Ecological site group R008XG980WA
Wet Meadow

Last updated: 09/21/2023
Accessed: 05/08/2024

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): 8 – Columbia Plateau

Land Resource Unit (LRU) – Common Resource Areas (CRA):
8.1 - Channeled Scablands
8.2 - Loess Islands
8.3 - Okanogan Drift Hills
8.4 - Moist Pleistocene Lake Basins
8.5 - Moist Yakima Folds
8.6 - Lower Snake and Clearwater Canyons
8.7 - Okanogan Valley

Site Concept Narrative:

In the upland setting ecological sites are often expansive, and thus, can be delineated and separated on aerial photos.

But in the landscape position of bottoms, basins and depressions this is rarely the case as small changes in soil chemistry, the water table and elevation or aspect results in significant changes in plant community composition. In short distances there are often big swings of available water holding capacity, and soils can go from hydric to non-hydric, or from saline-sodic to not. So, in bottoms, riparian areas and depressions, ecological sites and community phases occur as small spots, strips and patches, or as narrow rings around vernal ponds. And generally, in a matter of steps one can walk across several ecological sites. On any given site location, two or more of these sites often occur as a patchwork – Loamy Bottom, Alkali Terrace, Sodic Flat, Wet Meadow, Herbaceous Wetland and Riparian Woodland. These ecological sites may need to be mapped as a complex when doing resource inventory.

Diagnostics:
Wet Meadow sites have hydric soils and experience seasonal flooding. The water table drops 12-36 inches (approximation) during late spring and summer. Wet Meadow stands out because this ecological site is much wetter than adjacent upland sites. It is green in summer when the uplands are dry. This site is part of the lentic (standing water) ecosystem.

Wet Meadow occurs on non-saline or non-sodic bottoms, depressions, floodplains, channel shelves and terraces (first, stream, pond). This site also occurs as a zonal band near springs, lakes, perennial streams or intermittent streams with spring-fed reaches. Sites with perennial streams experience overbank flooding as a seasonal event in most years during late winter to early spring.

The soils are moderately deep to deep silt loam or sandy loam texture. Upper layer of soil profile is often deposited or captured from the current year's flood. The soils have mottling or greying high in the profile, and thus, are hydric. There are also redoximorphic features (color patterns) in the upper 20 inches.

Loamy Bottom, Wet Meadow, and Wetland Complex ecological sites, all bottomland sites, are home to different groups of plant species. Upland and facultative upland species (UPL & FACU) are found on Loamy Bottom. Wet Meadow is largely facultative wetland species (FACW), while Wetland complex is dominated by obligate wetland species (OBL).

The reference community is largely grass-sedge-rush with a few forbs. Shrubs are virtually nonexistent. Tufted hairgrass, slender wheatgrass, northern reedgrass, bluejoint, clustered field sedge, smallwing sedge and Baltic rush are important grass and grass-like species. Cinquefoil, iris, camas and sagewort are common forbs.

Principle Vegetative Drivers:
The vegetative expression of Wet Meadow is driven by the magnitude and duration of flooding and groundwater discharge. The water table level during mid- and late-season determines the production potential. Wet Meadow is far more productive and any upland site.

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 run off-site or infiltrate into the soil
2. Whether soil condition remain aerobic or become saturated and anaerobic
3. How quickly the soil reaches the wilting point

Wet Meadow experiences seasonal flooding and discharging groundwater from nearby uplands which creates saturated soil conditions in late winter to early spring. By late summer the water table may be as shallow as 12" or as deep as 36". (approximated)

Physiographic Features:
The landscape is part of the Columbia basalt plateau. This site is often associated with stream terraces and valleys having less than 3% gradient. Wet Meadow usually appears near bank full. This site also occurs as a zonal band near springs, lakes, perennial streams or intermittent streams with spring-fed reaches. Wet Meadow occurs on non-saline or non-sodic bottoms, depressions, floodplains, channel shelves and terraces (first, stream, pond). There are also Riparian Complex patches on draws, basins, depressions, and near ponds, lakes or springs. In the upland setting ecological sites are often expansive, and thus, can be delineated and separated on aerial photos. But in the landscape position of bottoms, basins and depressions this is rarely the case as small changes in soil chemistry, the water table and elevation or aspect results in significant changes in plant community composition. In short distances there are often big swings of available water holding capacity, and soils can go from hydric to non-hydric, or from saline-sodic to not. So, in bottoms, riparian areas and depressions, ecological sites and community phases occur as small spots, strips and patches, or as narrow rings around vernal ponds. Generally, in a matter of steps one can walk across several ecological sites. On any given site location, two or more of these sites occur as a patchwork – Loamy Bottom, Alkali Terrace, Sodic Flat, Wet Meadow, Wetland Complex and Riparian Complex. These ecological sites may need to be mapped as a complex when doing resource inventory.

Physiographic Division: Intermontane Plateau
Physiographic Province: Columbia Plateau
Physiographic Sections: Walla Walla Plateau Section

Landscapes: Valleys, plateaus and hills
Landform: depressions, floodplains and drainageways

Elevation: Dominantly 1,000 to 3,600 feet
Slope: Total range: 0 to 5 percent
Central tendency: 0 to 3 percent
Aspect: Occurs on all aspects

Geology:
This MLRA is almost entirely underlain by Miocene basalt flows. Columbia River basalt is covered in many areas with as much as 200 feet of loess and volcanic ash. Small areas of sandstones, siltstones, and conglomerates of the Upper Tertiary Ellensburg Formation are along the western edge of this area. Some Quaternary glacial drift covers the northern edge of the basalt flows, and some Miocene-Pliocene continental sedimentary deposits occur south of the Columbia River, in Oregon.

A wide expanse of scablands in the eastern portion of this MLRA, in Washington, was deeply dissected about 16,000 years ago, when an ice dam that formed ancient glacial Lake Missoula was breached several times, creating catastrophic floods. The geology of the northernmost part of this MLRA is distinctly different from that of the rest of the area. Alluvium, glacial outwash, and glacial drift fill the valley floor of the Okanogan River and the side valleys of tributary streams. The fault parallel with the valley separates pre-Tertiary metamorphic rocks on the west, in the Cascades, from older, pre-Cretaceous metamorphic rocks on the east, in the Northern Rocky Mountains. Mesozoic and Paleozoic sedimentary rocks cover the metamorphic rocks for most of the length of the valley on the west.

Climate

The climate is characterized by moderately cold, wet winters, and hot, dry summers, with limited precipitation due to the rain shadow effect of the Cascades. Taxonomic soil climate is either xeric (12 – 16 inches ppt.) or aridic moisture regimes (10 – 12 inches ppt.) with a mesic temperature regime.

Mean Annual Precipitation:
Range: 10 – 16 inches
Seventy to seventy-five percent of the precipitation comes late October through March as a mixture of rain and snow. June through early October is mostly dry.

Mean Annual Air Temperature:
Range: 44 to 54 F
Central Tendency: 48 – 52 F
Freezing temperatures generally occur from late-October through early-April. Temperature extremes are 0 degrees in winter and 110 degrees in summer. Winter fog is variable and often quite localized, as the fog settles on some areas but not others.

Frost-free Period (days):
Total range: 90 to 200
Central tendency: 110 to 160
The growing season for Wet Meadow is March through mid-August or later depending on water table.

Soil features

Edaphic:
Wet Meadow has deep, well drained to poorly drained soils formed in loess. Wet Meadow commonly occurs adjacent to Alkali Terrace, Sodic Flat, Loamy Bottom Herbaceous Wetland and Riparian Woodland, ecological sites. It also occurs near upland sites such as Loamy, Stony, and Cool Loamy.

Representative Soil Features:
This ecological site components are dominantly Cumulic, Typic and Fluvaquentic taxonomic subgroups of Haploxerolls, Endoaquolls and Vitraquands great groups of the Mollisols and Andisols taxonomic orders. Soils are dominantly very deep but can be as shallow as moderately deep. Average available water capacity of about 7 inches (17.8 cm) in the 0 to 40 inches (0-100 cm) depth range.

Soil parent material is dominantly mixed alluvium and loess with possible mixed ash.

The associated soils are Aquolls, Cocolalla, Haploxerolls, Konert, Munset, Toppenish and similar soils.

Dominate soil surface is silt loam to gravelly fine sandy loam, with ashy modifier sometimes occurring as well.

Dominant particle-size class is fine to fine-loamy but includes limited ashy.

Fragments on surface horizon > 3 inches (% Volume):
Minimum: 0
Maximum: 2

Fragments within surface horizon > 3 inches (% Volume):
Minimum: 0
Maximum: 10
Average: 1

Fragments within surface horizon ≤ 3 inches (% Volume):
Minimum: 0
Maximum: 30
Average: 5

Subsurface fragments > 3 inches (% Volume):
Minimum: 0
Maximum: 30
Average: 5

Subsurface fragments ≤ 3 inches (% Volume):
Minimum: 0
Maximum: 30
Average: 10

Drainage Class: Range from very poorly drained to moderately well drained.
Water table depth: 5 to 40 inches

Flooding:
Frequency: Rare to frequent

Ponding:
Frequency: None to frequent

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: 10

Sodium Absorption Ratio:
Minimum: 0
Maximum: 10

Calcium Carbonate Equivalent (percent):
Minimum: 0
Maximum: 5

Soil Reaction (pH) (1:1 Water):

0 - 10 inches: 5.6 to 8.4
10 - 40 inches: 5.6 to 9.0

Available Water Capacity (inches, 0 – 40 inches depth):
Minimum: 2.6
Maximum: 9.6
Average: 7

Vegetation dynamics

Ecological Dynamics:
Wet Meadow produces about 6000-7500 pounds/acre of biomass annually.

Regarding saline-alkali soils Daubenmire (page 50) wrote, “It seems impossible to find areas where one can be confident that the vegetation has not been somewhat altered by domesticated animals.” The same is also true of meadows, riparian areas and wetlands. Some areas were also manipulated by tillage or other farming practices.

Plant production at the site level and individual species level can vary greatly depending on soil properties (depth to permanent water table) and growing conditions (timing and amount of precipitation, temperature). This site, because of the permanent water table, provides a very favorable soil-water-plant relationship.

Northern reedgrass and bluejoint are perennial rhizomatous, cool season grasses of the Calamagrostis genus. Tufted hairgrass is a low, dense cool season bunchgrass that prefers poorly drained soil. Clustered field sedge plants are often dioecious, bearing male or female flowers but not both. Smallwing sedge has a dense cluster of green or brown spikes packed tightly. Baltic rush is the most common of the rushes found in the Intermountain West as it occurs in both salt and freshwater habitats.

Wet Meadow is dominated by grasses, sedges and rushes in the reference community. Wet Meadow remains green late into the season and rarely burns.

Grazing by big game and livestock is a common disturbance that occurs to this ecological site. Grazing pressure can be defined as heavy to severe grazing intensity, or frequent critical period (vulnerable time of reproductive growth) grazing, or season-long grazing. As grazing pressure increases the plant community unravels in stages:

1. Tufted hairgrass, bluejoint and other grasses decline while Baltic rush, silverweed cinquefoil and clustered field sedge increase.
2. With further decline, invasive species such as Kentucky bluegrass, Canada bluegrass, reed canarygrass, redtop, quackgrass and Canadian thistle increase and become co-dominant. Eventually these invasive species dominate the site.
3. Eventually all the reference state species are replaced by invasive species.

In Washington, Wet Meadow communities provide habitat for a variety of upland and wetland wildlife species.

Supporting Information:

Associated Sites:
Wet Meadow is associated with other ecological sites in bottoms and basin areas of MLRA 8, including Loamy Bottom, Alkali Terrace, Sodic Flat, Wetland Complex and Riparian Complex. Wet Meadow is also associated with upland sites such as Loamy, Stony, and Cool Loamy.

Similar Sites:
There is no similar ecological site at this time.

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 Program

Major Land Resource Area

MLRA 008X
Columbia Plateau

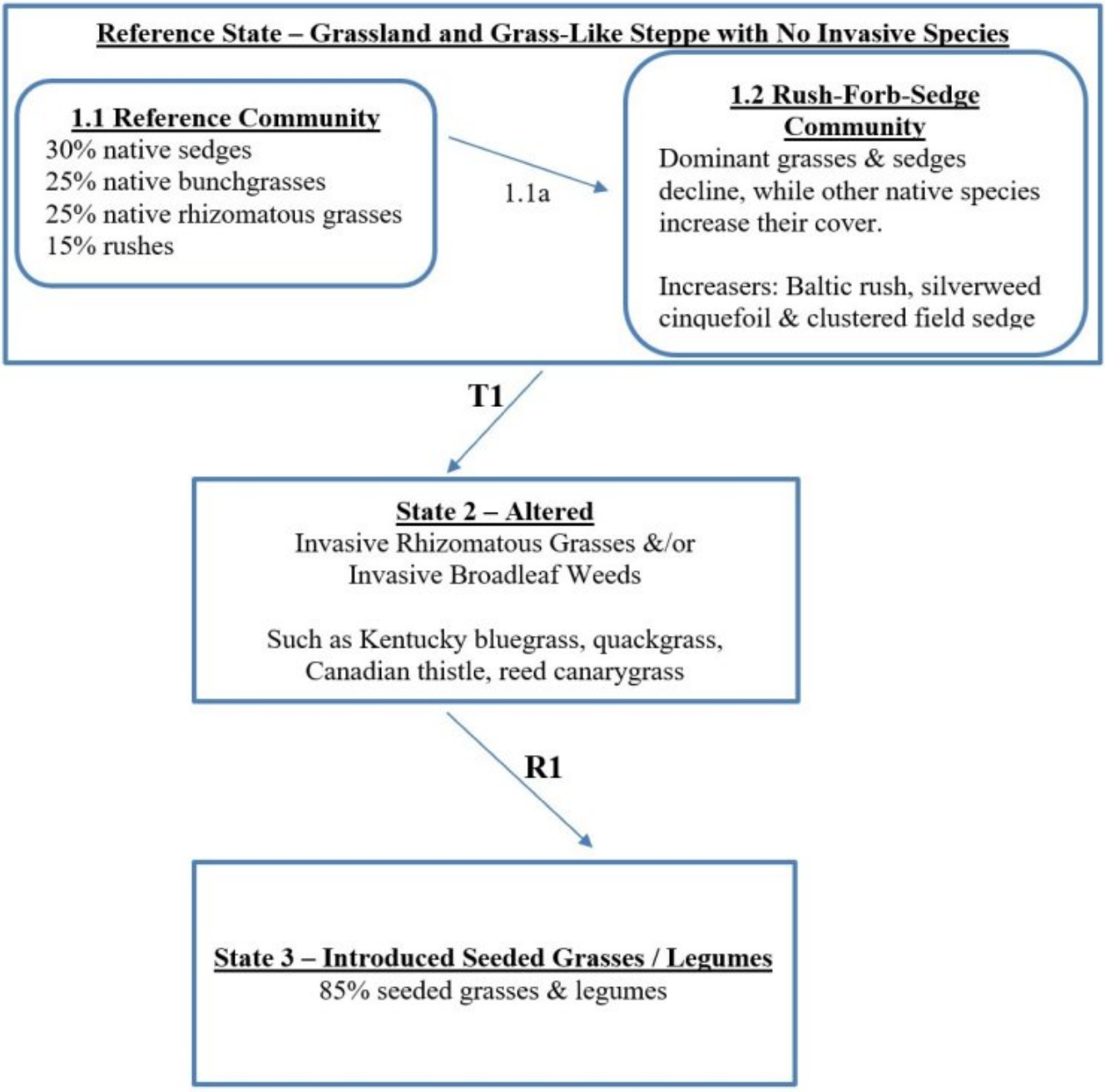
Stage

Provisional

State and transition model

State and Transition Diagram for Wet Meadow in MLRA 8:

This state and transition model (STM) explains the general ecological dynamics for the Wet Meadow 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.



RECONSTRUCTED Reference Community 1.1 for Wet Meadow

Percentages for plant species composition below are an approximated weight. 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: Many Wet Meadow sites have been through land use conversion to pasture&/or hay, or to cropland. Other Wet Meadow sites have been highly altered due to tillage, heavy grazing and other farming practices. The Reference Community below is a reconstruction. A Wet Meadow site in good condition would be mainly FACW species

	Similarity Index			Similarity Index
Native Shrubs – Minor	5-10%	750 lbs.	**Trees – Trace**	Trace
BEOC2 water birch			QUTR aspen	
ROWO Woods' rose				
SALIX willow				
Dominant Bunchgrasses	25%	1900 lbs.	**Native Annual Grasses – Trace**	Trace
DECE tufted hairgrass			HOBR2 meadow barley	
ELTR7 slender wheatgrass			HOJU foxtail barley	
Dominant Rhizomatous Grasses	20%	1500 lbs.		
CACA4 bluejoint				
CAST northern reedgrass				
Dominant Native Sedges	25%	1900 lbs.	**Native Rushes – Subdominant**	15% 1150 lbs.
CAPR5 clustered field sedge			JUEN swordleaf rush	
CAMI7 smallwing sedge			JULO longstyle rush	
			JUTE poverty rush	
			JUBA Baltic rush	
Native Forbs – Minor				5-10% 750 lbs.
ARAN7 silverweed cinquefoil			RUSA willow dock	
IRMI Rocky mountain iris			EPILO willowherb	
CAQU camas			GALIU bedstraw	
LYAS rough bugleweed			MIGO seep monkeyflower	
POGR9 seep cinquefoil				

	Below	Normal	Above
Estimated Production (pounds / acre)	4000	6000	7500

State 1
Reference Community

There may be few examples of good condition Wet Meadow remaining in MLRA 8, as most sites have been converted to other land uses or altered by farming practices. State 1 Narrative: State 1 represents Wet Meadow with no invasive or exotic weeds species. This has been reconstructed because there are few to no examples of pristine Wet Meadow remaining. Reference Community 1.1 is dominated by native bunchgrasses, sodforming grasses, and native sedges and rushes. Community 1.2 is mainly native increasers. Reference State Community Phases: 1.1 The main species are tufted hairgrass, slender wheatgrass, bluejoint, northern reedgrass, 1.2 the main

species are Baltic rush, silverweed cinquefoil, clustered field sedge, Rocky Mtn. iris, and camas At-risk Communities: All communities in the reference state are at risk because of heavy grazing pressure, tillage, and other human manipulations to meadows.

Community 1.1
Reference Community

1.1 The main species are tufted hairgrass, slender wheatgrass, bluejoint, northern reedgrass.

Community 1.2
Rush-Forb-Sedge Community

1.2 the main species are Baltic rush, silverweed cinquefoil, clustered field sedge, Rocky Mtn. iris, and camas

Pathway 1.1a
Community 1.1 to 1.2

1.1a Result: Shift from Reference Community 1.1 to Community 1.2 Rush-forb-Sedge Community Causes: Grazing pressure (heavy grazing or season long grazing) cause dominant species (native bunchgrasses, sodforming grasses, etc.) to decline while other native species increase (Baltic rush, silverweed cinquefoil and clustered field sedge). Ecological process: with consistent defoliation pressure native grasses have low vigor, shrinking crowns and some mortality. This gives native increasers the opportunity to expand their cover. Indicators: decreasing cover of native grasses and increasing cover of Baltic rush, silverweed cinquefoil, clustered field sedge.

State 2
Altered State

State 2 Narrative: State 2 represents communities of invasive species that have crossed a biological threshold. Virtually all the native functional, structural groups have been replaced. Common invasive grass species for State 2 include Kentucky bluegrass, Canada bluegrass, quackgrass, redtop and reed canarygrass. Invasive broadleaf weeds include Canada thistle, bull thistle, houndstongue. Community Phases for State 2: there is only one community in State 2

State 3
Seeded Grasses

State 3 Narrative: State 3 represents a site that has been seeded to desirable grasses &/or legumes. Common seeded species include orchard grass, tall fescues, smooth brome, intermediate wheatgrass, and legumes Pathways within State 3: there is only one community in State 3

Transition T1
State 1 to 2

Transitions from State to State T1 Result: Shift from Reference State with native species and no invasive species to State 2 which is dominated by invasive species. The plant community that has crossed a biological threshold. Virtually all the native functional, structural groups are missing. Primary Trigger: tillage, other farming practices and grazing pressure (heavy grazing or season-long grazing) to native grasses. The transition from State 1 to State 2 occurs as Community 1.2 declines until it crosses the biological threshold. Ecological process: with continued defoliation pressure native species have low vigor, shrinking crowns and mortality. This gives invasive species the opportunity to invade, then expand its cover and eventually become dominant. Indicators: the presence of invasive species where none has existed before. Declining cover for native species and increasing cover for invasive species.

Restoration pathway R1
State 2 to 3

R1 Transition from State 2 (a community dominated by invasive rhizomatous grasses and broadleaf weeds) to

State 3, which is predominately introduced grasses and legumes. This restoration transition does not occur without significant time and inputs to control weeds, prepare a seedbed, seed desirable species, and post-seeding weed control and management. This can require a commitment of two years or more for weed control. Care must be taken to maintain soil structure. Seed placement must be managed to achieve seed-soil contact at very shallow depth (about 1/8-1/4 inch is desired). Proper grazing management is essential to maintain the stand post-seeding. Species such as orchardgrass, tall fescue, intermediate wheatgrass and clovers are highly adapted to the Wet Meadow ecological site. The actual transition occurs when the seeded species have successfully established and are outcompeting the invasive species for cover and dominance of resources. 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. Pages 156-161 Inter-Mountain Basin Big Sagebrush. Rouse, Gerald, MLRA 8 Ecological Sites as referenced from Natural Resources Conservation Service-Washington FOTG, 2004 Rouse, Gerald, Wet Meadow 10-16 PZ, draft Provisional ESD, this was never completed, approved nor loaded onto FOTG, date unknown. 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