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)

R2SBWYwt Wyoming Big Sagebrush Semi Desert with Trees

General Information

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Vegetation Type

Shrubland

Dominant Species*

ARTR
CHVI8
ACHY
HECO

General Model Sources

- [x] Literature
- [ ] 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

This PNVG is found in the southern portion of the Great Basin; western CA, central NV, and UT

Biophysical Site Description

This widespread PNVG is common to the Basin and Range province. In elevation it ranges from 4,500 - 7,000 ft, and occurs on well-drained soils on foothills, terraces, slopes and plateaus. It is found on soil depths greater than 18 inches and up to 60+ inches. Elevationally it is found between low elevation salt desert shrub and mountain big sagebrush zones where pinyon and juniper can establish. Occurs from 4 to 12 inch precipitation zones.

Vegetation Description

Shrub canopy cover generally ranges from 5 to 25%, but can exceed 30% at the upper elevation and precipitation zones. Wyoming big sagebrush sites have fewer understory species relative to other big sagebrush types. Rabbit rubberbrush co-dominant. Perennial forb cover is usually <10%. Perennial grass cover may reach 20 - 25% on the more productive sites. Bluebunch wheatgrass may be a dominant species following replacement fires and as a co-dominant after 20 years. Bottlebrush squirreltail and Indian ricegrass are common. Percent cover and species richness of understory are determined by site limitations. Pinyon (generally Pinus monophyla) and juniper (generally Juniper osteosperma) present, occasionally reaching 90% canopy cover in areas that have escaped fire. Wyoming big sagebrush semi-desert is critical habitat for the Greater Sage Grouse and many sagebrush obligates.

Disturbance Description

This PNVG is characterized by replacement fires where shrub canopy exceeds 25% (50 - 100 years; mean FRI of 125 years, i.e., 80% of total fire probability) or where grass cover is >15% and shrub cover is > 20% (40 - 70 years; mean FRI of 100 years). Mixed Severity fires account for 20% of fire activity (mean FRI of 500 years) where shrub cover ranges from 10 to 20% (20 - 40 years). Surface fires where shrub cover is <10% (0 - 20 years) and generally uncommon during early development (FRI of 200 years). Where pinyon

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or juniper has encroached after 100 years without fire, mean FRI of fire replacement increases from 100 to 125 years.

The Aroga moth is capable of defoliating large acreages (i.e., > 1,000 ac), but usually 10 to 100 acres.

Weather stress: Prolonged drought (1 in 100 years) on the more xeric sites may reduce shrub cover. Flooding may also cause mortality if the soil remains saturated for an extended period of time (i.e., 1 in 300 year flood events).

Herbivory (non-insect); Herbivory can remove the fine fuels that support Mixed Severity fires and result in woody fuel build up that leads to severe Replacement fires. Surface fires occur in the early seral stage where shrub cover is < 10%.

Adjacency or Identification Concerns

This community may be adjacent to mountain big sagebrush at elevations above 6,500 ft., or adjacent to pinyon-juniper, ponderosa pine, at mid- to high-elevations, and salt desert shrub at low elevations. Low sagebrush or black sagebrush may form large islands within this community where soils are shallow or have restrictive layers.

Concerns: Post-settlement conversion to cheatgrass is common and results in change in fire frequency and vegetation dynamics. Fire suppression can lead to pinyon-juniper encroachment with subsequent loss of shrub and herbaceous understory. Disturbance of this community may result in establishment of annual grasslands (e.g., cheatgrass) and/or noxious weeds. Lack of disturbance can result in pinyon-juniper encroachment where adjacent to pinyon-juniper woodlands.

Scale Description

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

Historic disturbance (fire) likely ranged from small (< 10 ac) to large (> 10,000 acres) depending on conditions, time since last ignition, and fuel loading. Assumed the average patch size is 250 acres.

Issues/Problems

1) Some reviewers recommended merging all Wyoming big sagebrush PNVGs: R2SBWY, R2SBWYse, and R2SBWYwt. These PNVGs do not occur in the same areas or effective precipitation zones. Revised PNVGs are more clearly distinguished with greater differences in MFIs and fire behavior. Also, some reviewers did not know the LANDFIRE definition of mixed severity fire (25-75% of vegetation within burn perimeter is top killed by fire), which caused them to include mixed severity within replacement fire (>75% topkill).

2) There are no data, although abundant opinions, for the percentage of replacement and mixed severity fires, especially during mid-development, or whether surface fires occurred at all during early development during the pre-settlement phase.

Model Evolution and Comments

This model assumes the sites are near pinyon-juniper woodlands and without frequent fire, the p-j will encroach into the sagebrush range site.

The first three development classes chosen for this PNVG correspond to the early, mid-, and late seral stages familiar to range ecologists. The two classes with conifer invasion (classes D and E) approximately correspond to Miller and Tausch's (2001) phases 2 and 3 of pinyon and juniper invasion into shrublands. A PNVG for Wyoming big sagebrush without tree invasion (R2SBWy; due to low elevation) was developed.

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

Post-replacement disturbance; grass dominated with scattered shrubs. Fuel loading discontinuous. Surface fire occurs every 200 years on average but has no effect on succession. Succession to class B after 20 years.

Dominant Species* and Canopy Position

ACHY
HECOC
CHVI8
ARTR

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	10 %
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 50 %

Mid1 Open

Description

Shrubs and herbaceous can be co-dominant, fine fuels bridge the woody fuels, but fuel discontinuities are possible. Replacement fire accounts for 80% of fire activity (mean FRI of 125 years), whereas mixed severity fire occurs every 500 years on average (20% of fire activity) and maintains vegetation in class B. Succession to class C after 40 years.

Dominant Species* and Canopy Position

ARTR
ACHY
CHVI8
HECO2

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	11 %	25 %
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 25 %

Mid2 Closed

Description

Shrubs dominate the landscape; fuel loading is primarily woody vegetation. Shrub density sufficient in old stands to carry the fire without fine fuels. Establishment of pinyon and juniper seedlings and saplings widely scattered. Replacement fire (mean FRI of 100 years) and rare flood events (return interval of 333 years) cause a transition to class A. Prolonged drought (mean return interval of 100 years) and insect/disease (every 75 years on average) cause a transition to class B. Succession to

Dominant Species* and Canopy Position

ARTR
CHVI8
ELEL5
HECO2

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	26 %	35 %
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 after 40 years.

Class D 5 %

Late1 Open

Description

Pinyon-juniper encroachment where disturbance has not occurred for 100+ years (tree species cover <15%). Saplings and young trees are the dominant lifeform. Sagebrush cover (<25%) and herbaceous cover decreasing compared to class C. Replacement fire occurs every 125 years on average. Insect/disease (every 75 years) and prolonged drought (every 100 years) thin both trees and shrubs, causing a transition to class C. Succession to class E after 50 years.

Dominant Species* and Canopy Position

JUNIP
PIMO
ARTR

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	15 %
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

Pinyon-juniper woodland (cover 16-90%) where disturbance does not occur for 50+ years in Class D. Shrub cover <10% and graminoids scattered. Replacement fire occurs every 125 years on average. Prolonged drought thins trees, causing a transition to class B. Succession from class E to E.

Dominant Species* and Canopy Position

JUNIP
PIMO

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	16 %	90 %
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
- [x] Insects/Disease
- [x] Wind/Weather/Stress
- [ ] Native Grazing
- [x] Competition
- [ ] Other:
- [ ] Other

Historical Fire Size (acres)

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

Sources of Fire Regime Data

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

Fire Regime Group: **4**

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	137	30	200	0.0073	84
Mixed	1000	20	333	0.001	11
Surface	2500	20	200	0.0004	5
All Fires	115			0.0087	

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