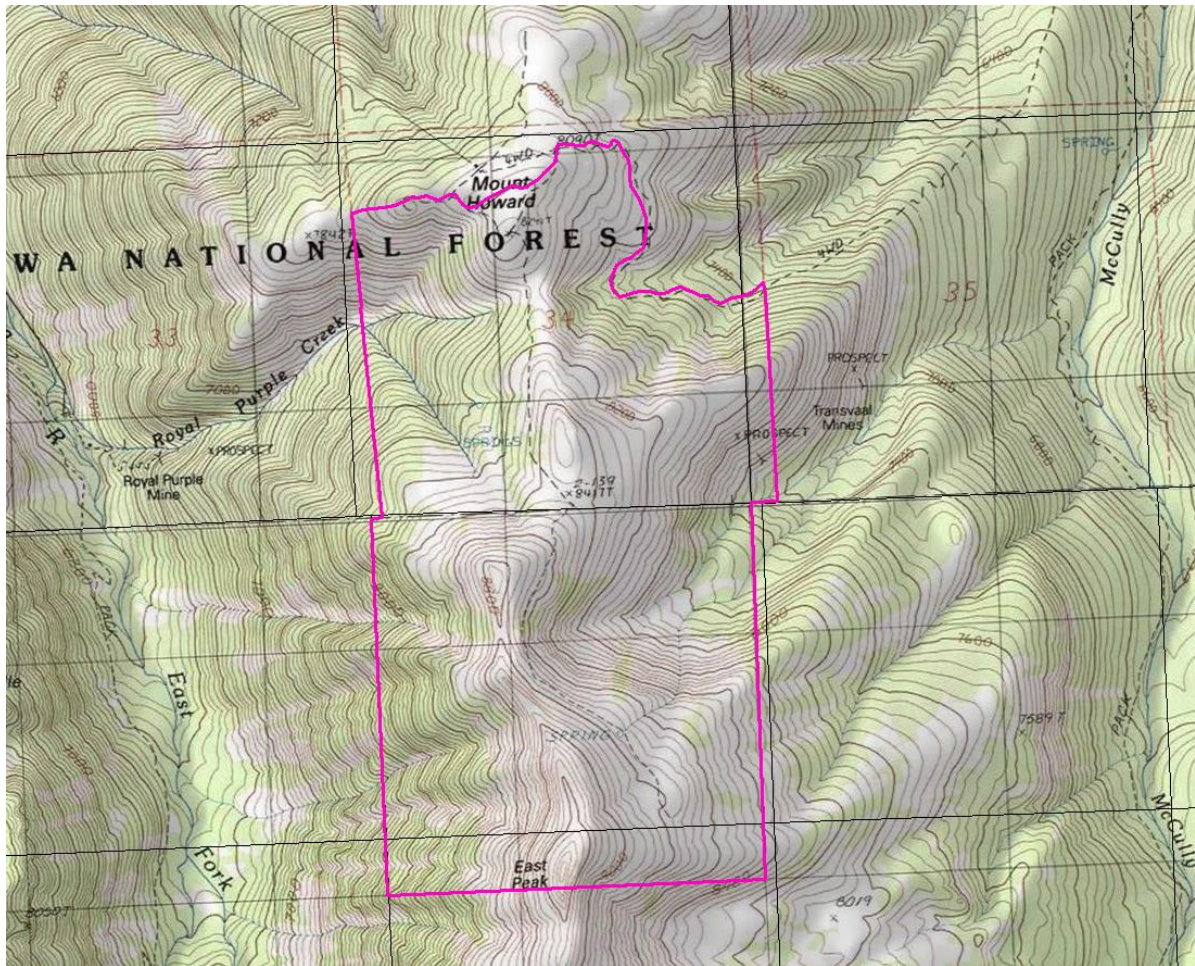


Figure 5. Mount Howard - East Peak Potential NNL Boundary (pink line).

Land Use and Condition

Historic Land Use

The site, along with all of northeastern Oregon, was heavily grazed by sheep at the turn of the century, but the large sheep operations disappeared by the 1930s; but then were reinvigorated by 1950, using the extended grasslands in the Wallowa Mountains as summer pasture (Pickford and Reid 1942). Studies have shown significant recovery in many of the Blue Mountain green fescue montane grasslands, although historic livestock damage still can be seen in many areas. Reid et al. (1980) looked at 40 years of recovery in these grasslands, and there may be plans to revisit these sites again in another 7 years. The records at the Wallowa Ranger Station show that the sheep allotment was active through the 1970s, with the allotment becoming vacant and then closed sometime in the early 1980s. Regardless, the grazing within the proposed NNL has been light, and there is almost none of the evidence of historic damage described by Reid and Pickford from other green fescue areas occurring at the Mount Howard – East Peak site.

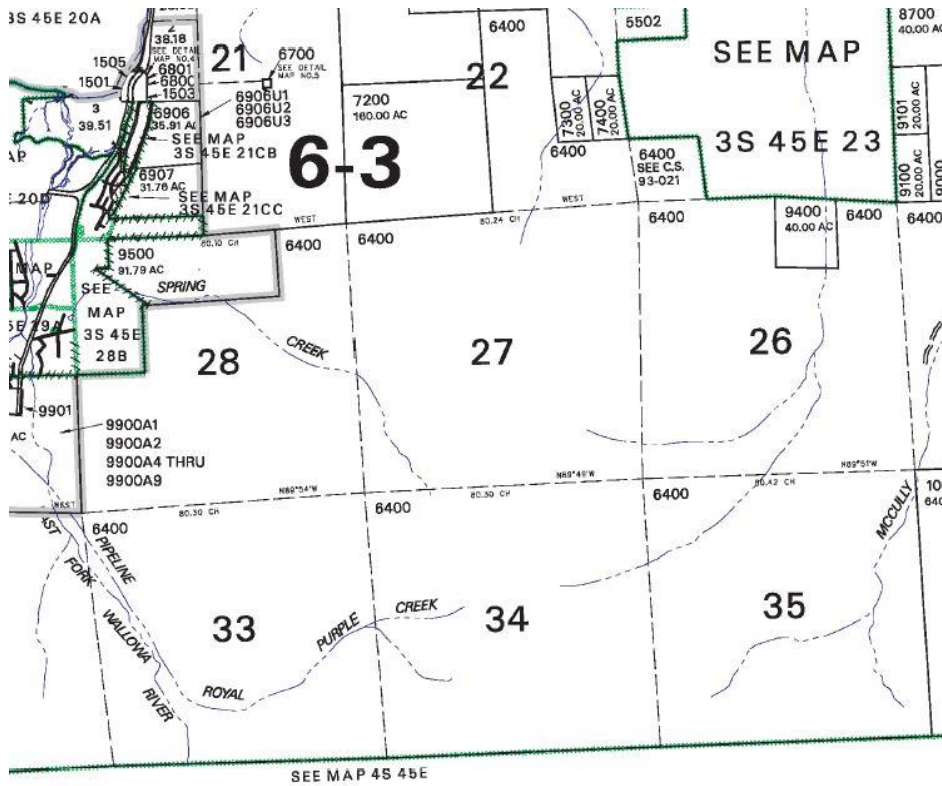


Figure 6. Wallowa County Plat Map of the north half of the Mount Howard - East Peak PNNL.

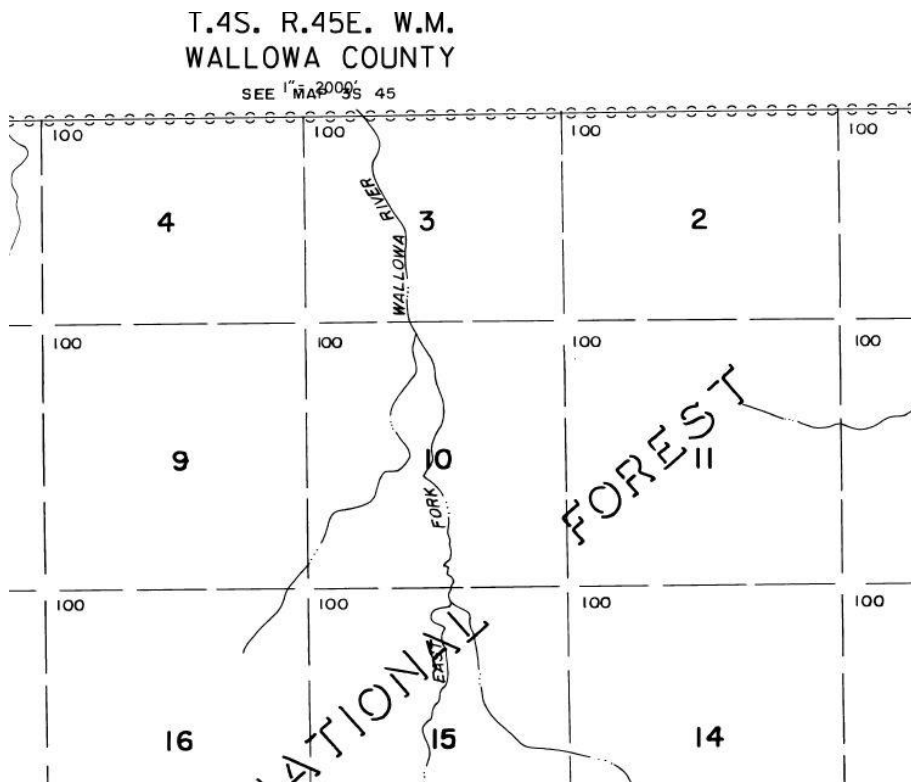


Figure 7. Wallowa County Plat Map of south half of the Mount Howard - East Peak PNNL.

Current Land Use and Present Condition

The site is currently managed for the natural and recreational values present. Mount Howard receives heavy visitor use, primarily by tourists interested in the spectacular view. A well-established and maintained network of trails now criss-crosses the top of Mount Howard, in the area north and west of the proposed landmark, but there is little trampling or trail damage in the proposed landmark. The extreme northeast corner of the landmark had an old, dirt roadway which provided access to an abandoned mine. There is no active mining going on in the area. This road had largely disappeared, until 1989, when a portion of it was re-bladed in an attempt to control part of the Canal Fire, which burned almost 25,000 acres of timberland. The site was historically grazed by domestic sheep, and is currently occasionally grazed by native bighorn sheep. However, there is no evidence of any grazing by domestic livestock occurring in the recent past, and the site is in remarkable condition. Wildlife grazing in the area may be reduced by the large number of visitors to the adjacent Mount Howard summit. The southern third of the site is located within the congressionally established, Eagle Cap Wilderness Area. This portion of the area is managed for its natural and recreational values, although it receives little use due to the lack of a marked trail.

Sensitive or Hazardous Resources

The most significant rare plant resource at the Mount Howard - East Peak PNNL is the Greenman's desert parsley, which had been significantly impacted by visitors to the site. However, the adoption of the Conservation Strategy by the Forest Service (Wallowa-Whitman National Forest 2011) instituted management changes that have limited damage to the species and allowed for high levels of visitation without additional resource damage. The wildlife resources, including the peregrine falcon, bighorn sheep and the gray wolf are not especially vulnerable because they are wide-ranging, and spend considerable amounts of time away from the site. There are no known hazardous resources on the proposed NNL, although it does have some very steep cliffs, slopes, and ridges which require reasonable caution.

Anticipated Damage to the Area

During the months of July and August, Mount Howard receives heavy visitor use. Over the last decade, the U.S. Forest Service and the tram concessionaire have made significant improvements to help keep visitors on the trails, to mark the boundaries of the trails, and to create viewing areas with interpretive signs. These have significantly changed visitor behavior and limited damage to sensitive habitats and to Greenman's desert parsley. Wildlife, particularly the yellow-pine chipmunk (*Tamias amoenus*) and the Columbian ground squirrel (*Spermophilus columbianus*) present at the site continue to be fed by tourists, causing them to be tame and overweight, but the NNL designation is unlikely to change this at all. In addition, practically the entire area with heavy visitor use and most extensive chipmunk and squirrel feeding was excluded from the proposed landmark boundaries.

Effects of Publicity

Publicity could bring additional visitors to the site, although given the location, use of the gondola is likely to limit visitation. The site supports spectacular views and scenery when accessible during the late June – September time in which the gondola is operational. There is relatively simple public access from a paved road in a major summer recreational area at the south end of Wallowa Lake.

Comparative Assessment

Regional Site Inventory

The Regional Site Inventory was compiled through a literature search and conversations with scientific experts, some when the initial theme study was done in 1985. Because the subthemes were reorganized (Crawford 2004) a new list of potential sites was developed as part of this study.

A total of 19 sites in the Columbia Plateau Biophysiographic Province were evaluated, of which five sites were evaluated to complete a more-detailed assessment as to their representativeness, quality, and ability to represent the Montane Grasslands subtheme. Three of the five sites were visited in 1985 as part of the original subtheme study (Kagan et al 1985), while the other sites were visited in 2012. The sites are listed in priority order below.

1. Mount Howard - East Peak (Oregon)
2. Boner Flat (Oregon)
3. McCully Basin-Big Sheep Basin (Oregon)
4. Lightning Creek PRNA (Idaho)
5. North Chief Joseph Mountain (Oregon)



Figure 8. Location of the 5 sites evaluated for the Montane Grasslands Subtheme.

Site Descriptions

1. Mount Howard - East Peak (Oregon)

The Mount Howard-East Peak site has large, very high quality examples of most of the montane grassland communities. It contains the largest and best examples of montane Idaho fescue and sheep fescue grasslands known from the region. It also has a very good example of the green fescue-spurred lupine community, as well as a small but good quality example of the green fescue-Hood's sedge community. This site is in pristine condition. It has been (like all montane grasslands) historically grazed by domestic sheep. However, no grazing has occurred for years, and there is no evidence of non-natural disturbance of any type. There are trails through the site, but it is not used by horses and has not caused the invasion of introduced plant species. This area has a very high diversity of montane grassland communities, as well as numerous other habitats. These include two mountain big sagebrush communities, at least two whitebark pine communities, a number of alpine sedge and grassland communities, and some extremely unusual assemblages of forbs. The site is unique in its diversity of habitats, and includes some very rare and at-risk species. The area contains the majority of the world's population of Greenman's desert parsley (*Lomatium greenmanii*), a rare plant listed as Threatened by the State of Oregon. It also includes many other Wallowa Mountain endemic species, as well as some Rocky Mountain species which do not occur elsewhere in the Columbia Plateau Biophysiographic Province.

2. Boner Flat (Oregon)

Boner Flat is an unusual place but has excellent examples of green fescue grassland communities. The area is dominated by different green fescue communities, and has some examples of alpine fescue. The most important communities are the green fescue-Parry rush (*Juncus parryi*) community and the green fescue-spurred lupine community. The site has both sedimentary and basalt substrates, and includes large montane grasslands on many aspects and slopes, including some montane flats. This area is largely in excellent condition. Much of the site has been historically grazed, some quite heavily by sheep. No grazing had occurred in a number of years until 1989, when sheep grazing was reintroduced to the site. Before 1989, most areas had returned to climax montane fescue communities. The areas which received the heaviest grazing are only in fair condition. Due to the 1989 grazing, it is impossible to determine the current condition. A number of rare plant species endemic to the Wallowa Mountains are found at this site. It is unusual because of the large grassland expanses, and the good condition of these grasslands. The presence of both limestone and basaltic substrates in a small area also make the site very unusual.

3. McCully Basin-Big Sheep Basin (Oregon)

McCully and Big Sheep Basins are montane grasslands located on the eastern flank of the Wallowa Mountains, not far from the Mount Howard – East Peak site. This site contains very large and high quality examples of green fescue, montane Idaho fescue, and sheep fescue grasslands. It probably contains the largest examples of montane grasslands in the Columbia Plateau Biophysiological Province. It also has good examples of montane grasslands found in subalpine basins dominated by whitebark pine and subalpine fir. This area has been grazed by domestic sheep, and also receives heavy use from elk and bighorn sheep. The grazing has caused erosion, reduction of green fescue cover, and other problems. The site is large, and there are still a number of very good quality sites which have not gotten much recent sheep use - although it is impossible to predict the condition over time, with the current grazing policy. The site has a number of rare species, including three rare Wallowa endemics (Wallowa penstemon (*Penstemon spathulatus*), cliff buckwheat (*Eriogonum scopulorum*), and Wallowa indian-paintbrush (*Castilleja oresbia*). In addition, the diversity of substrates and habitats is very unusual in this region.

4. Lightning Creek Research Natural Area (Idaho)

This site has very good examples of montane Idaho fescue communities. The Idaho fescue/Hood sedge association occurs on the upper elevation ridges of Lightning Creek Research Natural Area (RNA). Small examples of sheep fescue also occur at the higher sites in the RNA. Little land-disturbing activities occur at the site. The area was certainly grazed by sheep and/or cattle at some time in the past, but there is currently no evidence of this past disturbance. Overall, it is one of the best condition grassland sites in the region. Lightning Creek encompasses a wide elevational cross-section of the Hells

Canyon. A complex mosaic of associations occurs in the RNA representing many vegetation zones.

5. Chief Joseph Mountain (Oregon)

Chief Joseph Mountain is the primary landmark seen from the Wallowa Valley, the giant massif towering over the towns of Enterprise and Joseph. While the lower slopes are well-timbered, the open grasslands and alpine habitats can be seen for miles. This site has very good examples of green fescue and montane Idaho fescue communities, and on the top extensive alpine turf. The north slope grasslands, which are the ones visible from the valley, are characteristic of the montane grasslands theme, but are relatively small (only about 80 ha, 200 acres). This area is east and north-facing, which is not typical of these grasslands elsewhere in the region. The top of the mountain and flats heading east are shallow-soiled alpine turf with some alpine fescue occurring on white limestone soils, not at all typical of montane grasslands in the Columbia Plateau. However, the site is in exceptional condition, one of the best quality montane grasslands.

Comparative Analysis and Discussion

1. Comparison of Mount Howard - East Peak as a Potential NNL

Primary Criteria

Illustrative Character: *Excellent*. The Mount Howard-East Peak site has large, very high quality examples of most of the montane grassland communities. It contains the largest and best examples of montane Idaho fescue and sheep fescue grasslands known from the region. It also has a very good example of the green fescue-spurred lupine community, as well as a small but good quality example of the green fescue-Hood's sedge community.

Present Condition: *Excellent*. This site is in pristine condition. It has been (like all montane grasslands) historically grazed by domestic sheep. However, no grazing has occurred for years, and there is no evidence of non-natural disturbance of any type. There is a trail through the site, but it is not used by horses and has not caused the invasion of introduced plant species.

Secondary Criteria

Diversity: *Excellent*. This area has a very high diversity of montane grassland communities, as well as numerous other habitats, including two mountain big sagebrush communities, at least two whitebark pine communities, a number of alpine sedge and grassland communities, and some extremely unusual assemblages of forbs.

Rarity: *Excellent*. The site is unique in its diversity of habitats, and includes some very rare and endangered species. The area contains most of the world's population of the threatened, Greenman's desert parsley (*Lomatium greenmanii*). It also includes many other Wallowa Mountain endemic species, as well as some Rocky Mountain species which do not occur elsewhere in the Columbia Plateau Biophysiological Province.

Value for Science and Education: *Excellent*. The site is the only easily accessible montane grassland, due to the existence of a tram providing access to the top of Mount Howard from the south end of Wallowa Lake, 10 km (6 miles) from Joseph, OR on a paved road. The area is currently used for its recreational and educational values, and is one of the only montane grasslands not grazed by domestic sheep.

2. Comparison of Boner Flat as a Potential NNL

Primary Criteria

Illustrative Character: *Excellent*. Boner Flat has excellent examples of green fescue grassland communities. The area is dominated by different green fescue communities, and has some examples of alpine fescue. The most important communities are the green fescue-Parry rush community and the green fescue-spurred lupine community. The site has both sedimentary and basalt substrates, and includes large montane grasslands on many aspects and slopes, including some montane flats.

Present Condition: *Good*. This area is largely in excellent condition. Much of the site has been historically grazed, some quite heavily by sheep. No grazing had occurred in a number of years until 1989, when sheep grazing was reintroduced to the site. Before 1989, most areas had returned to climax montane fescue communities. The areas which received the heaviest grazing are only in fair condition. Sheep grazing was removed in 1992, and is unlikely to return.

Secondary Criteria

Diversity: *Good*. The area has both green fescue and alpine fescue communities, some subalpine mountain big sagebrush communities, and small examples of typical boreal (subalpine fir) forests. The site also includes small patches of limestone alpine habitats which support a number of rare plants and unusual communities.

Rarity: *Excellent*. A number of rare plant species endemic to the Wallowa Mountains are found at this site. It is unusual because of the large grassland expanses, and the good condition of these grasslands. The presence of both limestone and basaltic substrates in a small area also make the site very unusual.

Value for Science and Education: *Fair*. The area is in the Eagle Cap Wilderness, and is protected from development, logging, and most other disturbances. It has a good trail running through the site, but is over 10 miles from a road - and the trailhead is somewhat isolated, involving a very long drive on only moderate roads.

3. Comparison of McCully Basin – Big Sheep Basin as a Potential NNL

Primary Criteria

Illustrative Character: *Excellent*. This site contains very large and high quality examples of green fescue, montane Idaho fescue, and sheep fescue grasslands. It probably contains the largest examples of montane grasslands in the Columbia Plateau Biophysiological Province. It also has good examples of montane grasslands found in subalpine basins dominated by whitebark pine and subalpine fir.

Present Condition: *Fair*. The area was heavily grazed by domestic sheep between 1989 and 1992, and currently receives heavy use from elk and bighorn sheep. The grazing has caused erosion, reduction of green fescue cover, and other problems. The site is large, and so is patchy, with many good quality sites which have not been impacted by livestock or wildlife, and other areas still recovering.

Secondary Criteria

Diversity: *Excellent*. McCully Basin is an extremely diverse area, with numerous montane grassland and shrubland habitats present. There is an excellent example of a subalpine basin, whitebark pine and subalpine fir forests, and some alpine sedge and grassland habitats. It also includes patches of granitic, limestone, sedimentary and basaltic substrates, all which support somewhat different vegetation.

Rarity: *Excellent*. The site has a number of rare species, including three rare Wallowa endemics (Wallowa penstemon (*Penstemon spathulatus*), cliff buckwheat (*Eriogonum scopulorum*), and Wallowa indian-paintbrush (*Castilleja oresbia*)). In addition, the diversity of substrates and habitats is very unusual in this region.

Value for Science and Education: *Fair*. The site is fairly remote. The upper portions of the basin can be reached by a short walk (5 km, 3 mi) from the top of the Mount Howard gondola, which goes through the Mt. Howard – East Peak potential NNL. The lower parts of the basin are best reached from a trail off a short gravel road. It is a 10 km (6 mile) hike to the beginning of the basin.

4. Comparison of Lightning Creek Research Natural Area as a Potential NNL

Primary Criteria

Illustrative Character: *Good*. This site has very good examples of montane Idaho fescue communities. The Idaho fescue/Hood sedge association occurs on the upper elevation ridges of Lightning Creek RNA. Small examples of sheep fescue also occur at the higher sites in the Research Natural Area.

Present Condition: *Excellent*. Little land-disturbing activities occur in Lightning Creek RNA. The area was certainly grazed by sheep and/or cattle at some time in the past, but there is currently no evidence of this past disturbance. Overall, it is one of the best condition grassland sites in the region.

Secondary Criteria

Diversity: *Good*. Lightning Creek encompasses a wide elevational cross-section of the Hells Canyon. A complex mosaic of associations occur in the RNA representing many vegetation zones.

Rarity: *Fair*. There are no rare species or plant communities at the site.

Value for Science and Education: *Fair*. Lightning Creek RNA is not easily accessible. A relatively long hike along the Salmon River-Hells Canyon divide is required to reach the top of the RNA and its montane grasslands.

5. Comparison of Chief Joseph Mountain as a Potential NNL

Primary Criteria

Illustrative Character: *Good*. This site has very good examples of green fescue and montane Idaho fescue communities. The representative grasslands are relatively small (only about 80 ha, 200 acres), occurring on the north side of Chief Joseph Mountain. However, the extensive alpine grasslands to the north are spectacular, although unusual.

Present Condition: *Excellent*. This site is one of the best quality montane grasslands. Due to its isolation, it has received little historic sheep grazing. The site has an old mine, but this has caused only minimal, local damage.

Secondary Criteria

Diversity: *Good*. The area is quite diverse. It contains examples of montane grasslands, diverse alpine and subalpine habitats, including grasslands, forblands, and parklands.

Rarity: *Excellent*. The site includes three species of limestone plant endemics, one of which (*Castilleja rubida*) is restricted to the single ridge between Chief Joseph Mountain and the Matterhorn, 5 miles to the south. If the site included the entire mountain, it would include numerous rare plants and animals.

Value for Science and Education: *Fair*. Access to this area is confusing. The typical montane grasslands on the north side of the mountain are easily accessible from the south end of Wallowa Lake by a good, moderate trail (about 5 km, 3 miles). The trailhead is adjacent to a good condition, paved road. However, it is almost impossible to reach the more interesting alpine habitats on the top and to the south side of Chief Joseph Mountain from this area. The top must be reached by a difficult climb along the ridge to the east of the mountain, which explains why the area is rarely seen.

Other Sites

Alum Beds PRNA (Idaho)
Bear Creek-Lostine Divide (Oregon)
Bridge Creek Flats (Oregon)
Copper Bob PRNA (Oregon)
Elk Creek Grassland (Oregon)
Goat Mountain (Oregon)
Little Granite Creek PRNA (Idaho)
Pleasant Valley PRNA (Oregon)
Silver Creek Basin-Traverse Ridge (Oregon)
Stanley Spring (Oregon)
Sturgill Basin (Oregon)
Tenderfoot Basin (Oregon)
Thompson Flat (Oregon)
Twin Peaks Ridge (Oregon)

None of the sites considered have previously been recommended as potential National Natural Landmarks.

Evaluation Recommendations

The Mount Howard-East Peak site is the most diverse, high quality site and most representative site, making it the best choice as a national natural landmark. Boner Flat, McCully Basin and Tenderfoot Basin were all in very good condition in 1988, having recovered from past abuses with the removal of sheep grazing. Boner Flat and Tenderfoot Basin were almost as good, and would have made a good landmark, but both were much less accessible and the grasslands were significantly less diverse, making them better green fescue sites but slightly less representative of this subtheme. The Stanley Spring and Sturgill Basin areas, while typical, were not in good enough condition to merit NNL designation, as they still have not recovered from past grazing abuse. The only other ungrazed, fairly high quality sites are too small to be representative.

Potential Landmark Boundary Maps

The proposed boundary includes the summits of both Mount Howard and East Peak, and the grasslands covering them. The southern half of the proposed NNL including the summit of East Peak is entirely located within the Eagle Cap Wilderness Area. As a result, the NNL includes all of Section 3, in Township 4 South – Range 45 East. The north part of the proposed NNL is entirely located within Section 34, in T3S, R45E, and is outside of the Eagle Cap Wilderness. It includes the summit of Mount Howard, but the boundary was drawn to exclude the very small developed areas around the top of the tram, and the adjacent property which received most of the visitor use. In this area (see close-up in **Figure 9**) the trails and roads provide the north and northeastern boundary.

From the Royal Purple Overlook towards the summit of Mount Howard, the boundary follows the trail. West of the overlook, it follows the ridge to the section line between Sections 34 and 33, at which point it heads south along the section line to the Wilderness boundary. It continues south, jogging slightly to the west to continue to follow the section boundary between Sections 3 and 4 in T4S R45E. The southern bend near the center of the north boundary represents where the trail reaches the summit of Mount Howard. The eastern boundary at the north follows the road to the top from McCully Basin.



Figure 9. The north boundary of proposed NNL, showing tram landing and restaurant, following the ridge trail from Royal Purple Overlook east to the roadway along the Mount Howard ridge trail.

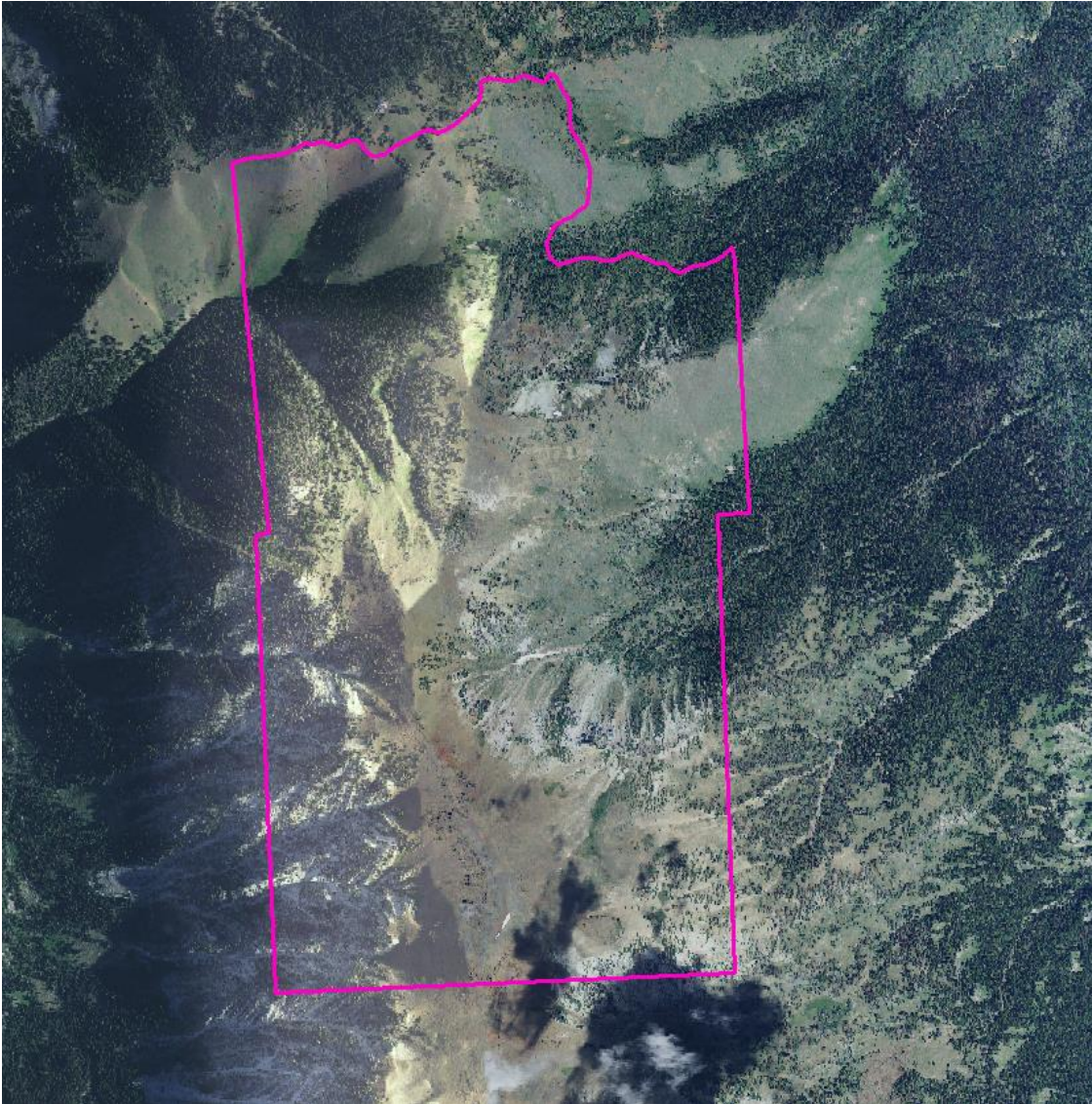


Figure 10. Boundary of proposed Mt. Howard - East Peak PNNL on 2011 air photography.

Justification:

The proposed landmark includes almost all of the montane grassland communities in the area. It includes major grasslands on the south facing slopes of the main ridge of Mount Howard, as well as all slopes and aspect of the unnamed peak between Mount Howard and East Peak. The boundary includes the contiguous open grasslands and shrublands, as well as montane forests located within the overall area. The shrublands below the open grasslands were included because they are part of the contiguous grassland ecosystem. The extent of these mountain big sagebrush and grassland areas probably varies with fire history. The only grasslands excluded were those on the north and west slopes of Mount Howard, in which recreational pressure and opportunities may not be completely compatible with the designation.

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Appendix A: Photographs of the Mount Howard – East Peak PNNL



Photo 1. Green fescue grassland at the top of Mt. Howard.



Photo 2. Mixed green fescue and montane fescue grassland on Mt. Howard.



Photo 3. Montane fescue grassland with Greenman's lomatium at Mt. Howard.



Photo 4. South slope montane fescue grassland at Mt. Howard – East Peak saddle.



Photo 5. North slope grasslands and whitebark pine forests at Mt. Howard – East Peak saddle.



Photo 6. East slope alpine grasslands and heath and the summit of East Peak.



Photo 7. Parry's rush and montane fescue open alpine grassland below East Peak.



Photo 8. Green fescue and shrubby cinquefoil on lower slopes of East Peak.



Photo 9. Trail to “Royal Purple Overlook” seen from the summit of Mount Howard. Note the alpine grasslands and forblands on the south slope of the ridge, and the whitebark pine and subalpine fir on the north slope behind. Chief Joseph Mountain is in the background.



Photo 10. View from the proposed NNL to the east towards Hell’s Canyon. Note the extensive montane grasslands following the ridge, with small patches of whitebark pine.

Appendix B. Mount Howard – East Peak National Natural Landmark Brief

U.S. Department of the Interior National Park Service National Natural Landmarks Program



Name: Mount Howard – East Peak

Location: Wallowa County, Oregon

Description: 1,012 acres (410 ha)

Mount Howard and East Peak are two peaks at the northeastern end of the Wallowa Mountains of northeastern Oregon. The site includes the ridges, montane grassland slopes and subalpine woodlands located between Mount Howard and East Peak. The montane grasslands dominate most of the areas, including a wide diversity of native bunchgrass vegetation communities, in a spectacular location supporting many endemic plant species. The site also contains montane white-bark pine woodlands and parklands, sedge wetlands, and montane shrublands of sagebrush and heaths.

Significance:

Mount Howard - East Peak has the best quality and most diverse example of Montane Grasslands remaining in the Columbia Plateau. It is the area least impacted by domestic sheep, and has exceptional examples of other montane habitats as well. The area also has important botanical diversity, providing habitat for a number of Wallowa Mountain endemic plant species, including over 80% of the world's population of the imperiled plant, Greenman's desert-parsley (*Lomatium greenmanii*).

Ownership: Federal

Designation:

Evaluation: James S. Kagan, Portland State University, 1989 and 2013.

Appendix C. Vascular Plant Species list from Mount Howard – East Peak Potential National Natural Landmark

TREES	
<i>Abies lasiocarpa</i>	sub-alpine fir
<i>Picea engelmannii</i>	Engelmann spruce
<i>Pinus albicaulis</i>	white-bark pine
<i>Pinus flexilis</i>	limber pine
SHRUBS	
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	mountain big sage
<i>Cassiope mertensiana</i>	Merten's mountain heather
<i>Dasiphora fruticosa</i>	shrubby cinquefoil
<i>Juniperus communis</i>	mountain juniper
<i>Phyllodoce empetriformis</i>	pink mountain heather
<i>Ribes montigenum</i>	mountain gooseberry
<i>Salix arctica</i>	arctic willow
<i>Symphoricarpos oreophilus</i>	mountain snowberry
<i>Vaccinium scoparium</i>	grouse whortle-berry
HERBS	
<i>Achillea millefolium</i>	yarrow
<i>Agoseris aurantiaca</i> var. <i>aurantiaca</i>	orange agoseris
<i>Agoseris monticola</i>	short-beaked agoseris
<i>Androsace septentrionalis</i>	northern fairy-candelabra
<i>Antennaria lanata</i>	woolly pussytoes
<i>Antennaria media</i>	alpine pussytoes
<i>Antennaria rosea</i>	rosy pussytoes
<i>Antennaria umbrinella</i>	umber pussytoes
<i>Arenaria congesta</i>	ball-head sandwort
<i>Arenaria nuttallii</i>	Nuttall's sandwort
<i>Arnica cordifolia</i>	heart-leaved arnica
<i>Arnica longifolia</i>	long-leaved arnica
<i>Artemisia ludoviciana</i> var. <i>incompta</i>	western mugwort
<i>Artemisia michauxiana</i>	Michaux mugwort
<i>Astragalus australis</i> var. <i>glabriusculus</i>	indian milk-vetch
<i>Calyptridium umbellatum</i>	pussy paws
<i>Castilleja chrysantha</i>	Wallowa paintbrush
<i>Cymopterus terebinthinus</i>	turpentine cymopterus

<i>Draba densifolia</i>	Nuttall's draba
<i>Draba novolympica</i>	Payson's draba
<i>Eremogone aculeata</i>	prickly sandwort
<i>Erigeron bloomeri</i>	scabland fleabane
<i>Erigeron chrysopsidis</i> var. <i>brevifolius</i>	Wallowa daisy
<i>Erigeron compositus</i>	cut-leaved daisy
<i>Erigeron eatonii</i>	Eaton's daisy
<i>Erigeron simplex</i>	alpine daisy
<i>Eriogonum flavum</i> ssp. <i>piperi</i>	yellow buckwheat
<i>Eriogonum heracleoides</i>	Wyeth buckwheat
<i>Eriogonum ovalifolium</i> var. <i>depressum</i>	oval-leaved buckwheat
<i>Eriogonum strictum</i>	strict buckwheat
<i>Erysimum capitatum</i> var. <i>capitatum</i>	prairie-rocket
<i>Galium boreale</i>	northern bedstraw
<i>Geum triflorum</i>	prairie-smoke
<i>Hackelia micrantha</i>	blue stick-seed
<i>Helianthella uniflora</i>	one-flowered helianthella
<i>Heuchera cylindrica</i>	round-leaved avens
<i>Ivesia gordonii</i>	Gordon's ivesia
<i>Lewisia pygmaea</i> var. <i>pygmaea</i>	alpine or dwarf lewisia
<i>Ligusticum tenuifolium</i>	Idaho licorice-root
<i>Linum perenne</i>	flax
<i>Lomatium cusickii</i>	Cusick's biscuitroot
<i>Lomatium greenmanii</i>	Greenman's desert parsley
<i>Lomatium oregonum</i>	Oregon desert parsley
<i>Lupinus arbustus</i>	tail-cup lupine
<i>Lupinus lepidus</i> var. <i>lobbii</i>	prairie lupine
<i>Lupinus laxiflorus</i>	spurred lupine
<i>Microseris nutans</i>	nodding microseris
<i>Monardella odoratissima</i>	western mountain balm
<i>Oreostemma alpigenum</i> var. <i>haydenii</i>	alpine aster
<i>Oxyria digyna</i>	mountain sorrel
<i>Oxytropis campestris</i>	slender crazy-weed
<i>Packera cana</i>	woolly groundsel
<i>Packera streptanthifolia</i>	Rocky Mountain groundsel
<i>Pedicularis contorta</i>	white coiled-beak
<i>Penstemon humilis</i>	lowly penstemon
<i>Penstemon fruiticosus</i>	shrubby penstemon
<i>Penstemon globosus</i>	globe penstemon

<i>Penstemon spatulatus</i>	Wallowa penstemon
<i>Phacelia hastata</i> var. <i>alpina</i>	silver-leaf phacelia
<i>Phlox douglasii</i>	tufted phlox
<i>Phlox pulvinata</i>	cushion phlox
<i>Physaria occidentalis</i>	western bladderpod
<i>Polemonium pulcherrimum</i>	Jacob's ladder
<i>Potentilla flabellifolia</i>	high mountain cinquefoil
<i>Potentilla glandulosa</i>	sticky cinquefoil
<i>Potentilla glaucophylla</i>	diverse-leaved cinquefoil
<i>Potentilla gracilis</i>	northwest or slender cinquefoil
<i>Pyrrocoma carthamoides</i> var. <i>cusickii</i>	large-flowered goldenweed
<i>Ranunculus eschscholtzii</i> var. <i>trisectus</i>	sub-alpine buttercup
<i>Ranunculus verecundus</i>	modest buttercup
<i>Saxifraga bronchialis</i> var. <i>austromontana</i>	matted saxifrage
<i>Saxifraga integrifolia</i>	swamp saxifrage
<i>Sedum lanceolatum</i>	lance-leaved stonecrop
<i>Selaginella scopulorum</i>	compact selaginella
<i>Senecio integerrimus</i>	western groundsel
<i>Senecio streptanthifolius</i>	Rocky Mountain butterweed
<i>Sibbaldia procumbens</i>	creeping sibbaldia
<i>Silene douglasii</i>	Douglas' silene
<i>Silene oregana</i>	Oregon silene
<i>Solidago multiradiata</i>	northern goldenrod
<i>Stenotus lanuginosus</i> var. <i>lanuginosus</i>	woolly goldenweed
<i>Symphotrichum spicatum</i> var. <i>spicatum</i>	Douglas aster
<i>Synthyris missurica</i>	mountain kittentails
<i>Trifolium latifolium</i>	twin clover
<i>Trifolium longipes</i> var. <i>multipedunculatum</i>	longstock clover
<i>Valeriana sitchensis</i>	Sitka valerian
<i>Veronica cusickii</i>	Cusick's speedwell
<i>Viola purpurea</i>	goose-foot violet
<i>Woodsia oregana</i>	woodsia fern
GRASSES, SEDGES and RUSHES	
<i>Achnatherum nelsonii</i> ssp. <i>nelsonii</i>	Nelson's needlegrass
<i>Achnatherum occidentale</i>	western needlegrass
<i>Bromus vulgaris</i>	Columbia brome
<i>Carex scopulorum</i>	mountain sedge
<i>Carex geyeri</i>	elk sedge
<i>Carex hoodii</i>	Hood sedge

<i>Carex microptera</i>	smallwing sedge
<i>Carex nigricans</i>	alpine black sedge
<i>Carex paysonis</i>	Payson sedge
<i>Carex raynoldsii</i>	Raynold's sedge
<i>Carex rossii</i>	Ross sedge
<i>Carex tahoensis</i>	Tahoe sedge
<i>Deschampsia cespitosa</i>	tufted hairgrass
<i>Eleocharis pauciflora</i>	fewflower spikerush
<i>Elymus elymoides</i>	bottlebrush squirrel-tail
<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	bearded wheatgrass
<i>Festuca brachyphylla</i>	alpine sheep fescue
<i>Festuca saximontana</i> ssp. <i>purpusiana</i>	Rocky Mountain fescue
<i>Festuca viridula</i>	green fescue
<i>Juncus drummondii</i>	Drummond's rush
<i>Juncus parryi</i>	Parry rush
<i>Koeleria macrantha</i>	prairie june grass
<i>Luzula hitchcockii</i>	smooth woodrush
<i>Phleum alpina</i>	alpine timothy
<i>Poa alpina</i>	alpine bluegrass
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass
<i>Trisetum spicatum</i>	downy oatgrass