Rapid Assessment Reference Condition Model

The Rapid Assessment is a component of the LANDFIRE project. Reference condition models for the Rapid Assessment were created through a series of expert workshops and a peer-review process in 2004 and 2005. For more information, please visit www.landfire.gov. Please direct questions to helpdesk@landfire.gov.

Potential Natural Vegetation Group (PNVG)

R2ASMClw Aspen with Conifer--Low to Mid-Elevations

General Information

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Vegetation Type

Forested

Dominant Species*

POTR5
PIPO
PICO
PSME

General Model Sources

- [x] Literature
- [x] Local Data
- [x] Expert Estimate

LANDFIRE Mapping Zones

12 17 13 18 16

Rapid AssessmentModel Zones

- [ ] California
- [x] Great Basin
- [ ] Great Lakes
- [ ] Northeast
- [ ] Northern Plains
- [ ] N-Cent.Rockies
- [ ] Pacific Northwest
- [ ] South Central
- [ ] Southeast
- [ ] S. Appalachians
- [ ] Southwest

Geographic Range

Great Basin, California, northern Rockies, Alaska, Pacific Northwest, and north central regions.

Biophysical Site Description

This type typically occurs on flat to steep terrain (<80%) on all aspects. Elevation ranges from 5000' to 9000'. Higher latitude or northern aspects tend toward the lower elevation range while lower latitudes and southern aspects tend toward the higher elevation range. Soils are highly variable, but generally cool. This type occurs above the pinyon/juniper and/or sagebrush but below the spruce-fir cover.

Vegetation Description

Without regular fire and with high levels of herbivory, conifers may replace the aspen community. The presence of even a single aspen tree in a stand provides strong evidence that the area historically supported an aspen cover type. Areas with as few as five aspen trees per acre may return to an aspen community following disturbance.

As a species, aspen is adapted to a much broader range of environments than most plants found associated with it. Aspen exists in single-storied or multi-storied stands. Conifer species are common and often include Douglas-fir (Pseudotsuga menziesii), white fir (Abies concolor), ponderosa pine (Pinus ponderosa) and/or lodgepole pine (Pinus contorta). Historically ponderosa pine was the fire adapted species that occurred in open savannahs with old ponderosa pine on the ridges or rocky outcrops that provided some protection from periodic fire. Aspen could function as a tall shrub rather than an overstory tree because of fire's frequent return.

Disturbance Description

This is a strongly fire adapted community, with FRIs varying greatly with the encroachment of conifers. Some sites are prone to snowslides, mudslides and rotational slumping. Flooding may also operate in these

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systems. Before conifer encroachment in developing stands (<40 yrs), we adopted the FRI of stable aspen (R2ASPN), i.e., no fire in early development and only replacement fire every 75-yr in yound stand between 10-40 yrs old. Similarly, older stands dominated by conifers would experience replacement fire every 75 yrs. For stands between 40-125 yrs with encroaching conifers, replacement, mixed severity, and surface fires were more frequent. According to Baker (1925), who most closely studied the historic condition, the FRI for replacement fire was 20-40 yrs (min-max). The FRI for mixed severity fire and surface fire was 10-20 yrs (min-max). Mixed severity fire was found in closed stands between 40-125 yrs, whereas surface fire was found in open stand >40 yrs, which were less common, based on frequent fire scars left on aspen. Indian burning was the primary sources of fire, especially surface fire. Studies by Bartos and Campbell (1998) support these findings. It is important to understand that aspen is considered a fire-proof vegetation type that does not burn during the normal lightening season, yet evidence of frequent fire scars and historical studies show that native burning was the only source of fire that occurred mostly during the spring and fall.

Adjacency or Identification Concerns

This includes low elevation lodgepole, not the subalpine-fir mix.

If conifers are not present, the stable aspen model should be considered. If subalpine fir or spruce are present, the aspen w/mixed conifers for high elevation model should be considered.

Scale Description

Sources of Scale Data ☑ Literature ☑ Local Data ☑ Expert Estimate

This type occurs in a landscape mosaic from moderate to large sized patches.

Issues/Problems

There is uncertainty about the role of mixed severity fire. We assumed that native burning in aspen stands invaded by young conifers resulted in mixed severity fire, whereas the same source of fire would cause low severity fire (surface fire) in same age stands that were more open. Experts and modelers expressed different views about the frequency of all fires, citing FRIs longer than those noted by Baker (1925), who actually studied the historic condition. The FRIs used here were a compromise: 1) the longer FRIs were used for the earlier and oldest development states and 2) the maximum FRI of Baker (1925) was used for stands between 40 and 125 yrs that were being encroached by lower elevation conifers.

Model Evolution and Comments

This type is more highly threatened by conifer replacement than stable aspen. As this type has a fairly short fire return interval compared to other aspen types, it should be noted that aspen can act as a tall shrub. Bradley, et. Al. (1992) state that Loope & Gruell estimated a fire frequency of 25 to 100 years for a Douglas-fir forest with seral aspen in Grand Teton National Park (p39). They later state that fire frequencies of 100 to 300 years appear to be appropriate for maintaining most seral aspen stands. In the Fontenelle Creek , Wyoming drainage, the mean fire-free interval was estimated to be 40 years. Fires in this area burned in a mosaic pattern of severities, from stand-replacement to low fires that scarred bur did no kill the relatively thin-barked lodgepole pine on the site (p46).

Succession Classes**

Succession classes are the equivalent of "Vegetation Fuel Classes" as defined in the Interagency FRCC Guidebook (www.frcc.gov).

Class A 15 %

Early1 PostRep

Description

Grass/forb and aspen suckers <6'tall. Generally, this is expected to occur 1-3 years post-disturbance. Replacement fire was absent. Succession to B after 10 years.

Dominant Species* and Canopy Position

POTR5

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	99 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class B 40 %

Mid1 Closed

Description

Aspen saplings over 6' tall dominate. Canopy cover is highly variable. Conifers can invade. The stand is composed of 80% aspen, up to 10 % conifers. The FRI of 75 yrs was used for replacement fire. Succession to C after 30 years.

Dominant Species* and Canopy Position

POTR5
PIPO
PICO

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	20 %	99 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class C 15 %

Mid2 Closed

Description

Aspen 5" to 16". Mixed aspen overstory and conifer understory dominance. Less than 25 % conifer. Native burning causes both replacement fire (using Baker's max FRI of 40 yrs) and mixed severity fire (using Baker's max FRI of 20 yrs) that opens this stand by thinning conifers and aspen (disturbance to D). In the absence of fire it will naturally succeed to a closed conifer stand (E) after 85 years.

Dominant Species* and Canopy Position

POTR5
PIPO
PICO
PSME

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	20 %	99 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

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Class D 25 %

Late1 Open

Description

Aspen dominate with conifer understory up to co-dominance: 80% aspen overstory. Conifers (e.g., ponderosa pine) are assumed more resistant to fire than aspen and will likely cause the progressive suppression of aspen. Surface fire keeps this stand open, kills young conifers, and maintains aspen: every 20 yrs (max FRI from Baker). Replacement fire is every 40 years, the maximum from Baker. In the absence of any fire for 2-3 FRIs (84 yrs), the stand will become closed with conifers (E).

Dominant Species* and Canopy Position

POTR5
ABCO

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	0 %	39 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Class E 5 %

Late1 Closed

Description

Conifers dominate at 125+ years. Aspen over 16", mixed conifer mixed sizes, main overstory is conifers. Greater than 50% conifer in the overstory. FRI for replacement fire is every 75 years.

Dominant Species* and Canopy Position

PIPO
PICO
PSME
POTR5

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	40 %	80 %
Height	no data	no data
Tree Size Class	no data	

☐ Upper layer lifeform differs from dominant lifeform. Height and cover of dominant lifeform are:

Disturbances

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Disturbances Modeled

- [x] Fire
- [ ] Insects/Disease
- [ ] Wind/Weather/Stress
- [ ] Native Grazing
- [ ] Competition
- [ ] Other:
- [ ] Other

Historical Fire Size (acres)

Avg: no data
Min: no data
Max: no data

Sources of Fire Regime Data

- [x] Literature
- [x] Local Data
- [x] Expert Estimate

Fire Regime Group: **2**

I: 0-35 year frequency, low and mixed severity
II: 0-35 year frequency, replacement severity
III: 35-200 year frequency, low and mixed severity
IV: 35-200 year frequency, replacement severity
V: 200+ year frequency, replacement severity

Fire Intervals (FI)

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class. All values are estimates and not precise.

	Avg FI	*Min FI*	*Max FI*	*Probability*	*Percent of All Fires*
Replacement	61	20	40	0.01639	53
Mixed	137	10	20	0.0073	24
Surface	143	10	20	0.00699	23
All Fires	33			0.03069	

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