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)

R2SBWY **Wyoming Big Sagebrush Semi-Desert**

General Information

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

Modelers

Gary Back gback@srk.com

Reviewers

StanleyG. Kitchen skitchen@fs.fed.us

Jolie Pollet jpollet@blm.gov

Vegetation Type

Shrubland

Dominant Species*

ARTR
CHVI8
ACHY
HECO

General Model Sources

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

LANDFIRE Mapping Zones

12 17 9
13 18
16 8

Rapid AssessmentModel Zones

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

Geographic Range

Great Basin, southern portion; eastern CA, central NV, and UT.

Biophysical Site Description

Widespread PNVG common to the Basin and Range province. Elevation ranges from 4,500 - 6,700 ft, well-drained soils on foothills, terraces, slopes and plateaus. Soils depths greater than 18 inches and up to 60+ inches. Elevationally found between low elevation salt desert shrub and mountain big sagebrush zones or pinyon-juniper. Wyoming big sagebrush sites have fewer understory species relative to other big sagebrush types. 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 is the dominant shrub. Rabbit rubberbrush is common. 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 determined by site limitations. Wyoming big sagebrush semi-desert is critical habitat for the Greater Sage Grouse and many sagebrush obligates.

Disturbance Description

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).

Insects; Aroga moth capable of defoliating large acreages (i.e., > 1,000 ac) every 75 years on average, but

*Dominant Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

usually 10 to 100 acres.

Weather-related stress; Prolonged drought on the more xeric sites may reduce shrub cover very 100 years on average. Flooding may also cause mortality if the soil remains saturated for an extended period of time.

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.

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: 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 (> 1,000 acres) depending on conditions, time since last ignition, and fuel loading. Assume 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) For this PNVG, modeler initially based cover values per classes on total cover of dominant lifeforms (shrubs and grass), not only shrub cover (which are described above in Disturbance Description). The modeler of R2SBWYse based cover values strictly on shrub cover. To insure consistency among PNVGs, only shrub cover values were used instead of the following values: A 0-20%, B, 11-75%, and C 26-35%.

3) 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 PNVG replaces the PNVG R#SBWYlo from the Pacific Northwest.

This model assumes that the plant community is not adjacent to pinyon-juniper and will remain in the Wyoming big sagebrush community.

Succession Classes**

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

Class A 10 %

Early1 PostRep

Description

Post-replacement disturbance; grass dominated with scattered shrubs (<10% shrub cover). Fuel loading discontinuous. Rare surface fire (FRI of 200 years) occurs but has no effect on succession, which leads 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 55 %

Mid1 Open

Description

Shrubs and herbaceous can be co-dominant, fine fuels bridge the woody fuels, but fuel discontinuities are possible. Shrub cover 10-25%. Replacement fire is every 125 years on average, whereas mixed severity as a mean FRI of 333 years (20% of fire activity). 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 35 %

Late1 Closed

Description

Shrubs dominate the landscape (cover 25-35%); fuel loading is primarily woody vegetation. Shrub density sufficient in old stands to carry the fire without fine fuels. Replacement fire occurs every 100 years on average. Insect/disease (mean return interval of 75 years) and wind-related stress (mean return interval of 100 years) on thins the canopy, causing a transition to class B. Succession maintains vegetation in class C.

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:

---

*Dominant Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

Class D **0 %**

Description

Dominant Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
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 %**

Description

Dominant Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
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: **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	200	30	200	0.005	86
Mixed	2000	20	333	0.0005	9
Surface	3333	20	200	0.00030	5
All Fires	172			0.00580	

References

Brown, J. K. and J. K. Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1994. Intermountain Flora:

*Dominant Species are from the NRCS PLANTS database. To check a species code, please visit http://plants.usda.gov.

Vascular Plants of the Intermountain West, U.S.A. Asterales. Volume 5. New York Botanical Garden, Bronx, NY.

Kuchler, A.W. 1985. Potential natural vegetation (map at scale of 1:7,500,000). In: U.S. Geological survey, The National Atlas of the USA. U.S. Govt. Print. Off. Washington, D.C.

Miller, R.F. and L.L. Eddleman. 2000. Spatial and temporal changes of sage grouse habitat in the sagebrush biome. Oregon State Univ. Agr. Exp. Stat. Technical Bull. 151. 35pp.

NRCS. 2003. Major Land Resource Area 28A Great Salt Lake Area. Nevada Ecological Site Descriptions. Reno, NV.

NRCS. 2003. Major Land Resource Area 28B Central Nevada Basin and Range. Nevada Ecological Site Descriptions. Reno, NV.

NRCS. 2003. Major Land Resource Area 25 Owyhee High Plateau. Nevada Ecological Site Descriptions. Reno, NV.

NRCS. 2003. Major Land Resource Area 24 Humboldt Area. Nevada Ecological Site Descriptions. Reno, NV.

NRCS. 2003. Major Land Resource Area 27 Fallon-Lovelock Area. Nevada Ecological Site Descriptions. Reno, NV.

Tilsdale, E.W. 1994. Great Basin region: sagebrush types. P. 40-46. In: T.N. Shiflet (ed.) Rangeland Cover Types. Soc. Range Manage., Denver, CO.

West, N.E. 1983. Western Intermountain sagebrush steppe. P. 351-297. In: N.E. West (ed.) Ecosystems of the World 5: Temperate deserts and semi-deserts. Elsevier Scientific Publishing Company, New York, NY.