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)

R3ASMC **Aspen with Spruce-Fir**

General Information

Contributors *(additional contributors may be listed under "Model Evolution and Comments")*

Modelers		Reviewers	
Reuben Weisz	rweisz@fs.fed.us	William L. Baker	bakerwl@uwyo.edu
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Vegetation Type

Forested

Dominant Species*

POTR5
ABLA
PIEN

General Model Sources

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

LANDFIRE Mapping Zones

14 24 28
15 25
23 27

Rapid AssessmentModel Zones

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

Geographic Range

Central and southern Rocky Mountains

Biophysical Site Description

This type typically occurs on flat to steep terrain (<80%) on all aspects of the upper montane and lower subalpine zones. Elevation typically ranges from 2500-3400m in the southern Rockies.

Vegetation Description

This is a strongly fire adapted community. Without regular fire, mixed conifers replace the aspen community. The presence of even a single aspen tree in a present-day community indicates that the area may have supported an aspen cover type historically. Areas with as few as five aspen trees per acre may return to an aspen community following disturbance.

Aspen existed in single-storied and multi-storied stands depending on disturbance history and local stand dynamics. Conifer species were common stand components, often comprised of subalpine fir and Engelmann spruce with minor amounts of Douglas-fir and pine species.

Disturbance Description

The frequency of all fires was between 5 and 25 years, including aboriginal burning, although some disagreement exists about the frequency of fire in aspen-dominated stands (Buechling and Baker 2004, Romme et al. 2001). Some stands may have gone as long 300 years without fire (Kulakowski et al. 2003). There is also some debate about the distribution of replacement versus mixed versus surface severity fires. This type was modeled with stand replacement fires about every 50-100 years. Mixed severity fires (causing top-kill of 25-75% of the burned area) occurred at higher frequencies at return intervals of 40 or more years. Surface fires occurred at 10-20 years but were limited in extent.

Endemic disease (and insect outbreaks) would kill individual or small groups of aspen in most stands as

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aspen reached maturity. Ungulate grazing may have adversely impacted suckers during periods of cyclically high populations.

Adjacency or Identification Concerns

This aspen type is often associated with conifer-dominated types or mountain grassland communities. Aspen communities are characterized by the presence of conifer regeneration and relative lack of suckering. This type differs from the original FRCC model SPFI1 in that aspen was historically the dominant species. The type differs from the original FRCC model DWOA in that it is typically has little or no Quercus species and is found in cooler wetter climatic conditions at higher elevations. It differs from the Rapid Assessment PNVGs R3MCONcm and R3MCONwd, which occur at lower elevations, have different conifer composition, and different fire regimes. It differs from the edaphic R3ASPN type in aspen communities were fire maintained and thus had different stand dynamics.

The spatial extent of this PNVG has probably been significantly decreased in modern times due to a lack of fire disturbance.

Scale Description

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

100s to 1000s of acres

Issues/Problems

This latent PNVG is not obvious or frequent enough in distribution to fully characterize. What is known of the community dynamics and current distribution of higher elevation aspen communities suggests that the PNVG was readily apparent on historic landscapes, with aspen covering significant portions of the mixed conifer and subalpine life zones of the Rocky Mountains and California.

Aspen stand age distribution was non equilibrium: over broad temporal and spatial scales age-class distribution was negative exponential, as with all forested types. At base- and mid-level scales, age-class distributions could be drastically altered with each major fire event. For instance, following large stand replacement events stands in C and D would reverts to A initially, then to B, so that for a period of time the landscape will be dominated by younger mid closed aspen. MODEL ASSUMPTIONS: (1) mixed severity predominant regime in stands 20-80, stand replacement in stands over 80, (2) aboriginal burning constituted a significant fire source, (3) aspen stands typically required a developing conifer component to carry stand replacement fire, (4) over broad spatial and temporal scales aspen made up a majority of the composition in any given community (>70%) as a result of relatively frequent fire, and (5) the majority (>60%) of communities in this PNVG were in early-mid succession as a result of frequent fire.

Model Evolution and Comments

Modelers in addition to listed above: Jeff Redders (jredders@fs.fed.us); Rosalind Wu (rwu@fs.fed.us). Reviewer in addition to those listed above: Linda Wadleigh (lwadleigh@fs.fed.us).

Peer review results of this type were mixed. One reviewer felt the title original title ("Aspen with Mixed Conifers") was a misnomer because it does not include typical southwest mixed conifers sensu Moir and Ludwig (1979), but rather includes subalpine fir and Engelmann spruce. The title was adjusted. Another reviewer felt that the fire regime should be dominated by replacement fire, putting it into Fire Regime Group IV. One reviewer felt this type should be dropped entirely or the fire regime adjusted to eliminate mixed-severity fire and set the replacement fire return interval at 300 years. Because of the disagreement among reviewers and modelers, the model was left as-is and these comments were incorporated into the description.

Succession Classes**

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

Class A 20 %

Early1 Open

Description

Single storied tree communities dominated by aspen, often in dense stands of aspen suckers.

Dominant Species* and Canopy Position

POTR5

Structure Data (for upper layer lifeform)

	Min	Max
Cover	20 %	25 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

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

Fuel Model no data

Class B 45 %

Mid1 Closed

Description

Single-storied aspen stands developing into two-storied stands of seedlings, saplings, and pole. Increased vertical complexity brought on by wildlife browse, competition, conifer regeneration, and fire.

Dominant Species* and Canopy Position

POTR5
ABLA

PIEN

Structure Data (for upper layer lifeform)

	Min	Max
Cover	41 %	46 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

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

Fuel Model no data

Class C 5 %

Late1 Open

Description

Two and three-storied, aspen-dominated stands. Stands are in more open conditions due to mixed severity fire, disease mortality, and browsing of understory vegetation. Conifers occur as subordinate and occasionally codominant tree components. Conifers increase in proportion with stand age and time since disturbance.

Dominant Species* and Canopy Position

POTR5
ABLA
PIEN

Structure Data (for upper layer lifeform)

	Min	Max
Cover	5 %	7 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

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

Fuel Model no data

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Class D 30 %

Late1 Closed

Description

Two and three-storied, aspen-dominated stands. Conifers occur as subordinate and occasionally codominant tree components, increasing in proportion with stand age and time since disturbance.

Dominant Species* and Canopy Position

POTR5
ABLA
PIEN

Structure Data (for upper layer lifeform)

	Min	Max
Cover	25 %	30 %
Height	no data	no data
Tree Size Class	no data	

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

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

Fuel Model no data

Class E 0 %

Late1 Closed

Description

Dominant Species* and Canopy Position

Structure Data (for upper layer lifeform)

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

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

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

Fuel Model no data

Disturbances

Disturbances Modeled

- ☑ 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

- ☑ Literature
- ☐ Local Data
- ☑ Expert Estimate

Fire Regime Group: 1

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	75	40	90	0.01333	38
Mixed	75	40	70	0.01333	38
Surface	125	30	250	0.008	23
All Fires	29			0.03467	

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