USDA Natural Resources Conservation Service

Ecological site F025XY064NV
Streambank Aspen

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General information

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.

MLRA notes

Major Land Resource Area (MLRA): 025X–Owyhee High Plateau

MLRA Notes 25—Owyhee High Plateau
This area is in Nevada (56 percent), Idaho (30 percent), Oregon (12 percent), and Utah (2 percent). It makes up about 27,443 square miles. MLRA 25 is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. The western boundary is marked by a gradual transition to the lower and warmer basins of MLRA 24. The boundary to the south-southeast, with MLRA 28B, is marked by gradual changes in geology marked by an increased dominance of singleleaf pinyon and Utah juniper and a reduced presence of Idaho fescue. The boundary to the north, with MLRA 11, is a rapid transition from the lava plateau topography to the lower elevation Snake River Plain.
Physiography:
All of this area lies within the Intermontane Plateaus. The southern half is in the Great Basin section of the Basin and Range province. This part of the MLRA is characterized by isolated, uplifted fault-block mountain ranges separated by narrow, aggraded desert plains. This geologically older terrain has been dissected by numerous streams draining to the Humboldt River.
The northern half of the area lies within the Columbia Plateaus province. This part of the MLRA forms the southern boundary of the extensive Columbia Plateau basalt flows. Most of the northern half is in the Payette section, but the northeast corner is in the Snake River Plain section. Deep, narrow canyons draining into the Snake River have been incised into this broad basalt plain. Elevation ranges from 3,000 to 7,550 feet on rolling plateaus and in gently sloping basins. It is more than 9,840 feet on some steep mountains. The Humboldt River crosses the southern half of this area
Geology:
The dominant rock types in this MLRA are volcanic. They include andesite, basalt, tuff, and rhyolite. In the north and west parts of the area, Cretaceous granitic rocks are exposed among Miocene volcanic rocks in mountains. A Mesozoic igneous and metamorphic rock complex dominates the south and east parts of the area. Upper and Lower Paleozoic calcareous sediments, including oceanic deposits, are exposed with limited extent in the mountains. Alluvial fan and basin fill sediments occur in the valleys.
Climate:
The average annual precipitation in most of this area is typically 11 to 22 inches. It increases to as much as 49 inches at the higher elevations. Rainfall occurs in spring and sporadically in summer. Precipitation occurs mainly as snow in winter. The precipitation is distributed fairly evenly throughout fall, winter, and spring. The amount of precipitation is lowest from midsummer to early autumn. The average annual temperature is 33 to 51 degrees F. The freeze-free period averages 130 days and ranges from 65 to 190 days, decreasing in length with elevation. It is typically less than 70 days in the mountains.
Water:
The supply of water from precipitation and streamflow is small and unreliable, except along the Owyhee, Bruneau, and Humboldt Rivers. Streamflow depends largely on accumulated snow in the mountains. Surface water from mountain runoff is generally of excellent quality and suitable for all uses. The basin fill sediments in the narrow alluvial valleys between the mountain ranges provide some ground water for irrigation. The alluvial deposits along the large streams have the most ground water. Based on measurements of water quality in similar deposits in

adjacent areas, the basin fill deposits probably contain moderately hard water. The water is suitable for almost all uses. The carbonate rocks in this area are considered aquifers, but they are little used. Springs are common along the edges of the limestone outcrops.
Soils:
The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic or frigid temperature regime and an aridic, aridic bordering on xeric, or xeric moisture regime. Soils with aquic moisture regimes are limited to drainage or spring areas, where moisture originates or runs on and through. These soils are of a very limited extent throughout the MLRA. They generally are well drained, clayey or loamy, and shallow or moderately deep. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam with ashy texture modifiers in some areas. Argillic horizons occur on the more stable landforms. They are exposed nearer the soil surface on convex landforms, where ash and loess deposits are more likely to erode. Soils that formed in carbonatic parent material in areas that receive less than 12 inches of precipitation are characterized by calcic horizons throughout the profile, while soils in areas that receive more than 12 inches of precipitation do not have calcic horizons in the upper part of the profile. Soils that formed on stable landforms at the lower elevations are dominated by ochric horizons. Soils that formed at the middle and upper elevations are characterized by mollic epipedons. Soils in drainage areas at all elevations that receive moisture running on or through them are characterized by thicker mollic epipedons.
Biological Resources:
This MLRA supports shrub-grass vegetation. Lower elevations are characterized by Wyoming big sagebrush associated with bluebunch wheatgrass, western wheatgrass, and Thurber’s needlegrass. Other important plants include bluegrass, squirreltail, penstemon, phlox, milkvetch, lupine, Indian paintbrush, aster, and rabbitbrush. Black sagebrush occurs but is less extensive. Singleleaf pinyon and Utah juniper occur in limited areas. With increasing elevation and precipitation, vast areas characterized by mountain big sagebrush or low sagebrush/early sagebrush in association with Idaho fescue, bluebunch wheatgrass, needlegrasses, and bluegrass become common. Snowberry, curl-leaf mountain mahogany, ceanothus, and juniper also occur. Mountains at the highest elevations support whitebark pine, Douglas-fir, limber pine, Engelmann spruce, subalpine fir, aspen, and curl-leaf mountain mahogany.
Major wildlife species include mule deer, bighorn sheep, pronghorn, mountain lion, coyote, bobcat, badger, river otter, mink, weasel, golden eagle, red-tailed hawk, ferruginous hawk, Swainson’s hawk, northern harrier, prairie falcon, kestrel, great horned owl, short-eared owl, long-eared owl, burrowing owl, pheasant, sage grouse, chukar, gray partridge, and California quail. Reptiles and amphibians include western racer, gopher snake, western rattlesnake, side-blotched lizard, western toad, and spotted frog. Fish species include bull, red band, and rainbow trout.

Ecological site concept

This site is on nearly level to gently sloping mountain basins and along mountain streams and terraces. Slopes range from 0 to 15 percent but are typically 2 to 4 percent. Elevations are 7000 to 8500 feet. The average growing season is 50 to 70 days.

Soils associated with this site are typically more than 60 inches deep and are usually somewhat poorly drained. The soils normally have a seasonally high water table within 40 to 60 inches of the surface. These soils have a thick, dark, medium textured surface layer. The underlying material is medium to moderately fine textured and is slightly acid to mildly alkaline in reaction.

The reference plant community is dominated by several quaking aspen clones, each with a common genetic makeup and individual phenological and physiological characteristics. Understory vegetative composition is about 60 percent grasses, 10 percent forbs and 30 percent shrubs and young trees when the average overstory canopy is medium (about 35 percent). Average understory production ranges from 1000 to 1600 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4½ feet of the ground surface. Overstory tree canopy composition is 100 percent quaking aspen. An overstory canopy cover of about 35 percent is assumed to be representative of tree dominance on this site in a natural environment.

Associated sites

R025XY003NV	**LOAMY BOTTOM 8-14 P.Z.** Loamy Bottom 8-14 is well drained and does not flood or pond. Dominant species are ARTRT/LECI4.

R025XY079NV	**STREAMBANK** Streambank is found on north aspects, MAAT is 3 to 6 degrees Celsius. Average precipitation is 21 to 30 inches. Dominant species are SALIX-PRVIM/ELTR7-PONE3-CAREX

Similar sites

R025XY079NV	**STREAMBANK** Streambank is found on north aspects, MAAT is 3 to 6 degrees Celsius. Average precipitation is 21 to 30 inches. Dominant species are SALIX-PRVIM/ELTR7-PONE3-CAREX
F025XY065NV	**Backslope Aspen** Backslope Aspen is found on mountain slopes.

Table 1. Dominant plant species

Tree	(1) *Populus tremuloides*
Shrub	(1) *Rosa woodsii*
Herbaceous	(1) *Poa secunda* (2) *Elymus trachycaulus*

Physiographic features

The Streambank Aspen site is on nearly level to gently sloping mountain streams, terraces, depressions and drainageways. Slopes range from 0 to 15 percent, but are typically 2 to 4 percent. Elevations are 7000 to 8500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Stream (2) Terrace (3) Drainageway (4) Depression
Runoff class	Low to very high
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	2,134–2,591 m
Slope	2–4%
Ponding depth	Not specified
Water table depth	15–76 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	Not specified
Slope	0–15%
Ponding depth	Not specified
Water table depth	Not specified

Climatic features

The climate associated with this site is semiarid, characterized by cold, moist winters and warm, dry summers. Mean annual air temperature is typically less than 45 degrees F. The average growing season is 50 to 70 days.

Mean annual precipitation across the range in which this ES occurs is 15 inches.

Monthly mean precipitation: January 1.65”; February 1.68”; March 1.98”; April 2.43”; May 2.41”; June 1.62”; July 0.61”; August 0.63”; September 0.84”; October 1.41”; November 1.51”; December 1.79”.

*The above data is averaged from the Jarbridge 4N and Lamoille PH WRCC climate stations and from the NASIS database.

Table 4. Representative climatic features

Frost-free period (characteristic range)	50-90 days
Freeze-free period (characteristic range)	60-100 days
Precipitation total (characteristic range)	356-432 mm
Frost-free period (actual range)	50-90 days
Freeze-free period (actual range)	60-100 days
Precipitation total (actual range)	330-508 mm
Frost-free period (average)	70 days
Freeze-free period (average)	90 days
Precipitation total (average)	381 mm

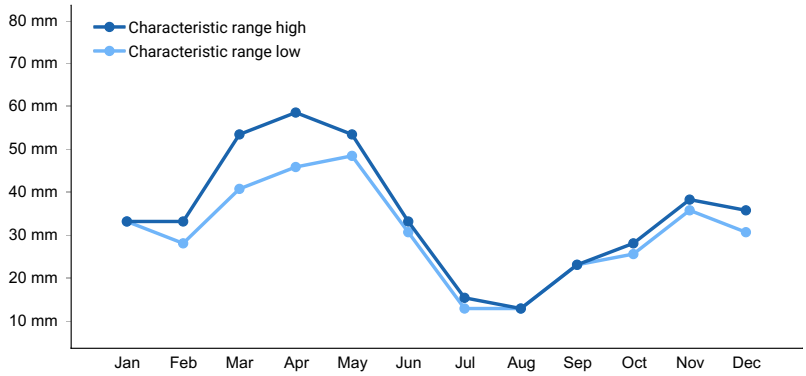


Figure 1. Monthly precipitation range

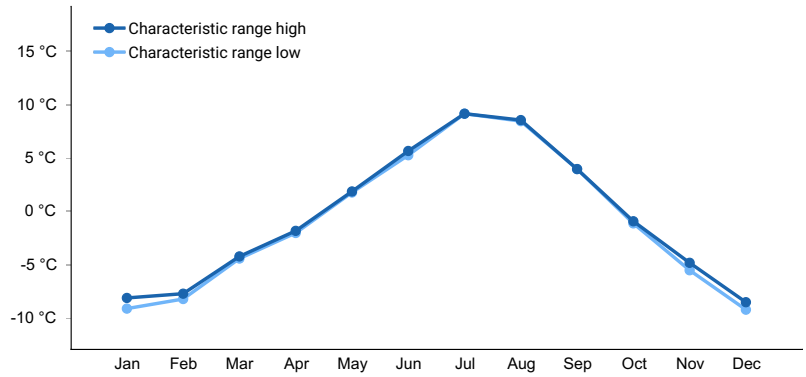


Figure 2. Monthly minimum temperature range

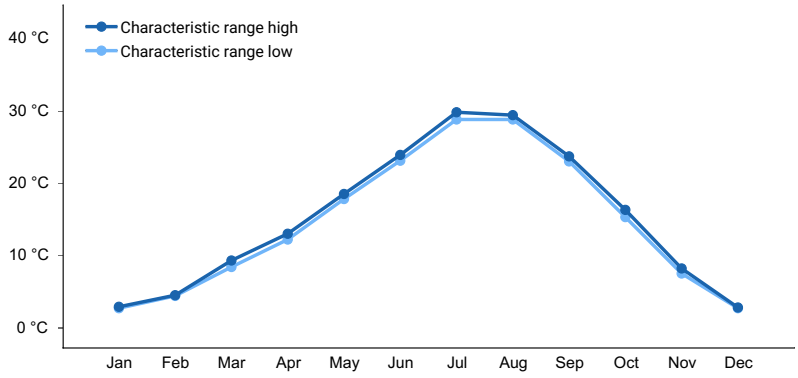


Figure 3. Monthly maximum temperature range

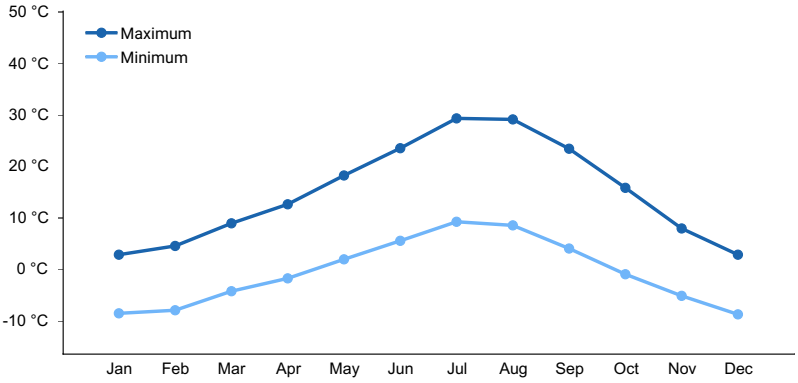


Figure 4. Monthly average minimum and maximum temperature

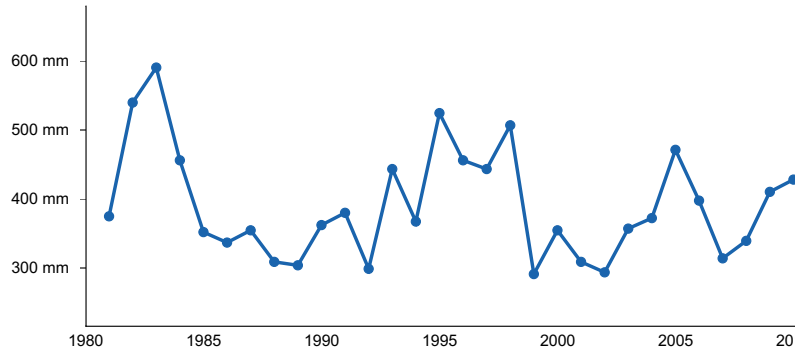


Figure 5. Annual precipitation pattern

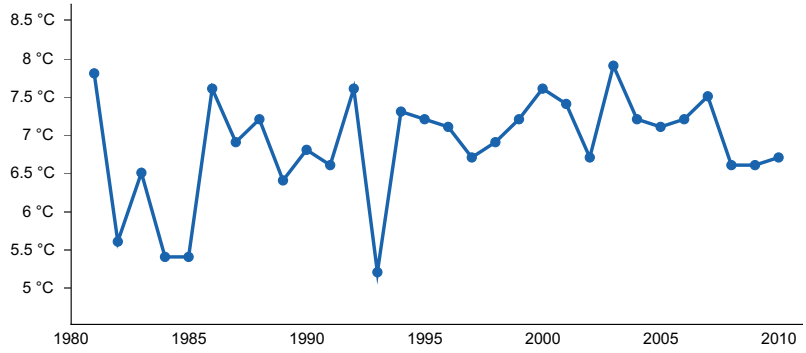


Figure 6. Annual average temperature pattern

Climate stations used

- (1) JARBIDGE 7 N [USC00264039], Jackpot, NV
- (2) LAMOILLE YOST [USC00264394], Spring Creek, NV

Influencing water features

This site is associated with perennial mountain streams.

Soil features

Soils associated with this site are typically greater than 60 inches (150 cm) deep and are typically somewhat poorly drained. The soils normally have a seasonally high water table within 40 to 60 inches (100 to 150 cm) of the surface. These soils have a thick, dark, surface horizon.
The subsoil texture is typically loam or sandy loam and is slightly acid to mildly alkaline in reaction. Available water capacity is high and surface runoff is very slow to medium depending on slope. The soils are susceptible to gullying which intercepts normal overflow patterns causing site degradation.

Soil series correlated to the ecological site are: Poppellen.

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Loam (3) Gravelly loam
Family particle size	(1) Sandy-skeletal (2) Loamy-skeletal
Drainage class	Somewhat poorly drained
Permeability class	Moderately slow to moderately rapid
Depth to restrictive layer	213 cm
Soil depth	183–213 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–5%
Available water capacity (0-152.4cm)	4.06–11.18 cm
Calcium carbonate equivalent (Depth not specified)	0–2%
Electrical conductivity (0-152.4cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-152.4cm)	0
Soil reaction (1:1 water) (0-152.4cm)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	12–35%
Subsurface fragment volume >3" (Depth not specified)	7–15%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	Not specified

Surface fragment cover >3"	Not specified
Available water capacity (0-152.4cm)	2.79–19.81 cm
Calcium carbonate equivalent (Depth not specified)	Not specified
Electrical conductivity (0-152.4cm)	Not specified
Sodium adsorption ratio (0-152.4cm)	Not specified
Soil reaction (1:1 water) (0-152.4cm)	Not specified
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Major Successional Stages of Forestland Development:

HERBACEOUS: Vegetation is dominated by grasses and forbs under full sunlight. This stage is experienced after a major disturbance such as fire, root-rot, insect damage, or tree harvest. Following a major disturbance, the root system gives rise to many root suckers, assuming the root system is intact and healthy. Residual trees left following harvest have little or no affect on the composition and production of the herbaceous vegetation.

SHRUB-HERBACEOUS: Herbaceous vegetation dominates the site. Quaking aspen suckers are evident. If the aspen stand is healthy, these first two stages will only last from one to two years. However, if competing brush and herbaceous plants grow for a full season before aspen suckers emerge, a reduction in growth and survival of aspen suckers may occur.

SAPLING: Early growth of quaking aspen suckers ranges from less than 1 foot to more than 3 feet per year for shoots having good competitive position. In the absence of disturbance, suckers develop into saplings (to 4½ feet in height) with a range in canopy cover of about 5 to 15 percent. Vegetation consists of grasses, forbs and a few shrubs in association with tree saplings.

POLE STAGE: As the canopy closes, trees stratify into crown classes quickly despite genetic uniformity within clones. Aspen stands are self-thinning, especially at young ages. This stage is characterized by rapid growth of the aspen trees, both in height and canopy. The visual aspect and vegetal structure are dominated by aspen ranging from about 10 to 20 feet in height, and having a diameter at breast height (DBH) of about 2 to 4 inches. Understory vegetation is moderately influenced by a tree canopy of about 15 to over 25 percent.

IMMATURE FORESTLAND: Growth of the aspen slows somewhat during this stage. There is a fairly continual adjustment of trees to growing space, and a loss in competitive position of many trees making up the codominant, intermediate, and overtopped classes. When competition becomes intense enough to appreciably affect the diameter growth of dominants, mortality quickly reduces the number of trees in the lower crown classes. When competition becomes intense enough to appreciably affect the diameter growth of dominants, mortality quickly reduces the number of trees in the lower crown classes. There are periodic surges in mortality, with a large number of trees dying within a short time. The visual aspect and vegetal structure are dominated by aspen mostly greater than 25 feet in height. Understory vegetation is moderately influenced by a tree overstory canopy of about 25 to over 50 percent.

MATURE FORESTLAND: Diameter growth shows strong recovery with reduced competition during this stage. The visual aspect and vegetal structure are dominated by single-storied aspen that have reached or are near maximal heights for the site. Tree heights range from 50 to 80 feet, depending upon site and clone genotype. Tree canopy cover ranges from 25 to about 40 percent. Trees have developed tall, straight, clear stems with short, narrow, dome-like crowns, that develop greater spread at the edge of the stand. Despite considerable forage production in

most aspen communities, the overstory trees do compete with the undergrowth plants for moisture, light, nutrients, and space. Vegetative shoots and/or saplings of aspen occur in the understory, but they are inconspicuous and have a high mortality rate.

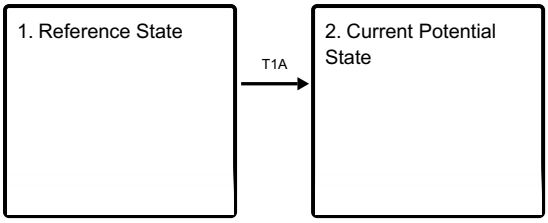
OVER-MATURE FORESTLAND: In the absence of wildfire or other naturally occurring disturbances, the tree canopy on this site can become somewhat dense. This stage is normally dominated by aspen that have reached maximal heights for the site. Trees have straight, clear stems with short, high-rounded crowns. In the absence of disturbance, over-mature, even-aged aspen stands slowly die. The canopy opens up, and otherwise inconspicuous aspen suckers survive and grow in the openings left by the aspen. These suckers typically arise over a period of several years and the resulting stand is broadly even-aged. If broadly even-aged stands reach old age without disturbance, their deterioration is likely to extend over a longer period than before because of the range of tree ages. That, in turn, will result in a longer regeneration period and a new stand with an even greater range of ages. If this continues over several generations, all-aged stands will result. Tree canopy cover is usually greater than 50 percent. Understory production is strongly influenced by the overstory, as is species composition. Shade tolerant forbs, grasses, and grass-like plants, will dominate the understory.

The amount and nature of the understory vegetation in a forestland is highly responsive to the amount and duration of shade provided by the overstory canopy. Significant changes in kinds and abundance of plants occur as the canopy changes. Some changes occur slowly and gradually as a result of normal changes in tree size and spacing. Other changes occur dramatically and quickly, following intensive forestland harvest, thinning, or fire.

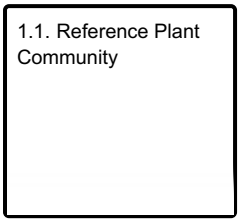
Fire effects:
The most important agent of disturbance in aspen forests before 1900 was fire, although other natural disturbances were locally important including windthrow, snow damage, hail, lightning, fungal diseases and insect damage. Most aspen forests in the West are seral and have been dependent upon fire for their perpetuation. If fire occurs at infrequent intervals (e.g. 50-150 years) and is intense enough to kill most of the aspen and competing conifers, them most aspen sites in the West will retain viable stands of aspen. Periodic wildfires prevent over-mature aspen stands and maintain a naturally stratified mosaic of even-aged aspen communities in various stages of successional development. Uneven-aged stands form under stable conditions where the overstory gradually disintegrates with disease or age, and is replaced by aspen suckers. Although aspen forests do not burn readily, aspen trees are extremely sensitive to fire. A severe fire will top-kill the aspen overstory and will stimulate abundant suckering. A severe fire also removes the duff and may kill roots. Repeated fires have a detrimental effect on site quality and can eliminate aspen from a site. Aspen is highly competitive on burned sites and has several adaptations to fire including the following: a) the thin bark has little heat resistance, and aspen is easily top-killed by fire, b) root systems of top-killed stems send up a profusion of sprouts for several years after fire, c) sprouts grow rapidly by extracting water, nutrients, and photosynthate from an extant root system, and may outcompete other woody vegetation, d)following fire, a new, even-aged quaking aspen stand can develop within a decade, and e) aspen is self-thinning and a mature forest of healthy trees can develop from dense sprouts. Wood’s rose is typically top-killed by fire. Wood’s rose is moderately fire tolerant and is usually favored by low-severity fire. It can persist after low to moderate severity fire because of its ability to sprout from undamaged or buried root crowns and rhizomes. The shallow root crowns of Wood’s rose are susceptible to injury, and populations consequently decrease following high-severity fire. It occasionally germinated from on-site and off-site seed sources after fire. Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur. Sandberg bluegrass usually increases after fire. The effects of fire on slender wheatgrass are dependent on its growth form. Tall, decadent plants with many leaves sustain the most fire damage, while those with short, sparse growth form, is the least likely to sustain damage to the root system during a fire.

State and transition model

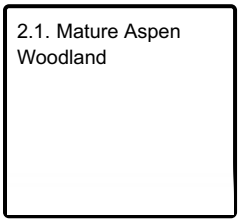
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The Reference State is a representative of the natural range of variability under pristine conditions. This site has a mature woodland phase. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic long-term drought and/or insect or disease attack.

Community 1.1
Reference Plant Community

The reference plant community is dominated by several quaking aspen clones, each with a common genetic makeup and individual phenological and physiological characteristics. Understory vegetative composition is about 60 percent grasses, 10 percent forbs and 30 percent shrubs and young trees when the average overstory canopy is medium (about 35 percent). Average understory production ranges from 1000 to 1600 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4½ feet of the ground surface. Overstory tree canopy composition is 100 percent quaking aspen. An overstory canopy cover of about 35 percent is assumed to be representative of tree dominance on this site in a natural environment.

Forest overstory. MATURE FORESTLAND: Diameter growth shows strong recovery with reduced competition during this stage. The visual aspect and vegetal structure are dominated by single-storied aspen that have reached or are near maximal heights for the site. Tree heights range from 50 to 80 feet, depending upon site and clone genotype. Tree canopy cover ranges from 25 to about 40 percent. Trees have developed tall, straight, clear stems with short, narrow, dome-like crowns, that develop greater spread at the edge of the stand. Despite considerable forage production in most aspen communities, the overstory trees do compete with the undergrowth plants for moisture, light, nutrients, and space. Vegetative shoots and/or saplings of aspen occur in the understory, but they are inconspicuous and have a high mortality rate.

Forest understory. Wood's rose and willow are the principal understory shrubs. Nevada bluegrass, sedges, slender wheatgrass, mountain brome, groundsel, yarrow, and meadowrue are common understory species associated with this site.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	673	874	1076
Shrub/Vine	269	350	430
Forb	112	146	179
Tree	67	87	108
Total	**1121**	**1457**	**1793**

Table 8. Ground cover

Tree foliar cover	10-15%
Shrub/vine/liana foliar cover	5-10%
Grass/grasslike foliar cover	10-20%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	50-70%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-15%

Table 9. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-1%	0-2%
>0.15 <= 0.3	–	–	1-5%	1-5%
>0.3 <= 0.6	–	1-5%	5-10%	5-10%
>0.6 <= 1.4	5-10%	5-10%	1-5%	1-5%
>1.4 <= 4	5-10%	0-1%	–	–
>4 <= 12	5-10%	–	–	–
>12 <= 24	10-20%	–	–	–
>24 <= 37	0-1%	–	–	–
>37	–	–	–	–

State 2
Current Potential State

This state is similar to the Reference State with four similar community phases. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Community 2.1
Mature Aspen Woodland

This community phase is similar to the Reference State Community Phase 1.1, with the presence of non-native species in trace amounts such as common dandelion and cheatgrass. The visual aspect and vegetal structure are dominated by single-storied aspen that have reached or are near maximal heights for the site. Tree heights range from 60 to 80 feet, depending upon site. Tree canopy cover ranges from 25 to about 35 percent. Despite considerable understory forage production, the overstory trees do compete with the undergrowth plants for moisture, light, nutrients, and space. Vegetative shoots and/or saplings of aspen occur in the understory, but they are inconspicuous and have a high mortality rate.

Transition T1A
State 1 to 2

Trigger: This transition is caused by the introduction of non-native annual plants, such as Kentucky bluegrass, thistles and common dandelion. Slow variables: Over time the annual non-native species will increase within the community. Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses/Grasslikes**			583–1224	
	sedge	CAREX	*Carex*	146–350	–
	mountain brome	BRMA4	*Bromus marginatus*	73–131	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	73–131	–
	rush	JUNCU	*Juncus*	73–131	–
	bluegrass	POA	*Poa*	73–131	–
2	**Secondary Perennial Grasses**			15–73	
	Kentucky bluegrass	POPR	*Poa pratensis*	15–73	–
Forb					
3	**Perennial**			57–248	
	columbine	AQUIL	*Aquilegia*	15–73	–
	ragwort	SENEC	*Senecio*	15–73	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	15–73	–
	yarrow	ACHIL	*Achillea*	7–15	–
	angelica	ANGEL	*Angelica*	7–15	–
Shrub/Vine					
4	**Primary Shrubs**			15–350	
	Woods' rose	ROWO	*Rosa woodsii*	146–350	–
	yarrow	ACHIL	*Achillea*	15–73	–
	angelica	ANGEL	*Angelica*	15–73	–
	columbine	AQUIL	*Aquilegia*	15–73	–
5	**Secondary Shrubs**			29–146	
	currant	RIBES	*Ribes*	15–73	–
	willow	SALIX	*Salix*	15–73	–
Tree					
6	**Deciduous**			73–131	
	quaking aspen	POTR5	*Populus tremuloides*	73–131	–

Animal community

Livestock Interpretations:
This site is suited to cattle and sheep grazing during the summer and early fall. Livestock use aspen types for forage and shade. Cattle select for mountain brome, slender wheatgrass, and other forage grasses while sheep select for bluegrasses, meadowrue and forbs.

Browsing has a direct impact on aspen. Through the early sapling stage, browsing reduces aspen growth, vigor and numbers. Heavy browsing by sheep or deer can eliminate aspen sucker regeneration. Suckers can be drastically reduced or eliminated by big game browsing on winter ranges. Sheep browse the aspen with increasing pressure through late summer and early fall. Browsing is incidental to grazing by cattle. If grazing is light to moderate, the effect on aspen will be also. This, however, is less true for sheep and wild ungulates. Grazing management should allow aspen saplings to attain a minimum height of 55 to 60 inches before use to prevent destructive browsing by livestock.

Harvesting trees under a sound management program can open up the tree canopy to allow increased production of understory species desirable for grazing and browsing.

Stocking rates vary with such factors as kind and class of grazing animal, season of use and fluctuations in climate. Actual use records for individual sites, a determination of the degree to which the sites have been grazed, and an evaluation of trend in site condition offer the most reliable basis for developing initial stocking rates.

The forage value rating is not an ecological evaluation of the understory as is the range condition rating for rangeland. The forage value rating is a utilitarian rating of the existing understory plants for use by specific kinds of grazing animals.

The amount and nature of the understory vegetation in a forestland is highly responsive to the amount and duration of shade provided by the overstory canopy. Significant changes in kinds and abundance of plants occur as the canopy changes, often regardless of grazing use.

Wildlife Interpretations:
The aspen community is important habitat for many species of birds and mammals, especially where it is associated with free flowing streams. Mule deer and elk use aspen woodlands mostly in summer and fall for browse, thermal and hiding cover. Commonly associated birds using aspen during breeding season include the Western tanager, common nighthawk, mourning dove, Swainson's hawk and various species of bluebird, thrush and flycatcher. Birds using aspen during the wintering season include the Ruby-crowned kinglet, Townsend's solitaire, rough-legged hawk, Cooper's hawk, sharp-shinned hawk, and various species of finch and waxwing. Birds that use aspen either yearlong or as migrants, include the American robin, American kestrel, mountain chickadee, scrub jay, yellow-bellied sapsucker, long-eared owl, screech owl, great-horned owl, California quail, red-tailed hawk, golden eagle, and various species of sparrow, nuthatch and woodpecker. Commonly associated mammals using the aspen community type include various species of shrew, myotis, bat, mouse and vole. Some very common species include deer mouse, Nuttall's cottontail, least chipmunk, Western gray squirrel, bushy-tailed woodrat, raccoon, long-tailed weasel and the North American porcupine.

Hydrological functions

A well stocked aspen stand provides excellent watershed protection. A mixture of herbaceous and woody root systems penetrate and anchor the soil. Erosion producing overland flow is almost non-existent. The hydrologic cover condition of this site is good in a representative stand. The average runoff curve is about 80 for group D soils.

Recreational uses

Aesthetic value is derived from the rich hues and textures of the aspen trees, particularly in the fall. The diverse flora and fauna, and the colorful wildflowers in the summer enhance the beauty of this site. The site offers rewarding opportunities to photographers and for nature study. It has high value for hunting, camping, picnicking, cross country skiing and family wood gathering.

Wood products

Historically, quaking aspen has been used for mine props, posts, bridge planking, flooring, furniture and fuelwood. This tree has a considerable potential for increased utilization. It makes excellent pulp, excelsior, door corestock, paper, particleboard, matchsticks, structural flakeboard, lumber products and boxwood.

PRODUCTIVE CAPACITY

This site has moderate to moderately low site quality for tree production. Site indexes for quaking aspen range from 45 to 55 (Baker, 1925).

Productivity class: Quaking aspen - 2
CMAI*: 20 to 28 ft3/ac/yr
1.4 to 2.0 m3/ha/yr
*CMAI: is the culmination of mean annual increment or highest average growth rate of the stand in the units specified.

Saw timber: About 400 board ft/ac for stands averaging 6 inches at breast height (USDA Technical Bulletin 1291, Table 17).

Basal Area: About 115 square feet/acre for stands averaging 6 inches in diameter at breast height (USDA Technical Bulletin 1291, Table 17).

Fuelwood Production: About 17 cords per acre of quaking aspen in stands averaging 6 inches in diameter at breast height and 100 years in age (USDA Technical Bulletin 1291, Table 17). There are about 203,000 gross British Thermal Units (BTUs) heat content per cubic foot of quaking aspen wood. Firewood is commonly measured by the cord, or a stacked unit equivalent to 128 cubic feet. Solid wood volume in a cord varies, but assuming an average of 75 cubic feet of solid wood per cord, there are about 15 million BTUs of heat value in a cord of quaking aspen wood.

MANAGEMENT GUIDES AND INTERPRETATIONS

1. LIMITATIONS AND CONSIDERATIONS
a. Soil compaction and erosion hazards are greatest if logging is done with heavy equipment when soils are saturated in late spring or early summer. Logging at this time is most damaging to aspen roots, which can reduce suckering. Because root carbohydrate reserves are lowest in spring, harvesting at this time can further reduce sprouting.
b. Proper spacing is the key to a well managed, multiple use and multi-product aspen forestland.
c. To begin short-rotation management, older stands with larger trees need to be harvested.
d. Cut residual, unmerchantable, trees to stimulate maximum sucker regeneration and rapid development of a replacement stand – thin resulting sucker stands.

2. ESSENTIAL REQUIREMENTS
a. Adequately protect from high intensity wildfire.
b. Protect soils from accelerated erosion.
c. Apply proper grazing management.

3. SILVICULTURAL PRACTICES
a. Harvest Cutting: Selectively harvest surplus trees to achieve desired spacing. Harvest stands in small blocks of 1/5 to 1/2 acre with slash left in place to shelter emerging aspen suckers from browsing.
1) Clear-Cutting - Clear-cutting is appropriate when the primary management objective is sustained production of forest products, either saw timber or fiber. Cutting sub-merchantable stems along with the merchantable ones will maximize sucker production, minimize the presence of diseased or defective growing stock in the new stand, and avoid suppression of the new crop by residual overstory stems.
2) Partial Cutting - Partial cutting may be feasible in some uneven-aged stands where management objectives require vertical canopy diversity or retention of some overstory; partial cutting may result in enough sprouting to adequately regenerate stands. Individual tree or group selection cutting methods can be applied. Extreme care is necessary to avoid injury to residual stems during logging. Partial cutting is not worthwhile in deteriorated aspen clones where root system die back has reduced suckering.
3) Selective Tree Removal: Remove selected trees on suitable sites to enhance forage production and manage site reproduction.
b. Thinning - Ordinarily, only stands on saw timber sites should be thinned. Pre-commercial thinning may be uneconomical as the low productivity of this site would not justify thinning costs.
c. Protection from Disease - There are no proven forest stand treatments that successfully prevent or control disease in aspen. Maintenance of well-stocked stands, minimizing wounding of stems and control of damaging agents, and harvesting at the proper rotation age are the best management recommendations that can be made today.
d. Protection from Insects - Direct control of insects in aspen forests has not been practical. The environmental side-effects from chemical pesticide spraying usually has not been acceptable in the aspen ecosystem. Maintenance of a well-stocked stand and protection from wounding is the most practical method of coping with insects in the aspen forest.
e. Protection from Mammals - Domestic livestock, wild ungulates, porcupines, rodents and hares utilize aspen as food and can have measurable impacts on some stands. Most animal damage can be prevented by careful husbandry of domestic livestock and by population control of wild game. Because most aspen stands are grazed by cattle and/or sheep and have a significant population of wild ungulates, grazing management and game management are important to aspen communities.
f. Fire Management - Fire is a natural feature of the aspen ecosystem. Fire is considered responsible for the

abundance of aspen in the west as well as the even-aged structure of many stands. Without human intervention, fire appears to be necessary for the continued well-being of aspen on sites where natural degeneration of the clone occurs, or where insects or pests are especially harmful to the stand. Fires in aspen generally are infrequent, spread slowly and are of low intensity. Although aspen forests do not burn readily, aspen trees are extremely sensitive to fire. Even very light fires will kill aspen because the bark is thin and green, and lacks protective corky layers. Moderate intensity fire that kills most or all the overstory will stimulate adequate suckering and will have the least effect on subsequent sucker growth.

Other products

Quaking aspen is widely used in ornamental landscaping.

Other information

Aspens are unique in their ability to stabilize soil and watersheds. Fire-killed stands are promptly revegetated by root sprouts(suckers). Wide adaptability of quaking aspen makes it well-suited for restoration and rehabilitation projects on a wide range of sites.

Table 11. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
quaking aspen	*POTR5*	45	55	20	28	–	–	–	

Inventory data references

Physiographic and soils features were gathered from NASIS database.

Type locality

Location 1: Elko County, NV	
Township/Range/Section	T43N R61E S19
General legal description	About 12 air miles south of the Gilmer Ranch, west fork of Deer Creek, O'Neil Basin area, Elko County, Nevada.

Other references

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Contributors

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Approval

Kendra Moseley, 4/24/2024

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/19/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**