

# Ecological site group R006XG165WA

## Stony south aspect, 6000-7600 feet

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### Key Characteristics

None specified

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

### Physiography

Hierarchical Classification

Major Land Resource Area (MLRA): 6 – Cascade Mountains, East Slope

Land Resource Unit (LRU) – Common Resource Areas (CRA):

6.1 – North Cascades Subalpine/Alpine

6.2 – Pasayten/Sawtooth Highlands

6.3 – Okanogan Pine/Fir Hills

6.4 – Chelan Tephra Hills

6.5 – Chiwaukum Hills and Lowlands

Site Concept Narrative:

Diagnostics:

More than 80% of the landscape of MLRA 6 is forest. This site stands out because of a lack of trees.

Stony south aspect, 6,000 – 7,600 feet is an upland site at high elevations (6000-7600 feet) in the 25-35-inch precipitation zone in MLRA 6. This site is found on southeast and south to west aspects. Level areas and other aspects are forest. The soils are generally deep and stony. Sandy loam and loam are the main textures.

Stony south aspect, 6,000 – 7,600 feet is shrub steppe. This site is not dominated by one or two species like most ecological sites. Instead, dominance is shared by a complex of species – grasses, forbs, and grass-like species. Native forbs (especially lupine, buckwheat, paintbrush, yarrow), rhizomatous grasses (pinegrass, mountain brome), and mid-size bunchgrasses (prairie junegrass, slender wheatgrass, oatgrass, oniongrass) are co-dominant, while grass-like species (sedges and spiked woodrush), and short grasses (bluegrass species, alpine timothy), are also important to the reference plant community. The shrub layer is dominated by mountain sagebrush

Principle Vegetative Drivers:

The vegetative expression of this ecological site is driven by the combination of four factors:

- (1) Elevation between 6,000 and 7,600 feet and correspondently short growing season
- (2) 25-40 inches of precipitation
- (3) The southeast, and south to west aspects
- (4) Moderately deep to deep soils provide unrestricted rooting for most species
- (5) Timing and amount of late-May and June precipitation

Influencing Water Features:

A plant's ability to grow on a site and overall plant production is determined by soil-water-plant relationships

1. Whether rain and melting snow runs off-site or infiltrates into the soil
2. Whether soil condition remain aerobic or become saturated and become anaerobic
3. Water drainage and how quickly the soil reaches wilting point

With adequate cover of live plants and litter, there are no restrictions on Loamy sites with water infiltrating into the soil. These sites are well drained and are saturated for only a short period.

#### Physiography of MLRA 6:

Most of MLRA 6 is in the Northern and Middle Cascade Mountains. This mountainous area consists of sharp alpine summits with some higher volcanic cones to the west, and lower lying foothills to the east. Strongly sloping mountains and U-shaped valleys are dominant in the north, with eroded basalt plateaus more typical in the south. The East Slope of the Cascades is a transitional area between the moist, rugged Cascade Mountains to the west and the drier, lower lying Columbia Basalt Plateau to the east. MLRA 6 has some of the landforms typical of both mountains and plateaus.

Physiographic Division: Pacific Mountains

Physiographic Province: Cascade-Sierra Mountains

Physiographic Sections: Northern Cascade and Middle Cascade Mountains

Landscapes: Mountains

Landform: Sideslopes, shoulders, summits, benches

Elevation: Dominantly 5,000 to 8,400 feet

Central tendency: 6,000 to 7,600 feet

Slope: Total range: 2 to 90 percent

Central tendency: 20 to 50 percent

Aspect: Dominantly occurs on southerly aspects

#### Geology:

MLRA 6 consists of Pre-Cretaceous metamorphic rocks cut by younger igneous intrusives. Tilted blocks of marine shale, carbonate, and other sediments occur in the far north, and some younger continental, river-laid sediments occur around Leavenworth, WA. Columbia River basalt is dominant in the southern portion of the state. Alpine glaciation has left remnants of glacial till, debris, and outwash in the northern part of this MLRA.

### Climate

The climate across MLRA 6 is characterized by moderately cold, wet winters, and hot, dry summers, with limited precipitation due to the rain shadow effect of the Cascades. The average annual precipitation for most of the East Slope of the Cascades is 16-50 inches. Seventy-five to eighty percent of the precipitation comes late October through March as a mixture of rain and snow. The lowest precipitation occurs along the eastern edge, then increasing with rising elevation to the west. Most of the rainfall occurs as low-intensity, Pacific frontal storms during the winter, spring and fall. Rain turns to snow at the higher elevations. All areas receive snow in winter. Summers are relatively dry. The East Slopes experience greater temperature extremes and receive less precipitation than the west side of the Cascades. The shortest freeze-free periods occur along the western edge and the northern end of this MLRA, which are mountainous. The first snow generally comes by the 1st of September. Snowstorms through mid-October will melt but snow in late October and later stays.

Mean Annual Precipitation:

Range: 25-50 inches

Central tendency: 25 – 40 inches

Soil moisture regime is xeric

Mean Annual Air Temperature:

Range: 35 to 43 degrees

Central tendency: 38 to 41 degrees

Soil temperature regime is cryic

Frost-free period (days):

Total range: 50 to 90

Central tendency: 60 to 80

The growing season is early mid-June to early August.

## Soil features

Edaphic:

Stony south aspect, 6,000 – 7,600 feet ecological site commonly occurs with Shallow Stony, 6,000 – 7,600 feet and subalpine fir ecological sites.

Representative Soil Features:

This ecological site components are dominantly Andic and Vitrixerandic taxonomic subgroup of Humicryepts and Cryumbrepts great groups of the Inceptisols. Soils are dominantly moderately deep and deep. Average available water capacity of about 3.5 inches (8.9 cm) in the 0 to 40 inches (0-100 cm) depth range.

Soil parent material is dominantly mixed volcanic ash in the upper part of the soil over colluvium and residuum.

The associated soils are Bagmont, Crocamp, Darland and similar soils.

Dominant soil surface is very gravelly ashy loam to stony sandy loam.

Dominant particle-size class is loamy-skeletal.

Fragments on surface horizon > 3 inches (% Volume):

Minimum: 0

Maximum: 10

Average: 1

Fragments within surface horizon > 3 inches (% Volume):

Minimum: 0

Maximum: 30

Average: 15

Fragments within surface horizon ≤ 3 inches (% Volume):

Minimum: 5

Maximum: 30

Average: 15

Subsurface fragments > 3 inches (% Volume):

Minimum: 10

Maximum: 50

Average: 30

Subsurface fragments ≤ 3 inches (% Volume):

Minimum: 10

Maximum: 50

Average: 25

Drainage Class: Well drained

Water table depth: Greater than 60 inches

Flooding:

Frequency: None

Ponding:

Frequency: None

Saturated Hydraulic Conductivity Class:  
0 to 10 inches: Moderately high and high  
10 to 40 inches: Moderately high and high

Depth to root-restricting feature (inches):  
Minimum: 20  
Maximum: Greater than 60

Electrical Conductivity (dS/m):  
Minimum: 0  
Maximum: 0

Sodium Absorption Ratio:  
Minimum: 0  
Maximum: 0

Calcium Carbonate Equivalent (percent):  
Minimum: 0  
Maximum: 0

Soil Reaction (pH) (1:1 Water):  
0 - 10 inches: 5.1 to 7.3  
10 - 40 inches: 5.6 to 7.3

Available Water Capacity (inches, 0 – 40 inches depth):  
Minimum: 1.8  
Maximum: 6.7  
Average: 3.5

## **Vegetation dynamics**

Ecological Dynamics:  
Stony South Aspect, 6000-7600 feet produces about 800-1200 pounds/acre of biomass annually.

This site is not dominated by one or two species like most ecological sites. Instead, dominance is shared by a complex of species – grasses, forbs, and grass-like species. Native forbs (especially lupine, buckwheat, paintbrush, yarrow), rhizomatous grasses (pinegrass, mountain brome), and mid-size bunchgrasses (prairie junegrass, slender wheatgrass, oatgrass, oniongrass) share the dominant position, while short grasses (bluegrass species, alpine timothy), and grass-like species (sedges and spiked woodrush) are also important to the reference plant community. The shrub layer is dominated by mountain sagebrush

This complex of grasses, sedges and forbs provide a crucial and extensive network of roots to the soil profile. These roots create a massive underground source to stabilize the soils, provide organic matter and nutrients inputs, and help maintain soil pore space for water infiltration and water retention in the soil profile. The extensive rooting system of grasses, forbs and grass-like species fill the top two feet of the soil profile. The stability and resiliency of the reference communities is directly linked to this root-network.

At this elevation very few invasive grasses and broadleaf weeds are adapted, so altered states are not included in the State and Transition Model.

Stony South Aspect, 6000-7600 feet does not regularly burn in August and September as it is normally quite green during fire season. However, the mountain sagebrush, which tend to increase over time, is quite susceptible to a sudden sharp drop in temperatures in late fall or early winter if not covered by snow. These events, very temperature dependent, will reduce a stand of mountain sagebrush to less than 5% canopy

Grazing pressure can be defined as heavy grazing intensity, or frequent grazing during reproductive growth, or

season-long grazing (the same plants grazed more than once). Grazing pressure impacts Reference Community species composition.

The perennial bunchgrasses remain competitive if:

- (1) Basal buds are replaced annually,
- (2) Enough top-growth is maintained for growth and protection of growing points,
- (3) Idaho fescue and other seeding grasses make viable seed and
- (4) The timing of grazing and non-grazing is managed over a several-year period. Careful management of late spring grazing is especially critical

For more grazing management information refer to Range Technical Notes found in Section I Reference Lists of NRCS Field Office Technical Guide for Washington State.

In Washington, grass-forb-grass-like communities provide habitat for a variety of upland wildlife species.

Supporting Information:

Associated Sites:

Stony south aspect, 6,000 – 7,600 feet is associated with Shallow Stony 6000-7600 feet, Very Shallow and subalpine forest sites.

Similar sites:

Stony south aspect, 6,000 – 7,600 feet in MLRA 6 is similar in some respects and different in other respects.

Inventory Data References (narrative):

Data to populate Reference Community came from several sources: (1) NRCS ecological sites from 2004, (2) Soil Conservation Service range sites from 1980s and 1990s, (3) Daubenmire's habitat types, and (4) ecological systems from Natural Heritage

## **Major Land Resource Area**

MLRA 006X

Cascade Mountains, Eastern Slope

## **Stage**

Provisional

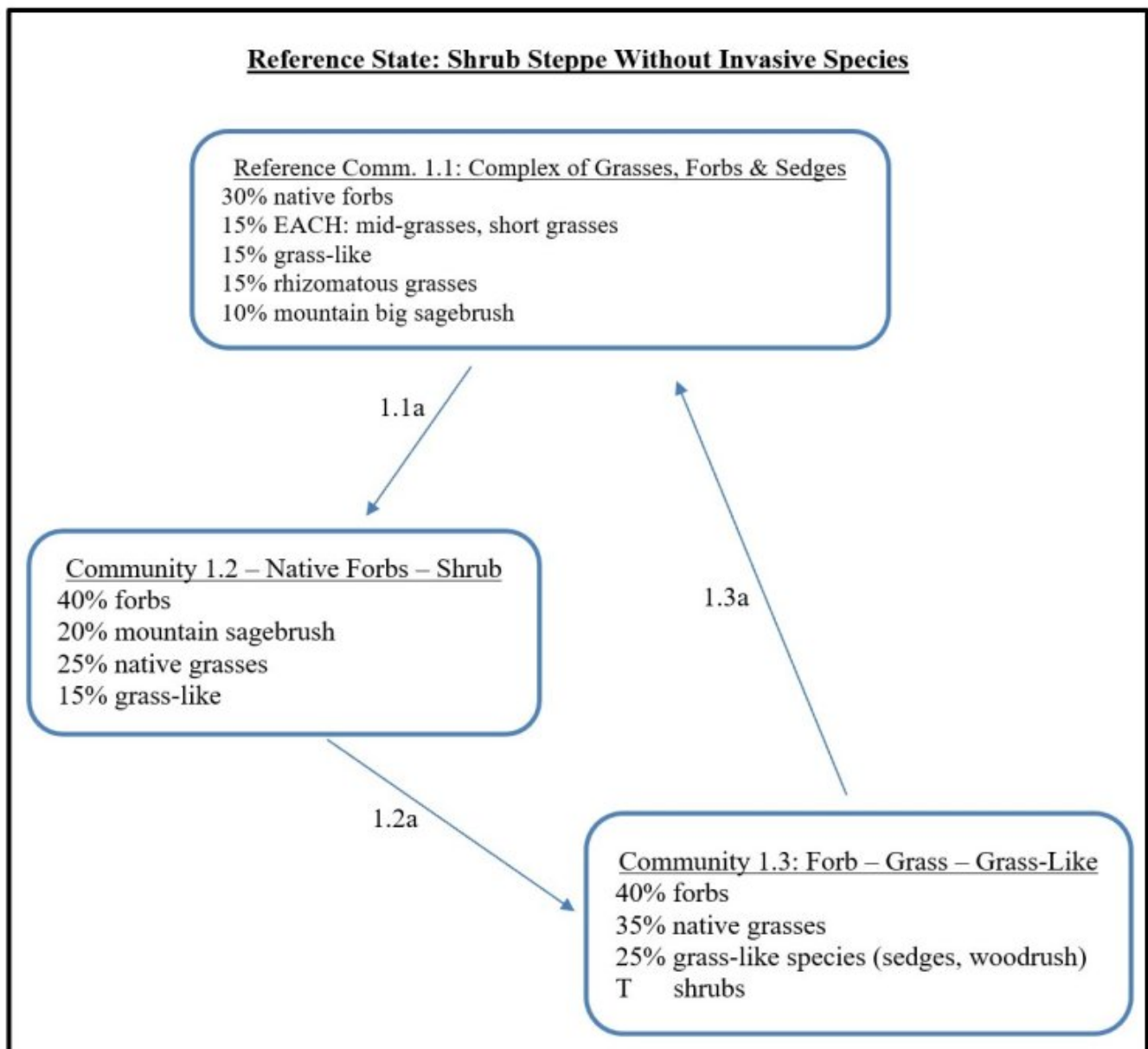
## **Contributors**

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## **State and transition model**

## State and Transition Diagram for Stony south aspect, 6,000 – 7,600 feet (MLRA 6):

This state and transition model (STM) explain the general ecological dynamics for the Stony South Aspect, 6000-7600 feet ecological site. The STM illustrates the common plant communities that can occur on the site. Boxes around each state represent the ecological threshold, which if crossed, is not reversible without human intervention. Arrows within a state represent the pathway between plant communities, while the arrows between states represent the transition or recovery between the states. Plant species composition is represented as a percentage of total annual production (pounds). The composition of pristine sites can vary somewhat due to variations in site conditions.



## **Reference Community 1.1 for Stony South Aspect, 6,000 – 7,600 feet (MLRA 6)**

Plant species composition is represented as a percentage of total annual production (pounds). The composition of pristine sites can vary somewhat due to variations in site conditions. Pounds listed below are the maximum allowable for Similarity Index. Many numbers have been rounded to not show more precision than our current state of knowledge.

Note: Stony South Aspect, 6000-7600 feet has shared dominance with a complex of native forbs, mid-size bunchgrasses and rhizomatous grasses all dominant, and with short grasses, and grass-like species also being important.

Similarity Index		Similarity Index	
<b>Non-Sprouting Shrub – Minor</b>		<b>Trees – Trace</b>	
(3-7% canopy) 10% 125 lbs.		PSME Douglas fir Trace	
ARTRV mountain big sagebrush			
<b>Dominant Mid-Size Bunchgrasses</b>			
20% 250 lbs.			
KOMA	prairie junegrass		
ELTR7	slender wheatgrass		
MEBU	oniongrass		
STIPA	needlegrass		
DAUN	one-spike oatgrass		
FEID	Idaho fescue.		
<b>Short Grasses – Subdominant</b>		<b>Dominant Rhizomatous Grass</b>	
15% 200 lbs.		20% 250 lbs.	
POA	bluegrass species 2x	CARU	pinegrass
PHAL	alpine timothy	BRMA4	mountain brome
		<b>Grass-Like – Subdominant</b>	
		15% 200 lbs.	
		CAREX	sedges
		LUSP4	spiked woodrush
<b>Dominant Native Forbs</b>		20% 250 lbs.	
BALSA	balsamroot	DELPH	larkspur
CALOC	lily – mariposa, sego	POTEN	cinquefoil
LUPIN	lupine	ORTHO	owl clover
ACMI2	yarrow	CASTI2	paintbrush
ERIOG	buckwheat species	ASTRA	milk vetch / locoweed
ERIGE2	fleabane	GEUM	prairie smoke
ANTEN	pussytoes	RAES	Eschscholtz's buttercup
PENST	penstemon	ANAR	Angelica
AGGL	pale agoseris	COLLO	collomia
HIERA	hawkweed	PLPA2	woolly plantain
CREPI	hawksbeard	PHLO2	longleaf phlox
PHHO	spiny phlox	LOMAT	lomatium / biscuitroot
LIPU11	granite gilia	LIRU4	stoneseed
FRPU2	yellow fritillary	TOVE	death camas
		Below	Normal
<b>Estimated Production (pounds / acre)</b>		800	1000
			Above
			1200

## **Reference State: Shrub Steppe Without Invasive Species**

State 1 Narrative: State 1 represents parkland with no invasive or exotic weed species. Each functional, structural group has one or more native species. Dominate Reference State Species: a complex of grasses, forbs, sedges and mountain big sagebrush share dominance. At-risk Communities: At high elevations (6000-7600 feet) invasive species are rare.

### **Community 1.1 Reference Community**

Complex of Grasses, Forbs & Sedges

### **Community 1.2 Native Forb – Shrub**

Native Forbs – Mtn. Big Sagebrush

### **Community 1.3 Forb – Grasse – Grass-Like**

Native Forbs & Grasses – Sedges

### **Pathway 1.1a Community 1.1 to 1.2**

1.1a Result: shift from Reference Community 1.1 to Community 1.2 Native Forbs – Shrub. Moderate reduction in bunchgrasses and a big increase in mountain sagebrush and unpalatable native forbs. Primary Trigger: grazing pressure (heavy grazing intensity, season long grazing or frequent critical period grazing) by cattle or pikas to a variety of native grasses. Ecological process: defoliation pressure to native grasses and other palatable species results in poor vigor and shrinking crowns. Shrubs and forbs gain the competitive edge, set new seedlings and expand. Indicators: increasing shrub canopy, increasing forb cover, and declining native bunchgrass cover.

### **Pathway 1.2a Community 1.2 to 1.3**

1.2 a Result: shift from native forbs – shrub Community 1.2 to Community 1.3 Forb – Grass – Grass-Like Primary Trigger: In late fall to early winter with limited snow cover and a sudden drop in temperature, sagebrush experiences a lot of mortality. Improved grazing management (proper intensity and timing) is necessary for native bunchgrasses to have a positive response. Ecological Process: The low temperatures kill the unprotected sagebrush and shrub canopy cover is reduced to less than 5%. Sound grazing management promotes improved vigor in the native bunchgrasses and grass-like species, which set new seedlings or establishes new shoots via tillering Indicators: increasing cover of native grasses and grass-like species. Forb cover remains consistent while shrubs are only a trace.

### **Pathway 1.3a Community 1.3 to 1.1**

1.3a Result: shift from forb – grass – grass-like Community 1.3 to the Reference Community complex of grasses, forbs & sedges. Primary Trigger: sound grazing practices in both intensity and timing promotes improved vigor for all native grasses. Ecological process: sound grazing practices in both intensity and timing promotes improved vigor for all native grasses. Shrubs re-enter the community gradually over time. Indicators: increasing cover of native grasses, declining cover of grass-like species and forbs, and shrubs re-entering the community. References: Boling M., Frazier B., Busacca, A., General Soil Map of Washington, Washington State University, 1998 Daubenmire, R., Steppe Vegetation of Washington, EB1446, March 1968 Davies, Kirk, Medusahead Dispersal and Establishment in Sagebrush Steppe Plant Communities, Rangeland Ecology & Management, 2008 Environmental Protection Agency, map of Level III and IV Ecoregions of Washington, June 2010 Miller, Baisan, Rose and Pacioretty, “Pre and Post Settlement Fire regimes in mountain Sagebrush communities: The Northern Intermountain Region Natural Resources Conservation Service, map of Common Resource Areas of Washington, 2003 Rapid Assessment

Reference Condition Model for Wyoming sagebrush, LANDFIRE project, 2008 Rocchio, Joseph & Crawford, Rex C., Ecological Systems of Washington State. A Guide to Identification. Washington State Department of Natural Resources, October 2015. Rouse, Gerald, MLRA 8 Ecological Sites as referenced from Natural Resources Conservation Service-Washington FOTG, 2004 Soil Conservation Service, Range Sites for MLRA 8 from 1980s and 1990s Tart, D., Kelley, P., and Schlafly, P., Rangeland Vegetation of the Yakima Indian reservation, August 1987, YIN Soil and Vegetation Survey

## **Citations**