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)

R2SDSH **Salt Desert Shrub**

General Information

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

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Vegetation Type

Shrubland

Dominant Species*

ATCO
CEAR
ARSP5
SAVE4

General Model Sources

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

LANDFIRE Mapping Zones

12 17 21
13 18 22
16 9

Rapid AssessmentModel Zones

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

Geographic Range

Great Basin; OR, ID, UT, NV, CA, and Colorado Plateau. This PNVG generally occupies sites west of the Wasatch Mountains, east of the Sierras, south of the Idaho batholith, and north of the Mojave Desert.

Biophysical Site Description

This type occurs from lower slopes to valley bottoms ranging in elevation from 4,300 - 6,500 feet. Soils are often alkaline or calcareous. Soil permeability ranges from high to low, with more impermeable soils occurring in valley bottoms. Water ponds on alkaline bottoms. Texture is variable becoming finer toward valley bottoms. Many soils are derived from alluvium.

Average annual precipitation ranges from 5 to 10 inches. Summers are hot and dry with many days reaching 100F. Spring is the only dependable growing season with moisture both from winter and spring precipitation. Cool springs can delay the onset of plant growth and drought can curtail the length of active spring growth. Freezing temperatures are common from November through April.

This group generally lies above playas and lakes. It tends to be the lowest vegetation group. Both to the north and up slope it is bordered by low elevation big sagebrush groups, commonly ARTRWY, ARAR, and ARNO communities, and sometimes by juniper and pinyon steppe. To the south this group is bordered by Mojave Desert transition communities.

Vegetation Description

This PNVG includes low (<3 ft) and medium-sized shrubs found widely scattered (often 20-30 feet apart) to high density (3-4 plants per sq. m) shrubs interspersed with low to mid-height bunch grasses. Common shrubs are greasewood, shadscale, winterfat, fourwing saltbush, sickle saltbush, Nevada ephedra, horsebush, low rabbitbrush, broom snakeweed, saltbush, and spiny hopsage. Common bunch grass species are Indian ricegrass, needle-and-thread, purple tree-awn, and bottlebrush squirreltail, whereas common rhizomatous/sod forming grasses are galleta grass, sand drop seed, and blue gramma. Globemallows are the

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most common and widespread forbs. Greasewood communities typically occur on alkaline soils with perched or near the surface water tables and has a closed canopy aspect. The understory grasses and forbs are salt-tolerant, not particularly drought tolerant, and are variably abundant.

The relative abundance of species may vary in a patchwork pattern across the landscape in relation to subtle differences in soils and reflect variation in disturbance history. Total cover rarely exceeds 25% and annual precipitation is closely linked to prior 12 months precipitation. Stand replacing disturbances (insects, flooding, and drought) tended to be a return to the grass dominated condition (Class A; see below) or to short lived forb grass communities (Class D; see below). Early succession communities dominated by shrubs that resprouted (e.g., black greasewood) also existed. The primary succession path was from grass dominant to shrub dominant, however alternative trajectories among the three different early successional classes depended on the existing composition at the time of disturbance, and weather conditions during the next growing seasons).

Disturbance Description

Disturbance was unpredictable. Severe drought (every 70 years on average), flooding (series of high years; 100 years return interval), and insect outbreaks (60 years return interval) were the most common disturbances. The length and severity of drought in the Great Basin has increased since the beginning of the 20th century.

Documented Mormon cricket/grasshopper outbreaks since settlement have corresponded with drought. Outbreaks have lasted from 2 to 17 years. Cricket outbreaks every 60 yrs on average was assumed. Impacts ranged from extensive and pervasive to scattered. Mormon cricket outbreaks probably severely impacted salt desert shrub communities as a result of the cricket's life history. During outbreaks Mormon crickets prefer open, low plant communities. Herbaceous communities and the herbaceous component of mixed communities were more susceptible to cricket grazing.

Fire was a rare and perhaps limited to more mesic sites during the pre-settlement period. Native American manipulation of salt desert shrub plant communities was probably less than nearby higher elevation communities. Grass seed may have been one of the more important salt desert shrub crops. It is unlikely that native Americans manipulated the vegetation to encourage grass seed. Very rare occurrence of fire was added to the PNVG only to the late development type with higher shrub cover. Stand replacement fire occurs every 1,000 years. Mixed severity fire, also with FRI of 1,000 years, would favor resprouting shrubs (greasewood, sickle saltbush, and fourwing saltbush).

Adjacency or Identification Concerns

This PNVG contains the typical Great Basin salt desert shrub and included communities.
Salt desert shrub is also common in the Wyoming Basin. There is species overlap with the Wyoming Basin.

At a large scale this group includes greasewood, playa fringe, and riparian communities. A wide range of salt desert shrubs can occur in this group.

This PNVG may be very similar to the PNVG R3SDSH from the Southwest model zone, but fire regimes differ significantly due to changes in dominant species, climatic patterns, and geographic variability.

Scale Description

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

Disturbance scale was variable during pre-settlement. Droughts could be region wide, or more local. Mormon cricket disturbances could effect hundreds to perhaps thousands of acres for years to 1-2 decades. Most fires were less than 1 acre and rare. A series of high water years could affect whole basins.

Issues/Problems

Lack of citations during model development. Reviewers indicated that there is little evidence for fire in salt desert shrub during pre-settlement. Research from the USFS Desert Experimental Range supports this and

indicates shifting mosaics of communities based of drought, flooding, and insect outbreaks.

There was little/no information about the low successional species and their relationships in this group prior to the advent of aggressive and noxious non-natives during model development. Because of the pervasive replacement of native, low successional species by non natives, an adequate description of the forb grass low seral communities may be difficult to complete.

Upland salt desert shrub communities are easily invaded and, in the short term at least, replaced by cheatgrass. Other non-native problematic annuals include halogeton, Russian thistle, and several mustards. Through central UT and east central NV this group is susceptible to invasion by square rose knapweed. More mesic areas can be invaded by tall whitetop and hoary cress. All three are noxious weeds in Great Basin states.

Model Evolution and Comments

This PNVG has replaces the PNVG R#DESH from the Pacific Northwest model zone and R0SDSH for the Northern and Central Rockies model zone for Rapid Assessment mapping because their descriptions were very similar and only a small portion exists in the Pacific Northwest and Northern and Central Rockies model zones.

*Succession Classes***

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

Class A 30 %

Early1 Open

Description

Perennial grass dominated communities. This stage would follow a disturbance and could occur from 1 to 50 yrs post disturbance.

Succession to C, the late-development class. Insects (mostly Mormon crickets) will have two different effects depending on season, weather, and past history. Assuming serious insects outbreaks every 60 years, 90% of them will cause a successional setback of 50 years in class A, whereas in the other 10% of cases insects will favor low successional native species and cause a transition to class D. Drought every 70 years will also cause a transition to class D.

Dominant Species* and Canopy Position

POSE
SIHY
ACHY
HIJA

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	20 %	70 %
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 B 10 %

Early3 Open

Description

The class is made of sprouting shrubs (e.g., black greasewood, sickle saltbush, and fourwing saltbush) that survived either drought, insects, or rare mixed severity fire events.

Insects will maintain vegetation in this class (60 years return interval), whereas rare replacement fire (FRI of 1,000 years) will cause a transition to class D, low successional native species. Succession to the climax class C after 50 years.

Dominant Species* and Canopy Position

CHRYS
TETRA
POSE
GUSA2

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	20 %	40 %
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 55 %

Late1 Open

Description

Climax salt desert shrub communities. Shadscale, winterfat, and bud sage would be the expected dominant shrubs. Depending on soils, elevation, and weather common perennial grasses may include Indian ricegrass, squirreltail, Sandberg bluegrass, and galleta.

Depending on many factors, weather-related stress will cause a stand replacing (die-off of shrubs by drought) transition to class A every 78 years, whereas under different conditions the transition will be to class D (average return interval of 700 years), the low successional native species. Insects every 60 yrs would thin the vegetation in C, but not cause a transition to early successional stages. Rare replacement fire (FRI of 1,000 years) will cause a transition to class A, whereas mixed severity fire (FRI of 1,000

Dominant Species* and Canopy Position

ATCO
CEAR1
ARSP5
ACHY

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	20 %	40 %
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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years) will favor resprouting shrubs (transition to class B). Succession maintains vegetation in this class, although shadscale, in particular, will senesces after 75 years.

Class D 5 %

Early2 Open

Description

Some disturbances, insects, drought, and past disturbances would open the community to invasion by low successional native species. These species could dominate the site for 10 years.

Whether this stage succeeded to classes A or B would depend on the pre-disturbance composition, disturbance severity, and weather conditions pre-/post-disturbance. The primary succession path is to A after 10 yrs, unless insects (return interval of 70 yrs) either reset temporarily the successional clock to zero (50% of times) or cause a transition to class B by favoring resprouting shrubs. Weather-related stress every 70 years will also cause a transition to class B.

Dominant Species* and Canopy Position

BRASS
CLEO
SPHAE
STANL

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	10 %	30 %
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 0 %

Late1 Closed

Description

Dominant Species* and Canopy Position

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Fuel Model no data

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	%
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
- [x] 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
- [ ] Local Data
- [x] Expert Estimate

Fire Regime Group: **5**

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	1666	500	1000	0.00060	50
Mixed	1666	500	1000	0.00060	50
Surface					
All Fires	832			0.00121	

References

Paysen, Timothy E.; Ansley, R. James; Brown, James K.; [and others]. 2000. Fire in western shrubland, woodland, and grassland ecosystems. In: Brown, James K.; Smith, Jane Kapler, eds. Wildland fire in ecosystems: Effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-volume 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 121-159. [36978].

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