Section 5: Example Zones of Agreement for Aspen with Science and Supporting Documentation

This provides a look at aspen zones of agreement with the supporting science and discussion points built into each one. Provided here for committee work or leaders to help with discussion when questions about each zone come up around the science to support it or where to go for further support.

Example ZOA with Science and Supporting Documentation

1. Priority Habitat

Social Statement and Agreement

Aspen stands are a priority for restoration, as they are biodiversity hotspots and provide critical habitat to wildlife. Aspen supports more birds, plants, and wildlife diversity than any of the conifer forest types in central and eastern Oregon.

Science Background

Priority for Restoration:
Aspen restoration has been a priority for National Forests across central Oregon and the Blue Mountains for many years (Shirley and Ericson 2001, Strong et al. 2010, Swanson et al. 2010, Seager 2010). Increasing, restoring, or integrating aspen and hardwood restoration was included in the Forest Plans of the Deschutes, Ochocho, Malheur, Umatilla, and Wallowa-Whitman National Forests (USDA Forest Service 1989, 1990a,1990b, 1990c, 1990d). Additionally, the Rocky Mountain Elk Foundation, Blue Mountains Elk Initiative, and Oregon Hunters Association have all prioritized aspen as an important habitat to restore within forest restoration and separately when it may not be reached in time through larger forest projects (see organizational websites). On a larger scale, the effort to prioritize aspen restoration is highlighted in many Blue Mountain and Eastside Restoration strategies (Franklin et al. 2013, USDA Forest Service 2010, USDA Forest Service 2013, Stine et al. 2014).

Red-naped sapsuckers create cavities that are critical to other wildlife species and create sap wells that drive entire food webs. Photo: Ron Larson

Biodiversity Hotspots and Critical Wildlife Habitat:
Aspen stands provide critical wildlife habitat (DeByle 1985), are biodiversity hotspots for small mammals (Oaten and Larsen 2009), host diverse amounts of nesting and foraging birds (Flack 1976, Martin and Eadie 1999, Martin et al. 2004). In Oregon, aspen supports more wildlife diversity than surrounding forest types (Dobkin et al. 1995, Strong et al. 2010, Swanson et al. 2010, Seager et al. 2013a).

Key Points of Discussion

- Prioritize aspen depending on current amount within Ponderosa Pine, Dry Mixed Conifer, and Moist Mixed Conifer
- Desired Conditions
- Tools to use to reach desired conditions

For Further Information

- Aspen Biology, Community Classification, and Management in the Blue Mountains (Swanson et al. 2010)
- Land Manager's Guide to Aspen Management in Oregon (Strong et al. 2010)
- Aspen Restoration Strategy for the Fremont-Winema National Forest (Seager et al. 2013)

The aspen shown here have retreated to a wet meadow to escape pressure from competing conifers. In the absence of fire, logging and girdling can help restore these aspen-meadow complexes by opening up the overstory and releasing moisture and light. Aspen stands like this one in central Oregon, that are persisting but are limited in size, should be prioritized for restoration and expansion (photo: Trent Seager).

2. Habitat Complexity

Social Statement and Agreement

Aspen stands that have a complex overstory, midstory, and understory are more productive and support more wildlife and food webs. Stands that are missing one or more of those story components should be prioritized for restoration.

Science Background

Structurally complex aspen stands provide more habitat for more diverse wildlife species (Rogers et al. 2014, Shepperd et al. 2006). An aspen restoration strategy in Oregon outlined the different sizes of stands (acres), trees sizes (dbh), and understory, midstory, and overstory structure that specific species of birds and mammals require (see Seager et al. 2013a). While aspen stands can persist for decades without an understory or midstory structure, they are not providing complex habitat for many wildlife species and are at-risk of being lost when the overstory becomes decadent (Strong et al. 2010, Swanson et al. 2010).

Single storied aspen lack the complex structure of understory, shrubs, and midstory. Restoration efforts should focus on drivers and suppressors that would allow aspen sprouts to grow above browse height. Note: this type of split rail fencing doesn't exclude deer or elk. When not properly maintained, it doesn't exclude livestock either.

Key Points of Discussion:

- Do the aspen stands provide the right habitat (understory, midstory, overstory) for the wildlife species that are prioritized?

For Further Information

- Size of Stands and Trees for Specific Avian and Mammal Use of Aspen Ecosystems (Seager et al. 2013)

3. Habitat Transition

Social Statement and Agreement

The area around the aspen stand should be treated to provide shrubs, aspen sprouts, and open habitat that is important for wildlife, livestock, and aspen persistence.

Science Background

The greatest area of aspen sprouts and shrubs is the area around the aspen stand, sometimes called the aspen sprouting zone or regeneration periphery (Keyser et al. 2005, Seager 2010). Elk, deer, and other wildlife species depend on open areas or connectivity of open spaces for migration and movement across a landscape. Aspen stands and aspen-meadow complexes were more extensive and played a critical habitat role historically. Open space around the aspen stand allows it to expand, be more resilient, and to provide habitat for species that depend upon it (Shepperd et al. 2006, Swanson et al. 2010, Seager et al. 2013a).

The area between aspen stands and the surround conifer forest can be important wildlife habitat. These open areas fill with shrubs, grasses, aspen sprouts, and become connectivity. In this recent restoration effort on the Fremont-Winema National Forest, understory plant response is already occurring out into the transition zone. Note that the old growth ponderosa pine were retained for ecological and social reasons (photo: EmilyJane Davis).

Key Points of Discussion

- Different forest types associated with aspen have different transition habitats
- Some landscapes need meadows and open areas restored in addition to aspen, and transition habitat can help with that

For Further Information

- Aspen Biology, Community Classification, and Management in the Blue Mountains (Swanson et al. 2010)
- Ecology, Biodiversity, Management, and Restoration of Aspen in the Sierra Nevada (Shepperd et al. 2006)
- Trembling aspen response to a mixed-severity wildfire in the Black Hills, South Dakota, USA (Keyser et al. 2005)

4. Conifer Encroachment and Retention

Social Statement and Agreement

Conifers that encroach the stand can outcompete the aspen trees and sprouts, so should be removed. Leaving some conifers can increase wildlife habitat and diversity.

Science Background

In the absence of fire and other disturbances, conifer encroachment had greatly impacted aspen stands across Oregon (Wall et al. 2001, Bates et al. 2006, Seager 2010, Strong et al. 2010, Swanson et al. 2010). Retention of some conifers may increase avian diversity (Griffis-Kyle and Beier 2003, Seager et al. 2013a). Old growth ponderosa (>150 years) was shown to have little impact on aspen recruitment, as were openly spaced conifers (Seager 2010). Conifers showing old growth characteristics (Franklin et al. 2013) and potentially replacement old growth conifers should be retained in and around the aspen stands, as long as their density doesn't impact aspen persistence and expansion (Seager 2010, Seager et al. 2013a).

Conifer removal with retention of older pine (and replacement pine) showing release of moisture, light, and soil resources for this aspen in central Oregon. The open area around the stand provides a sprouting zone and transition habitat (shrub and open space) between the aspen and conifers (photo: Trent Seager).

Key Points of Discussion

- What conifer association type is around the aspen, and which conifers are old growth and fire resistant?
- After removal of conifer < 150 years, what density is left?
- What wildlife species are being managed for that use conifers within aspen?

For Further Information

- Restoration of dry forests in eastern Oregon (Franklin et al. 2013)
- Aspen biology, community classification, and management in the Blue Mountains (Swanson et al. 2010)
- Land Manager's Guide to Aspen Management in Oregon (Strong et al. 2010)
- Aspen Restoration Strategy for the Fremont-Winema National Forest (Seager et al. 2012)

5. Browsing and Grazing

Social Statement and Agreement

Chronic browsing or grazing from wild ungulates and livestock can suppress aspen sprouts and remove the midstory and future overstory. When needed, fencing, deterrents, and alternate grazing patterns should be used.

Science Background

Elk and deer use aspen stands for food and cover throughout the seasons. Healthy aspen stands should have plenty of sprouts, allowing up to 50% of sprouts to show signs of herbivory from elk and deer. Chronic herbivory (high levels over decades of time) suppress the sprouts. This removes the midstory and stops new cohorts of small diameter aspen trees from recruiting into the overstory (Seager et al. 2013) and suppresses shrubs and understory plants that are important for wildlife habitat (White et al. 1998). Increased forage across the landscape should help disperse elk and

Elk in aspen stand on winter range. Note the absence of aspen sprouts or small trees, signs of chronic herbivory. Also note the dark scaring (barking) on the aspen bark from previous elk damage. The lighter marks are where the elk were eating the bark (cambium) in the past year and currently. Photo: Debi Boucher © (used by permission).

deer herds, decreasing their herbivory impact on aspen. For the short-term, fencing or other deterrents (jackstraw, coarse woody debris) can help exclude these ungulates. After 10-15 years, sprouts should be trees and above the height of elk herbivory (8' or 2.5m). Not all National Forests have livestock grazing. Cattle and livestock use of aspen on National Forest land is usually limited to grazing season. Research shows that early season use of aspen was least impactful on sprout growth and survival (Jones et al. 2009). Areas that experience late season grazing should be considered for resting the following year or have short early season grazing. This is of particular importance in areas where fencing can be avoiding by alternate grazing strategy. In the areas so large that fencing creates an economic barrier, deterrents or removal of livestock should be considered until aspen recovers (Seager et al 2013b).

Key Points of Discussion

- Local herbivore suite (elk, deer, livestock) and density
- Historical numbers of wild ungulates and livestock across time
- Fencing types already in use
- Effectiveness of fencing, alternate grazing, jackstraw
- Local data/information from resource specialists, permittees, hunters

For Further Information

1. Herbivores and Aspen - Fencing
   - Blue Mountains studies in Aspen biology, community classification, and management in the Blue Mountains by Swanson and coauthors (2010).

2. Patterns and consequences of ungulate herbivory on aspen in western North America (Seager et al. 2013b).

3. Effectiveness of Fenced Exclosures in Aspen Restoration
   - Blue Mountain study in Wallowa County; Chapter 5 in Land Manager's Guide to Aspen Management in Oregon by Strong and coauthors (2010).

6. Mapping and Placement on the Landscape

Social Statement and Agreement

Aspen stands in project areas should be mapped so restoration can happen in context of placement on the landscape and condition of nearby stands.

Science Background

Mapping of aspen stands allows for spatial analysis to answer many ecological and scientific questions about: landscape-level restoration, connectivity and permeability, Aspen stands with diverse structure and varying size support more wildlife (Seager et al. 2013a). Some decadent aspen stands may need to be reinitiated through prescribed fire, clear-fell coppicing (cutting aspen overstory), or other overstory or root disturbance (Shepperd 2001). Such disturbances greatly increase clonal root-sprouting density and area, allowing the stand to expand. Mapping stands allows for spatial analysis of stands in a watershed or project area to emphasize diverse size (acres) and trees sizes (dbh).

Key Points of Discussion

- GPS points for each stand on the landscape is a good start
- Mapping stand boundaries is more effective, but more expensive
- Data on stand condition should match across districts for comparison

For Further Information

- Aspen Restoration in the Blue Mountains of Northeast Oregon (Shirley and Erickson 2001)
- Aspen Polygon Maps for Prioritizing Treatment on the Fremont-Winema National Forest (Seager et al. 2013)
- Size of Stands and Trees for Specific Avian and Mammal Use of Aspen Ecosystems (Seager et al. 2013)

7. Aspen Expansion

Social Statement and Agreement

Oregon has lost up to 80% of its aspen stands. Most stands have been diminished in size and many have been lost all together. Expansion of aspen stands should be the priority and approach rather than preserving existing trees and acreage.

Science Background

Aspen stands can expand through their sprouting zone (area around the stand), which can be as far out as 100 to 150 feet out from the last mature stem during successful treatment (Shepperd 2001). Aspen can sprout prolifically when moisture, light, and herbivory pressure are released (Seager et al. 2013a, and see Section 4: Science and Ecology of Quaking Aspen). Expansion of aspen stands makes them more resistant to disturbances, resilient to drought and climate change, and better meets the historical range of variation (HRV) of aspen occurrence (acreage, placement) on most National Forests in Oregon.

Aspen stand expanding even with old growth ponderosa pine and snag retention. Note the density of aspen sprouts and height even from the small number of overstory trees. Aspen can expand 100-150' out from the last mature tree, though sprouting may occur across many years as soil moisture increases. Photo: Trent Seager.

Key Points of Discussion

- Areas around aspen stands that show soil, slope, or other factors that indicate aspen expansion would work
- Look in the immediate area around the stands for downed aspen logs (carcasses) or snags (skeletons) to show historical extent of the stand
- Connected meadows, drainages, or grasses-wet areas may contain remnants of aspen to show historical extent and connectivity

For Further Information

- Aspen Restoration in the Blue Mountains of Northeast Oregon (Shirley and Erickson 2001)
- Aspen Polygon Maps on the Fremont-Winema National Forest (Seager et al. 2013) – showing the extent of aspen in meadow systems and in corridors

8. Resistance and Resilience

Social Statement and Agreement

Aspen are more resistant to drought and stressors and more resilient to fire and disturbance when they are restored to multi-storied stands with open areas around them.

Science Background

The effect of increased frequency, duration, and severity of drought on aspen includes widespread occurrence of root mortality and crown loss in mature stands (SAD) in the Rocky Mountain region (Worrall et al. 2013). Efforts around the western US have focused on increasing aspen sustainability by moving past restoration to resiliency (Rogers et al. 2013). Still, climate projections suggest drought will drive substantial loss of aspen across its current distribution (Worrall et al. 2013), including much of Oregon (Rehfeldt et al. 2009). Moisture can be increased at the stand scale to support aspen persistence, growth, and expansion during normal and drought years by removing competing conifers (Jones et al. 2005, Seager 2010, Swanson et al. 2010, Seager et al. 2013a). Aspen that occur in small patches (such as those in Oregon) depend on fire to remove competing conifers more than to reinitiate the aspen stand (Kurzel et al. 2007). Fire suppression has increased competition stress on aspen (Seager 2010) leading some managers to mimic fire through conifer removal (Jones et al. 2005). Aspen stands that have competing conifers removed show increased resiliency as measured by increase in: basal area, stand size, and recruitment of midstory and overstory (Seager 2010). Multi-storied and aspen stands with recruiting sprouts were more likely to persist during drought and other disturbances (Worral et al. 2010, Seager 2010)

Key Points of Discussion

- Consider how climate change and associated drought, increased heat stress, and altered precipitation patterns (rain instead of snow) might effect aspen stands in the project area
- Assess stands for recruitment and multi-storied structure to see if diverse ages of aspen trees are present
- Consider a buffer zone around the stand to protect it from fire and other disturbances, and thus preserve existing structure
- Fire may not be needed to reinitiate the stand (kill the overstory and send root system into dense sprouting) but historically did remove conifer competition and release moisture into the system

For Further Information

- The Effects of Herbivory, Conifer Encroachment, and Coarse Woody Debris on Aspen Persistence in the Central Oregon Cascades (Seager 2010)
- Removal of Encroaching Conifers to Regenerate Degraded Aspen Stands (Jones et al. 2005)
- Aspen Biology, Community Classification, and Management in the Blue Mountains (Swanson et al. 2010)

9. Genetic Diversity and Seeds

Social Statement and Agreement

Current aspen stands expand through cloning and root sprouting, limiting diversity. Aspen seeds can provide new genetics on the landscape if seedlings can persist.

Science Background

Aspen resiliency can be increased through greater: stand area, stem density, and stem age classes, and thus most restoration efforts focus on existing stands (Seager et al. 2013a). However, current aspen genetics might have originated under a different climate pattern during a previous era (Long and Mock 2011), though new stems and root systems grew between fire, disturbance, or stem senesce (~ 100 years). Aspen genetics show diverse responses to climate change, herbivory and other stressors (Lindroth and St. Clair 2013). This may be more important than previously thought, as predicted climate scenarios suggest stressors that may decrease available aspen habitat (Worrall et al. 2013). In a burned area that had not previously contained aspen, seedlings were found inside an exclosures in the Blue Mountains (Swanson et al. 2010), showing the importance of both finding aspen seedlings and protecting them. With aspen seeding events occurring in Oregon, new genetics and new locations should be seen as important to aspen persistence, as they could offer insight into where aspen can establish and grow during current (and thus more likely, future) climate stressors. To better understand seeding potential, it is important to: delineate aspen clones, assess landscape genetics, and look at the adaptive variation of those individual clones (Mock et al. 2013), some of which has occurred in Oregon (Shirley and Erickson 2001).

Key Points of Discussion:

- Consider if aspen stands in proximity (same watershed) represent both male and female clones
- Note where local land managers have documented aspen seeding on the landscape
- Consider planting clones of a different sex if the watershed or district only has clones of the same sex
- Areas that were burnt by wildfire or prescribed fire should be considered and/or surveyed for aspen seedlings. If found, consider options for protection.

For Further Information

- Aspen Biology, Community Classification, and Management in the Blue Mountains (Swanson et al. 2010)
- Establishment, persistence, and growth of aspen (Populus tremuloides) seedlings (Romme et al. 2005)
- Sexual Reproduction, Seeds, and Seedlings (McDonough 1985)

Aspen seedlings provide new genetics and may establish in new areas. When found, they should be protected until they escape browse height (8’ or 2.5m) or become a small stand of multiple trees.