USDA Natural Resources Conservation Service

Ecological site F043BP709WY
Upland Cold Woodland Group

Last updated: 3/01/2024
Accessed: 05/02/2024

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): 043B–Central Rocky Mountains

043B – Central Rocky Mountains – This MLRA is extensive including Montana, Idaho, Wyoming and a small portion in Utah. This MLRA consists of the major chains of Mountain Ranges with the corresponding valleys. Cartographic standards limited the ability to capture the foothills as a separate MLRA, so revisions of the MLRA boundaries in 2006 led to the inclusion of the foothills with the mountains for much of Wyoming.

Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook.

LRU notes

LRU P: PES (Provisional Ecological Site or Group - PEG) A PROVISIONAL ECOLOGICAL SITE is a conceptual grouping of soil map unit components within a Major Land Resource Area
(MLRA) based on the similarities in response to management. Although there may be wide variability in the productivity of the soils grouped into a Provisional Site, the soil vegetation
interactions as expressed in the State and Transition Model are similar and the management actions required to achieve objectives, whether maintaining the existing ecological state or managing for an alternative state, are similar. Provisional Sites are
likely to be refined into more precise concept during the process of meeting the APPROVED ECOLOGICAL SITE DESCRIPTION criteria.

This PROVISIONAL ECOLOGICAL SITE has been developed to meet the standards established in the National Ecological Site Handbook. The information associated with this ecological site does not meet the Approved Ecological Site Description Standard, but it has been through a Quality Control and Quality Assurance processes to assure consistency and completeness. Further investigations, reviews and correlations are necessary before it becomes an Approved Ecological Site Description.

Classification relationships

Other Classifications
ABLA/JUCOD habitat type (Steele Et.Al. 1983)
ABLA/RIMO2 habitat type (Steele Et.Al. 1983)
POTR5-ABLA/SHCA habitat type (Steele Et.Al. 1983)
ABLA/ARCO9 habitat type (Steele Et.Al. 1983)
ABLA/ARLA8 habitat type (Steele Et.Al. 1983)
ABLA/MARE11 habitat type (Steele Et.Al. 1983)
ABLA/LIBO3 habitat type (Steele Et.Al. 1983)

ABLA/VAME habitat type (Steele Et.Al. 1983)
POTR5-ABLA/ARCO9 habitat type (Steele Et.Al. 1983)

Ecological site concept

• Site does not receive any additional water
• Soils are
o Generally not saline or saline-sodic
o Moderately deep, deep, or very deep
o Typically less than 5% stone and boulder on surface (<30%)
o Soil surface texture ranges from sandy loam to clay loam in surface mineral 4”
o Duff layer is common

Associated sites

F043BP708WY	**Upland Aspen Woodland Group** Upland Aspen Woodlands are common on the lower edge of Upland Cool Woodlands, especially in areas with snow catch/runoff.
F043BP707WY	**Subirrigated Cool Woodland Group** Subirrigated Cool Woodlands can be found in areas with snow melt catch, or seeps on the lower fringes of or in depressions within the Upland Cool Woodlands.

Similar sites

R043BY108WY	**Coarse Upland High Mountains** Course Upland High Mountains has similar soils, but is the rangeland composition of this site. No timber is seen within this community.
R043BY122WY	**Loamy High Mountains** Loamy High Mountains has similar soils, but is the rangeland composition of this site. No timber is seen within this community.
F043BP710WY	**Upland Cool Woodland Group** Upland Cool Woodland have similar soils, but the temperature is warmer with lower moisture than the Upland Cold Woodland.

Table 1. Dominant plant species

Tree	(1) *Abies lasiocarpa* (2) *Pinus contorta*
Shrub	(1) *Ribes montigenum* (2) *Shepherdia canadensis*
Herbaceous	(1) *Calamagrostis rubescens* (2) *Carex geyeri*

Physiographic features

This site occurs on most slopes, especially in pockets or concave areas within landslides and other deposits. Average slope is less than 45 percent.

Table 2. Representative physiographic features

Geomorphic position, mountains	(1) Mountainflank (2) Free face
Landforms	(1) Mountains > Mountain slope (2) Mountains > Moraine (3) Mountains > Escarpment
Runoff class	Negligible to high

Elevation	6,500–10,000 ft
Slope	15–80%
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 24-60 inches per year. June is generally the wettest month. July, August, and September are somewhat less with daily amounts rarely exceeding one inch. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures.

Snowfall is quite heavy in the area. Annual snowfall averages about 200 inches. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. Prevailing winds are from the southwest, because of the varied
topography, the wind will vary considerably for different parts of the area. The wind is usually much lighter at the lower elevations and in the valleys as compared with the higher terrain. Occasional storms, however, can bring brief periods of high winds with gusts
exceeding 50 mph. Growth of native cool season plants begins about May 15 and continues to about September 15.

The following information is from the “Darwin Ranch”, “Snake River”, "Old Faithful", and "Burgess Junction" climate stations, at the lower end of this precipitation zone. Climate Data is limited and is being extrapolated from the nearest stations.

Table 3. Representative climatic features

Frost-free period (characteristic range)	0-5 days
Freeze-free period (characteristic range)	9-31 days
Precipitation total (characteristic range)	19-27 in
Frost-free period (actual range)	0-6 days
Freeze-free period (actual range)	5-43 days
Precipitation total (actual range)	17-29 in
Frost-free period (average)	3 days
Freeze-free period (average)	21 days
Precipitation total (average)	23 in

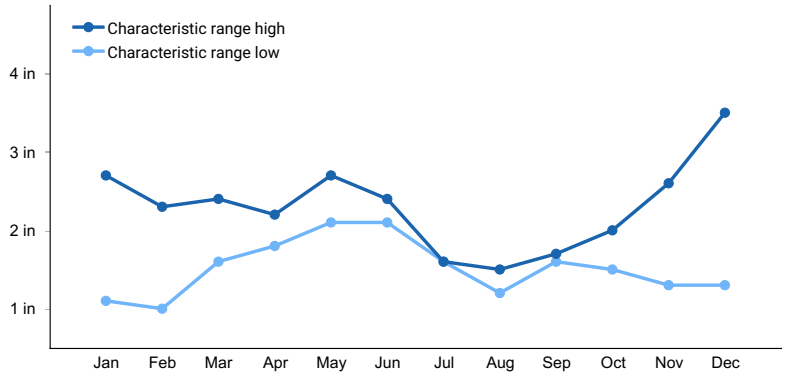


Figure 1. Monthly precipitation range

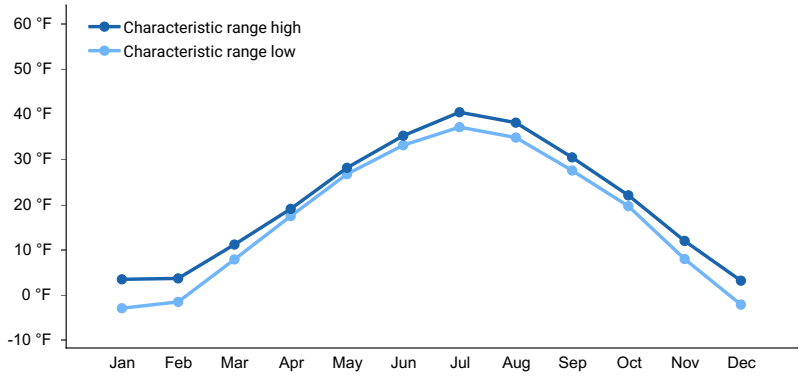


Figure 2. Monthly minimum temperature range

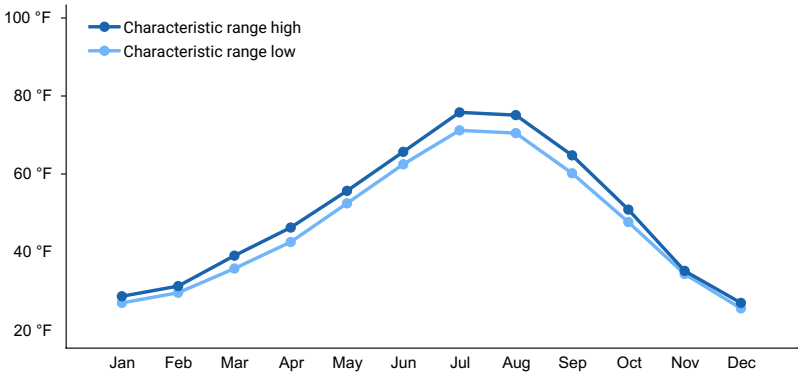


Figure 3. Monthly maximum temperature range

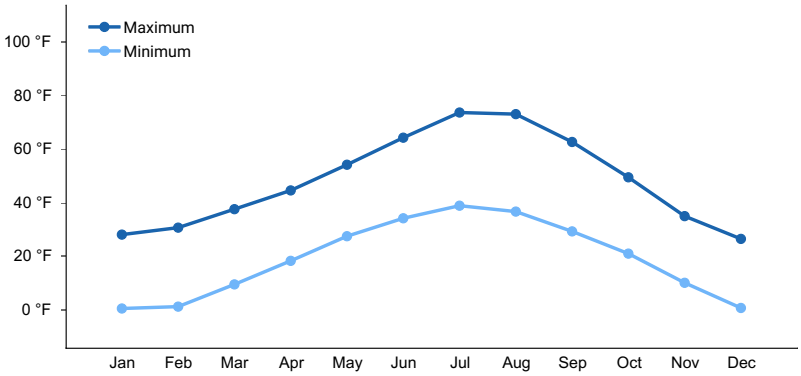


Figure 4. Monthly average minimum and maximum temperature

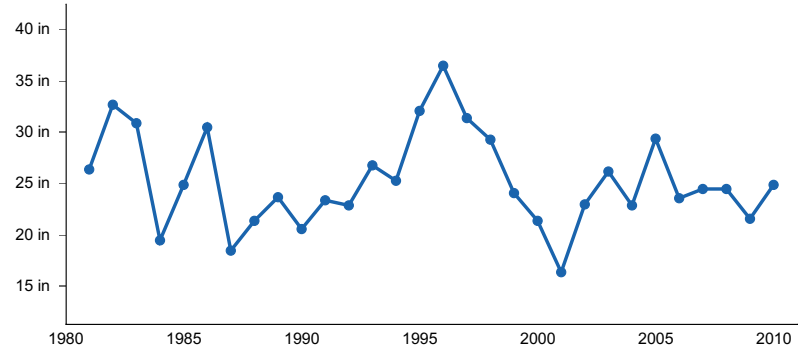


Figure 5. Annual precipitation pattern

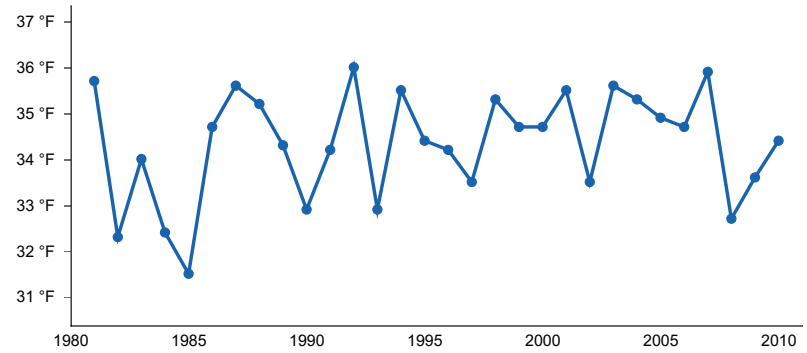


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DARWIN RCH [USC00482375], Jackson, WY
- (2) SNAKE RIVER [USC00488315], Moose, WY
- (3) OLD FAITHFUL [USC00486845], Yellowstone National Park, WY
- (4) BURGESS JUNCTION [USC00481220], Dayton, WY

Influencing water features

This site is not associated with any type of surface water feature. Snow drift impact is moderate.

Soil features

The soils associated with this site were derived from calcareous sandstone, limestone, quartzite-sandstone mixes, or granitics. These soils are generally less than 20” in depth and virtually impermeable to plant roots. Pockets of deep soil may occur in this site and are moderately acidic. The bedrock will include igneous, metamorphic and sedimentary material. The soil characteristic having the most influence on the plant community is the shallow depth and slope. Soil temperature regime is cryic; while, soil moisture regime is typic udic.

Figure 7. Hand excavated soils pit for the Upland Cold Woodland ecological site.

Table 4. Representative soil features

Parent material	(1) Colluvium–volcanic rock (2) Slope alluvium–igneous, metamorphic and sedimentary rock (3) Residuum–granite and gneiss (4) Quartzite

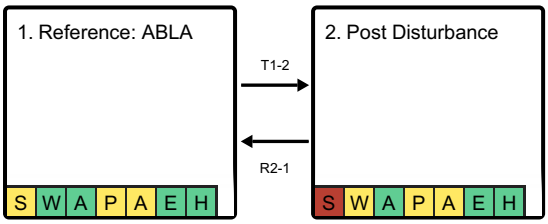
Surface texture	(1) Bouldery, stony, cobbly sandy loam (2) Clay loam (3) Loam (4) Silty clay loam
Drainage class	Well drained
Permeability class	Slow to rapid
Depth to restrictive layer	20 in
Soil depth	20 in
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–15%
Calcium carbonate equivalent (Depth not specified)	0–5%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Soil reaction (1:1 water) (Depth not specified)	3.8–7.1
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

The cold extent of these deep soils are forested with a diverse under story. In capturing the transitions in the community phases, there is opportunity to debate whether a transition is between community phases or states. In considering the time required for regeneration and growth of the forests in this climate as well as the fire frequency and management responses, transitions between significant stages of forest growth will be considered as states within this ecological site. Fire is a major player in the natural cycle of this community; however, frequency, intensity and type of fire will influence the shifts within communities. Logging and other alternative land uses has had an impact in these transitions, and these shifts will be described briefly in the following state and transition model. For more information concerning the major forest community groupings in this class, refer to the Habitat type guides referenced below.

State and transition model

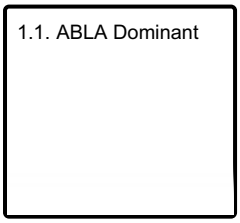
Ecosystem states



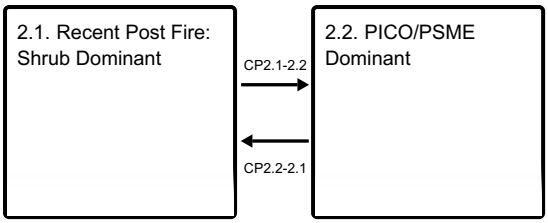
T1-2 - Fire, insect and disease impacts as well as logging can initiate the transition to the post disturbance state.

R2-1 - Time for recovery with management of forest stand health is what drives the recovery to the Reference State.

State 1 submodel, plant communities



State 2 submodel, plant communities



CP2.1-2.2 - Time and management of use of the area drives the transition between community phases.

CP2.2-2.1 - Fire, disease, insect or other tree removing disturbance transitions this community phase back to a shrub dominated phase.

State 1
Reference: ABLA

Figure 8. Subalpine fir establishing within a beetle kill stand.

Subalpine fir has the most extensive range reaching from the alpine zone to the fringes of the upland cool woodlands with Douglas-fir and Engelmanns spruce. Lodge pole pine is a major seral species in this community. This state is typical of old standing timber stands with a long duration fire return interval. Although fire has altered much of this community, the State is relatively fire resistant.

Characteristics and indicators. Subalpine fir are the dominant tree species in this state, with both old and young growth showing sufficient signs of reproduciton. There will be other sub-dominant species within the stand as well, including lodge pole pine, white bark pine, and engelmann spruce. The under story of this community is predominately shrubs and forbs with a few grasses intermixed. The composition of the under story is highly variable from north to south and from the west to eastern extent of this community.

Resilience management. Dead material resulting from insect and disease in old growth stands is the greatest threat of decline in these old growth forests. The fuel build up provides the risk of intense fire that will impact this community. Outside of this, this state is said to be resistant to significant change. Under story use by livestock and wildlife, where accessible, can have a significant impact to the under story composition. Utilization or browse on young growth and saplings can slow regeneration of key species especially in subalpine fir saplings.

Dominant plant species

- subalpine fir (*Abies lasiocarpa*), tree
- lodgepole pine (*Pinus contorta*), tree
- whitebark pine (*Pinus albicaulis*), tree
- Engelmann spruce (*Picea engelmannii*), tree
- gooseberry currant (*Ribes montigenum*), shrub
- russet buffaloberry (*Shepherdia canadensis*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- grouse whortleberry (*Vaccinium scoparium*), shrub
- pinegrass (*Calamagrostis rubescens*), grass

- sedge (*Carex*), grass
- woodrush (*Luzula*), grass
- arnica (*Arnica*), other herbaceous
- lupine (*Lupinus*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous

Dominant resource concerns

- Aggregate instability
- Plant productivity and health
- Plant structure and composition
- Wildfire hazard from biomass accumulation
- Terrestrial habitat for wildlife and invertebrates
- Inadequate livestock water quantity, quality, and distribution

Community 1.1
ABLA Dominant

Figure 9. Subalpine fir establishing within a beetle kill stand.

Figure 10. Old Growth Subalpine fir stand.

Subalpine fir are dominant on this site with an intermixed canopy with lodge pole pine and white bark pine. Under story canopy is diverse depending on openness of the over story canopy and access potential to the site.

Resilience management. This state is slow to mature, slow to change once mature. Fire frequency is long-term (150 years), so old growth stands are common. The fire resistance of this community relates to the dead or down fall within the timber stand and the health of the standing timber. Managing this community to maintain a diversity of age classes, and to minimize disease and insect impacts, improves resiliency.

Dominant plant species

- subalpine fir (*Abies lasiocarpa*), tree

- lodgepole pine (*Pinus contorta*), tree
- whitebark pine (*Pinus albicaulis*), tree
- gooseberry currant (*Ribes montigenum*), shrub
- russet buffaloberry (*Shepherdia canadensis*), shrub
- grouse whortleberry (*Vaccinium scoparium*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- pinegrass (*Calamagrostis rubescens*), grass
- Geyer's sedge (*Carex geyeri*), grass
- woodrush (*Luzula*), grass
- twinflower (*Linnaea borealis*), other herbaceous
- lupine (*Lupinus*), other herbaceous
- arnica (*Arnica*), other herbaceous

State 2
Post Disturbance

The succession of the subalpine fir community following a major disturbance, generally an intense stand replacing fire or timber harvest/logging, includes two major stages before the stand can transition back to a subalpine fir community. These two phases include a shrub dominated community that then matures to a lodge pole pine community. Community composition will vary across the extent of this state based on parent materials, aspect, slope, and other site factors (historic use, past disturbance history) that are too broad to cover at this time.

Characteristics and indicators. The initial indicator of this state is the evidence of subalpine fir stands that have recently burned, disturbed, or have been harvested. The regeneration on this state includes primarily lodge pole pine at first, but engelmann spruce, white bark pine, and Douglas-fir are commonly associated species that may be present. Fireweed is a major indicator species of the disturbance, with ceanothus. As the community establishes and matures, lodge pole pine and Douglas-fir are the dominant forest components.

Resilience management. These communities are successional, and although the maturation process is relatively slow, the community is in a state of change or flux. Low intensity fires help to maintain a healthy forest as it matures, and influences the rate and type of change that occurs within each location. This state is resistant to significant change and is resilient, with adaptations occurring slowly - with time.

Dominant plant species

- lodgepole pine (*Pinus contorta*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- Engelmann spruce (*Picea engelmannii*), tree
- whitebark pine (*Pinus albicaulis*), tree
- ceanothus (*Ceanothus*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- gooseberry currant (*Ribes montigenum*), shrub
- grouse whortleberry (*Vaccinium scoparium*), shrub
- pinegrass (*Calamagrostis rubescens*), grass
- sedge (*Carex*), grass
- woodrush (*Luzula*), grass
- arnica (*Arnica*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous

Dominant resource concerns

- Sheet and rill erosion
- Classic gully erosion
- Organic matter depletion
- Aggregate instability
- Plant productivity and health
- Plant structure and composition
- Wildfire hazard from biomass accumulation

- Terrestrial habitat for wildlife and invertebrates
- Feed and forage imbalance
- Inadequate livestock water quantity, quality, and distribution

Community 2.1
Recent Post Fire: Shrub Dominant

Figure 11. Post fire and insect damage remnants of subalpine fir and lodge pole pine.

Figure 12. The shrub dominant community occurring after large scale die back of subalpine fir due to beetle infestation.

Following an intense stand replacing fire or other major disturbance, the first community to establish is a shrub dominated community. Location and historic disturbances and use will influence the composition of the community. The main characteristic of this community phase is a shrub dominated community with only young sapling trees present in the canopy.

Resilience management. This community is resilient to disturbances, adapting to the conditions at hand. However, the community is in flux to return to a forested ecosystem. Management of this site to reduce tree establishment and to maintain a herbaceous cover type can be achieved with inputs.

Dominant plant species

- ceanothus (*Ceanothus*), shrub
- grouse whortleberry (*Vaccinium scoparium*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- gooseberry currant (*Ribes montigenum*), shrub
- pinegrass (*Calamagrostis rubescens*), grass
- Geyer's sedge (*Carex geyeri*), grass
- spike fescue (*Leucopoa kingii*), grass
- Idaho fescue (*Festuca idahoensis*), grass
- arnica (*Arnica*), other herbaceous

- twinflower (*Linnaea borealis*), other herbaceous
- milkvetch (*Astragalus*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous

Community 2.2
PICO/PSME Dominant

Figure 13. Lodge pole pine and white bark pine community with subalpine fir.

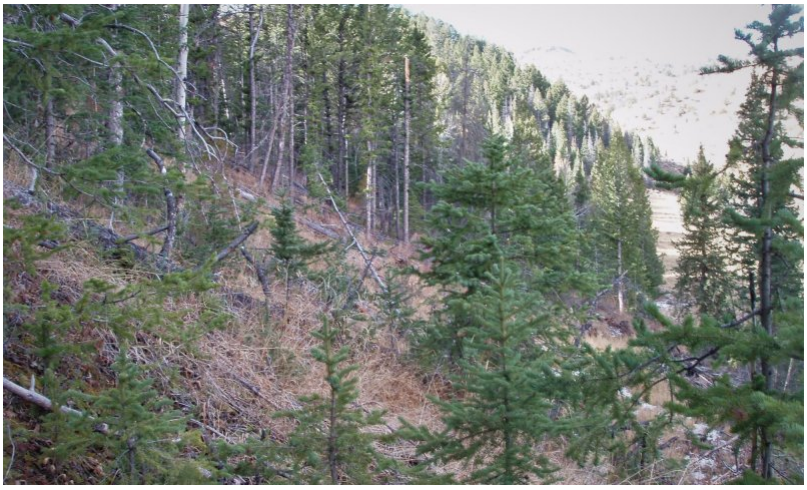


Figure 14. Old growth lodge pole pine timber stand with subalpine fir present in the understory.

The re-establishment of the woody canopy following a major fire or other major disturbance is not a rapid occurrence on these sites, and is a successional process. Initially, lodge pole pine and Douglas-fir establish and becomes dominant with white bark pine, subalpine fir, and englemann spruce as sub-dominant species. The under story maintains a strong shrubby component with intermittent forbs and grasses.

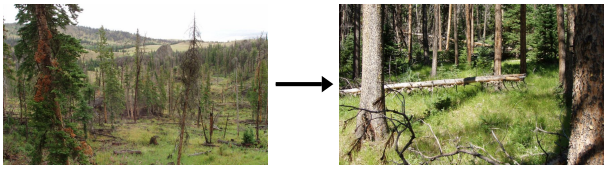
Resilience management. Fire, disease and insect impact are threats to this community phase. The fire frequency of this community phase is long-term. The aging of this what leads to the transition back to reference with Subapline fir taking dominance in the community.

Dominant plant species

- lodgepole pine (*Pinus contorta*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- subalpine fir (*Abies lasiocarpa*), tree
- russet buffaloberry (*Shepherdia canadensis*), shrub
- gooseberry currant (*Ribes montigenum*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- pinegrass (*Calamagrostis rubescens*), grass
- Geyer's sedge (*Carex geyeri*), grass

- Ross' sedge (*Carex rossii*), grass
- heartleaf arnica (*Arnica cordifolia*), other herbaceous
- western meadow-rue (*Thalictrum occidentale*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous

Pathway CP2.1-2.2
Community 2.1 to 2.2



Recent Post Fire: Shrub Dominant

PICO/PSME Dominant

The transition from the shrub dominated community to a forest stand, time is the mechanism with the greatest control. However, rest or management of the use of these areas has an influence on the establishment of trees.

Pathway CP2.2-2.1
Community 2.2 to 2.1

PICO/PSME Dominant

Recent Post Fire: Shrub Dominant

The transition from the established tree community back to a shrub dominated community is driven by fire, insect and disease impacts, or other major disturbances including microburts and logging/timber activities. With the death or removal of tree cover, the shrub under story becomes the dominant cover on this site.

Conservation practices

Upland Wildlife Habitat Management
Prescribed Forestry
Patch-burning to enhance wildlife habitat
Forest stand improvement for habitat and soil quality
Wildlife corridors
Forest stand improvement pre-treating vegetation and fuels
Forest Stand Improvement, Prescribed burning
Forest Stand Improvement to Reduce Wildfire Risk
Forest stand improvement pre-treating vegetation and fuels preceding a prescribed fire

Transition T1-2
State 1 to 2

Transition to the post disturbance state is driven primarily by stand replacement fires, as well as by insect and disease impacts on the tree stand. Major logging practices, including clear-cutting, can also be a mechanism to force this change. In this system fire frequency is long, and so the fire that occur are intense in nature.

Constraints to recovery. Time and stability of the site are the major constraints to recovery. Stability of the site relates to the slope, parent material and soil characteristics of these sites. After intense fires, erosion is a concern that could hinder recovery of this site.

Context dependence. Accessibility of the site by livestock and human impacts will influence some of the variability in the recovery constraints of this site.

Restoration pathway R2-1
State 2 to 1

Over time, and with the absence of fire, insect and disease damage, this community will mature back to the subalpine fir dominant tree stand. The use of timber management practices can assist in the restoration process. However, time is the key mechanism.

Conservation practices

Upland Wildlife Habitat Management
Forest Stand Improvement
Forest Land Management
Prescribed Forestry
Patch-burning to enhance wildlife habitat
Forest stand improvement for habitat and soil quality
Wildlife corridors
Forest stand improvement pre-treating vegetation and fuels
Forest Stand Improvement, Prescribed burning
Forest Stand Improvement for Soil Quality
Forest stand improvement pre-treating vegetation and fuels preceding a prescribed fire

Additional community tables

Animal community

This site and plant community complex has minimal livestock grazing capacity in the old stand forests. In new growth or following logging or fire, this site does provide some livestock forage. This site is common habitat for elk, mule deer, bear, wolf, mountain lion, and a variety of other wildlife.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group C, with localized areas in hydrologic group B and D. Infiltration ranges from moderately slow to moderate. Runoff potential for this site varies from low to moderate depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with
bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to nonexistent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for large ungulates and fur bearing species. Limited for upland game bird species. Hiking is limited by density of mature tree stands, otherwise provides an excellent area to camp, hike, and recreate.

Wood products

Timber harvest for lumber and firewood, as well as post and pole cuttings are common on this forest type. Christmas tree harvest occurs on lower extents of this forest type.

Other products

Berry harvest from under story species as well as medicinal plants can be found within this ecological site. Fungi (mushroom) harvest can also occur in specific locations.

Inventory data references

Information presented here has been derived from NRCS data and other inventory data.
Field observations from range trained personnel were also used. Those involved in developing this site include: Bill Christensen, Range Management Specialist, NRCS; Karen Clause, Range Management Specialist, NRCS; and Everet Bainter, Range Management Specialist, NRCS. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Other references

Steele, Robert; Cooper, Stephen V.; Ondov, David M.; Roberts, David W.; Pfister, Robert D. 1983. Forest Habitat Types of Eastern Idaho-Western Wyoming. General Technical Report INT-144. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 122 p.

Contributors

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Approval

Kirt Walstad, 3/01/2024

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	05/02/2024
Approved by	Kirt Walstad
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):

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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:**
