

Evaluation of Round Top Butte Jackson County, Oregon



**For its Merit in Meeting National Significance Criteria
as a National Natural Landmark to Represent
Upland Valley Grasslands and Savanna in the
North Pacific Border Biophysiographic Province**

by
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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. Round Top Butte includes a basaltic butte and the flat, volcanic plains and small hills south of the butte. The area is a mosaic of dry grassland, ponderosa pine savanna, white oak savanna, and buckbrush chaparral. The grassland, savanna and chaparral habitats are exceptional in that they are mostly dominated by native bunchgrasses, rather than the introduced annual grasses or pasture grasses which dominate most other similar areas in the interior valleys of the Pacific Northwest. The site is also unusual in having savannas and forest composed mostly of large, widely spaced old trees.

The Potential Round Top Butte National Natural Landmark is comprised of two protected parcels. One is an established Research Natural Area (RNA) managed by the Medford District of the Bureau of Land Management (BLM). The other is managed by the Oregon Chapter of The Nature Conservancy as a preserve. Both the BLM and The Nature Conservancy have consented to allow the site to be evaluated as a Potential National Natural Landmark (PNNL) and are supportive of its designation. The site was initially identified and recommended as meeting the criteria for a PNNL in 1985 (Kagan 1985a, 1985b), evaluated and recommended in 1987 and then re-evaluated and re-recommended by Murray and Kagan in 2001. This evaluation considers whether the resources at Round Top Butte remain intact, nationally significant, and deserving of NNL designation.

This report recommends that Round Top Butte PNNL meets the national significance criteria required for the NNL Program. The proposed site supports the best remaining examples of upland interior valley grasslands, which occur in a natural mosaic of chaparral, savanna and woodland. Although there are thousands of acres of grasslands remaining in the interior valleys of the North Pacific Border Biophysiographic Province, almost all of them have been significantly altered by livestock use, and are dominated by introduced annual grasses and perennial pasture grasses. In addition, most sites are threatened by altered fire regimes, which render them difficult if not impossible to manage. Round Top Butte is one of the very few sites in the interior valleys within the natural range of variability for fire.

After considerable research, collaboration with subject matter experts, and site visits, we conclude that Round Top Butte 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 302 hectares (747 acres) is included, along with maps showing the vegetation and ownership.

Introduction

Source of Site Proposal

Upland valley grasslands were described as a nationally significant ecological resource in the Phase 1, National Natural Landmark Project (Kagan 1985a). Round Top Butte was selected as the best example remaining for the Upland Valley Grassland Subtheme in the Phase 2 portion of the Project (Kagan 1985b). The initial review indicated that Round Top Butte was a good example of this theme, rather than a pristine and exceptional example. However, it also showed that this formerly abundant ecosystem type had become so depleted that no exceptional examples remain.

Most of the dry grassland at Round Top Butte was acquired by The Nature Conservancy (TNC) in 1985 following a three-year effort to locate native valley grassland remnants. The site has a dry hillside grassland community which was formerly unknown from the valleys, largely because most perennial bunchgrasses have been lost due to overgrazing and replaced by introduced annual grasses. In addition to the dry grassland, the site has an excellent California oatgrass (*Danthonia californica*) stand in the extensive bottomlands by the seasonal creek (Wineteer 2001). The area adjacent to the TNC preserve has been designated as a Research Natural Area (RNA) by the Bureau of Land Management (BLM). It has grasslands in and among a matrix of open oak and pine savanna and chaparral, in a pattern that would have historically been found when the first settlers arrived at the end of the Oregon Trail.

As a result, the site has the best representative assemblage of upland valley grasslands, and an extraordinary mixture of grasslands, shrublands, savanna and forest communities which typify valley bottoms in southwestern Oregon and northwestern California. These communities have been lost to residential development, grazing, logging, and other direct human activities including fire suppression that has interrupted the natural fire frequency. Round Top Butte's inaccessibility and ownership patterns have kept the communities largely intact until fairly recently. In addition, there have been two fires within the last 60 years that have maintained the natural open character of the oak-pine savanna and grassland mosaic, although the last fire was over 30 years ago.

Evaluator

Jimmy Kagan, Research Faculty, Oregon Natural Heritage Information Center (ORNHIC), Institute for Natural Resources, Oregon State University.

Scope of Evaluation

Round Top Butte was first proposed in 1985 (Kagan 1985b) in the Phase II, National Natural Landmarks Project final report. It was evaluated in 1987 (Kagan and Macdonald 1987), and recommended as an NNL with some reservations, mostly due to uncertainty about the status of the Bureau of Land Management lands in the proposed landmark. It

was reevaluated in 2001 (Murray and Kagan 2001), and strongly recommended as an NNL, using the old format which did not include any information from either earlier Phase 1 or Phase 2 theme studies.

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, and new photographs are included. No new references in published literature were found that are relevant to the Potential National Natural Landmark designation.

Characterization of the Primary Natural Features of the North Pacific Border Biophysiographic Province, Upland, Un-Glaciaded Grasslands Subtheme

In the 1985 theme study, Kagan (1985a) updated the grassland ecosystems portion of the Chilcote et al. 1976 Theme study of National Natural Landmarks in the North Pacific Border Biophysiographic Province. The Interior Valley Grasslands Theme included all interior valley grassland areas which were neither glaciaded nor directly affected by recent glaciation (glacial outwash prairies). This theme could therefore include any bottomland or upland remnant native grasslands in the Chehalis and Cowlitz River Valleys of Washington, as well as the interior valley grasslands of western Oregon. The initial theme was called "Upland and Floodplain Grasslands" located in the Western Oregon Interior Valleys of Oregon physiographic province, and in 1985, Kagan identified two subthemes:

Interior Valley Grasslands (Theme)
 Upland, Un-glaciaded Grasslands (subtheme)
 Floodplain Grasslands (subtheme)

The new subthemes were based primarily on the work of Moir and Mika (unpublished), Habeck (1961) and on data in the Oregon and Washington Heritage Programs' files. These two grassland types appear to have little overlap, are easily differentiated, and both were major parts of the landscape in the valleys before European settlement. For simplicity, the Upland, Un-glaciaded Grasslands are referred to as Upland Grasslands for the remainder of this report. Because of their significance and importance to the conservation of species, they have also been addressed by the U.S. Fish and Wildlife Service (USFWS) in their Willamette Basin Recovery Plan (Wilson 1998).

Subtheme Description

Upland Grasslands are fairly easily distinguished from the floodplain, bottomland grasslands by their upland slope position. Bottomlands are essentially flat, with alluvial silts and pluvial clays. These bottomland areas always have some tufted hairgrass (*Deschampsia caespitosa*) present. The upland grasslands occur on gentle to steep slopes and hilltops, with some Roemer fescue (*Festuca roemerii*) or Lemmon's needlegrass (*Achnatherum lemonnii*) present. The glaciaded and glacial outwash prairies of the Puget

Trough are distinguished by dominance of Roemer fescue, as well as having extremely gravelly or rocky soil characteristics.

The grasslands historically occurred in a matrix with open oak savanna, chaparral, and riparian hardwood-conifer bottomland forests. Throughout most of the valley bottoms in the North Pacific Border Biophysiographic Province, all of these habitats have become replaced by agriculture. In addition, fire suppression has lead to the natural conversion through secondary succession of the oak savannas to oak forests and oak-conifer forests. As a result, remnant grasslands are now found in a mosaic with farmland, pasture, and forests.

Primary Geological Features

The Upland Grasslands occur on a variety of substrates. The soils are older, originating from alluvial deposits from major floods, and from erosion of volcanic and sedimentary parent materials. The northern part of the subtheme in Washington and northern Oregon are primarily basalt weathered clays, often with overlay deposits of alluvial silts. Further south, the clays are of sedimentary or metasedimentary origin and there are also significant amounts of serpentine bedrock and soils. The average annual temperature and rainfall figures change significantly from north to south in the region. The northern portions are wetter and cooler, with average annual temperatures around 11 degrees C, and precipitation of 110 cm annually in the Willamette Valley. The Rogue Valley has annual average temperatures of 12-12.5 degrees C, with average precipitation ranging from 50 to 80 cm per year. Weather patterns are similar throughout the region, with dry summers and mild, wet winters.

Upland Grasslands pose a number of difficult problems for managing natural areas in the region. This is because most, if not all of the grasslands are early successional habitats and were maintained as the significant feature of the landscape by fire. Especially in the northern valleys, presettlement vegetation was largely native upland grasses – maintained, presumably since the drier times of the most recent ice age, by periodic burning by the Kalapuya Indians (Boyd 1986). The Rogue and Umpqua Valleys have sufficient lightning activity to maintain a natural grassland-chaparral-oak-pine savanna matrix, although Indian burning was probably a significant factor in their vegetative patterns as well.

Primary Biological Features

These interior valleys are the most disturbed and modified of all the themes in the region. Most of the population of Oregon and Washington live in these valleys, and remaining natural habitats have been modified by development, farming or grazing. The upland, unglaciated valley grasslands are probably the most disturbed of all types. Only a few, small scattered remnants occur. The dominant species on these remnants is Roemer fescue (*Festuca roemerii*). Codominant are bearded wheatgrass (*Elymus caninus*) and junegrass (*Koeleria macrantha*). To the south, California oatgrass (*Danthonia californica*) can dominate on heavy clay soils and valley bottoms, along with California fescue (*Festuca californica*) found on partially shaded or rocky areas; both with increased

importance in the southern (Rogue and Umpqua) valleys. Other associated grasses are rough bluegrass (*Poa scabrella*), Hall's bentgrass (*Agrostis hallii* in the Willamette Valley only), California brome (*Bromus carinatus*), Columbia brome (*B. vulgaris*), and blue wildrye (*Elymus glaucus*). Forbs include mostly perennials such as yarrow (*Achillea millefolium*), woolly sunflower (*Eriophyllum lanatum*), common lomatium (*Lomatium utriculatum*), Oregon yampah (*Perideridia oregona*), strawberry (*Fragaria vesca*), and rose checker-mallow (*Sidalcea virgata*).

On shallow, rocky slopes and hill or ridgetop balds in the Willamette Valley, and in all the grasslands in the Rogue and Umpqua Valleys, Lemmon's needlegrass (*Achnatherum lemmonii*) becomes dominant, replacing most of the grasses. A moss, *Rhacomitrium canescens*, is often codominant on these balds. Associated forbs differ here, including barestem buckwheat (*Eriogonum nudum*), Douglas' violet (*Viola douglasii*) as well as Phacelia (*Phacelia* sp.), shootingstar (*Dodecatheon*, sp.) and onion (*Allium* sp.).

Patches of shrubs, including poison oak (*Toxicodendron diversiloba*), baldhip rose (*Rosa gymnocarpa*), and snowberry (*Symphoricarpos albus*) occur within these remnants, as do occasional Oregon white oak (*Quercus garryana*) or Ponderosa pine (*Pinus ponderosa*) trees. The pine becomes more important to the south, where California black oak (*Quercus kelloggii*) also occurs, especially in the bottomlands, usually with Oregon white oak and pine, rarely alone. Also in the south chaparral shrubs, mostly buckbrush (*Ceanothus cuneatus*) and sometimes sticky manzanita (*Arctostaphylos viscidus*) occur in the margins of most of the grasslands, and in and around oak and pine savannas.

Distribution and Context

Interior valleys in the North Pacific Border Biophysiographic Province include the Chehalis and Cowlitz River valleys in Washington, and the Willamette, Umpqua, and Rogue River valleys in Oregon. It is best represented in the Willamette Valley in Oregon. Only very small remnants still occur in the Washington valleys. There are also scattered examples of upland grasslands in the Umpqua and Rogue valleys, although presettlement vegetation of these areas consisted largely of chaparral, oak, or oak-pine savanna --as opposed to the fairly open upland grasslands which occurred further north.

Figure 1 below shows the presettlement vegetation reconstructed from the General Land Office surveyors notes from the 1850s (Titus et al. 1996). The upland prairie and savanna are shown in the light green, which make up the most common vegetation type throughout the southern two-thirds of the Willamette Valley. Figure 2 shows this same area as a visualization of both the presettlement and current vegetation. The area shown is the extreme southern edge of the valley, just north of Eugene, Oregon. Note the changes along the valley edges, with the chaparral, grasslands and savannas being replaced by farmlands and closed canopy forests.

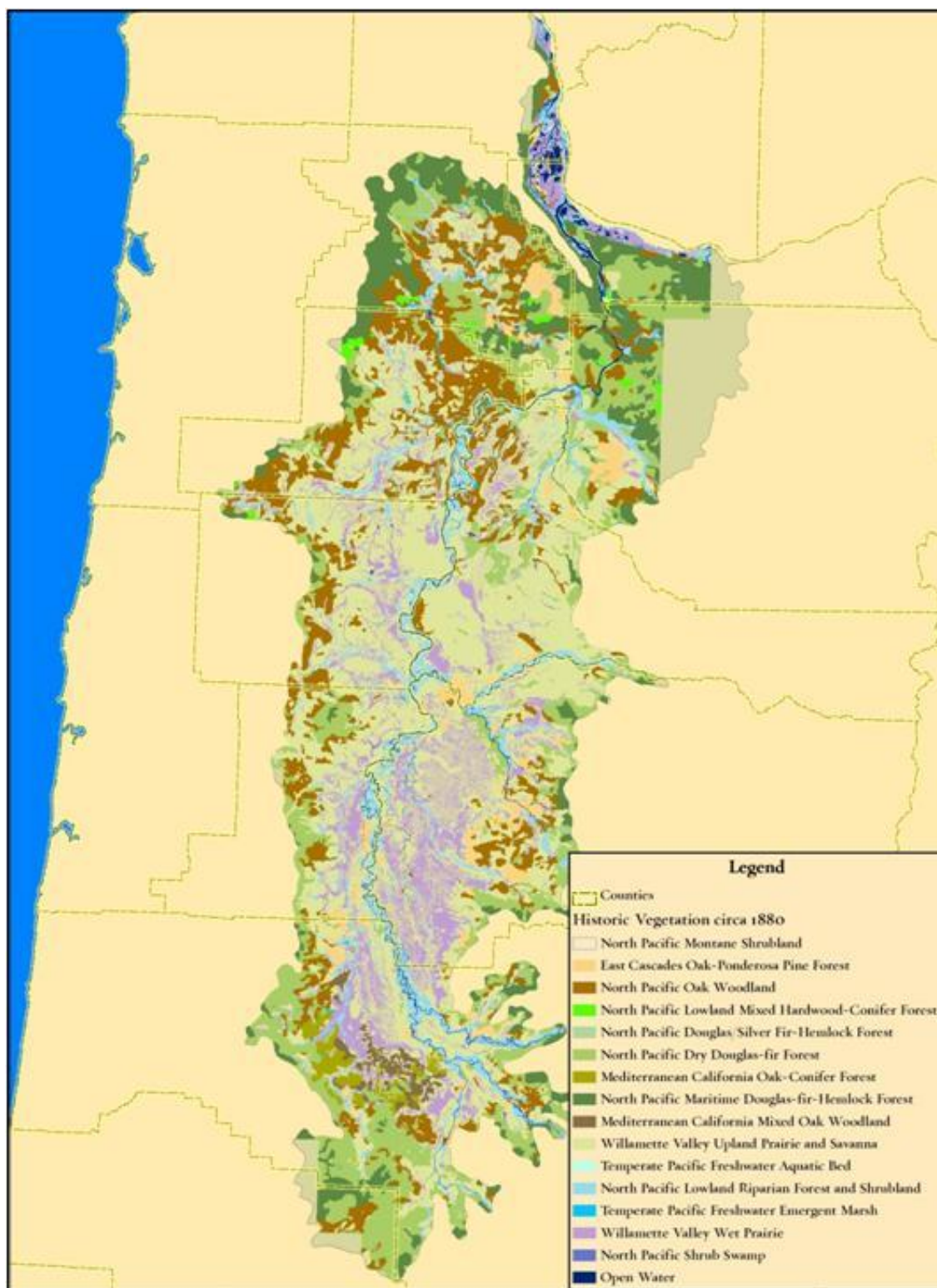


Figure 1. Historic Vegetation of the Willamette Valley circa 1880 from General Land Office Surveys



Figure 2. Visualization of Changes in Willamette Valley Vegetation

Regional Variation

Upland grasslands in the interior valleys are generally dominated by Roemer fescue (*Festuca roemerii*) but change from north to south. In Washington and the Willamette Valley there is more seasonal moisture, and junegrass (*Koeleria macrantha*), blue wildrye (*Elymus glaucus*) and slender wheatgrass (*Elymus trachycaulus*) are the dominant grasses, with California oatgrass at the edges of the wet prairies or in the wet clay soils, and with Lemmon's needlegrass (*Achnatherum lemmonii*) found only on very shallow soils. To the south, California fescue (*Festuca californica*) becomes more important, as do the California oatgrass and Lemmon's needlegrass, and on the drier

slopes bluebunch wheatgrass (*Pseudoreognaria spicata*) and Sandberg's bluegrass (*Poa secunda*) are often dominant.

Significance

Native, bunchgrass dominated bottomland and dry hillside grassland plant communities were one of the most common and dominant ecosystems found in the North Pacific Border Biophysiological Province valleys when the earliest settlers arrived at the end of the Oregon Trail. Today, these grasslands are now almost entirely absent from the region. Native grasslands of any type have become exceptionally rare throughout the areas west of the Cascade mountains in the coastal states of California, Oregon and Washington, with the exception of the serpentine areas. Almost all known valley grasslands remnants that were not farmed have disappeared, largely because most perennial bunchgrasses have been lost due to overgrazing and replaced by introduced annual grasses.

The Round Top Butte site has the best representative assemblage of upland valley grasslands, and an extraordinary mixture of grasslands, shrublands, savanna and forest communities which typify valley bottoms in southwestern Oregon and northwestern California. These communities have been lost to logging, grazing, development and other direct human-related activities, including fire suppression that has interrupted the natural fire frequency. Round Top Butte's inaccessibility and ownership patterns have kept the communities largely intact to date. In addition, there have been two fires within the last 60 years that have maintained the natural open character of the oak-pine savanna and grassland mosaic.

Round Top Butte Site Description

Overview

Round Top Butte is located in Jackson County, about 10 miles northeast of Medford, Oregon (Figure 5). It includes a basaltic butte and the flat, volcanic plains and small hills south of the butte. The area is a mosaic of dry grassland, ponderosa pine savanna, white oak savanna, and buckbrush chaparral. An old growth Douglas fir, incense cedar and pine forest occurs on the east slope of the butte and north slopes of the surrounding small hills. Most of the site has extremely shallow soils, and much of the area is littered with volcanic rocks. The soils on the bottomland are heavy red clays, which shrink and swell, and cause the area to vary significantly throughout the year. The entire area is protected either as a nature preserve or a Research Natural Area (Wineteer 2001).

Natural History Theme Represented

Round Top Butte is representative of the Upland, Un-glaciated Grasslands subtheme, in the Interior Valley Grasslands theme, in the North Pacific Border Biophysiological Province. This subtheme is quite distinct from any other subthemes in the region.

Primary Natural Features

The Round Top Butte Potential National Natural Landmark (PNNL) occupies approximately 302 hectares (747 acres) in Jackson County, in southwestern Oregon. The site is managed by the BLM and The Nature Conservancy as a Research Natural Area and Preserve to support education, research and biodiversity conservation.

Primary Biological Features

Round Top Butte has the typical mosaic of southwestern Oregon, upland valley vegetation. It has patches of open dry and moist grassland, chaparral, oak savanna and woodland, ponderosa pine savanna, and fir-pine forests. The patches vary in size, with only minor representation of the chaparral and forest types, and large areas of grassland, savanna and open woodland. Their approximate distribution is shown in Figure 3, although woodlands and forests are not distinguished. Almost all of the area is in very good condition, with native bunchgrasses providing most of the vegetative cover, even in the chaparral areas.

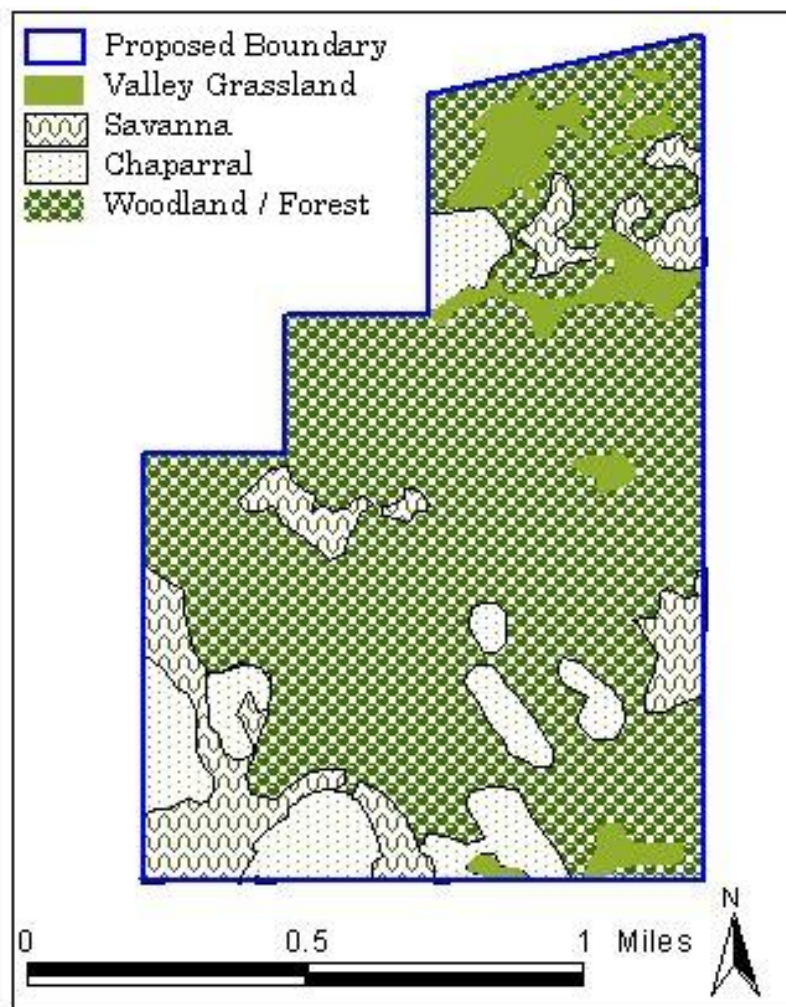


Figure 3. Distribution of vegetation types at Round Top Butte

Valley Grasslands (20 ha = 50 ac): The upland grassland community is comparatively dry and steep, occurring on the upper south-facing slope of the Butte. This extraordinary grassland is dominated by Lemmon's needlegrass (*Achnatherum lemmonii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), junegrass (*Koeleria macrantha*), and Idaho fescue (*Festuca idahoensis*). Most of the vegetative cover is composed of bunchgrasses, but there's a diverse range of forbs, including balsamroot (*Balsamorhiza caryana*), sandwort (*Arenaria californica* and *A. douglasii*), phacelia (*Phacelia hastata*), rocket-flower (*Gilia capitata*) and California knotweed (*Polygonum californicum*). At the edges of the slope, and in other areas of former heavy cattle use, introduced grasses, including oatgrass (*Avina sativa*) and annual brome grass (*Bromus mollis*) can become significant.

In moister bottomland areas, sites with sticky, shrink-swell clays, or areas which are less exposed, the grasslands are dominated by one species, California oatgrass (*Danthonia californica*). Small California oatgrass remnants have been found throughout northern California and as far north as the central Willamette Valley. This site has the largest known remnant. California oatgrass provides up to 80% of the cover in areas, forming a turf. Roemer fescue (*Festuca roemerii*) and Lemmon's needlegrass can be codominant in some areas. There is low forb diversity and density in these communities, although a number of early blooming species and annual species occur. The most important forbs include false-dandelion (*Agoseris heterophylla*), yarrow (*Achillea millefolium*), strawberry (*Fragaria virginiana*), horkelia (*Horkelia daucifolia*), and desert-parsley (*Lomatium nudicaule*).

All the large open areas tend to have been more heavily disturbed by historic grazing activities. As a result, they have patches which are dominated by non-native weeds, primarily brome grass species (*Bromus mollis* and *B. commutatus*), dogtail (*Cynosurus echinitus*), medusahead (*Tanaetherum caput-medusae*), Mediterranean barley (*Hordeum marinum*) and yellow starthistle (*Centaurea solstitialis*). As the time since the cessation of grazing has increased, the overall areas dominated by these species have continued to decline, while the native bunchgrasses and forb density has increased.

Savanna (37 ha = 91 ac): California oatgrass occurs both as an open grassland, and as large patches within a larger Oregon white oak and ponderosa pine savanna area. Sites dominated by oatgrass are typically upon small depressions underlain by clay. Convex clay loams support high amounts of fescue. These savanna communities appear to be an Oregon white oak - California black oak - ponderosa pine / California oatgrass - Roemer fescue (*Pinus ponderosa* - *Quercus garryana* - *Quercus kelloggii* / *Danthonia californica* - *Festuca roemerii*) savanna. This area is typified by the occurrence of large, old individuals of the three dominant trees in a California oatgrass prairie. At this site, and at most other sites in which this is known, the soils vary somewhat. Here, California oatgrass dominates in the open, heavy clay-soiled areas. Around the trees, in the shrubs, and in areas with deeper or siltier soils, Roemer fescue is the dominant grass. A photograph of this type is shown in Figure 4.



Figure 4. Savanna within the Potential NNL

Smaller individuals of ponderosa pine, white oak and black oak can be found in patches. On the deep soils with north or northeast aspects, Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*) saplings thrive, usually in partial shade of 20-30 year old pine or oak trees. The site overall has one of the best remnant of this Oregon white oak (*Quercus garryana*) - ponderosa pine (*Pinus ponderosa*) savanna. Almost all of the pine and oak savannas and upland grasslands in the North Pacific Border Biophysiological Province have been replaced by small scrub oaks and dense pine thickets as a result of unnatural fire patterns which have existed since European settlement. By chance, this site has had two burns in the 1980s, which have helped maintain the presettlement structure of the grasslands, savannas and the adjacent forests.

Chaparral (35 ha = 86 ac): Buckbrush (*Ceanothus cuneatus*) and sticky manzanita (*Arctostaphylos viscida*) are the clear dominants of this community. Dense patches of shrubs are an important feature of the potential NNL. While the chaparral is limited in distribution, the patches are significant because of the dense native bunchgrass and forb cover between the shrubs. The most important understory species is Idaho fescue, occasionally comprising up to 30% of the vegetative cover. The other important understory species include California oatgrass, Lemmon's needlegrass, and junegrass. Forbs tend to be the same as those found in the oak - pine savanna.

Woodland and Forest (211 ha = 523 ac): Trees dominate much of the potential NNL. Woodlands are less densely stocked than closed-canopied forests. Because woodlands fail to shade all of the understory, grasses and low shrubs can thrive. The canopy in this

community is diverse, with Douglas-fir (*Pseudotsuga menziesii*), incense-cedar (*Calocedrus decurrens*), sugar pine (*Pinus lambertiana*), western white pine (*Pinus monticola*), ponderosa pine, and grand fir (*Abies grandis*). While grand fir is rare in the canopy, it is (along with Douglas-fir) abundant in the many saplings present. The understory of the community is dominated by California and western fescue (*Festuca californica* and *F. occidentalis*). Aside from the grasses, poison oak (*Toxicodendron diversiloba*), Oregon grape (*Berberis repens*), whipple-vine (*Whipplea modesta*), and honeysuckle (*Lonicera* sp.) can be found in the open understory.

The forest community is dominated by white and black oak, madrone (*Arbutus menziesii*), and ponderosa pine. These forests support large old oaks, pines, and Douglas-fir which have survived fires as evidenced by their scarred and charred bark. Along with these large old trees are abundant pole-sized individuals of oak and madrone. A major cohort of young (sapling) Douglas-fir trees are also present. Because most sunlight is blocked by the closed canopy, relatively little grass cover is evident.

The only other significant vegetation type at the site is open mature coniferous forest found only in small patches. These appear more like a woodland since the trees are widely spaced and the understory is largely composed of grasses and low shrubs. The canopy in this community is diverse, with Douglas-fir (*Pseudotsuga menziesii*), incense cedar (*Calocedrus decurrens*), and sugar pine (*Pinus lambertiana*) codominant, but with western white pine (*Pinus monticola*), ponderosa pine (*Pinus ponderosa*), and white fir (*Abies concolor*) also present. While white fir is rare in the canopy, it is (along with Douglas-fir) abundant in the many saplings present. The understory of the community is dominated by grasses with most of the cover composed of California and western fescue (*Festuca californica* and *F. occidentalis*). Aside from the grasses, poison oak (*Toxicodendron diversiloba*), Oregon grape (*Mahonia nervosa*), whipple-vine (*Whipplea modesta*), and honeysuckle (*Lonicera* sp.) can be found in the open understory. It is classified as an incense cedar-pine-Douglas fir/California fescue (*Calocedrus decurrens*-*Pinus*-*Pseudotsuga menziesii*/*Festuca californica*) community, and is considered to be a fire climax (Kagan 1986). The U.S. Forest Service currently classifies it as a white fir-Douglas fir/Oregon grape (*Abies concolor*-*Pseudotsuga menziesii*/*Berberis nervosa*) community (Atzet 1984).

There are no threatened or endangered plants found at the site, although it supports many rare plants. The bottomland also has an example of a rare pygmy monkeyflower (*Mimulus pygmaeus*), a species thought to be at-risk until 2004. The site also has populations of two other rare plant species, California sandwort (*Arenaria californica*) and carrot-leaf horkelia (*Horkelia daucifolia*).

Wildlife:

Because of the natural condition of the ecosystem at Round Top Butte, the site is a haven for wildlife. The area is part of critical deer and elk winter range and is heavily used by elk in winter and spring. The area is also used by owls, hawks and apparently a nesting

site for Lewis's woodpeckers (*Melanerpes lewis*). Wildlife species were informally surveyed by the BLM during the spring of 1997 (BLM 2000). Table 1 provides a list of birds observed. This table is not a complete listing because observations were restricted to daylight hours during the springtime.

Table 1. Birds observed in vegetation communities in springtime (BLM 2000)

| SAVANNA | WOODLAND and FOREST | CHAPARRAL | GRASSLAND |
|--|--|--|--|
| American robin Bullocks oriole California quail Dark-eyed junco Lazuli bunting Mourning dove* Red-tailed hawk Song sparrow Spotted towhee Turkey vulture Western scrub jay | American kestrel American robin Black-headed grosbeak Brown creeper Common raven* Dark-eyed junco Downy woodpecker Flycatcher* Hairy woodpecker House wren* Lazuli bunting Northern flicker Pileated woodpecker Ruffed grouse Solitary vireo* Spotted towhee Steller's jay Turkey vulture Western bluebird Belted king-fisher Ruffed grouse Rufous hummingbird Western tanager Mountain quail* Nashville warbler* Western scrub jay Wild turkey* | Hummingbird Ruffed grouse Spotted towhee Steller's jay Turkey vulture Western scrub jay | Red-tailed hawk Turkey vulture Western scrub jay |

* Identified by call

Predictions of additional wildlife which likely use the site can be made based on knowledge gained from other sites in the province which support similar vegetation. The following lists are organized by the broad habitat areas mapped. They highlight both predicted and observed rare species plus those with a high affinity for the respective vegetation type. Status, if any, is provided after their names with the US Fish and Wildlife Service first; then the OR Department of Fish and Wildlife. The USFWS status

are LT = Listed Threatened, SoC = Species of Concern, C = Candidate; ODFW status are LT = Listed Threatened, SC = Sensitive Critical, SV = Sensitive Vulnerable, SU = Sensitive Undetermined Status (BLM 2000), -- = no status.

Grasslands, Oak savanna and Chaparral: The diverse vegetative structure provides habitat for many species of lizards and snakes as well as woodpeckers and shrubland songbirds, including several such as the blue-gray gnatcatcher (*Polioptila caerulea*) that reach the northern limits of their range in Oregon.

Herps:

Common kingsnake, *Lampropeltis getula* (SoC, SV)
California mountain kingsnake, *Lampropeltis zonata* (SoC, SV)
Northern sagebrush lizard, *Sceloporus graciosus graciosus* (SoC, SV)
Rough-skinned newt, *Taricha granulosa* (--, --)
Western rattlesnake, *Crotalus viridis* (--, --)
Alligator lizard, *Elgara* sp. (--, --)
Western skink, *Eumeces skiltonianus* (--, --)
Gopher snake, *Pituophis melanoleucus* (--, --)
Western fence lizard, *Sceloporus occidentalis* (--, --)
Common garter snake, *Thamnophis sirtalis* (--, --)

Birds:

Acorn woodpecker, *Melanerpes formicivorus* (SoC, --)
Lewis's woodpecker, *Melanerpes lewis* (SoC, SC)
Oregon vesper sparrow, *Pooecetes gramineus affinis* (SoC, SC)
Western bluebird, *Sialia mexicana* (--, SV)

Mammals:

Western gray squirrel, *Sciurus griseus* (--, SU)
Coyote, *Canis latrans* (--, --)
Roosevelt elk, *Cervus elaphus roosevelti* (--, --)
Mountain lion, *Felis concolor* (--, --)
Black-tailed jackrabbit, *Lepus californicus* (--, --)
Black-tailed deer, *Odocoileus hemionus columbianus* (--, --)
Botta's pocket gopher, *Thomomys bottae* (--, --)

Woodland and Forest: This habitat supports a diverse assemblage of amphibians and reptiles, woodpeckers, and several mammal species, such as the ringtail, found only in this area of the state. It also provides habitat for northern goshawks and other forest raptors, including the northern spotted owl as well as several sensitive bat species.

Herps:

Pacific Tree Frog, *Pseudacris regilla* (--, --)
Clouded salamander, *Aneides ferreus* (SoC, SU)
Northern red-legged frog, *Rana aurora aurora* (SoC, SU)
Foothill yellow-legged frog, *Rana boylei* (SoC, SV)

Birds:

Northern goshawk, *Accipiter gentilis* (SoC, SC)
Band-tailed pigeon, *Columba fasciata* (SoC, --)
Olive-sided flycatcher, *Contopus cooperi* (SoC, SV)
Flammulated owl, *Otus flammeolus* (--, SC)
Northern spotted owl, *Strix occidentalis caurina* (LT, LT)

Mammals:

Pacific pallid bat, *Antrozous pallidus pacificus* (SoC, SV)
Ringtail, *Bassariscus astutus* (--, SU)
Pacific western big-eared bat, *Corynorhinus townsendii townsendii* (SoC, SC)
Pacific fisher, *Martes pennanti pacifica* (SoC, SC)

Invertebrates (Butterflies):

Mardon skipper, *Polites mardon* (C, --)
Johnson's hairstreak, *Mitoura johnsoni* (--, --)

Aquatic: There is a man-made pond in the northwestern corner of the RNA which supports non-native species such as the largemouth bass (*Micropterus salmoides*) and bullfrogs (*Rana catesbeiana*) (BLM 2000).

Primary Geological Features

The Round Top Butte area is located in an area of recent volcanic activity. Round Top Butte, the adjacent Obenchain Mountain and Green Top Mountain are small lava cones. The plateau which makes up most of the potential landmark is a lava flow which is littered with basalt rubble.

The soils are made of weathered, volcanic clays. A few areas in the site have some significant soil build-up, but much of the site is very shallow soiled and rocky. The soils have been mapped by the U.S. Soil Conservation Service and are classified as five different types. The primary differences have to do with the fineness of the clays, and the depth and productivity of the soils (although the soils are mapped partially on the basis of existing vegetation, which in this area may reflect fire history as much as soil type).

The heavy clay soil which is most common in the California oatgrass bottomland meadows, is classified as a Carney clay, which is a vertisolic type. The remainder of the plateau area is a mosaic of three types of clay loams, called Medco, McMullen, and McNeil soils. The most prominent are the Medco-McMullen stony clay complex and the McNeil-McMullen shallow clay loam complex. The steep, rocky open grasslands occur on a type classified as a McMullen rock outcrop complex. Of these three soil types, the McNeil is the most productive, and tends to have the timbered types, while the others support savanna and grassland vegetation. The productive forest area on the top of Obenchain Mountain has the deepest soils, which are classified as a Frexner-Geppart complex.

Physical Setting

The natural area has extremely variable topography. The elevations range about 1100 m (3690 feet) at the top of Round Top Butte to 770 m (2600 feet) at the lowest part of the plateau at the southwest corner of the site. The northern part of the site consists of the top and south half of Round Top Butte, the saddle between Round Top and Obenchain Mountain, and the flat top of Obenchain. This area includes a number of fairly steep slopes of all aspects. The south half of the Potential NNL is part of a gently sloping plateau. This plateau faces southwest, with slopes of only about 5%. The plateau has a number of low hills, which tend to support different vegetation from the surrounding open flats. There is a seasonal creek which heads east across most of the landmark before heading south to Lake Creek.

The climate of the Potential Landmark is typical of the valleys of southwestern Oregon and northwestern California. The site has hot, dry summers and moist, mild winters. The following climatic data is from the Medford Weather Service Office, which is about 24 km (15 mi) east of the Potential National Natural Landmark.

Table 2. Climate summary for Medford, Oregon (National Weather Service)

| | |
|--|---------------------|
| Mean annual temperature | 12.0°C (53.7°F) |
| Mean January temperature | 3.8°C (38.8°F) |
| Mean July temperature | 23.2°C (73.8°F) |
| Mean annual precipitation (At Medford) | 47.12cm (18.55 in) |
| Mean annual precipitation (At Butte Falls) | 110.67cm (43.57 in) |

Almost all of the precipitation occurs in the months from November through March. As can be seen from the table, precipitation varies dramatically from the station at Medford to the station at Butte Falls 1 SE, located 13 km (8 mi) east of the potential landmark. Only precipitation is recorded at this station. The precipitation at the landmark is probably intermediate between the sites. Neither station receives much precipitation during the summer months, with an average of less than 5 cm (2 inches) for the months of July through September. During these months, the area is also prone to have lightning storms, which produces a natural wildfire frequency of 5-12 years. The highest temperature recorded from the Medford area during the 75 years of weather data was 45°C (103°F), while the lowest was -38°C (19°F), indicating how mild the climate is in this area.

Location and Access

Medford, Oregon (population 76,860) is located about 30 km (18 miles) to the southwest. Eagle Point, Oregon (population estimate in 2007, 8,500), is the nearest town, which is 9.6 km (6 mi) southwest of the site. Butte Falls (population 450) is also nearby, about 9 kilometers (5.5 miles) northwest of the Potential National Natural Landmark.

Although the site is fairly close to Medford and is less than three air miles from a major road, Round Top Butte is in a fairly remote location and is somewhat difficult to find.

It is difficult to reach due to primitive roads with unsigned intersections. Access also requires traversing private property. It is recommended that anyone unfamiliar with the vicinity be guided by someone who is. If attempting access without help, it is recommended to bring a high clearance vehicle, USGS topographic map, and aerial photo. It is also important that permission to cross private property is obtained. To do this, the BLM or TNC should be contacted to acquire phone numbers of private landowners. There are three possible routes to the site described here. Two routes approach the area from the north, while the third approaches from the south.

Route #1: From Interstate 5, take exit 30 in Medford onto the Crater Lake Highway 62. Follow Highway 62 approximately 14.3 miles north (through White City, past Eagle Point, past the junction with Sam's Valley Highway 234) to the Butte Falls Highway, which turns off to the right at a low point in the road. Follow the Butte Falls Highway approximately 14 miles to the intersection of Obenchain Road. The Butte Falls Highway tends first eastward, then northward, then east again, and finally southeast on a 2-mile long straight stretch. Turn right onto Obenchain Road and follow almost 3 miles in a southwesterly direction. The road is paved on the initial portion then turns to gravel. Look for a BLM road marker for road 35-2E-18. Take this BLM road (gravel) 2.6 miles on a winding path to the northwest to the end of the gravel. Note: you will have passed several timber management roads which tend to be less well-surfaced. These roads all access Boise Cascade and Superior Lumber timber harvest units in sections 12 and 11. At the end of the gravel, on a ridge sloping to the north, the road narrows, turns to clay, which can be treacherous when wet (typically December through mid-April), and loops around to the south through a typically rutted spot. Follow the rutted and eroded dirt road southerly and downhill to the barbwire fence gate at the TNC Round Top Butte Preserve. Alternatively, follow another branch of the dirt road to the west, across and down the north slope and there are two dirt roads leading to the top of Round Top Butte, one on the east shoulder, and one up the west shoulder to the summit. Travel on the preserve, and the adjoining RNA, should be on foot. There are several over-grown roads and tracks that may be visible on aerial photos.

Route #2: From Interstate 5, take exit 30 in Medford onto the Crater Lake Highway 62. Follow Highway 62 approximately 14.3 miles north (through White City, past Eagle Point, past the junction with Sam's Valley Highway 234) to the Butte Falls Highway, which turns off to the right at a low point in the road. Follow the Butte Falls Highway approximately 14 miles to the intersection of Obenchain Road. The Butte Falls Highway tends first eastward, then northward, then east again, and finally southeast on a 2-mile long straight stretch. Follow Obenchain Road 5 miles southwest looking for a gate on the right leading to the Hamann (Dan and Lois) Ranch. The driveway leads to the north through forest in section 23, then along the east edge of a meadow and clearing, and upslope and behind a shop, and two homes in section 14. There are various timber skidding roads leading northwesterly through the Hamann tract. The final ¼ mile approach to the TNC preserve in section 10 is made on foot with compass and photo.

Route #3: The third, and by far the fastest route, is the only way to reach the site staying on paved roads. From Medford, take the Crater Lake Highway (62) north to Nick Young

Road or Old Highway 62, located 9.3 miles from the I-5 exit in Medford. Turn right on this road, and go about 0.2 miles to Royal Avenue, and bear right. Follow Royal for 2.5 miles and where the road forks, bear left (north-east) onto Brophy Road and continue for 5 miles (after 1.3 miles the road becomes Worthington Road), where the road ends at a private gate. The gate and the road are private, and permission must be obtained to reach the site. With permission, park at the gate and continue walking one mile north on the road, or if the gate is open, drive 0.5 miles to the end of the opening, and park and walk to the RNA.

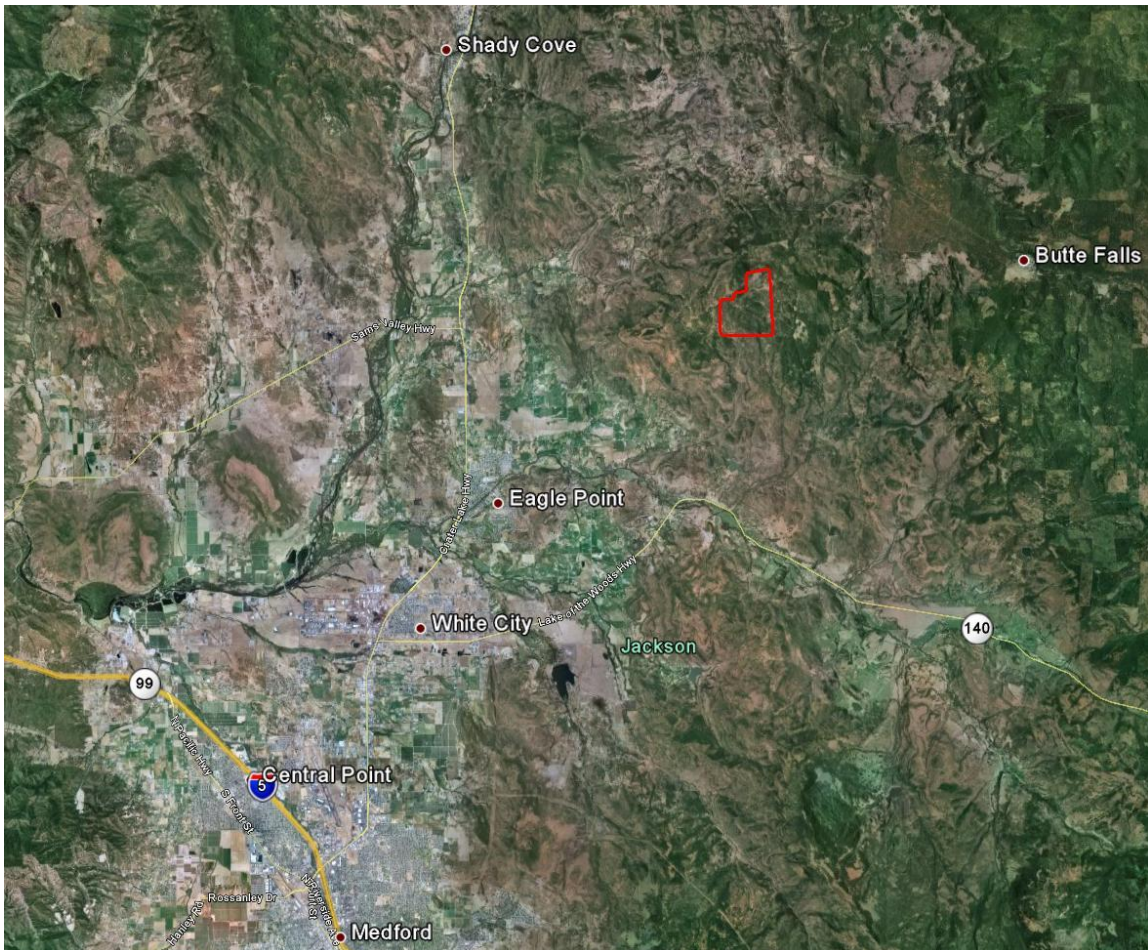


Figure 3. General Location of Round Top Butte Potential NNL in the Rogue Valley, Oregon

Ownership

The majority of the NNL is owned by the public and is administered by the BLM (Figure 6). The Nature Conservancy, a private conservation organization, owns the remainder.

Township 35 South, Range 1 East, Section 10

- Taxlot 4600 (139.88 acres total) owned by The Nature Conservancy of Oregon

Township 35 South, Range 1 East, Section 15

- Taxlot 6600 (444.92 acres total) administered by the Bureau of Land Management
- Taxlot 6500 (121.59 acres total) administered by the Bureau of Land Management
- Taxlot 6501 (40.58 acres total) administered by the Bureau of Land Management

Both of these latter parcels occur within the Butte Falls Resource Area of the Medford District of the BLM. The person who directly is in charge of these lands is the Resource Area Manager, who answers to the District Manager. The two other people in the BLM with management interests in the site are the District Botanist, who is responsible for the District's Research Natural Areas, and the Resource Area's Wildlife Biologist, who is responsible for the Critical Deer and Elk Winter Range. BLM personnel can be contacted at: Medford District Office, 3040 Biddle Road, Medford, OR 97504, (541)-618-2200.

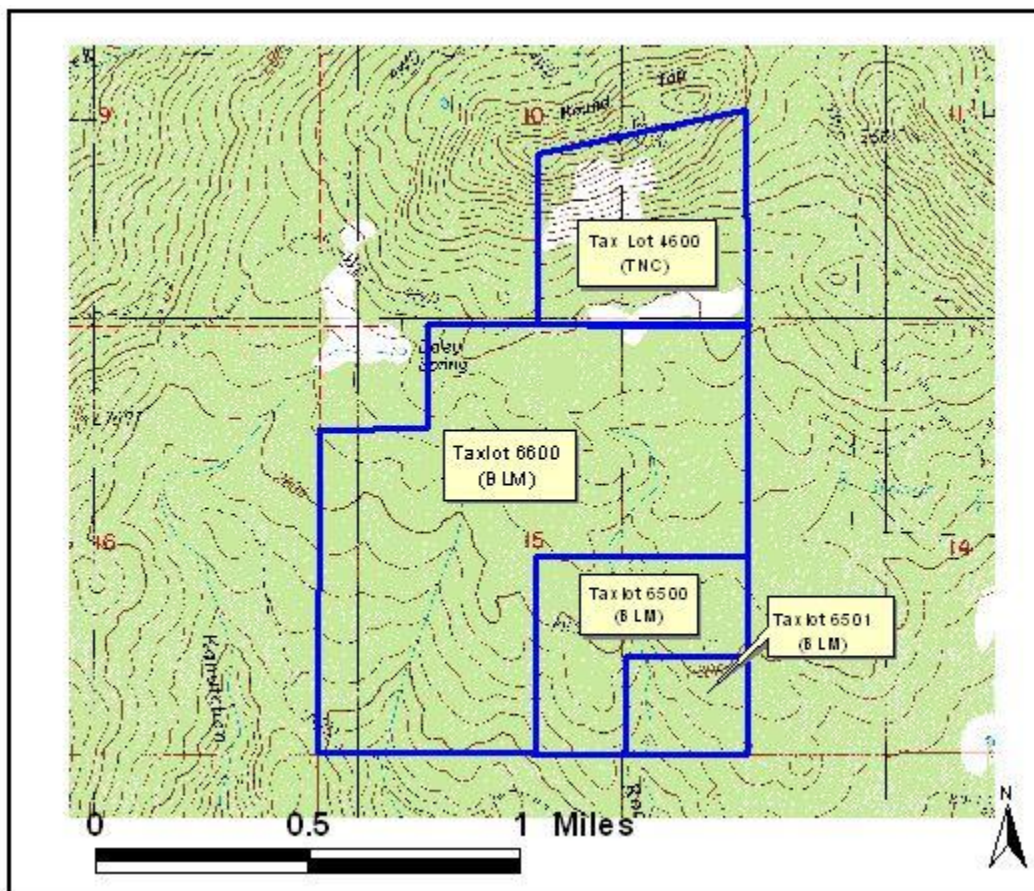


Figure 4. Ownership patterns at Round Top Butte

Land Use and Condition

Historic Land Use

This remote area has had very few historic land uses. A few, large trees were removed from the central oak-pine savanna over the years. Apparently the large pines were

removed during World War II (Bill Drewien, retired BLM Range Conservationist, personal communication). Occasional oaks have been removed for firewood. Overall, very few of the trees have been cut, and evidence of historic logging is difficult to observe. The primary historic use has been livestock grazing, although livestock use appears to have been limited to light cattle grazing.

Current Land Use and Present Condition

The lands adjacent to the potential landmark are currently used primarily for timber production. Recent logging is the reason most of the adjacent areas have been disturbed. The potential landmark varies in its disturbance from historic logging. No major logging has occurred within the landmark, except for a small portion of the site in Section 11, which was thinned by Boise Cascade about 20 years ago. This area is mostly oak-pine savanna, so the practice of thinning has had little effect on the grassland conditions. It appears certain that the logging activities of the past have not changed the structure of the vegetation within the potential landmark. Most likely, these activities have not caused any noticeable effects on the understory vegetation either.

There is an existing county right-of-way through the site. This route was formerly a dirt road, which bisected the potential landmark. The route has been impassable for the last 20 years, and The Nature Conservancy is attempting to reroute this right-of-way around the natural area. Driving on the old road in the central bottomland meadows has caused significant disturbance, since the heavy clay soils are sticky and slick when wet. The old road parallels the seasonal creek, and some of the deeper ruts have become stream channels. While this has been recovering since the road has been impassable, it will be many years before this part of the landmark is again dominated entirely by native species.

Round Top Butte RNA is located within grazing allotment #10021. This allotment pertains to the southern half of Section 15 which supports excellent native grassland. Currently, it is not occupied by livestock and has remained vacant for nine years. Because livestock are not native elements of the potential NNL, and therefore pose a significant threat to its ecological integrity, it is strongly suggested that they be prevented from grazing here in the future. Furthermore, the RNA needs to be completely fenced to prevent trespass grazing. Currently, no trespass grazing is occurring.

In 1988, taxlots 6500 and 6501 were transferred from private ownership to the BLM. The BLM portion of the potential NNL was designated a federal Research Natural Area (RNA) in 1995. As a RNA, it is managed to maintain ecological integrity of the ecosystems it supports. A baseline for scientific research and education, the management doctrine of this area is complimentary for protecting and studying the unique native vegetation it harbors.

The current fire management approach is to suppress all fires within the RNA. All fire management actions must adhere to minimal impacts from mechanized equipment. The Nature Conservancy has actively managed its Round Top Butte Preserve to restore and maintain the natural communities. In October 1989, TNC and Oregon Department of

Forestry initiated a prescribed burn on the Preserve. The objective was to increase Idaho fescue, California oatgrass, and sticky manzanita while killing medusahead and saplings of incense-cedar, grand fir, ponderosa pine, and Douglas-fir. The burn was successful and affected approximately five acres located near the southern boundary of the Preserve.

Sensitive or Hazardous Resources

Parts of this area had been heavily grazed and have patches dominated by introduced European weedy annuals, including brome grass species (*Bromus mollis* and *B. commutatus*), dogtail (*Cynosurus echinitus*), and medusahead (*Tanaetherum caput-medusae*). In addition to these bottomland areas, the steep slope grassland has some small patches with significant amounts of common oats (*Avena sativa*). These appear to have invaded the grassland when the entire area was grazed. Although the site has not been grazed in a number of years (i.e. nine), the native dry bunchgrasses do not appear to be replacing the oats very rapidly. There has been no observed change in the frequency or cover of weedy grasses in this community since 1983. An on-going effort to control the spread of starthistle (*Centaurea solstitialis*) by hand-pulling has also met success on both the Preserve and RNA. No starthistle was observed in either area in the 2009 survey.

As mentioned above, a few rare plants occur at this site. All three species, the pygmy monkeyflower (*Mimulus pygmaeus*), California sandwort (*Arenaria californica*) and carrot-leaf horkelia (*Horkelia daucifolia*) were considered very rare when the original NNL evaluation was completed in 1987. However, new populations of all three species have been found resulting in them being no longer considered species of concern.

Anticipated Damage to the Area

Currently, the entire potential landmark is in stable ownership, and is being managed for the natural values at the site. The only real threat is that of a catastrophic wildfire, and this would threaten primarily the oak-pine savanna and the fir-pine forest; although if timed badly could increase the introduced species cover in the grasslands. The grassland and chaparral communities would probably not be affected by any type of natural fire (A fire in June or early July might tend to favor the annual weedy grasses, but wildfires almost always occur in August and September in this area.). The Nature Conservancy and the BLM are developing a modified fire suppression plan and will be working on a full fire management plan that will outline how fire will be reintroduced to the site and will provide for the protection of the site from catastrophic wildfires.

Effects of Publicity

There would be no real effects on the natural features of the site as a result of the publicity of National Natural Landmark designation. The site is quite attractive in early spring, with abundant wildflowers and an extraordinary view of Mt. McLaughlin. Although there is public access via a county dirt road, the road is not maintained, and the site is somewhat difficult to find. Publicity may slightly increase the number of visitors,

and perhaps an increase in trespass on adjacent private roads from visitors who become lost. It is a reasonable expectation that the BLM and TNC will work out a system of optimal access for researchers, educators and sightseers.

Comparative Assessment

Regional Site Inventory

The Regional Site Inventory was compiled through a literature search and conversations with scientific experts when the initial theme study was done in 1985. Two new sites were added to this initial list based on new discoveries or restorations occurring since 2005.

A total of thirteen sites were evaluated, of which five sites were visited to complete a more-detailed assessment as to their representativeness, quality, and ability to represent the Uplands Grasslands. Three of the five sites were visited in 1985 as part of the original subtheme study (Kagan 1985a). Two additional sites were visited in 2008 to replace two of the 1985 sites which have been destroyed. The best remaining five sites are listed in priority order below. Of these, only three are fairly high quality sites, which generally meet the requirements of a national natural landmark. The remaining two are either not of sufficiently high quality or the occurrence of the subtheme is too small to adequately represent it. The sites are listed in priority order below.

1. Round Top Butte
2. Coburg Hills
3. Baskett Butte
4. Rattlesnake Butte
5. Wren Prairie

Site Descriptions

Round Top Butte

Round Top Butte includes a basaltic butte and the flat, volcanic plains and small hills south of the butte. The area is located at the foothill margins of the Rogue River Valley, about 10 miles northeast of Medford in Jackson County, Oregon. It contains a mosaic of dry grassland, ponderosa pine savanna, white oak savanna, and buckbrush chaparral typical of southwest Oregon valley bottoms and margins. Round Top Butte has an old growth Douglas-fir, incense cedar and pine forest on the east slope of the butte and north slopes of the surrounding small hills. Most of the site has extremely shallow soils, and much of the area is littered with volcanic rocks.

The site is composed of a Nature Conservancy preserve to the north and a Bureau of Land Management Research Natural Area to the south; so the entire area is protected for research, education and conservation. A series of fires in the 1980s created a natural mosaic of grasslands, savanna, chaparral, woodlands and forest typical of interior valley

habitats in northwestern California, southwestern Oregon and the southern Willamette Valley. The fires and the benign neglect the property has received resulted in the preservation of large, widely spaced ponderosa pine and Oregon white oak trees, between meadows and grasslands and open woodlands. The site is largely in exceptional condition, dominated by native bunchgrasses which have disappeared from similar habitats elsewhere.

Coburg Hills

Coburg Hills is a north-south running ridge along the eastern edge of the Willamette Valley located just north of Eugene. It is bordered by the Willamette River to the west, the McKenzie River to the south, and the Mohawk River to the east. The area includes native grasslands, Oregon oak savanna, mixed oak and Douglas-fir woodlands, and young Douglas-fir forests, along with some pastures and homesteads. The evaluated site is a 500 hectare (1,244) acre preserve acquired through a conservation easement by The Nature Conservancy in 2007.

The site is in good condition, with native bunchgrasses dominating many of the grasslands, although introduced pasture grasses provide significant cover throughout. The oak savanna areas are limited, with many of the areas being taken over by invading Douglas-fir trees. The native habitats along the ridge support one of the largest populations of Fender's blue butterfly (*Icaricia icarioides fenderi*), a federally endangered species which lives on Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), a federally threatened species.

The property was not evaluated in 1985 because it was privately owned and access was not available. Since 2007 it represents one of the best examples of this subtheme, and the best example of the most common Roemer fescue dominated grassland. However, access remains somewhat restricted due to the nature of the easement protecting the site.

Baskett Butte

Part of the Baskett Butte National Wildlife Refuge was not even considered for evaluation in 1985 because the quality of the grasslands on the butte was so poor. The majority of the refuge is managed for waterfowl habitat, and the natural features seemed limited. However, over the last 24 years, the U.S. Fish and Wildlife Service has worked diligently to restore the native grasslands on the butte, removing introduced blackberry shrubs by mowing and burning when possible, and by planting native species.

The focus of the restoration efforts was primarily to conserve and expand the Fender's blue butterfly and associated Kincaid's lupine populations (Schultz 2001). The restoration has resulted in the establishment of one of the largest examples of Roemer fescue grasslands in the Willamette Valley. The rare species are doing well, and each year the acreage of the natural habitats expand. Most of the site remains dominated by introduced pasture grasses, and due to the population of Fenders butterfly, fire has to be

used sparingly, meaning that mowing is the best tool for keeping the shrubs from invading the site.

Rattlesnake Butte

Rattlesnake Butte is an isolated butte located on the southwest edge of the Willamette Valley, located at the Lane – Benton County line about 10 miles (16 km) north of Veneta, Oregon. The east and south facing slopes of the butte contain the largest known remnant of Willamette Valley grass bald - Oregon oak savanna, with an exceptional example of the Lemmon's needlegrass - moss (*Racomitrium canescens*) bald community.

The butte was protected by The Nature Conservancy in 1989, although only the native habitat at the top of the butte was acquired, resulting in a relatively small protected area of less than 30 acres (12 hectares). The preserve protects the high quality grass bald, as well as one of the very few rattlesnake winter dens located in the Willamette Valley. The western rattlesnake (*Crotus oreganus*) was added to the ODFW Sensitive list in December 2008 as Sensitive - Critical.

Wren Prairie

Wren Prairie is a small, hillslope area located on the western edge of the Willamette Valley, about 5 miles (8 km) west of Philomath, Oregon. The site was one of the earliest native Roemer fescue prairie remnants located, and it is quite close to a main highway, and not far from Oregon State University. The grasslands are south and southwest facing slopes located in a matrix of closed Oregon white oak woodlands and pastures. The area is protected as a nature preserve by The Nature Conservancy, but has limited access.

The grasslands at the site are good, but slightly patchy, with high quality Roemer fescue, junegrass and bluegrass areas mixed with introduced pasture grasses, primarily orchardgrass (*Dactylus glomerata*), tall fescue (*Lolium arundinaceum*), and tall oatgrass (*Arrhenatherum elatius*). The oak woodlands have closed-in, with only a few grasses remaining, and an understory dominated by poison oak and snowberry. It has been undisturbed since it was protected by TNC in 1986.

Comparative Analysis and Discussion

1. Comparison of Round Top Butte as a Potential National Natural Landmark

Primary Criteria

Illustrative Character: *Excellent*. The site is protected for its natural values, with no grazing, timber removal or any other negative impacts. It has a diverse complex of natural habitats, including upland dry grasslands on the south face of the butte dominated by Lemmon's needlegrass and bluebunch wheatgrass, mesic grasslands on the flats dominated by California oatgrass and Roemer fescue, and native savanna and woodlands with Roemer fescue, California fescue and blue wildrye. The savanna is

dominated by large, old Ponderosa pine and Oregon white oak, and is characteristic of the southwestern Oregon examples of this subtheme.

Present Condition: *Good*. The site has about 50 acres of grassland, and over 200 acres of adjacent high quality oak-pine savanna, which is currently protected by the Bureau of Land Management (BLM) as a RNA and by TNC as a preserve. Bunchgrass frequency is high enough that with grazing removal, the annual grasses may naturally disappear.

Secondary Criteria

Diversity: *Excellent*. This site has excellent examples of southwest Oregon interior valley xeric grassland and California oatgrass meadow grassland communities. These communities represent the range of grassland diversity of southwest Oregon valleys. The site also has adjacent areas with both oak-pine savanna and low elevation, mixed conifer old growth forest. It is a model example of Rogue Valley margin grassland - savanna habitat. However, these types were never as widespread as the red fescue upland grasslands of the Willamette Valley.

Rarity: *Fair*. Round Top Butte provides habitat for some rare birds and uncommon plants, although all of the species thought to be rare when the site was evaluated in 1987 have been found to be more common in southwestern Oregon.

Value for Science and Education: *Good*. The area has been designated as a RNA by the BLM or is a Nature Conservancy Preserve; so has been set aside for education, research and conservation. Also, the site has exceptional value for range, wildlife, and ecological research. It is fairly remote, and somewhat difficult to get to, which limits some of its educational values.

2. Comparison of Coburg Hills as a Potential National Natural Landmark

Primary Criteria

Illustrative Character: *Excellent*. The site has one of the largest example of Roemer fescue upland prairie, with small examples of shallow-soiled balds and oak savanna.

Present Condition: *Good*. Most of the grasslands at Coburg are in good condition, having received little grazing pressure over the last 20 years. The site was historically grazed, and the grasslands are contracting with the spread of Douglas-fir forests.

Secondary Criteria

Diversity: *Excellent*. The site is fairly diverse, with high quality examples of grasslands, oak savanna and conifer forests, and some small grass balds. It includes a number of slopes and aspects, with a moderate range of elevations.

Rarity: *Good*. Coburg Hills supports a population of Fender's blue butterfly (*Icaricia icarioides fenderi*), a federally endangered species which lives on Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), a federally threatened species.

Value for Science and Education: *Good*. The site has been managed by The Nature Conservancy as a preserve since the conservation easement was acquired in 2007. It is quite easily reached, close to the University of Oregon, and very near Eugene, but access is somewhat limited by the easement.

3. Comparison of Baskett Butte as a Potential National Natural Landmark

Primary Criteria

Illustrative Character: *Excellent*. Baskett Butte is typical of a Willamette Valley native upland grasslands. The area is part of a U.S. Fish and Wildlife Service Refuge and was known in 1985, but not considered because it was not in very good condition.

However, over the last 10 years, the USFWS has restored over 100 acres (40 hectares) to Roemer fescue prairie with some oak savanna.

Present Condition: *Good-Fair*. The area still has significant cover of weedy, introduced perennial grasses, but restoration continues to improve the condition of the prairie.

Secondary Criteria

Diversity: *Excellent*. In addition to the upland prairie and savanna, the site has small examples of wet, bottomland prairie. As a wildlife refuge, it supports large populations of geese and waterfowl, and other wildlife as well.

Rarity: *Excellent*. Baskett Butte provides habitat for a population of Fender's blue butterfly (*Icaricia icarioides fenderi*), a federally endangered species which lives on Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), a federally threatened species.

Value for Science and Education: *Excellent*. This site is managed by the U.S. Fish and Wildlife Service as a refuge, is easily accessible, and fairly central in the Willamette Valley. The refuge also has facilities to support research.

4. Comparison of Rattlesnake Butte as a Potential National Natural Landmark

Primary Criteria

Illustrative Character: *Good*. While fairly small, this site still contains the largest known remnant of Willamette Valley grass bald - Oregon oak savanna with the Lemmon's needlegrass bald community. However, it does not have any examples of the most common upland grassland communities from the subtheme.

Present Condition: *Good*. It has been grazed lightly for years, which has caused a slow but steady increase in introduced annual weeds, and a decrease in native bunchgrasses. Since grazing exclusion in 1985, the condition has continued to improve.

Secondary Criteria

Diversity: *Fair*. The area has a good example of native interior valley grass bald, and a small example of native oak savanna. The site does not have any examples of the widespread interior valley grassland types.

Rarity: *Fair*. The site provides one of the only areas for rattlesnakes to den in the Willamette Valley.

Value for Science and Education: *Excellent*. The site is relatively easy to reach, and is close to the University of Oregon and Oregon State University, Oregon's major natural resources research universities.

5. Comparison of Wren Prairie as a Potential National Natural Landmark

Primary Criteria

Illustrative Character: Condition: *Good*. This area has a very good, but slightly patchy occurrence of Willamette Valley Upland grassland and oak woodlands. It has been undisturbed for a number of years; open areas are almost entirely dominated by native species.

Present Condition: *Fair*. The site is extremely small (only 10 acres), and has only about five to six acres of native grasslands remaining. While the area is being managed by TNC for its native values, its small size and the need for periodic burning, cause this area to have viability questions.

Secondary Criteria

Diversity: *Fair*. The site has a small but high quality example of the very threatened Willamette Valley upland fescue grassland, and very small occurrences of Oregon oak woodlands and successional Douglas fir forests.

Rarity: *Excellent*. The site has populations of two rare plants. One is the federally endangered plant, Nelson's checker mallow (*Sidalcea nelsoniana*). It also has a population of the shaggy horkelia (*Horkelia congesta*), a Willamette Valley grassland endemic species known from fewer than 30 sites in the world.

Value for Science and Education: *Fair-Poor*. This area is easy to reach and is very close to a major university, Oregon State. It is currently protected and managed for its natural values. However, TNC is not yet able to provide access to the site from the nearby highway. Until access easements are available, the value for science or education is limited.

Other Sites

This subtheme is rare in that there are not very many sites to consider. The following sites represent those sites that were evaluated but considered not worthy of consideration as an NNL either because they are not sufficiently representative of the theme, lack the quality to represent the theme, or are in an ownership that was not supportive to establishment. The sites are listed below with the primary reason they were rejected.

Agate Desert – All upland grasslands present are a result of restoration.

Bald Hill – A small and urban area in moderate condition

Lower Table Rock – A large natural area with a very small example of the subtheme

Maple Knoll RNA – A mostly forested RNA with limited upland grasslands

McDonald Forest – A university forest with small, fairly weedy upland grasslands

Noble Pasture – Formerly high quality area, now developed for housing

Pigeon Butte – Small grasslands only

Philomath Grasslands – Large, high quality area now developed for housing

Evaluation Recommendations

The range of diversity within this subtheme element makes it difficult to represent at only one NNL. Specifically, there is little overlap between the Willamette and Cowlitz Valley Grasslands, and the Rogue and Umpqua Valley Grasslands. Of the sites proposed, only Round Top Butte and the Coburg Hills Grasslands fit the criteria for a NNL. The other sites are either too small, have difficulties with long-term viability, or are not in good enough condition to merit designation as a Natural Landmark. If access to the Coburg site were improved, and if long-term viability was less of a concern, this might represent the best potential landmark, only because it contains the best remaining example of the upland grasslands of the Willamette Valley. These grasslands were more widespread, and have declined more than the grasslands in the Rogue or Umpqua Valleys.

The two sites meeting the minimal requirements for an NNL are distinctly different, and together represent the entire range of grassland diversity within this subtheme; and both can therefore be considered for NNL designation. However, given that Round Top Butte 1) includes a large area completely protected in fee as either a Nature Conservancy Preserve or a BLM Research Natural Area, 2) has the largest intact areas of habitat, and 3) is located in an area where these natural features can be maintained, make it the best choice for a National Natural Landmark to represent this subtheme.

The Round Top Butte potential National Natural Landmark has the largest, best quality and most representative remnant of upland valley grasslands in the North Pacific Border Biophysiographic Province. It has good examples of California oatgrass meadows and slopes, and of bluebunch wheatgrass-Idaho fescue-Lemmon needlegrass hillside grassland. Aside from the native grasslands, the site is unique in the diversity of its vegetation. There is oak-pine savanna, chaparral, and old-growth, fir-pine forest also present at the site. The area has exceptional plant species diversity, and provides important habitat for deer, elk and other wildlife species. While not pristine, the site represents the best remaining example of this theme, which has dramatically declined throughout the province.

Round Top Butte is also significant in the structure of the vegetation. Due to the frequent history of wildfires at the site, it has a natural mosaic of grassland, chaparral, savanna, and open mature forest. This mosaic has disappeared from other areas due to fire suppression followed by unnaturally hot, catastrophic fires which kill all the trees. The natural pattern of vegetation present makes this site more manageable by allowing the use of prescribed fire.

Potential Landmark Boundary and Ownership Maps

The boundary includes all of the portions of Round Top Butte and adjacent lands to the south which have been designated as natural areas, including the BLM RNA and TNC Preserve.

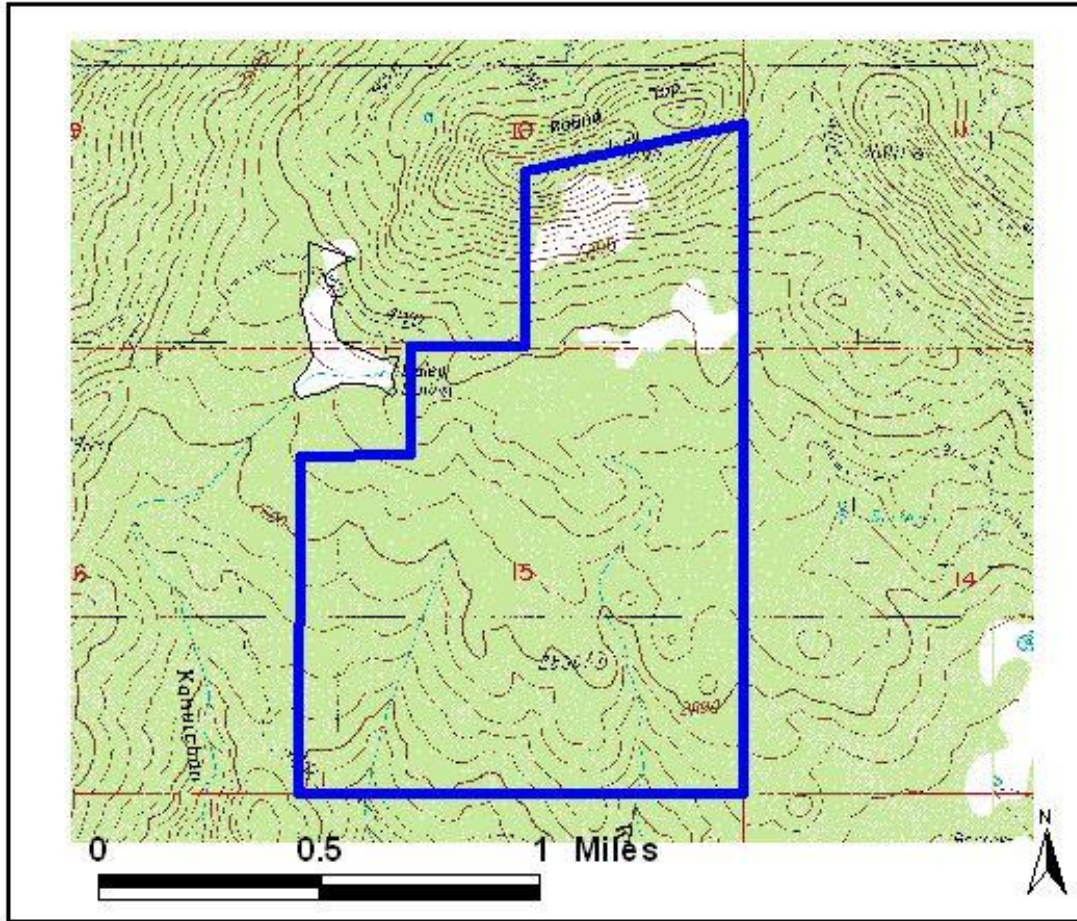


Figure 7. Evaluation area for the Round Top Butte PNNL

The boundary starts at the midpoint of the section line between Sections 10 and 11 (Township 35 South, Range 1 East) and heads south for 0.6 km (0.4 mi) through the southeast corner of Section 11, and continues south another 1.6 km (1 mi) to the southeast corner of Section 15. The boundary then heads west for 1.6 km (1 mi), along the section line between Sections 15 and 22, to the southwest corner of Section 15. It heads north along the section line for 1.2 km (0.75 mi), and then east for 0.4 km (0.25 mi) and then north again for 0.4 km (0.25 mi), to the section line between Sections 10 and 15, to exclude the northwest quarter of the northwest quarter of Section 15. The boundary follows the Section line east for 0.4 km (0.25 mi) to the midpoint of the section line between Sections 15 and 10. From here, it heads north for 0.64 km (.40 mi) to the western summit of Round Top Butte and then heads in a north-northeast direction along the TNC boundary for about 0.8 km (0.50 mi) to the start.

As can be seen on the ownership map in Figure 6 (page 19) the entire potential NNL is owned either by The Nature Conservancy and managed as a preserve, or by the Bureau of Land Management, and designated as a Research Natural Area.

Justification:

The area in Section 15 is the BLM RNA. The boundaries were limited to BLM ownership in this area since the adjacent lands to the east, south and west have been recently logged and heavily grazed, eliminating most of their natural values. The west boundary in Section 10 also is defined by ownership, since the included TNC Preserve is in very good condition, while the adjacent private land has been logged and is also heavily grazed. On the north, the line follows the road, and includes all of TNC ownership. To represent the grassland and savanna ecosystem, only the areas in Sections 10 and 15 (i.e. the areas currently in the RNA or Preserve) are necessary, and therefore only these were included within the boundary of the potential NNL.

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The author would like to acknowledge the help, support and patience of our partners at the National Park Service, in particular Steve Gibbons, who has been managing the Pacific West Region's NNL program for the past 19 years and has helped us with formatting, questions, and direction on the project. We would also like to acknowledge Gordon Atkins formerly of the National Park Service; now retired.

Appendix A. Physical and Demographic Background Information – City of Medford

PHYSICAL CHARACTERISTICS

Location

122 52' 30" West, Longitude

42 19' 15" North, Latitude

(Same as Boston, MA and Chicago, IL)

Distance to Major Cities

| | |
|--------------------------|-----------------|
| Grants Pass | 25 mi (40 km) |
| Klamath Falls | 76 mi (122 km) |
| Roseburg | 93 mi (149 km) |
| Brookings (Oregon Coast) | 130 mi (209 km) |
| Eugene | 165 mi (265 km) |
| Salem | 230 mi (370 km) |
| Portland | 277 mi (445 km) |
| San Francisco | 385 mi (619 km) |

Climate

| | |
|---------------------------|-------------------------------|
| Mean Annual Temperature | 53 F (11.7 C) |
| Mean Annual Precipitation | 20.6 in (52.4 cm) |
| Record Low | -10 F (-23.3 C) December 1919 |
| Record High | 115 F (46.1 C) July 1946 |
| Average Growing Season | 170 Days |
| Latest Recorded Frost | June 12 |
| Earliest Recorded Frost | September 13 |
| Average Annual Snowfall | 8.1 in (20.6 cm) |

Elevation

1,300 - 1,400 feet.

General Terrain

River Valley

Elevation of Surrounding Mountains

East - 4,000 to 9,000 feet (Cascades)

West - 3,500 to 5,500 feet (Coast Range)

North - 3,500 to 5,500 feet (Umpqua Divide)

South - 3,000 to 7,600 feet (Siskiyou Mountains)

POPULATION

| | |
|---------------------------------|--------------------|
| City of Medford Population | 76,850 (7-1-08) |
| Jackson County Population | 205,305 (7-1-08) |
| Average Annual City Growth Rate | 3.4% (1990 - 2002) |
| Median Age | 37.0 (2000) |

Medford 2000 Population Demographics

| | |
|---------------------------|--------|
| Age 65 and Over | 16.5% |
| Age 18 and Under | 25.8% |
| Female | 52.1% |
| White | 90.0% |
| Non-white | 10.0% |
| Spanish Origin | 9.2% |
| Female Head of Household | 11.7% |
| Projected 2010 Population | 74,164 |

From (<http://www.ci.medford.or.us/Page.asp?NavID=79>), city of Medford web site, 2009

Appendix B: Plants, ferns and fern allies of Round Top Butte

Scientific and common names of vascular plants, ferns and fern allies^{a b}

| <u>Scientific name</u> | <u>Common name</u> |
|----------------------------------|----------------------------------|
| Coniferous trees | <i>Exotic species in italics</i> |
| <i>Abies concolor</i> | White fir |
| <i>Calocedrus decurrens</i> | Incense cedar |
| <i>Pinus lambertiana</i> | Sugar pine |
| <i>Pinus monticola</i> | Western white pine |
| <i>Pinus ponderosa</i> | Ponderosa pine |
| <i>Pseudotsuga menziesii</i> | Douglas-fir |
| Hardwood trees | |
| <i>Arbutus menziesii</i> | Madrone |
| <i>Lithocarpus densiflorus</i> | Tanoak |
| <i>Quercus garryana</i> | Oregon white oak |
| <i>Quercus kelloggii</i> | California black oak |
| <i>Prunus virginiana</i> | Chokecherry |
| Shrubs | |
| <i>Amelanchier alnifolia</i> | Western serviceberry |
| <i>Arctostaphylos nevadensis</i> | Pinemat manzanita |
| <i>Arctostaphylos patula</i> | Greenleaf manzanita |
| <i>Arctostaphylos viscida</i> | Whiteleaf manzanita |
| <i>Berberis repens</i> | Creeping barberry |
| <i>Ceanothus cuneatus</i> | Buckbrush |
| <i>Ceanothus integerrimus</i> | Wild lilac |
| <i>Cercocarpus betuloides</i> | Birchleaf mountain mahogany |
| <i>Cercocarpus ledifolius</i> | Curl-leaf mountain mahogany |
| <i>Ericameria nauseosa</i> | Gray rabbitbrush |
| <i>Holodiscus discolor</i> | Ocean spray |

Prunus subcordata
Purshia tridentata
Ribes cereum
Symporticarpus mollis
Toxicodendron diversiloba

Klamath plum
Antelope bitterbrush
Wax currant
Trailing snowberry
Poison oak

Ferns and allies

Polystichium munitum

Swordfern

Herbs

Achillea millefolium
Asclepias sp.
Agoseris heterophylla
Allium amplexans
Blepharipappus scaber
Brodiaea coronaria
Calochortus tolmiei
Camassia leichtlinii
Calystegia occidentalis
Centurea solstitialis
Cerastium arvense ssp. *strictum*
Clarkia sp.
Claytonia perfoliata
Claytonia sibirica
Collinsia parviflora
Collomia grandiflora
Croton setigerus
Delphinium sp.
Dianthus armeria ssp. *armeria*
Dichelostemma capitatum
Dodecatheon hendersonii

Common yarrow
Milkweed
Annual agoseris
Narrowleaf onion
Rough eyelashweed
Crown brodiaea
Tolmiei start tulip
Camas
Chaparral false bindweed
Yellow starthistle
Field chickweed
Clarkia
Miner's lettuce
Siberian springbeauty
Maiden blue-eyed Mary
Grand collomia
Dove weed
Larkspur
Deptford pink
Bluedicks
Mosquito bills

| | |
|--|------------------------------|
| <i>Epilobium brachycarpum</i> | Tall annual willowherb |
| <i>Epilobium minutum</i> | Chaparral willowherb |
| <i>Eriophyllum lanatum</i> | Common woolly sunflower |
| <i>Erodium cicutarium</i> | Redstem storksbill |
| <i>Fritillaria pudica</i> | Yellow fritillary |
| <i>Galium aparine</i> | Stickywilly |
| <i>Geranium dissectum</i> | Cutleaf geranium |
| <i>Horkelia daucifolia</i> | Carrot-leaved horkelia |
| <i>Horkelia congesta</i> ssp. <i>nemorosa</i> | Sierra horkelia |
| <i>Hypericum perforatum</i> | St. John's wort |
| <i>Lactuca serriola</i> | Wild lettuce |
| <i>Linum bienne</i> | Pale flax |
| <i>Lithophragma glabrum</i> | Bulbous woodland-star |
| <i>Lomatium utriculatum</i> | Common lomatium |
| <i>Lomatium macrocarpum</i> | Bigseed biscuitroot |
| <i>Lomatium triternatum</i> | Nineleaf biscuitroot |
| <i>Lotus unifoliolatus</i> var. <i>unifoliolatus</i> | American bird's-foot trefoil |
| <i>Madia gracillis</i> | Grassy tarweed |
| <i>Mimulus pygmaeus</i> | Pygmy monkeyflower |
| <i>Navarretia</i> sp. | Pincushion plant |
| <i>Penstemon laetus</i> | Mountain blue penstemon |
| <i>Phacelia heterophylla</i> | Varileaf phacelia |
| <i>Plagiobothrys</i> sp. | Popcornflower |
| <i>Plectritis macrocera</i> | Longhorn plectritis |
| <i>Potentilla millefolia</i> | Cutleaf cinquefoil |
| <i>Prunella vulgaris</i> | Common selfheal |
| <i>Psilocarphus brevissimus</i> | Short woollyheads |
| <i>Ranunculus occidentalis</i> | Western buttercup |
| <i>Saxifraga</i> sp. | Saxifrage |
| <i>Scutellaria nana</i> | Dwarf skullcap |
| <i>Sedum leibergii</i> | Leiberg stonecrop |

Sisyrinchium bellum
Taraxacum officinale
Torilis arvensis
Tragopogon dubius
Trifolium dubium
Triteleia hyacinthina
Verbascum blattaria
Whipplea modesta
Wyethia angustifolia
Zigadenus venenosus

Grasses and Graminoides

Achnatherum lemmonii
Aira caryophyllea
Aristida oligantha
Avena fatua
Bromus carinatus
Bromus mollis
Bromus racemosus
Cynosurus echinatus
Deschampsia danthonioides
Elymus elymoides
Elymus glaucus
Festuca californica
Festuca idahoensis
Festuca occidentalis
Festuca roemerii
Festuca subuliflora
Gastridium phleoides
Hordeum marinum
Juncus patens

Western blue-eyed grass
Common dandelion
spreading hedgeparsley
Yellow salsify
Suckling clover
White brodiaea
Mullein
Common whipplea
California compassplant
Meadow deathcamas

Lemmon needlegrass
Silver hairgrass
Prairie threeawn
Wild oats
California brome
Soft brome
Bald brome
Bristly dogtail
Annual hairgrass
Bottlebrush squirreltail
Blue wildrye
California fescue
Idaho fescue
Western fescue
Roemer fescue
Crickle-awn fescue
Nit grass
Mediterranean barley
Spreading rush

Koeleria macrantha

Melica geyeri

Poa bulbosa

Poa compressa

Poa pratensis

Poa secunda

Pseudoroegneria spicata

Taeniatherum caput-medusae

Ventenata dubia

Vulpia myuros

Prairie junegrass

Geyer's oniongrass

Bulbous bluegrass

Canada bluegrass

Kentucky bluegrass

Sandberg bluegrass

Bluebunch wheatgrass

Medusahead wildrye

North African grass

Six weeks fescue

^a Compiled from numerous sources

^b Nomenclature for vascular plants, ferns, and fern-allies follows the *NRCS Plants Database* and the Oregon Flora Project Web site (2007).

Appendix C: Photographs of Round Top Butte Potential National Natural Landmark (PNNL)



Photo 1. Chaparral along woodland - grassland interface at SE edge of RNA



Photo 2. Oak – pine savanna, grasslands, with patches of diverse chaparral along the edge



Photo 3. Fenceline contrast at southeastern RNA boundary



Photo 4. Grassland-open oak woodland, representing a white oak / buckbrush plant community, which has become quite rare. The grassland is California oatgrass with the invasive bristly dogtail.



Photo 5. Grasslands dominated by Roemer fescue, California oatgrass and blue wildrye, with carrot-leaved horkelia in partial shade, with almost no weeds.



Photo 6. Open meadow, with California oatgrass, occasional Idaho fescue and significant cover of introduced annual grasses, primarily bristly dogtail and bromes



Photo 7. Oak savanna with native bunchgrass understory of California fescue, Roemer fescue, blue wildrye and California brome



Photo 8. Large, old incense cedar tree surrounded by Douglas-fir and young white fir. Only the incense cedar is fire resistant.



Photo 9. Oregon white oak / buckbrush habitat being invaded and overtopped by Douglas-fir and Ponderosa pine.



Photo 8. Open Oregon white oak - Ponderosa pine savanna with native bunchgrass understory. This type has become quite rare, but historically occupied many thousands of acres.



Photo 9. Old ponderosa pine at the north end of the BLM RNA used as a marker for plant research, found in an Oregon white oak - pine savanna, with poison oak under the trees.



Photo 10. Lovely Ponderosa pine savanna with native bunchgrass understory. A young madrone seedling can be seen in the foreground.



Photo 11. Buckbrush and whiteleaf manzanita chaparral with including Ponderosa pine - Douglas-fir woodland in the background.



Photo 14. Large, old Oregon white oak with young Douglas-fir saplings.



Photo 16. Mixed forest, chaparral, and grasslands below and west of Round Top Butte.



Photo 17. Ponderosa pine - Oregon white oak woodlands in the foreground with Douglas-fir –Incense cedar forests in the background.



Photo 18. Buckbrush with native grasses, forming a band around oak-pine woodlands, as it does throughout this area.



Photo 12. Old pond and ditch at the edge of native meadow, located on the BLM RNA, near the TNC preserve. This is the only disturbance seen in the area.

Appendix D. Round Top Butte National Natural Landmark Brief

Location: 13.5 km (8 mi) west of Butte Falls, 10 km (6 mi) northeast of Eagle Point, Jackson County, OR

Biophysiographic Province: North Pacific Border

Size: 302 ha (747 acres)

Owner: The area is owned by the Bureau of Land Management (BLM) and The Nature Conservancy (TNC) and is being managed as a RNA and Nature Preserve.

Description: The potential landmark includes the south half of a basaltic butte and the flat, volcanic plains and small hills below the butte. The area is a mosaic of dry grassland, ponderosa pine savanna, white oak savanna, and buckbrush chaparral. An old growth Douglas fir, incense cedar and pine forest occurs on the east slope of the butte and north slopes of the surrounding small hills.

Most of the site has extremely shallow soils. The south slope of the butte and much of the plateau is littered with volcanic rocks. The soils on the bottomland are heavy red clays, which shrink and swell. The upland areas contain silts or clays, but there are few areas with any type of soil development.

Significance: Round Top Butte contains the best remaining example of native valley upland grasslands. It is the only site with examples of all of the community types which occurred throughout the valleys of southern Oregon and northern California prior to European settlement. Remnants of the valley vegetation types have all but disappeared because of fire suppression, conversion to agriculture, overgrazing, and development. Round Top Butte not only has the diversity of ecosystems which occurred in the presettlement landscape, but has extremely high quality examples of all of these types.

Land Use: The site is currently a designated Bureau of Land Management Research Natural Area (RNA) and Nature Conservancy Preserve. The Nature Conservancy's land is fenced to exclude cattle use and set aside for research. For many years, the BLM managed their lands in the potential National Natural Landmark under a rest rotation, short duration grazing system. Grazing has since been excluded for both properties since the RNA was designated, so the site is managed for conservation, research and education only.

Special Conditions: The majority of the site is being jointly managed for conservation, research and education by the Medford District of the BLM and The Nature Conservancy. Information on research efforts, access and other details can be obtained from the Oregon Field Office of The Nature Conservancy in Portland. Access to the area is extremely difficult, although the private land adjacent and just south of the BLM RNA is for sale and may be acquired by TNC or the BLM. Acquisition of this property would

provide better access to the site for research and education, and would increase the area of native grasslands, open oak and pine savanna, and bottomland chaparral.

Proposed by: Kagan, J. 1985. Phase II, National Natural Landmarks Project. Report to the National Park Service, United States Department of the Interior, page 16.

Evaluated in 1987: J.S. Kagan, Plant Ecologist-Coordinator, Oregon Natural Heritage Program and C.A. Macdonald, Director of Stewardship, Oregon Field Office; The Nature Conservancy, 1234 NW 25th Ave., Portland, OR 97210.

Evaluated in 2001: Michael Murray, Ecologist, Oregon Natural Heritage Program and J.S. Kagan, Plant Ecologist-Coordinator, Oregon Natural Heritage Program, 1322 SE Morrison St., Portland, OR 97214.

Evaluated in 2010: Recommended as a National Natural Landmark (Kagan, herein).

Designated:

Owner Agreement: