USDA Natural Resources Conservation Service

Ecological site F047XA512UT
High Mountain Loam (Douglas-fir)

Last updated: 2/05/2025
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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): 047X–Wasatch and Uinta Mountains

MLRA 47 occurs in Utah (86 percent), Wyoming (8 percent), Colorado (4 percent), and Idaho (2 percent). It encompasses approximately 23,825 square miles (61,740 square kilometers). The northern half of this area is in the Middle Rocky Mountains Province of the Rocky Mountain System. The southern half is in the High Plateaus of the Utah Section of the Colorado Plateaus Province of the Intermontane Plateaus. Parts of the western edge of this MLRA are in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The MLRA includes the Wasatch Mountains, which trend north and south, and the Uinta Mountains, which trend east and west. The steeply sloping, precipitous Wasatch Mountains have narrow crests and deep valleys. Active faulting and erosion are a dominant force in controlling the geomorphology of the area. The Uinta Mountains have a broad, gently arching, elongated shape. Structurally, they consist of a broadly folded anticline that has an erosion-resistant quartzite core. The Wasatch and Uinta Mountains have an elevation of 4,900 to about 13,500 feet (1,495 to 4,115 meters).

The mountains in this area are primarily fault blocks that have been tilted up. Alluvial fans at the base of the mountains are recharge zones for the basin fill aquifers. An ancient shoreline of historic Bonneville Lake is evident on the foot slopes along the western edge of the area. Rocks exposed in the mountains are mostly Mesozoic and Paleozoic sediments, but Precambrian rocks are exposed in the Uinta Mountains. The Uinta Mountains are one of the few ranges in the United States that are oriented west to east. The southern Wasatch Mountains consist of Tertiary volcanic rocks occurring as extrusive lava and intrusive crystalline rocks.

The average precipitation is from 8 to 16 inches (203 to 406 mm) in the valleys and can range up to 73 inches (1854 mm) in the mountains. In the northern and western portions of the MLRA, peak precipitation occurs in the winter months. The southern and eastern portions have a greater incidence of high-intensity summer thunderstorms; hence, a significant amount of precipitation occurs during the summer months. The average annual temperature is 30 to 50 degrees F (-1 to 15 C). The freeze-free period averages 140 days and ranges from 60 to 220 days, generally decreasing in length with increasing elevation.

The dominant soil orders in this MLRA are Aridisols, Entisols, Inceptisols, and Mollisols. The lower elevations are dominated by a frigid temperature regime, while the higher elevations experience cryic temperature regimes. Mesic temperature regimes come in on the lower elevations and south facing slopes in the southern portion of this MLRA. The soil moisture regime is typically xeric in the northern part of the MLRA, but grades to ustic in the extreme eastern and southern parts. The minerology is generally mixed and the soils are very shallow to very deep, generally-well drained, and loamy or loamy–skeletal.

Ecological site concept

The soils of this site are typically moderately deep and well-drained. They formed in colluvium and residium derived mainly from limestone, sandstone, shale, and quartzite. This site is correlated to both rocky and non-rocky soils, therefore rock fragments may occur on the soil surface and throughout the soil profile in some cases. pH is slightly acidic to mildly alkaline and available water-holding capacity ranges from 3.4 to 5.6 inches of water in the upper 40 inches of soil. The soil moisture regime for this site have been mapped as udic and the soil temperature regime is cryic.

Associated sites

F047XA508UT	**High Mountain Loam (quaking aspen)**
R047XA516UT	**High Mountain Loam (mountain big sagebrush)**
R047XA560UT	**High Mountain Gravelly Loam (mountain big sagebrush)**

Similar sites

F047XA532UT	**High Mountain Stony Loam (Douglas-fir)**
R047XA526UT	**High Mountain Shallow Loam (Douglas-fir)**

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii*
Shrub	(1) *Juniperus communis* (2) *Amelanchier alnifolia*
Herbaceous	(1) *Carex rossii* (2) *Elymus glaucus*

Physiographic features

The High Mountain Loam (Douglas Fir) ecological site typically occurs on sloping to very steep mountain slopes and mountains. Slopes normally range from 10 to 60 percent but may occasionally be steeper. Slope, aspect and elevation will influence the vegetative floristics of this site. Elevation ranges between 6,200 to 9,400 feet. Runoff is medium to high.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Mountain
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	6,200–9,400 ft
Slope	10–60%
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by cold, snowy winters and cool summers. The average annual precipitation ranges from 24 to 34 inches. October thru April, are typically the wettest months with June thru August being the driest. The most reliable sources of moisture for plant growth are the snow that accumulates over the winter and spring rains. Summer thunderstorms are intermittent and sporadic in nature, and thus, are less reliable sources of moisture to support vegetative growth on this site. The typical mean annual air temperature ranges from 31 to 45 degrees Fahrenheit.

Table 3. Representative climatic features

Frost-free period (characteristic range)	55-79 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	
Frost-free period (average)	70 days

Freeze-free period (average)	110 days
Precipitation total (average)	30 in

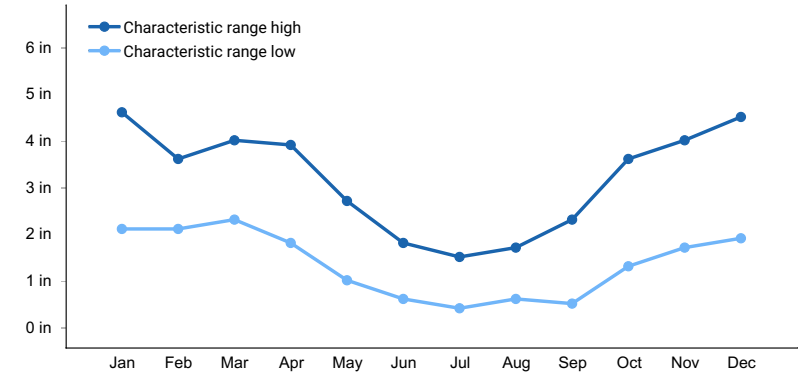


Figure 1. Monthly precipitation range

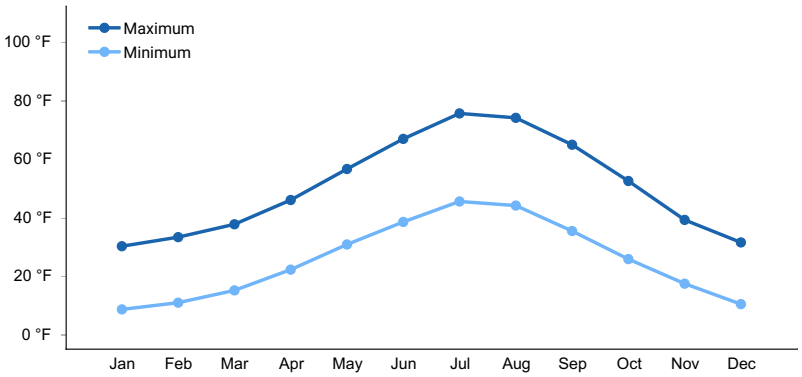


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features on this site.

Wetland description

N/A

Soil features

The soils are typically moderately deep and well-drained. They formed in colluvium and residuum derived mainly from limestone, sandstone, and shale. This site is correlated to both rocky and non-rocky soils, therefore rock fragments may occur on the soil surface and throughout the soil profile in some cases. pH is slightly acidic to mildly alkaline and available water-holding capacity ranges from 3.4 to 5.6 inches of water in the upper 40 inches of soil. The soil moisture regime for this site have been mapped as udic and the soil temperature regimes is cryic.

The following soil series have been correlated to this ecological site:
Soil Survey Area:
Cache Valley Area (UT603); Bickmore, Cluff, Dateman.
Rich County (UT604); Hourglass, Scout.
Salt Lake Area (UT612); Dateman.
Carbon Area (UT616); Senchert, Toze.
Henry's Fork Area (WY638); Condie,
Hoodle, Lail, Namon.
Duchesne Area (UT013); Hensnest, Gilluly, Northorn, Tingey.

Typical Profile: (Dateman).

A1-0-14 inches; brown (10YR5/3); cobbly silt loam; pH-neutral (7.2).
A2-14-24 inches; brown (10YR5/3); extremely cobbly silt loam (70 percent cobbles); pH-neutral (7.2).
Bt-24-34 inches; brown (10YR5/3); very cobbly silt loam (40 to 50 percent cobbles); pH-mildly alkaline (7.4).
R-34 inches; Fractures weathering limestone.

Table 4. Representative soil features

Parent material	(1) Colluvium–limestone, sandstone, and shale (2) Residuum–limestone, sandstone, and shale
Surface texture	(1) Cobbly silt loam (2) Loam (3) Silt loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	20–40 in
Soil depth	20–40 in
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–17%
Available water capacity (0-40in)	3.4–5.6 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–1 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.6–7.3
Subsurface fragment volume <=3" (0-40in)	5–25%
Subsurface fragment volume >3" (0-40in)	3–32%

Ecological dynamics

This ecological site occurs in the Wasatch Mountains Unit of the Middle Rocky Mountains Province of the Rocky Mountain System and evolved under all the ecological conditions and the natural influences of herbivory, fire and climate associated with that province. This site occurs on moderate to steep slopes (10 to 60%) and can occur on all aspects. It is usually found on high elevation mountain slopes and ledges. Species composition is generally dominated by an overstory canopy of Douglas fir. A wide mixture of shrubs occur in the understory with common juniper and Saskatoon serviceberry most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant herbaceous species. A wide diversity of perennial forbs are also present.

This sites high elevations, short growing season, and cobbly or gravelly soils, combined with its steep slopes limit its availability for livestock grazing. Grazing is usually limited to mid and late season cattle grazing and to bands of sheep that quickly move through the site during the summer months.

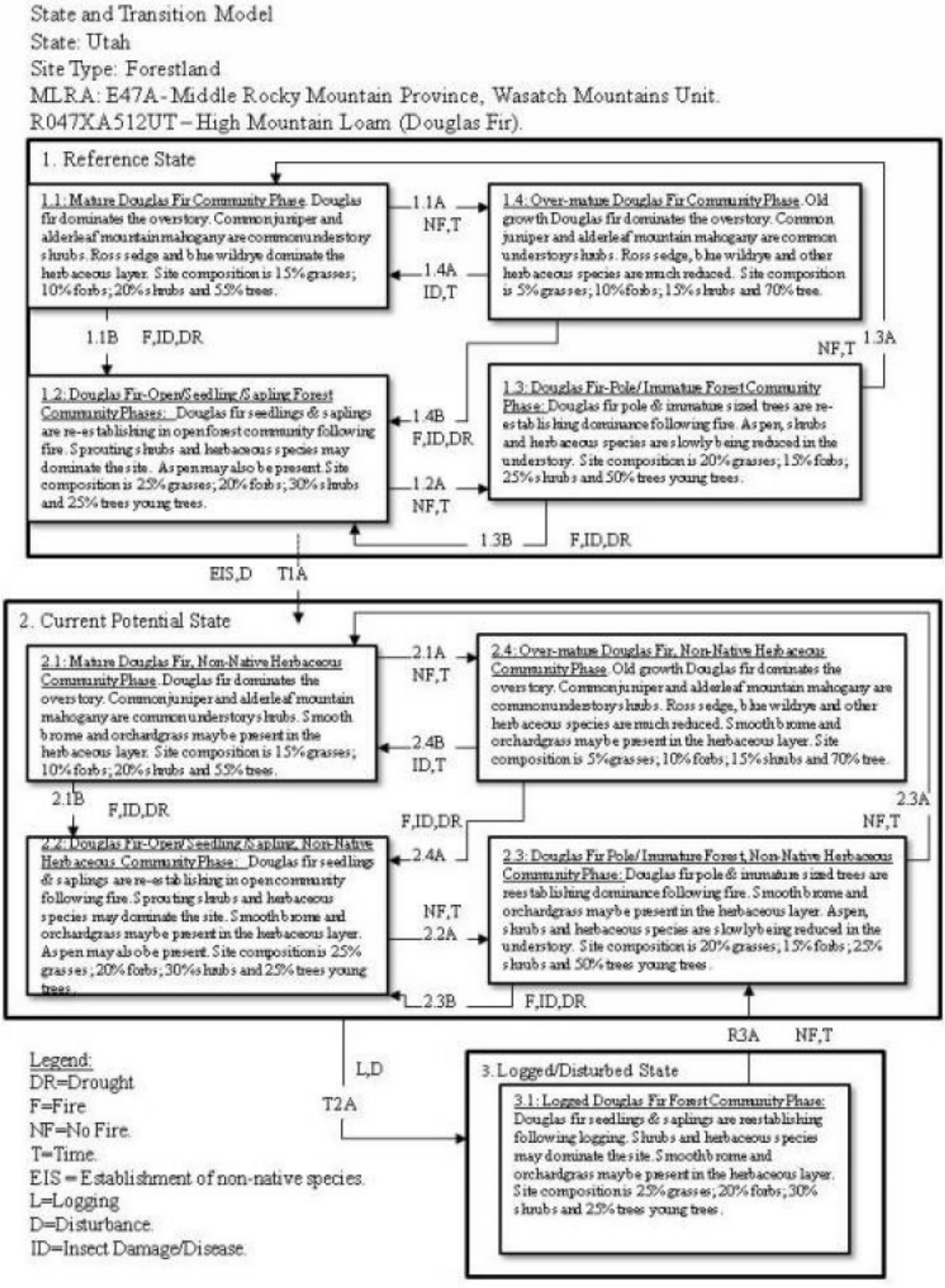
Evidence indicates that this site historically maintained a long burn cycle (150-200 years or more). Following a fire, Douglas fir and non-sprouting shrub species are removed or much reduced and sprouting shrubs and herbaceous species often dominate the site for a period of years. Over time, Douglas fir, and in some places some aspen, becomes reestablished on the burned areas and the site typically moves through several seral communities

including that of sapling, pole, immature forest, mature forest and eventually to an old or overmature forest type if fire is excluded for very long periods of time. Logging has been observed in some locations, but it is usually restricted to flatter slopes and easily accessible locations. Following logging events the remaining immature Douglas fir again moves through the mature and overmature community stages.

As vegetative communities respond to changes caused by natural or man made events that cause them to cross ecological thresholds, a return to previous states may not be possible. The amount of effort needed to affect desired vegetative shifts depends on a sites present biotic and abiotic features and the desired results.

The following State and Transition diagram depicts the most common plant communities found on this ecological site. It does not necessarily depict all the plant communities that can occur, but does show the most prevalent and repeatable. As more data are collected, some of these plant communities may be revised or removed, and new ones added. These descriptions capture the current knowledge and experience at the time of this revision.

State and transition model



State 1
Reference State

This Reference State (State 1) describes the biotic communities that may become established on the High Mountain Loam (Douglas Fir) ecological site if all successional sequences are completed under natural disturbance conditions. Species composition is generally dominated by an overstory canopy of Douglas fir. A wide mixture of shrubs occur in the understory with common juniper and Saskatoon serviceberry most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant herbaceous species. A wide diversity of perennial forbs are also present. The seral communities described in the Reference State are open canopy, seedling, sapling, pole, immature forest, mature forest, and old or over-mature forest type if fire is excluded for very long periods of time. The primary disturbance mechanisms in the Reference State (1) are overstory canopy density, weather fluctuations, and fire, or lack of fire. The Reference State is self-sustaining and resistant to change beyond it's normal seral community types due to adaptation to natural disturbances and a high resilience following those disturbances. When natural disturbances such as fire do occur, the rate of recovery can be quite variable. Reference State: Plant communities influenced by Douglas fir canopy density, long-term weather fluctuations, and periodic fire. Indicators: A community dominated by Douglas fir with understory Douglas fir reproduction, and sprouting shrubs including alderleaf mountain mahogany, grouse whortleberry and Saskatoon serviceberry. The density of the overstory canopy determines the amount and composition of the other native perennial grasses, grass-likes and forbs that may be present. Feedbacks: Natural fluctuations in weather patterns that allow for a self-sustaining mix of a Douglas fir, shrub and native grass and grass-like species in the community. Insect herbivory, more frequent fires, or other disturbances may allow for the establishment of invasive species. At-risk Community Phase: All communities are at risk when native plants are stressed and nutrients become available for invasive plants to establish. Trigger: The establishment of invasive plant species

Community 1.1
Mature Douglas Fir Forest Community Phase

Figure 3. Community Phase 1.1

The Mature Douglas Fir Forest Community Phase is characterized by an overstory canopy dominated by mature Douglas fir. A wide mixture of shrubs are found in the understory with common juniper and Saskatoon serviceberry, along with Douglas fir reproduction, being most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant grass and grass-like species. A wide diversity of perennial forbs are also present. Air dry composition of this site is approximately 15 percent grasses, 10 percent forbs, 20 percent shrubs and Douglas fir reproduction and 55 mature Douglas fir. Bare ground is variable (5 to 30 percent) depending on litter and biological crust cover, which are also variable (10 to 40 percent) and surface rock fragments (0 to 50 percent). Thick duff layers are present on some sites, completely covering the forest floor with needles and twigs. The following tables provide an example of the typical vegetative floristics of a community phase 1.1 plant community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	350	500	750
Shrub/Vine	160	180	200
Grass/Grasslike	100	140	180
Forb	90	130	170
Total	**700**	**950**	**1300**

Table 6. Ground cover

Tree foliar cover	25-50%
Shrub/vine/liana foliar cover	15-20%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	15-29%	–	–	–
>40 <= 80	5-10%	–	–	–
>80 <= 120	5-10%	–	–	–
>120	–	–	–	–

Community 1.2
Douglas Fir- Open/Seedling/Sapling Forest Community Phase

Figure 5. Community Phase 1.2

This Community Phase is typically found following significant natural disturbances including wildfire, disease or insect damage. It is characterized by the removal of the Douglas fir overstory canopy. Douglas fir seedlings and saplings are increasing in the community. Aspen is often present and may dominate a specific aspect within the site for many years. Young Douglas fir prefer shade, which aspen and native shrubs provide. A mixture of shrubs are found in the understory with common juniper and Saskatoon serviceberry being most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant grass and grass-like species. A wide diversity of perennial forbs are also present. Air dry composition of this site is approximately 15 percent grasses, 10 percent forbs, 20 percent shrubs and Douglas fir reproduction and 55 mature Douglas fir. Bare ground is variable (5 to 30 percent) depending on litter and biological crust cover, which are also variable (10 to 40 percent) and surface rock fragments (0 to 50 percent). Thick duff layers are present on some sites, completely covering the forest floor with needles and twigs. The following tables provide an example the typical vegetative floristics of a community phase 1.2 plant community.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	200	300	400
Grass/Grasslike	200	240	330
Shrub/Vine	260	280	300
Forb	90	130	170
Total	**750**	**950**	**1200**

Table 9. Ground cover

Tree foliar cover	20-35%
Shrub/vine/liana foliar cover	20-25%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 10. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.3
Douglas Fir- Pole/Immature Forest Community Phases.

Figure 7. Community Phase 1.3

This community phase is typically found many years following significant natural disturbances including wildfire, disease or insect damage. It is characterized by a partial recovery of the Douglas fir overstory canopy. Pole and/or immature sized trees are present and are beginning to once again dominant the community. Aspen may also still be present but is being replaced by Douglas fir. A wide mixture of shrubs are found in the understory with common juniper and Saskatoon serviceberry being most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant herbaceous species. A wide diversity of perennial forbs are also present. Air dry composition of this site is approximately 20 percent grasses, 15 percent forbs, 25 percent shrubs and Douglas fir reproduction and 50 pole and immature Douglas fir. Bare ground is variable (5-30%) depending on litter and biological crust cover, which are also variable (10-40%) and surface rock fragments (0-50%). Thick duff layers are present on some sites, completely covering the forest floor with needles and twigs. The following tables provide an example the typical vegetative floristics of a community phase 1.3 plant community.

Table 11. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	300	400	500
Grass/Grasslike	150	190	280
Shrub/Vine	210	230	250
Forb	90	130	170
Total	**750**	**950**	**1200**

Table 12. Ground cover

Tree foliar cover	30-40%
Shrub/vine/liana foliar cover	20-25%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 13. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	10-15%	–	–	–
>40 <= 80	10-15%	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.4
Over-Mature Douglas Fir Forest Community Phase.

Figure 9. Community Phase 1.4

This community phase is characterized by an overstory canopy dominated by a decadent, over-mature stand of Douglas fir. A mixture of shade tolerant of shrubs are found in the understory with common juniper and Saskatoon serviceberry, along with Douglas fir reproduction, occurring most often. Lesser amounts of Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are also present. Ross sedge, blue wildrye and fringed brome are reduced in the shand but are still the most common herbaceous species. A diversity of perennial forbs are also present. Air dry composition of this site is approximately 5 percent grasses, 10 percent forbs, 15 percent shrubs and Douglas fir reproduction and 70% mature Douglas fir. Bare ground is variable (5-30%) depending on litter and biological crust cover, which are also variable (10-40%) and surface rock fragments (0-50%). Thick duff layers are present on some sites, completely covering the forest floor with needles and twigs. The following tables provide an example the typical vegetative floristics of a community phase 1.4 plant community.

Table 14. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	450	600	850
Forb	90	130	170
Shrub/Vine	110	130	150
Grass/Grasslike	50	90	130
Total	**700**	**950**	**1300**

Table 15. Ground cover

Tree foliar cover	35-60%
Shrub/vine/liana foliar cover	15-20%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 16. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	15-29%	–	–	–
>40 <= 80	5-10%	–	–	–
>80 <= 120	5-10%	–	–	–
>120	–	–	–	–

Pathway 1.1B
Community 1.1 to 1.2

Mature Douglas Fir Forest Community Phase

Douglas Fir-Open/Seedling/Sapling Forest Community Phase

This community pathway occurs when wildfire removes the Douglas fir overstory. This event can be exacerbated by drought, insect damage or disease.

Pathway 1.1A
Community 1.1 to 1.4

Mature Douglas Fir Forest Community Phase

Over-Mature Douglas Fir Forest Community Phase.

This community pathway occurs when fire is excluded from the plant community for long periods of time.

Pathway 1.2A
Community 1.2 to 1.3

Douglas Fir-Open/Seedling/Sapling Forest Community Phase

Douglas Fir- Pole/Immature Forest Community Phases.

This community pathway occurs when fire is excluded from the plant community for long periods of time.

Pathway 1.3A
Community 1.3 to 1.1

Douglas Fir- Pole/Immature Forest Community Phases.

Mature Douglas Fir Forest Community Phase

This community pathway occurs when fire is excluded from the plant community for long periods of time.

Pathway 1.3B
Community 1.3 to 1.2

Douglas Fir- Pole/Immature Forest Community Phases.

Douglas Fir- Open/Seedling/Sapling Forest Community Phase

This community pathway occurs when wildfire removes the Douglas fir overstory. This event can be exacerbated by drought, insect damage or disease.

Pathway 1.4A
Community 1.4 to 1.1

Over-Mature Douglas Fir Forest Community Phase.

Mature Douglas Fir Forest Community Phase

This community pathway occurs when insect damage or disease kills old trees and allows the community to return to a community phase 1.1 type with snags present.

Pathway 1.4B
Community 1.4 to 1.2

Over-Mature Douglas Fir Forest Community Phase.

Douglas Fir- Open/Seedling/Sapling Forest Community Phase

This community pathway occurs when wildfire removed the Douglas fir overstory. This event can be exacerbated by drought, insect damage or disease.

State 2
Current Potential State

The Current Potential State is similar to the Reference State; however, minor amounts of invasive species are present in the community phases. This condition has not been well documented and so community phases in this State are based on possible community dynamics and not documented facts. This State describes the biotic communities that may become established on the High Mountain Loam (Douglas Fir) ecological site if all successional sequences are completed under natural disturbance conditions with the presence of a non-native species. Species composition is generally dominated by an overstory canopy of Douglas fir. A wide mixture of

shrubs occur in the understory with common juniper and Saskatoon serviceberry most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant herbaceous species. A wide diversity of perennial forbs are also present. Seral communities are described in the Current Potential State, including sapling, pole, immature forest, mature forest, and old or over-mature forest type if fire is excluded for very long periods of time. The primary disturbance mechanisms are overstory canopy density, weather fluctuations and fire or lack of fire. The Current Potential State is still self-sustaining but has a lower resistance to change due to a reduced resilience to disturbances. When disturbances do occur, the rate of recovery can be highly variable. Current Potential State: Plant communities influenced by wildlife browsing, insect herbivory, weather fluctuations, fire periods and surface disturbances. Indicators: A community dominated by Douglas fir with understory Douglas fir reproduction, and sprouting shrubs including alderleaf mountain mahogany, grouse whortleberry and Saskatoon serviceberry. The density of the overstory canopy determines the amount and composition of the other native perennial grasses, grass-likes and forbs that may be present. Feedbacks: Natural fluctuations in weather patterns that allow for a self-sustaining mix of a Douglas fir, shrub, native grass, and grass-like community. Insect herbivory, more frequent fires, or other disturbances may allow for the establishment of invasive species. At-risk Community Phase: All communities are at risk when native plants are stressed and nutrients become available for invasive plants to establish. Trigger: The establishment of invasive plant species

Community 2.1
Mature Douglas Fir, Non-Native Herbaceous Community Phase

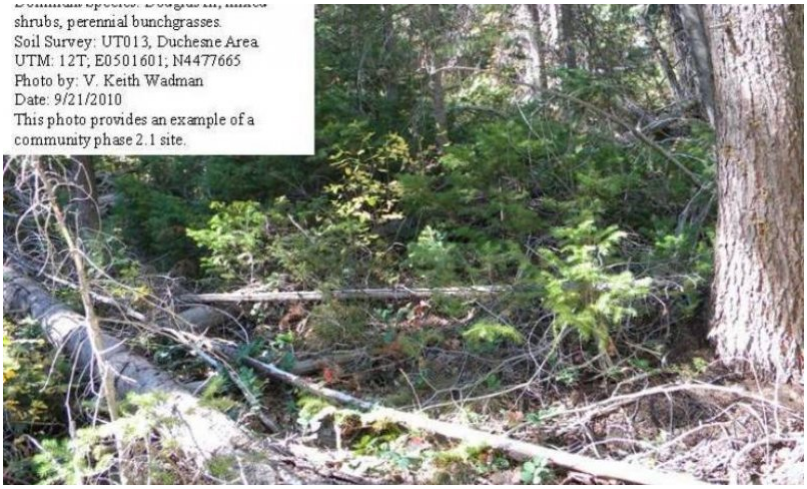


Figure 11. Community Phase 2.1

This community phase is characterized by an overstory canopy dominated by mature Douglas fir. A wide mixture of shrubs are found in the understory with common juniper and Saskatoon serviceberry, along with Douglas fir reproduction, being most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant grass and grass-like species. A wide diversity of perennial forbs are also present. Non-native herbaceous species such as orchardgrass, Kentucky bluegrass and smooth brome are potentially present in the community. This potential increases where roadcuts or other disturbance has impacted the site. Air dry composition is approximately 15 percent grasses, 10 percent forbs, 20 percent shrubs and Douglas fir reproduction and 55 percent mature Douglas fir. Bare ground is variable (5 to 30 percent) depending on litter and biological crust cover, which are also variable (10 to 40 percent) and surface rock fragments (up to 50 percent). Thick duff layers are present on some sites, covering the forest floor with needles and twigs. The following tables provide an example of the typical vegetative floristics of a community phase 2.1 plant community.

Table 17. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	350	500	750
Shrub/Vine	160	180	200
Grass/Grasslike	100	140	180
Forb	90	130	170
Total	**700**	**950**	**1300**

Table 18. Ground cover

Tree foliar cover	25-50%
Shrub/vine/liana foliar cover	15-20%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 19. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	15-29%	–	–	–
>40 <= 80	5-10%	–	–	–
>80 <= 120	5-10%	–	–	–
>120	–	–	–	–

Community 2.2
Douglas Fir- Open/Seedling/Sapling Non-Native Herbaceous Community Phase

Figure 13. Community Phase 2.2

This community phase is typically found following significant natural or man caused disturbances including road building, wildfire, disease, or insect damage. It is characterized by the removal of the Douglas fir overstory canopy. Douglas fir seedlings and saplings are present and increasing in the community. Aspen is often present and may dominate the site for many years. Young Douglas fir prefer shade, the aspen and native shrubs help provide shade in this community. A mixture of shrubs are found in the understory with common juniper and Saskatoon serviceberry being most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant grass and grass-like species. A wide diversity of perennial forbs are also present. Non-native species such as orchardgrass, Kentucky bluegrass and smooth brome may also be present. Air dry composition is approximately 15 percent grasses, 10 percent forbs, 20 percent shrubs and Douglas fir reproduction and 55 mature Douglas fir. Bare ground is variable (5 to 30 percent) depending on litter and biological crust cover, which are also variable (10 to 40 percent) and surface rock fragments (up to 50 percent). Thick duff layers are present on some sites, completely covering the forest floor with needles and twigs. The following tables provide an example of the typical vegetative floristics of a community phase 2.2 plant community.

Table 20. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	200	300	400
Grass/Grasslike	200	240	330
Shrub/Vine	260	280	300
Forb	90	130	170
Total	**750**	**950**	**1200**

Table 21. Ground cover

Tree foliar cover	20-35%
Shrub/vine/liana foliar cover	20-25%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%

Bare ground	5-20%

Table 22. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 2.3
Douglas Fir- Pole/Immature Forest, Non-Native Herbaceous Community Phase

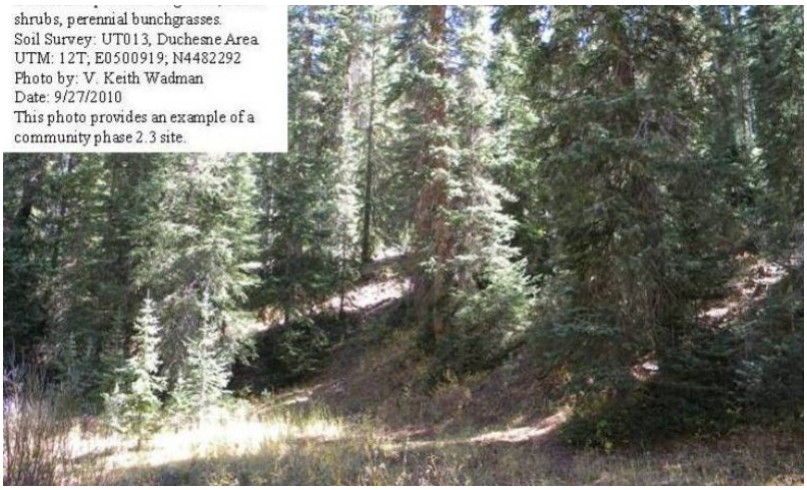


Figure 15. Community Phase 2.3

This community phase is typically found many years following significant natural or man caused disturbances including road building, wildfire, disease or insect damage. It is characterized by a partial recovery of the Douglas fir overstory canopy. Pole-sized and immature trees are beginning to once again dominant the community. Aspen may still be present but is being replaced by Douglas fir. A mixture of shrubs are found in the understory with common juniper and Saskatoon serviceberry being most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant grass and grass-like species. A wide diversity of perennial forbs are also present. Non-native species including orchardgrass, Kentucky bluegrass and smooth brome may be found on the site. Air dry composition of this site is approximately 20 percent grasses, 15 percent forbs, 25 percent shrubs and Douglas fir reproduction and 50 pole and immature Douglas fir. Bare ground is variable (5 to 30 percent) depending on litter and biological crust cover, which are also variable (10 to 40 percent) and surface rock fragments (0 to 50 percent). Thick duff layers are present on some sites, completely covering the forest floor with needles and twigs. The following tables provide an example of the typical vegetative floristics of a community phase 2.3 plant community.

Table 23. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	300	400	500
Grass/Grasslike	150	190	280
Shrub/Vine	210	230	250
Forb	90	130	170
Total	**750**	**950**	**1200**

Table 24. Ground cover

Tree foliar cover	30-40%
Shrub/vine/liana foliar cover	20-25%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 25. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	10-15%	–	–	–
>40 <= 80	10-15%	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 2.4
Over-Mature Douglas Fir, Non-Native Herbaceous Community Phase

Figure 17. Community Phase 2.4

This community phase is characterized by an overstory canopy dominated by a decadent, over-mature stand of Douglas fir. A mixture of shade tolerant shrubs are found in the understory with common juniper and Saskatoon serviceberry, along with Douglas fir reproduction, occurring most often. Lesser amounts of mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are also present. Ross sedge, blue wildrye and fringed brome are reduced in the stand but are still the most common grass and grass-like species. A diversity of perennial forbs are also present. Minor amounts of non-native species including orchardgrass, Kentucky bluegrass and smooth brome may also be present. Air dry composition is approximately 5 percent grasses, 10 percent forbs, 15 percent shrubs and Douglas fir reproduction and 70 percent mature Douglas fir. Bare ground is variable (5 to 30 percent) depending on litter and biological crust cover, which are also variable (10 to 40 percent) and surface rock fragments (up to 50 percent). Thick duff layers are present on some sites, completely covering the forest floor with needles and twigs. The following tables provide an example of the typical vegetative floristics of a community phase 2.4 plant community.

Table 26. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	450	600	850
Forb	90	130	170
Shrub/Vine	110	130	150
Grass/Grasslike	50	90	130
Total	**700**	**950**	**1300**

Table 27. Ground cover

Tree foliar cover	35-60%
Shrub/vine/liana foliar cover	15-20%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 28. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	15-29%	–	–	–
>40 <= 80	5-10%	–	–	–
>80 <= 120	5-10%	–	–	–
>120	–	–	–	–

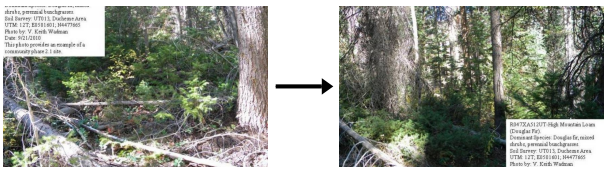
Pathway 2.1B
Community 2.1 to 2.2

Mature Douglas Fir, Non-Native Herbaceous Community Phase

Douglas Fir-Open/Seedling/Sapling Non-Native Herbaceous Community Phase

This community pathway occurs when wildfire removes the Douglas fir overstory. This event can be exacerbated by drought, insect damage or disease.

Pathway 2.1A
Community 2.1 to 2.4

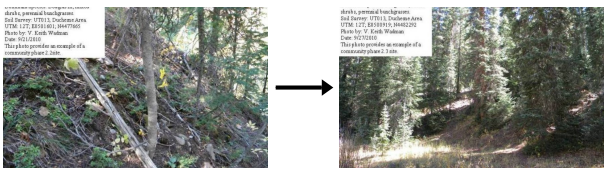


Mature Douglas Fir, Non-Native Herbaceous Community Phase

Over-Mature Douglas Fir, Non-Native Herbaceous Community Phase

This community pathway occurs when fire is excluded from the plant community for long periods of time.

Pathway 2.2A
Community 2.2 to 2.3

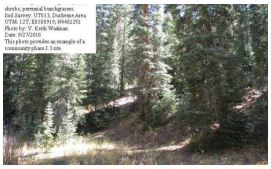


Douglas Fir-Open/Seedling/Sapling Non-Native Herbaceous Community Phase

Douglas Fir- Pole/Immature Forest, Non-Native Herbaceous Community Phase

This community pathway occurs when fire is excluded from the plant community for long periods of time.

Pathway 2.3A
Community 2.3 to 2.1

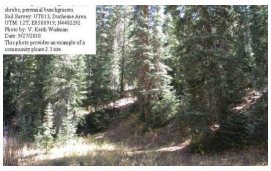


Douglas Fir- Pole/Immature Forest, Non-Native Herbaceous Community Phase

Mature Douglas Fir, Non-Native Herbaceous Community Phase

This community pathway occurs when fire is excluded from the plant community for long periods of time.

Pathway 2.3B
Community 2.3 to 2.2



Douglas Fir- Pole/Immature Forest, Non-Native Herbaceous Community Phase

Douglas Fir-Open/Seedling/Sapling Non-Native Herbaceous Community Phase

This community pathway occurs when wildfire removes the Douglas fir overstory. This event can be exacerbated by drought, insect damage or disease.

Pathway 2.4B
Community 2.4 to 2.1

Over-Mature Douglas Fir, Non-Native Herbaceous Community Phase

Mature Douglas Fir, Non-Native Herbaceous Community Phase

This community pathway occurs when insect damage or disease kills old trees and allows the community to return to a community phase 2.1 type with snags present

Pathway 2.4A
Community 2.4 to 2.2

Over-Mature Douglas Fir, Non-Native Herbaceous Community Phase

Douglas Fir-Open/Seedling/Sapling Non-Native Herbaceous Community Phase

This community pathway occurs when wildfire removes the Douglas fir overstory. This event can be exacerbated by drought, insect damage or disease.

State 3
Logged/Disturbed State

The Logged/Disturbed State is similar to the Current Potential State; however, merchantable timber composed

mostly of mature and old Douglas fir have been removed. Various amounts of invasive species are present in all community phases. This condition has not been well documented and so community phases in this State are based on possible community dynamics and not documented facts. Species composition is generally dominated by an immature canopy of Douglas fir. A wide mixture of shrubs occur in the understory with common juniper and Saskatoon serviceberry most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye, and fringed brome are dominant grass and grass-like species. A wide diversity of perennial forbs are also present. Non-native species including orchardgrass, Kentucky bluegrass and smooth brome may also be present. These species could have been seeded as part of the site rehabilitation following the logging process. Logging will release younger Douglas fir trees and will give the site the look of an immature forest. Site will return to a mature and finally an old or over-mature forest type if fire is excluded for very long periods of time. The primary disturbance mechanisms are logging, road building or other man caused activities, weather fluctuations and fire or lack of fire. The Logged/Disturbed State is still self-sustaining but has a lower resistance to change due to a reduced resilience to disturbances. When disturbances do occur, the rate of recovery can be highly variable. Logged/Disturbed State: Plant communities influenced by man caused activities, wildlife browsing, insect herbivory, weather fluctuations, fire periods and surface disturbances. Indicators: A community dominated by immature Douglas fir with understory of Douglas fir reproduction, and shrubs including common juniper, alderleaf mountain mahogany, grouse whortleberry and Saskatoon serviceberry. The density of the overstory canopy determines the amount and composition of the other native perennial grasses, grass-likes and forbs that may be present. Feedbacks: Natural fluctuations in weather patterns that allow for a self-sustaining mix of a Douglas fir, shrub, native grass, and grass-like species in the community. Insect herbivory, more frequent fires, or other disturbances may allow for the establishment of invasive species. At-risk Community Phase: All communities are at risk when native plants are stressed and nutrients become available for invasive plants to establish. Trigger: The increase of invasive plant species

Community 3.1
Logged Douglas Fir- Pole/Immature Forest, Non-Native Herbaceous Community Phase

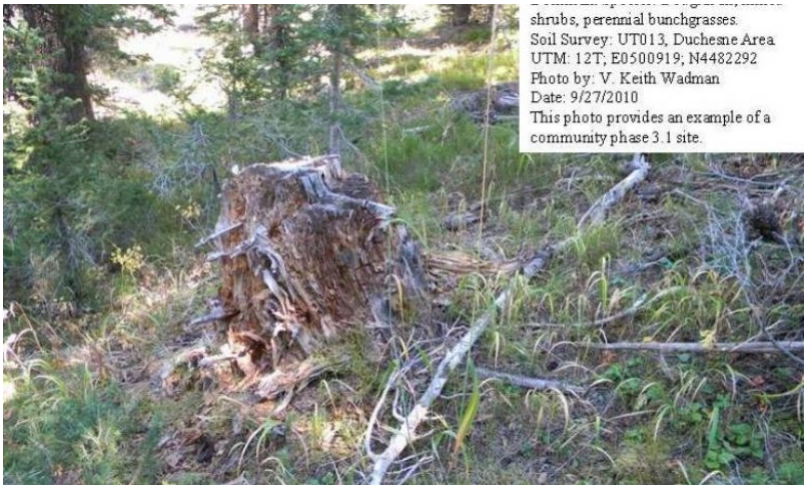


Figure 19. Community Phase 3.1

This community phase is typically found following logging or other man caused activity such as road building. It is characterized by a partial stand of Douglas fir. Pole and immature sized trees are present and are beginning to once again dominate the community. Aspen may also be present in the stand. A wide mixture of shrubs are found in the understory with common juniper and Saskatoon serviceberry being most dominant. Mountain snowberry, grouse whortleberry and alderleaf mountain mahogany are other common shrub species. Ross sedge, blue wildrye and fringed brome are dominant herbaceous species. A wide diversity of perennial forbs are also present. Non-native species including orchardgrass, Kentucky bluegrass and smooth brome may be in the community. Air dry composition of this site is approximately 25 percent grasses, 20 percent forbs, 30 percent shrubs and Douglas fir reproduction and 50 percent pole and immature Douglas fir. Bare ground is variable (5 to 30 percent) depending on litter and biological crust cover, which are also variable (10 to 40 percent) and surface rock fragments (up to 50 percent). Thick duff layers are present on some sites, covering the forest floor with needles and twigs. The following tables provide an example the typical vegetative floristics of a community phase 3.1 plant community.

Table 29. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	250	350	450
Grass/Grasslike	200	240	330
Shrub/Vine	210	230	250
Forb	90	130	170
Total	**750**	**950**	**1200**

Table 30. Ground cover

Tree foliar cover	30-40%
Shrub/vine/liana foliar cover	20-25%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	5-15%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-20%

Table 31. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	10-15%	5-10%
>0.5 <= 1	–	5-10%	5-10%	5-10%
>1 <= 2	10-15%	10-20%	2-5%	2-5%
>2 <= 4.5	10-15%	5-10%	–	–
>4.5 <= 13	10-15%	2-5%	–	–
>13 <= 40	10-15%	–	–	–
>40 <= 80	10-15%	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Transition T1A
State 1 to 2

This transition occurs when various disturbances such as road building, pipeline construction or fence-line clearing provides and opportunity for non-native species to become established. Seeding of these species could be a normal part of these activities. Once non-native species are established, a threshold has been crossed.

Transition T2A
State 2 to 3

This transition occurs when timber logging and its associated activities, including road building and skid trail development, removes mature and over-mature Douglas fir trees from the site and provides an opportunity for non-

native species to increase. Seeding species such as orchardgrass and smooth brome would often be a normal part of these activities. Once the site is logged, a threshold has been crossed.

Restoration pathway R3A
State 3 to 2

This restoration pathway occurs following logging activities when the site is allowed to recover naturally. Pole sized and immature Douglas fir trees are increasing in dominance. Seeded, non-native herbaceous species where present, are will established.

Additional community tables

Table 32. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			75–125	
	Ross' sedge	CARO5	*Carex rossii*	40–60	–
	blue wildrye	ELGL	*Elymus glaucus*	20–30	–
	fringed brome	BRCI2	*Bromus ciliatus*	20–30	–
2	**Sub-Dominant Grasses**			50–80	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	10–20	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	10–20	–
	mountain brome	BRMA4	*Bromus marginatus*	10–20	–
	Idaho fescue	FEID	*Festuca idahoensis*	10–20	–
	sheep fescue	FEOV	*Festuca ovina*	10–20	–
	muttongrass	POFE	*Poa fendleriana*	10–20	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	10–20	–
	spike trisetum	TRSP2	*Trisetum spicatum*	10–20	–
Forb					
3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–

	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–
	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–
	wax currant	RICE	*Ribes cereum*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
Tree					
6	**Dominant Trees**			350–450	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	350–450	–
7	**Sub-Dominant Trees**			200–300	
	white fir	ABCO	*Abies concolor*	60–90	–
	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Table 33. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			125–175	
	Ross' sedge	CARO5	*Carex rossii*	60–100	–
	blue wildrye	ELGL	*Elymus glaucus*	40–80	–
	fringed brome	BRCI2	*Bromus ciliatus*	40–80	–
2	**Sub-Dominant Grasses**			80–120	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	20–40	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	20–40	–

	mountain brome	BRMA4	*Bromus marginatus*	20–40	–
	Idaho fescue	FEID	*Festuca idahoensis*	20–40	–
	sheep fescue	FEOV	*Festuca ovina*	20–40	–
	muttongrass	POFE	*Poa fendleriana*	20–40	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	20–40	–
	spike trisetum	TRSP2	*Trisetum spicatum*	20–40	–
Forb					
3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–
	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–
	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–
	wax currant	RICE	*Ribes cereum*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–

	Nootka rose	RONU	*Rosa nutkana*	20–40	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
Tree					
6	**Dominant Trees**			100–150	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	100–150	–
7	**Sub-Dominant Trees**			150–250	
	white fir	ABCO	*Abies concolor*	60–90	–
	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Table 34. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			125–175	
	Ross' sedge	CARO5	*Carex rossii*	60–100	–
	blue wildrye	ELGL	*Elymus glaucus*	40–80	–
	fringed brome	BRCI2	*Bromus ciliatus*	40–80	–
2	**Sub-Dominant Grasses**			80–120	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	20–40	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	20–40	–
	mountain brome	BRMA4	*Bromus marginatus*	20–40	–
	Idaho fescue	FEID	*Festuca idahoensis*	20–40	–
	sheep fescue	FEOV	*Festuca ovina*	20–40	–
	muttongrass	POFE	*Poa fendleriana*	20–40	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	20–40	–
	spike trisetum	TRSP2	*Trisetum spicatum*	20–40	–
Forb					
3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–
	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–
	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–
	wax currant	RICE	*Ribes cereum*	20–40	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–
Tree					
6	**Dominant Trees**			200–250	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	200–250	–
7	**Sub-Dominant Trees**			200–300	
	white fir	ABCO	*Abies concolor*	60–90	–
	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Table 35. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			50–100	
	fringed brome	BRCI2	*Bromus ciliatus*	20–30	–
	Ross' sedge	CARO5	*Carex rossii*	20–30	–
	blue wildrye	ELGL	*Elymus glaucus*	20–30	–
2	**Sub-Dominant Grasses**			50–80	

	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	10–20	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	10–20	–
	mountain brome	BRMA4	*Bromus marginatus*	10–20	–
	Idaho fescue	FEID	*Festuca idahoensis*	10–20	–
	sheep fescue	FEOV	*Festuca ovina*	10–20	–
	muttongrass	POFE	*Poa fendleriana*	10–20	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	10–20	–
	spike trisetum	TRSP2	*Trisetum spicatum*	10–20	–
Forb					
3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–
	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–
	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–

	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	
	wax currant	RICE	*Ribes cereum*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
Tree					
6	**Dominant Trees**			450–550	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	450–550	–
7	**Sub-Dominant Trees**			200–300	
	white fir	ABCO	*Abies concolor*	60–90	–
	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Table 36. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			75–125	
	Ross' sedge	CARO5	*Carex rossii*	40–60	–
	blue wildrye	ELGL	*Elymus glaucus*	20–30	–
	fringed brome	BRCI2	*Bromus ciliatus*	20–30	–
2	**Sub-Dominant Grasses**			50–80	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	10–20	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	10–20	–
	smooth brome	BRIN2	*Bromus inermis*	10–20	–
	mountain brome	BRMA4	*Bromus marginatus*	10–20	–
	orchardgrass	DAGL	*Dactylis glomerata*	10–20	–
	Idaho fescue	FEID	*Festuca idahoensis*	10–20	–
	sheep fescue	FEOV	*Festuca ovina*	10–20	–
	muttongrass	POFE	*Poa fendleriana*	10–20	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	10–20	–
	Kentucky bluegrass	POPR	*Poa pratensis*	10–20	–
Forb					
3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–

	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–
	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–
	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–
	wax currant	RICE	*Ribes cereum*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
Tree					
6	**Dominant Trees**			350–450	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	350–450	–
7	**Sub-Dominant Trees**			200–300	
	white fir	ABCO	*Abies concolor*	60–90	–
	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Table 37. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					

1	**Dominant Grasses**			125–175	
	Ross' sedge	CARO5	*Carex rossii*	60–100	–
	blue wildrye	ELGL	*Elymus glaucus*	40–80	–
	fringed brome	BRCI2	*Bromus ciliatus*	40–80	–
2	**Sub-Dominant Grasses**			80–120	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	20–40	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	20–40	–
	smooth brome	BRIN2	*Bromus inermis*	20–40	–
	mountain brome	BRMA4	*Bromus marginatus*	20–40	–
	orchardgrass	DAGL	*Dactylis glomerata*	20–40	–
	Idaho fescue	FEID	*Festuca idahoensis*	20–40	–
	sheep fescue	FEOV	*Festuca ovina*	20–40	–
	muttongrass	POFE	*Poa fendleriana*	20–40	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	20–40	–
	Kentucky bluegrass	POPR	*Poa pratensis*	20–40	–
	spike trisetum	TRSP2	*Trisetum spicatum*	20–40	–
Forb					
3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–
	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–

	sagebrush				
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–
	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–
	wax currant	RICE	*Ribes cereum*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–
Tree					
6	**Dominant Trees**			100–150	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	100–150	–
7	**Sub-Dominant Trees**			200–300	
	white fir	ABCO	*Abies concolor*	60–90	–
	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Table 38. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			125–175	
	Ross' sedge	CARO5	*Carex rossii*	60–100	–
	blue wildrye	ELGL	*Elymus glaucus*	40–80	–
	fringed brome	BRCI2	*Bromus ciliatus*	40–80	–
2	**Sub-Dominant Grasses**			80–120	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	20–40	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	20–40	–
	smooth brome	BRIN2	*Bromus inermis*	20–40	–
	mountain brome	BRMA4	*Bromus marginatus*	20–40	–
	orchardgrass	DAGL	*Dactylis glomerata*	20–40	–
	Idaho fescue	FEID	*Festuca idahoensis*	20–40	–
	sheep fescue	FEOV	*Festuca ovina*	20–40	–
	muttongrass	POFE	*Poa fendleriana*	20–40	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	20–40	–
	Kentucky bluegrass	POPR	*Poa pratensis*	20–40	–
	spike trisetum	TRSP2	*Trisetum spicatum*	20–40	–
Forb					

3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–
	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–
	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–
	wax currant	RICE	*Ribes cereum*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–
Tree					
6	**Dominant Trees**			200–250	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	200–250	–
7	**Sub-Dominant Trees**			200–300	
	white fir	ABCO	*Abies concolor*	60–90	–

	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Table 39. Community 2.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			50–100	
	fringed brome	BRCI2	*Bromus ciliatus*	20–30	–
	Ross' sedge	CARO5	*Carex rossii*	20–30	–
	blue wildrye	ELGL	*Elymus glaucus*	20–30	–
2	**Sub-Dominant Grasses**			50–80	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	10–20	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	10–20	–
	smooth brome	BRIN2	*Bromus inermis*	10–20	–
	mountain brome	BRMA4	*Bromus marginatus*	10–20	–
	orchardgrass	DAGL	*Dactylis glomerata*	10–20	–
	Idaho fescue	FEID	*Festuca idahoensis*	10–20	–
	sheep fescue	FEOV	*Festuca ovina*	10–20	–
	muttongrass	POFE	*Poa fendleriana*	10–20	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	10–20	–
	Kentucky bluegrass	POPR	*Poa pratensis*	10–20	–
	spike trisetum	TRSP2	*Trisetum spicatum*	10–20	–
Forb					
3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–

	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–
	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–
	wax currant	RICE	*Ribes cereum*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–
Tree					
6	**Dominant Trees**			450–550	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	450–550	–
7	**Sub-Dominant Trees**			200–300	
	white fir	ABCO	*Abies concolor*	60–90	–
	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Table 40. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant Grasses**			125–175	
	Ross' sedge	CARO5	*Carex rossii*	60–100	–
	blue wildrye	ELGL	*Elymus glaucus*	40–80	–
	fringed brome	BRCI2	*Bromus ciliatus*	40–80	–
2	**Sub-Dominant Grasses**			80–120	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	20–40	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	20–40	–
	smooth brome	BRIN2	*Bromus inermis*	20–40	–

	mountain brome	BRMA4	*Bromus marginatus*	20–40	–
	orchardgrass	DAGL	*Dactylis glomerata*	20–40	–
	Idaho fescue	FEID	*Festuca idahoensis*	20–40	–
	sheep fescue	FEOV	*Festuca ovina*	20–40	–
	muttongrass	POFE	*Poa fendleriana*	20–40	–
	Wheeler bluegrass	PONE2	*Poa nervosa*	20–40	–
	Kentucky bluegrass	POPR	*Poa pratensis*	20–40	–
	spike trisetum	TRSP2	*Trisetum spicatum*	20–40	–
Forb					
3	**Forbs**			60–90	
	common yarrow	ACMI2	*Achillea millefolium*	10–20	–
	littleleaf pussytoes	ANMI3	*Antennaria microphylla*	10–20	–
	heartleaf arnica	ARCO9	*Arnica cordifolia*	10–20	–
	timber milkvetch	ASMI9	*Astragalus miser*	10–20	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	10–20	–
	miner's lettuce	CLPE	*Claytonia perfoliata*	10–20	–
	gypsyflower	CYOF	*Cynoglossum officinale*	10–20	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	10–20	–
	Richardson's geranium	GERI	*Geranium richardsonii*	10–20	–
	fewflower pea	LAPA5	*Lathyrus pauciflorus*	10–20	–
	western sweetroot	OSOC	*Osmorhiza occidentalis*	10–20	–
	western coneflower	RUOC2	*Rudbeckia occidentalis*	10–20	–
	western mountain aster	SYSP	*Symphyotrichum spathulatum*	10–20	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	10–20	–
	hookedspur violet	VIAD	*Viola adunca*	10–20	–
Shrub/Vine					
4	**Dominant Shrubs**			100–130	
	common juniper	JUCO6	*Juniperus communis*	60–80	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	30–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	30–60	–
5	**Sub-Dominant Shrubs**			70–100	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	30–60	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	30–60	–
	grouse whortleberry	VASC	*Vaccinium scoparium*	30–60	–
	greenleaf manzanita	ARPA6	*Arctostaphylos patula*	20–40	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	20–40	–
	hairy clematis	CLHI	*Clematis hirsutissima*	20–40	–
	creeping barberry	MARE11	*Mahonia repens*	20–40	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	20–40	–

	mallow ninebark	PHMA5	*Physocarpus malvaceus*	20–40	–
	wax currant	RICE	*Ribes cereum*	20–40	–
	gooseberry currant	RIMO2	*Ribes montigenum*	20–40	–
	Nootka rose	RONU	*Rosa nutkana*	20–40	–
Tree					
6	**Dominant Trees**			200–250	
	Douglas-fir	PSME	*Pseudotsuga menziesii*	200–250	–
7	**Sub-Dominant Trees**			200–300	
	white fir	ABCO	*Abies concolor*	60–90	–
	Rocky Mountain maple	ACGL	*Acer glabrum*	60–90	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	60–90	–
	Engelmann spruce	PIEN	*Picea engelmannii*	60–90	–
	quaking aspen	POTR5	*Populus tremuloides*	60–90	–

Animal community

--Wildlife Interpretation--
This site provides good thermal and escape cover, and limited browsing opportunities, for mule deer and elk. Several species of birds can be found using this site. Golden eagles and red-tailed hawks are common as well as great horned-owls. Other species typical of mixed forest and open areas including black-chinned and rufous hummingbirds, several fly catchers, wood peckers, and corvids will use this site for foraging. Several species of rodents occupy this site including cottontail, Colorado chipmunk, white–tailed Antelope squirrel and several species of Peromyscus. Bats (Myotis, Pipisturellus, and others) can be observed in this ecological site, but are likely limited to areas near water or canyons.

--Grazing Interpretations—
The grazable plant community consists primarily of mixed shrubs and herbaceous grasses and forbs growing on steep slopes. Common shrubs include alderleaf mountain mahogany and Saskatoon serviceberry. Grasses include fringed brome, Ross sedge and blue wildrye.

This sites steep slopes and high elevations somewhat limit its use for livestock grazing. The lack of natural perennial water sources also reduces its suitability. Mule deer and Rocky Mountain Elk often utilize this site, and heavy browsing on palatable shrub species is common. Bands of sheep may utilize the site as they move through the higher mountains and will browse on the palatable shrubs and herbaceous vegetation.

This sites high elevations, short growing season, and cobbly or gravelly soils, combined with its steep slopes limit its availability for livestock grazing. Grazing is usually limited to mid or late season cattle grazing and to bands of sheep that quickly move through the site during the summer months.

Hydrological functions

The soils associated with this ecological site are generally in Hydrologic Soil Group C with moderately high runoff potential (NRCS National Engineering Handbook). Once these soils become saturated, however, because of their steep slopes, runoff potential is high. Hydrological groups are used in equations that estimate runoff from rainfall. These estimates are needed for solving hydrologic problems that arise in planning watershed-protection and flood-prevention projects and for designing structures for the use, control and disposal of water. Heavy grazing can alter the hydrology by decreasing plant cover and increasing bare ground. Fire can also affect hydrology, but its affect is variable. Fire intensity, fuel type, soil, climate, and topography can each have different influences. Fires can increase areas of bare ground and hydrophobic layers that reduce infiltration and increase runoff (National Range and Pasture Handbook, 2003).

Recreational uses

This high elevation forest provides great summertime escapes from the heat of lower elevations. Recreation activities include aesthetic value, wildlife viewing and good opportunities for hiking and hunting. Trees can provide excellent screening values for camping and picnicking. There are several forbs and shrubs that bloom in the spring.

Wood products

Douglas fir has an estimated Site Index of 60 to 90 on this site. Its high quality wood can be harvested for many types of building materials. All age classes of fir trees are normally present in healthy communities and a return to a mature forest is fairly rapid because of its moderate growth habit.

Other products

None.

Other information

--Fire Ecology--
The ability for an ecological site to carry fire depends primarily on fuel load and plant moisture content. Sites with small fuel loads will burn more slowly and less intensely than sites with large fuel loads.

This Douglas fir forest can, when conditions are right, experience stand-replacing fires, though historically, fires were likely a mixture of surface and crown fires with intensities and frequencies dependent on site productivity. Historic fire return intervals are at a minimum 150-200 years, indicating that fire may have not played an important role in short-term community dynamics. Fires are more common when trees are stressed or dead due to drought and beetle infestations. Continuous (every 20 to 40 years) burning of these ecological sites can result in shrub dominated communities, due to the relatively fast recovery of shrubs when compared to trees.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used.

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Contributors

V. Keith Wadman

Approval

Kendra Moseley, 2/05/2025

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	05/12/2025
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):**

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

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

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

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

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:

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

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

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

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:**
