Ecological site group F023XY923NV
Cold North Slope Quaking Aspen

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Key Characteristics

- Site does not pond or flood
- Landform other than dunes
- Surface soils are not clayey
- Sites are tree dominated
- Elevation > 7000'

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

Physiography

This group is on concave mountain slopes, principally on northern aspects, at elevations above 6,000 feet. Slopes are 4 to 75 percent.

The sites receive supplemental moisture as snowmelt runoff from the upper slopes.

Climate

The climate is classified as Cold Semi-Arid in the Koppen Classification System. The area receives between 14 and 20 inches of annual precipitation, principally as snow. Summers are generally dry. The frost-free period is less than 70 days per year, and the mean annual air temperature is 40 to 45 °F.

Soil features

The soils in this group are deep, loamy soils formed from alluvium, colluvium, or loess. The soil temperature regime is cryic. The soils classify as Mollisols. Common soil series in this ecological site group are Hackwood, Hashwood, and Tosp.

Vegetation dynamics

An ecological site is the product of all the environmental factors responsible for its development. Each site has a set of key characteristics that influence its resilience to disturbance and resistance to invasives. According to Caudle et al. (2013), key characteristics include:

1. Climate factors such as precipitation and temperature.
2. Topographic characteristics such as aspect, slope, elevation, and landform.
3. Hydrologic processes such as infiltration and runoff.
4. Soil characteristics such as depth, texture, structure, and organic matter.
5. Plant communities and their functional groups and productivity.
6. Natural disturbance (fire, herbivory, etc.) regime.

Biotic factors that influence resilience include site productivity, species composition and structure, and population regulation and regeneration (Chambers et al., 2013).

Aspen is the most widely distributed tree in North America. In the West it is the only upland hardwood tree (Monsen et al., 2004). Aspen is typically found in nearly pure stands. Cryer and Murray (1992) found that stable aspen stands survive only on soils with a mollic horizon. Lateral roots may extend over 30 meters, with vertical sinker roots reaching nearly 3 meters deep. Entire stands are often a single clone from root sprouts or suckers. In such stands, individual “trees” are known as ramets. Aspen can establish from seed, but reproduction is primarily by root sprouts that develop within 10 meters of the parent stem. Growth from primordia (root tissue) is suppressed until the tree is top-killed by fire or another disturbance; just girdling the trees does not promote root sprouts (Perala, 1990).

Individual trees are short lived (less than 150 years) and rely on regular disturbances to regenerate (Bartos & Mueggler, 1981; Shepperd & Smith, 1993). Aspen is shade intolerant, which promotes even-aged ramets. Stands of mixed-age trees only form under stable conditions where the overstory gradually dies off with disease or age, and is replaced by aspen suckers (Perala, 1990).

Common disturbances in aspen stands include fire, insect and disease outbreaks, windstorms, and avalanches. Aspen stands have also shown some sensitivity to drought (Hogg et al., 2008). Quaking aspen (*Populus tremuloides*) is one of the most widely distributed forest plants in North America (Potter, 1998). Mature aspen stands (80 to 100 years) can reach heights up to 100 feet depending on the site. Most stands contain a variety of medium-high shrubs and tall herbs in the understory (DeByle & Winokur, 1985). Increased fire suppression, excessive browse pressure, and conifer encroachment threaten the structure of aspen stands in the West.

Conifer Dynamics:

Shading by conifer trees limits aspen regeneration (Bartos & Campbell, 1998; Stringham et al., 2015). If the aspen stands are near or intermixed with conifers like white fir (*Abies concolor*), spruce (Picea sp.), pinyon (Pinus sp.), or juniper (Juniperus sp.), the clone is at risk of being overtopped and killed from competition and shading over time (Wall et al., 2001). There is widespread encroachment of western juniper (*Juniperus occidentalis*) in northwestern Great Basin aspen stands; as juniper cover increases in these areas, aspen tree density, recruitment, and herbaceous understory production declines (Wall et al., 2001; Miller et al., 2000). The increase in conifers can be attributed to both fire suppression and grazing pressure by both livestock and wildlife (Potter, 2005; Strand et al., 2009b; Bartos & Campbell, 1998). Using a habitat model, Strand et al. (2009a) computed aspen occurrence probability across the landscape of the Owyhee Plateau. They visited 41 sites where they modeled aspen occurrence: 37 percent had dead aspen stems with no aspen regeneration; 51 percent had scattered aspen ramets and aspen regeneration in forest gaps; and 12 percent of the sites showed no evidence that aspen had ever occurred on or near the site. Strand et al.’s aspen successional model theorized that non-producing aspen stands can be permanently converted to a conifer stand and the aspen clone can be lost. They estimated that over 60 percent of aspen woodlands have been, or are in the process of being, converted to conifer woodlands. It is unknown how long an aspen stand can survive in a non-reproductive state under conifer canopy closure (Strand et al., 2009a).

Overstory clearing, whether in small gaps or in large openings, provides the needed light for aspen suckers to sprout (Shepperd et al., 2006). A limited aspen root system resulting from previous conifer dominance and/or persistent shading from surrounding uncut trees may require additional disturbance to initiate suckering. Additional management actions such as root ripping may be needed to stimulate root suckering (Shepperd et al., 2006). Prescribed fire is an effective tool for removing western juniper and releasing aspen stands; fall burning is most effective in removing juniper (Bates & Davies, 2018a), while spring burning has more desirable effects on the understory (Bates & Davies, 2018b). Other studies have explored this technique for releasing aspen and have seen success (Bartos & Mueggler, 1981; Brown & DeByle, 1989; DeByle, 1985; Walker, 1993). Limiting browse impacts is crucial to allow aspen regeneration after disturbance (see Livestock Interpretations section below).

There are many environmental factors that can contribute to stand decline or die-off. The major underlying cause can be attributed to tree and/or stand stress. Drought, low soil oxygen, and cold soil temperatures all limit soil water uptake and can contribute to xylem cavitation. Cavitation causes much of the aspen die-off, but the resulting stress can also leave the stand prone to secondary factors such as wood-boring insects and fungal pathogens (Frey et al., 2004). Drought is also attributed to the decline and death of aspen trees, and similarly contributes to secondary factors such as insects (Frey et al., 2004).

Aspen stands possess three characteristics that provide suitable sites for invasive plants:

1. Deep, rich soils.

2. Proximity to moist meadows and riparian areas with open water.
3. Dependency on disturbance and open light.

The ecological sites of this group are moderately resilient to disturbance and resistant to invasion. Human disturbance associated with recreation and animal (domestic and wildlife) disturbance may lead to the spread of invasive species such as Kentucky bluegrass (*Poa pratensis*), common dandelion (*Taraxacum officinale*), and thistles (Cirsium spp.).

The ecological sites contained within this group are moderately resilient and resistant due to productive soils, additional soil moisture, and the ability of aspen to sprout following fire or other stand or tree removal processes. Three stable states have been identified for this group: a reference state, a current potential state, and a tree state.

Fire Ecology:

Wildfire is a natural disturbance that influences the structure and composition of the vegetation of the reference state. Periodic wildfires prevent over-mature aspen stands and maintain a naturally stratified mosaic of even- aged aspen communities in various stages of successional development (Strand et al., 2009b). Wall et al. (2001) found a pattern of even-aged aspen stands that indicated there were stand-replacing fires roughly every 16 to 17 years on average. Aspen can regrow even when subjected to fires only 3 years apart (Perala, 1990). Although aspen stands rely on fire for successful regeneration, aspen stands don’t readily carry fire alone (Fechner & Barrows, 1976; DeByle & Winokur, 1985; DeByle et al., 1987; Monsen et al., 2004). At least 80 percent top-kill may be necessary to promote suckering (Brown, 1985). Bates and Davies (2018a) used cut and dried juniper to carry prescribed fire through experimental aspen stands. Aspen is extremely fire sensitive (Baker, 1925). Due to aspen’s thin bark, most individual ramets are killed by fire, and those left with scarring are usually killed within the next growing season by rot and disease (Bradley et al., 1992; Davidson et al., 1959; Meinecke, 1929). However, fires that kill the aspen overstory usually stimulate abundant suckering and enhance the long-term health of the clone (DeByle & Winokur, 1985; Bartos & Mueggler, 1981; Turner et al., 2003).

It is hypothesized that many of the fires that maintained these communities were set by the Native American population to manage plant communities for human benefit (Kay, 1997). Specific fire intervals depend upon surrounding vegetation communities. Reduced fire intervals in the last 100 to 150 years threaten the survival of existing aspen stands; fire suppression is a factor in reducing aspen recruitment (Hessl, 2002). Historic heavy grazing has been attributed to the reduction of fine fuels within stands; without the fuels to burn, fires seldom occur within aspen forests (DeByle & Winokur, 1985). While wild or prescribed fire can be a tool to promote aspen regeneration and clone health, it is important to manage browse impacts or else the beneficial effects of fire may be negated (Smith et al., 2016).

Mountain big sagebrush (*Artemisia tridentata* ssp. vaseyana), a minor component on these sites, is killed by fire (Neuenschwander, 1980; Blaisdell et al., 1982), and does not resprout (Blaisdell, 1953). Post-fire regeneration from seed and varies depending on site characteristics, seed source, and fire characteristics. Mountain big sagebrush seedlings can grow rapidly and may reach reproductive maturity within 3 to 5 years (Bunting et al.,1987). Mountain big sagebrush may return to pre-burn density and cover within 15 to 20 years following fire, but establishment after severe fires may proceed more slowly and can take up to 50 years (Bunting et al., 1987; Ziegenhagen, 2003; Miller & Heyerdahl, 2008; Ziegenhagen & Miller, 2009).

Mountain snowberry (*Symphoricarpos oreophilus*) is top-killed by fire, but resprouts after fire from rhizomes (Leege & Hickey, 1971; Noste & Bushey, 1987). Snowberry has been noted to regenerate well and exceed pre-burn biomass in the third season after fire (Merrill et al., 1982). Currant (Ribes sp.), a minor component of these sites, sprouts weakly from the root crown, but usually regenerates from soil-stored seeds after fire. It is susceptible to fire mortality and rarely survives fire (Crane & Fischer, 1986). Utah serviceberry (*Amelanchier utahensis*) sprouts after fire (Conrad, 1987) and grows more rapidly than some other serviceberry species (Plummer et al.,1968). If balsamroot (Balsamorhiza sp.) or mule-ears (Wyethia sp.) are common on the site before fire, these plants will increase after fire or heavy grazing (Wright, 1985).

The effect of fire on bunchgrasses relates to culm density, culm-leaf morphology, and the size of the plant. The initial condition of bunchgrasses on the site along with seasonality and intensity of the fire all factor into the individual species response. For most forbs and grasses, the growing points are located at or below the soil surface. This provides relative protection from disturbances that decrease above ground biomass, such as grazing or fire.

Thus, fire mortality is more correlated to duration and intensity of heat, which is related to culm density, culm-leaf morphology, size of plant, and abundance of old growth (Wright, 1971; Young, 1983).

Mountain brome (*Bromus marginatus*), the dominant grass found on these sites, is a robust, coarse-stemmed, short-lived perennial bunchgrass that can grow 1 to 5 feet tall (USDA, 1988; Tilley et al., 2004a). Mountain brome significantly decreases after burning (Nimir & Payne, 1978), but is commonly seeded after wildfires in high elevation areas, due to its ability to establish quickly from seed and reduce erosion (Tilley et al., 2004a). Slender wheatgrass (*Elymus trachycaulus*), a sub-dominant grass on these sites, may increase after fire. In a study by Nimir and Payne (1978), slender wheatgrass increased significantly on burned sites compared to non-burned sites, although the species did not appear in measurable quantities until mid-July after a spring (May) burn in the same year.

Livestock Grazing/Wildlife Browse Interpretations:

These sites are valuable for livestock grazing and wild ungulate browse. Grazing considerations include timing, intensity, and duration of grazing. Domestic livestock, wild ungulates, rodents, and rabbits utilize aspen stands and can have a measurable impact on them (Kay & Bartos, 2000). Cattle have a less injurious effect on aspen sprouts than sheep, who more readily browse twigs (Sampson, 1919). However, cattle and sheep still use aspen significantly less than deer and elk (Beck & Peek, 2005). Browsing during the sapling stage reduces aspen growth, vigor, and numbers (DeByle & Winokur, 1985). Heavy browsing on aspen suckers may result in lower clone vigor to the point that suckering no longer takes place (Lindroth & St. Clair, 2013). Browsing pressure may allow aspen to regenerate but prevents the development of trees, causing aspen to grow as a dense shrub instead of a tree (Bradley et al. 1992), or resulting in an aspen stand consisting only of old age classes with many dead stems (Hessl, 2002). A study of aspen across Utah, Idaho, and Wyoming showed that only 2 percent of trees were less than 50 years old, indicating that the effect of increasing elk numbers along with effects of cattle and deer use have prevented recruitment over time (Mueggler, 1989).

Snowberry is an important forage plant for sheep, deer, elk, and bighorn sheep (Guillon, 1964). Snowberry is poor to fair browse for cattle but may be heavily used by domestic livestock on overgrazed ranges (Morris et al., 1962). Utah serviceberry is considered a staple browse for deer and livestock, while the fruits are preferred by birds and small mammals (Conrad, 1987). Utah serviceberry also constituted two percent of the stomach contents of a big horn ram taken out of Clark County in 1952 (Guillon, 1964).

Mountain brome increases with grazing (Leege et al., 1981). A study by Mueggler (1967) found that with clipping, mountain brome increased in herbage production when clipped in June. When clipped in July, mountain brome increased due to reduced competition from forb species. The study also found that after 3 successive years of clipping, mountain brome started to show adverse effects. Mountain brome is ranked as highly valuable for elk winter forage (Kufeld, 1973).

Slender wheatgrass is a perennial bunchgrass that tends to be short lived but spreads well by natural reseeding (Monsen et al., 2004). It is widely used in restoration seedings (Monsen et al., 2004). Slender wheatgrass tends to persist for a longer time than other perennial grasses when subjected to heavy grazing (Monsen et al., 1996, 2004). Slender wheatgrass is palatable and nutritious for livestock. It is also grazed by wild ungulates and used for cover by small birds and mammals (Tilley et al., 2004b; Hallsten et al., 1987).

The forb community (Lupinus spp. and Balsamorhiza sagitata) found in aspen stands is important forage for sheep, cattle, deer, and elk (Beck & Peek, 2005).

Wildlife Interpretations:

Aspen stands are valued for their ability to support greater plant, insect, and bird biodiversity compared to surrounding forests and shrublands (Chong et al., 2001; Griffis-Kyle & Beier, 2003). These sites provide valuable habitat for several species of wildlife. Quaking aspen is important forage for large mammals. Elk (Alces alces) browse the bark, branches, and sprouts of quaking aspen year-round throughout the West (DeByle, 1979; Howard, 1996). Mule deer (Odocoileus hemionus) use quaking aspen year-round, especially if winters are mild. They browse leaves, buds, twigs, bark, and sprouts. New growth after burns or clearcuts are readily consumed by mule deer (Innes, 2013). Moose (Alces americanus) are only occasionally seen in Nevada but will feed on the bark of quaking aspen in winter, the saplings in spring, and leaves and branches the rest of the year (Shepperd et al., 2006). Black bear (Ursus americanus) will eat stems and leaves of quaking aspen, but forbs and other plants found in the quaking aspen understory are preferred (Beetle, 1974; Wildlife Action Plan Team, 2012). A study by Krebill (1972) found the majority of aspen decline within their study area was due to a combination of pathogenic fungi and insects that invade aspen trees damaged by big game.

Several lagomorphs use quaking aspen habitat. Although aspen groves are at elevations where desert cottontail (Sylvilagus audubonii) are not normally found, desert cottontail may use aspen habitat where aspen groves occur at lower elevations with sagebrush and shrubland (DeByle & Winokur, 1985). Snowshoe hares (Lepus americanus) feed on quaking aspen in summer and spring and will continue to use quaking aspen habitat year-round but are more common in the associated coniferous forests (DeByle & Winokur, 1985). The threatened species American Pika (Ochotona princeps) utilizes quaking aspen stands in higher elevation habitats, and has been documented feeding on quaking aspen buds, twigs, and bark (Wildlife Action Plan Team, 2012; Howard, 1996).

Rodents utilize aspen habitat for food and cover. Mountain pocket gophers (Thomomys monticola), a fossorial rodent, favor quaking aspen stands (Cassola, 2016). Aspen soils rarely freeze which makes them ideal for burrowing. Forbs and aspen sprouts provide forage in the spring and summer (DeByle & Winokur, 1985). Deer mice (Peromyscus maniculatus) and least chipmunks (Tamias minimus) occupy quaking aspen habitat (DeByle 1979). The deer mouse was trapped more than any other rodent, consistently throughout several years, in quaking aspen stands according to Andersen et al. (1980). The least chipmunk has been trapped at near equal density as the deer mouse in aspen habitat (DeByle & Winokur, 1985; Andersen et al., 1980). The Inyo shrew (Sorex tenellus), Merriam’s shrew (Sorex merriami), montane shrew (Sorex monticolus), and western jumping mouse (Zapus princeps) use the shrub and herbaceous cover within quaking aspen habitat for foraging and cover (Wildlife Action Plan Team, 2012). The flying squirrel (Glaucomys sabrinus), although rarely seen because of its nocturnal habit, is estimated to be one of the most common mammal species found in aspen woodlands (DeByle & Winokur, 1985). Larger rodents, such as the North American porcupine (Erethizon dorsatus) will eat quaking aspen in winter and spring months. In winter, porcupine eat the smooth outer bark of the upper trunk and branches; in spring, they eat the buds and twigs (Howard, 1996; DeByle & Winokur, 1985).

Beaver (Castor canadensis) use a large amount of aspen for building material to construct their dams. In fact, as many as 200 quaking aspen stems are required to support 1 beaver for a 1-year period. Beaver prefer the inner bark of aspen to that of other trees as food (Lanner, 1984). They will consume the leaves, bark, twigs, and quaking aspen branches of any diameter (Innes, 2013). Previous research estimated that an individual beaver consumes 2 to 4 pounds (1 to 2 kilograms) of quaking aspen bark daily (DeByle & Winokur, 1985).

Quaking aspen provides feed and cover for a variety of bird species in Nevada. The northern goshawk (Accipiter gentilis) and flammulated owl (Psiloscops flammeolus) use mature overstory for nesting (Wildlife Action Plan Team, 2012). Bird species including orange-crowned and yellow-rumped warblers (Vermivora celata and Dendroica coronata, respectively), broad-tailed hummingbirds (Selasphorus platycercus), robins (Turdus migratorius), house wrens (Troglodytes aedon), pewees (Contopus sordidulus), juncos (Junco hyemalis), and thrushes (Catharus ustulatus) nest and forage aspen stands. Furthermore, dead trees are used by downy woodpeckers (Picoides pubescens), flickers (Colaptes auratus), and Lewis’ woodpeckers (Melanerpes lewis) (Lanner, 1984; Wildlife Action Plan Team, 2012). Birds such as the mountain bluebird (Sialia currucoides), tree swallow (Tachycineta bicolor), pine siskin (Spinus pinus), and black-headed grosbeak (Pheucticus melanocephalus) can be found at the edges of aspen communities (Flack, 1976). Even duck species, including wood duck (Aix sponsa), common and barrow’s goldeneye (Bucephala clangula and Bucephala islandica, respectively), bufflehead (Bucephala albeola), and hooded and common merganser (Lophodytes cucullatus and Mergus merganser, respectively) utilize aspen habitat (DeByle & Winokur, 1985). Dusky grouse (Dendragapus obscurus), sooty grouse (Dendragapus fuliginosus), mountain quail (Oreortyx pictus), and rufous hummingbird (Selasphorus rufus) utilize the shrub and herbaceous cover provided by quaking aspen forests (Wildlife Action Plan Team, 2012).

Several bat species live within subalpine habitats, adding to the communities’ diversity. The fringed myotis (Myotis thysanodes), long-eared myotis (myotis evotis), hoary bat (Lasiurus cinereus), silver-haired bat (Lasionycteris noctivagans), little brown myotis (Myotis lucifugus), and western small-footed myotis (Myotis ciliolabrum) all are documented as occurring in quaking aspen forests and meadows above 9,000 feet (Keinath, 2003; Arroyo-Calbrales & Álvarez-Castañeda, 2008; Warner & Czaplewski, 1984; Sullivan, 2009; Wildlife Action Plan Team, 2012).

Habitat distribution of reptiles and amphibians is not as widely studied as other animals, and few reptiles and amphibians are found at elevations where quaking aspen trees grow. However, the Columbia spotted frog (Rana luteiventris) and northern rubber boa (Charina bottae) favor downed quaking aspen trees as well as stored ground moisture maintained by dead, decomposing logs (Wildlife Action Plan Team, 2012).

Threats and Management:

Problems contributing to the decline of aspen communities in Nevada include fire suppression, conifer encroachment, improper livestock grazing, and browsing by big game species (Wildlife Action Plan Team, 2012). Several fungi species cause large cankers on aspen trunks and roots and spots on leaves. The fungus Marssonina leaf blight causes particular damage to the trees by leaving brown leaves on quaking aspen mid-summer throughout large portions of their habitat (Lanner, 1984).

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Major Land Resource Area

MLRA 023X
Malheur High Plateau

Subclasses

- F023XY028NV–Backslope Aspen
- R023XY027NV–ASPEN THICKET
- R023XY418OR–ASPEN 16-35 PZ

Correlated Map Unit Components

21589692, 21589888, 21590071, 21589484, 21590718, 21590573, 21590318, 21604132, 21729854, 21589657, 21589664, 21589672, 21501143, 21500842, 21501122, 21590802, 21590798, 21501205, 21501396, 21589668, 21590033

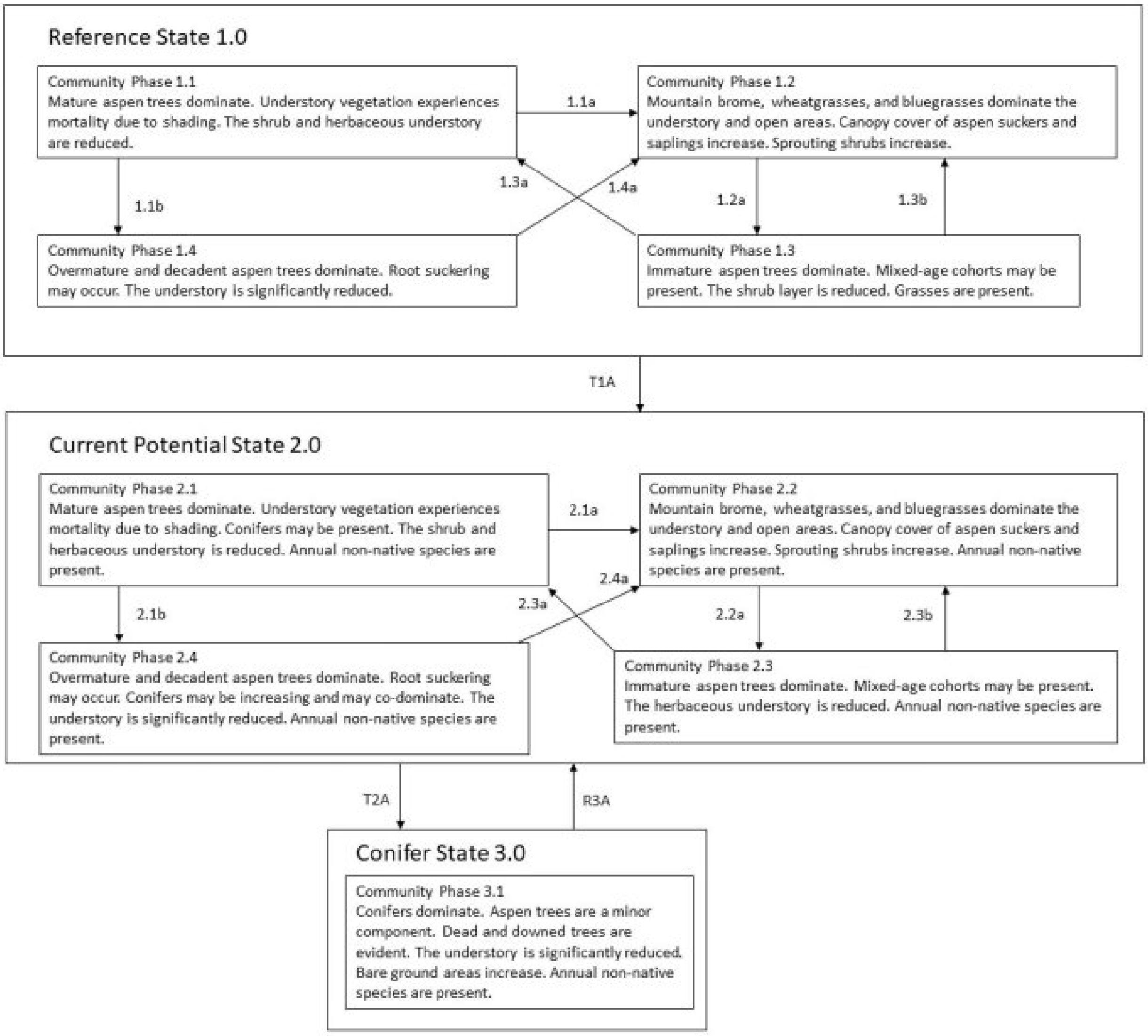
Stage

Provisional

Contributors

T Stringham (UNR under contract with BLM)
DMP

State and transition model


Reference State 1.0
Community Phase 1.1
Mature aspen trees dominate. Understory vegetation experiences mortality due to shading. The shrub and herbaceous understory are reduced.
1.1a
Community Phase 1.2
Mountain brome, wheatgrasses, and bluegrasses dominate the understory and open areas. Canopy cover of aspen suckers and saplings increase. Sprouting shrubs increase.
1.3a
1.4a
1.1b
1.2a
1.3b
Community Phase 1.4
Overmature and decadent aspen trees dominate. Root suckering may occur. The understory is significantly reduced.
Community Phase 1.3
Immature aspen trees dominate. Mixed-age cohorts may be present. The shrub layer is reduced. Grasses are present.
T1A
Current Potential State 2.0
Community Phase 2.1
Mature aspen trees dominate. Understory vegetation experiences mortality due to shading. Conifers may be present. The shrub and herbaceous understory is reduced. Annual non-native species are present.
2.1a
Community Phase 2.2
Mountain brome, wheatgrasses, and bluegrasses dominate the understory and open areas. Canopy cover of aspen suckers and saplings increase. Sprouting shrubs increase. Annual non-native species are present.
2.4a
2.3a
2.1b
2.2a
2.3b
Community Phase 2.4
Overmature and decadent aspen trees dominate. Root suckering may occur. Conifers may be increasing and may co-dominate. The understory is significantly reduced. Annual non-native species are present.
Community Phase 2.3
Immature aspen trees dominate. Mixed-age cohorts may be present. The herbaceous understory is reduced. Annual non-native species are present.
T2A
R3A
Conifer State 3.0
Community Phase 3.1
Conifers dominate. Aspen trees are a minor component. Dead and downed trees are evident. The understory is significantly reduced. Bare ground areas increase. Annual non-native species are present.

Reference State 1.0 Community Phase Pathways
1.1a: Fire, insect infestation, disease, or a windstorm remove the aspen canopy.
1.1b: Time and lack of disturbance allow aspen trees to age.
1.2a: Time and lack of disturbance or herbivory allow aspen trees to mature.
1.3a: Time and lack of disturbance or herbivory allow aspen trees to mature.
1.3b: Fire, insect infestation, disease, wind, or herbivory when young trees are within browsing reach remove the aspen canopy.
1.4a: Fire removes the aspen canopy.

T1A: This transition occurs following the introduction of non-native species such as Kentucky bluegrass, dandelion, and thistles.

Current Potential State 2.0 Community Phase Pathways
2.1a: Fire, insect infestation, disease, or a windstorm remove the aspen canopy. This pathway may also be achieved via harvesting or cutting, but with slower results.
2.1b: Time and lack of disturbance allow aspen trees to age.
2.2a: Time and lack of disturbance or herbivory allow aspen trees to mature.
2.3a: Time and lack of disturbance or herbivory allow aspen trees to mature.
2.3b: Fire, insect infestation, disease, wind, or herbivory when young trees are within browsing reach remove the aspen canopy.
2.4a: Fire removes the aspen canopy. This pathway may also be achieved via harvesting or cutting, but with slower results.

T2A: Time and lack of disturbance allow conifers to shade out aspen trees.

Conifer State 3.0 Community Phase Pathways
None.

R3A: Prescribed fire or conifer removal via harvesting or cutting leads to Community Phase 2.2.

Notes: Fire intervals are dependent upon surrounding vegetation communities. Open areas or localized aspen death can be caused by disease, insect infestation, heavy snow loading, windfall, etc.

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