

LANDFIRE Biophysical Setting Model

Biophysical Setting 1810800

Inter-Mountain Basins Big Sagebrush Shrubland

- This BPS is lumped with:
 This BPS is split into multiple models:

General Information

Contributors (also see the Comments field) **Date** 5/19/2005

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Modeler 2 **Reviewer**
Modeler 3 **Reviewer**

| <u>Vegetation Type</u> | <u>Dominant Species</u> | <u>Map Zone</u> | <u>Model Zone</u> | |
|---|-------------------------|-----------------|---|--|
| Shrubland | ARTRW8 CHVI8 | 18 | <input type="checkbox"/> Alaska | <input type="checkbox"/> Northern Plains |
| General Model Sources | ACHY | | <input type="checkbox"/> California | <input type="checkbox"/> N-Cent.Rockies |
| <input checked="" type="checkbox"/> Literature | HECO26 | | <input checked="" type="checkbox"/> Great Basin | <input type="checkbox"/> Pacific Northwest |
| <input type="checkbox"/> Local Data | ATCO | | <input type="checkbox"/> Great Lakes | <input type="checkbox"/> South Central |
| <input checked="" type="checkbox"/> Expert Estimate | ELELE | | <input type="checkbox"/> Hawaii | <input type="checkbox"/> Southeast |
| | | | <input type="checkbox"/> Northeast | <input type="checkbox"/> S. Appalachians |
| | | | | <input type="checkbox"/> Southwest |

Geographic Range

This ecological system is found in eastern CA, central and northern NV and UT and is distinct from sagebrush steppe (Inter-Mountain Basins Big Sagebrush Steppe, BPS 1125) which is found on the Columbia Plateau and in WY.

Biophysical Site Description

This widespread system is common to the Basin and Range province. In elevation it ranges from 3000-7000ft (above 4000ft at lower latitudes), and occurs on well-drained soils on foothills, terraces, slopes and plateaus. It is found on soil depths >18in and up to 60in+. Elevationally it is found between low elevation salt desert shrub and mountain big sagebrush zones where pinyon and juniper can establish. Occurs from 4-14in precipitation zones, however, Wyoming big sagebrush requires 8-12in of effective moisture within this broader range. Thus, other sites characteristics (eg, aspect and drainage) should be considered in identifying this ecotype. At the precipitation extremes, this system generally occurs as small patches and stringers.

Vegetation Description

Shrub canopy cover generally ranges from 5-25%, 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. Rubber rabbitbrush is 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 a co-dominant after 20yrs, but only in precipitation zones >10in. Bottlebrush squirreltail, Thurber's needlegrass and Indian ricegrass are common on more xeric sites. Percent cover and species richness of understory are determined by site limitations. Pinyon (generally

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Pinus monophyla) and juniper (generally Juniper osteosperma) are 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 ecological system is characterized by replacement fires where shrub canopy exceeds 20% cover (50-100yrs; mean FRI of 125yrs, ie, 80% of total fire probability) or where grass cover is >15% and shrub cover is >20% (40-70yrs; mean FRI of 100yrs). Mixed severity fires account for 20% of fire activity (mean FRI of 500yrs) where shrub cover ranges from 10-20% (20-40yrs). Surface fires where shrub cover is <10% (0-20yrs) are generally uncommon during early development (FRI of 200yrs). Where pinyon or juniper has encroached after 100yrs without fire, mean FRI of fire replacement increases from 100 to 125yrs.

The Aroga moth is capable of defoliating large acreages (ie, >1000ac; mean return interval of 75yrs), but usually 10-100 acres.

Weather stress: Prolonged drought (e.g. 3-7 consecutive years of drought) 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 (ie, 1 in 300 year flood events). In years with high winter precipitation, flooding (ie, soil saturation for extended periods) results in mortality and die-back.

Herbivory (non-insect); Herbivory can remove the fine fuel that supports mixed severity fires and result in woody fuel build up that leads to severe replacement fires.

Adjacency or Identification Concerns

ID Concerns: At the transition between the Great Basin and Columbia Plateau, this BpS can be confused with Inter-Mountain Basins Big Sagebrush Steppe (1125).

ID Concerns: This ecological system represents the merging of Basin big sagebrush (R2SBBB) and all Wyoming big sagebrush semi-desert PNVGs from the Rapid Assessment: R2SBW and R2SBWYwt. The NatureServe description of Intermountain Basins Big Sagebrush Shrubland (BpS 1080) includes both *Artemisia tridentata* spp. *tridentata* AND *Artemisia tridentata* spp. *wyomingensis*. Strong concerns were voiced that these two big sagebrush species should and can be mapped separately (especially areas currently invaded by adjacent trees).

ID concerns: The NatureServe description of this ecological system does not distinguish between sagebrush systems where sagebrush is too low elevation to allow for tree invasion (eg, as Humboldt River drainage of NV) and where trees can readily invade under fire exclusion (above 4500ft in NV). These two types of sagebrush system need to be separated, especially for management of greater sage grouse.

Identification concerns include instances of low-stature Wyoming big sagebrush due to reduced effective rooting zone. Low-stature Wyoming big sagebrush can be confused with black sagebrush (BpS 1079) from a distance or satellite.

Adjacency concerns: This community may be adjacent to mountain big sagebrush at elevations above 6500ft, 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 root-restrictive layers.

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ID 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 (eg, cheatgrass) and/or noxious weeds. Lack of disturbance at mid- to higher elevations can result in pinyon-juniper encroachment where adjacent to pinyon-juniper woodlands.

Post-settlement issues center around the high amount of big sagebrush with minimal to no understory, and whether these decadent stands are related to fire suppression or natural physiological/ecological progression.

Native Uncharacteristic Conditions

Scale Description

BpS can occupy vast areas (>100000ac) in NV and UT, however occurrences are smaller in MZ18 as the predominant sagebrush is steppe, not sagebrush semi-desert. Historic disturbance (fire) likely ranged from small (<10ac) to large (>10000ac) depending on conditions, time since last ignition and fuel loading. Assumed the average patch size is 250ac.

Issues/Problems

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 under reference (presettlement) condition.

Comments

D Major made changes to vegetation class structural values in response to MTD v3.1 updates (K Pohl 7/18/05 request). These changes have not been reviewed and accepted by model developers as of 7/24/05. In MZ18 the model is the same as that used for MZs 12 and 17 developed by Don Major (dmajor@tnc.org), Gary Medlyn (gmedlyn@nv.blm.gov) and Crystal Golden (ckolden@gmail.com). The model was accepted for MZ18 by Eric Limbach. Minor changes were made by Limbach to the database record; none to the model. Jon Bates (reviewer) suggested the following changes to the database: 1) Thurber's needlegrass was added to the list of xeric grass species. 2) Max shrub cover was reduced to 20% in class B and min and max of class C was adjusted to 21-30% to account for low and high productivity sites. Bates infrequently observed Wyoming big sagebrush semi-desert to exceed 15% cover with line-intercept, point-intercept and Daubenmire methods. 3) The cover of trees, mostly juniper, was reduced to 40% from 90% in class E based on data from Juniper Mountain (southeastern Idaho; Miller et al. 2000) and experience with sagebrush semi-desert.

This ecological system is closely based on R2SBWY and R2SBWYwt originally modeled by Gary Back (gback@srk.com) and modified by Louis Provencher (lprovencher@tnc.org) based on reviews by Stanley G. Kitchen (skitchen@fs.fed.us), Peter Weisberg (pweisberg@cabnr.unr.edu) and Jolie Pollet (jpollet@blm.gov). This model assumes the sites are near pinyon-juniper savanna or woodlands and without frequent fire, pinyon or juniper will encroach into the sagebrush range site. In areas without a potential for tree invasion (eg, lower elevation), the Historic Range of Natural Variability for classes A, B and C, respectively, is 10%, 55% and 35% (results of R2SBWY).

NOTE regarding depleted sagebrush: Late seral stage was not modeled as it was identified that sagebrush depletion rate is much slower than the rate of juniper invasion. Further, sagebrush is unable to exclude

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Class C 25 %

Mid Development 1 Closed

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model

2

Indicator Species and Canopy Position

ARTRW8
 Upper
 CHVI8
 Mid-Upper
 ELEL5
 Lower
 HECO26
 Lower

Structure Data (for upper layer lifeform)

| | Min | Max |
|-----------------|----------|------------|
| Cover | 21 % | 30 % |
| Height | Shrub 0m | Shrub 1.0m |
| Tree Size Class | None | |

Upper layer lifeform differs from dominant lifeform.

Description

Shrubs dominate the landscape; fuel loading is primarily woody vegetation. Shrub density sufficient in old stands to carry the fire without fine fuel. Establishment of pinyon and juniper seedlings and saplings widely scattered. Replacement fire (mean FRI of 100yrs) and rare flood events (return interval of 333yrs) cause a transition to class A. Prolonged drought (mean return interval of 100yrs) and insect/disease (every 75yrs on average) cause a transition to class B. Succession to class D after 40yrs.

Class D 5 %

Late Development 1 Open

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model

2

Indicator Species and Canopy Position

JUNIP
 Upper
 PIMO
 Upper
 ARTRW8
 Mid-Upper
 HECO26

Structure Data (for upper layer lifeform)

| | Min | Max |
|-----------------|------------------------|---------|
| Cover | 0 % | 20 % |
| Height | Tree 0m | Tree 5m |
| Tree Size Class | Sapling >4.5ft; <5"DBH | |

Upper layer lifeform differs from dominant lifeform.

Shrubs may still represent the dominant life form (canopy cover <25%) with pinyon and juniper saplings common (1-15% upper canopy cover).

Description

Pinyon-juniper encroachment where disturbance has not occurred for at least 100yrs (tree species cover <20%). Saplings and young trees are the dominant life form. Sagebrush cover (<25%) and herbaceous cover decreasing compared to class C. Replacement fire occurs every 125yrs on average. Insect/disease (every 75yrs) and prolonged drought (every 100yrs) thin both trees and shrubs, causing a transition to class C. Succession to class E after 50yrs.

Class E 5 %

Late Development 1 Closed

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model

6

Indicator Species and Canopy Position

JUNIP
 Upper
 PIMO
 Upper
 SYOR
 Lower
 HECO26
 Lower

Structure Data (for upper layer lifeform)

| | Min | Max |
|-----------------|---------------|----------|
| Cover | 21 % | 40 % |
| Height | Tree 0m | Tree 10m |
| Tree Size Class | Pole 5-9" DBH | |

Upper layer lifeform differs from dominant lifeform.

Description

Shrubland encroached with mature pinyon and/or juniper (cover 21-40%) where disturbance does not occur

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for at least 50yrs in Class D. Shrub cover <10% and graminoids scattered. Replacement fire occurs every 125yrs on average. Prolonged drought thins trees, causing a transition to class B. Succession from class E to E.

Disturbances

| Fire Regime Group**: | IV | Fire Intervals | | | | | |
|------------------------------|---------|----------------|--------|--------|-------------|----------------------|----|
| | | Avg FI | Min FI | Max FI | Probability | Percent of All Fires | |
| Historical Fire Size (acres) | | Replacement | 137 | 30 | 200 | 0.0073 | 84 |
| | | Mixed | 1000 | | | 0.001 | 11 |
| | Avg 250 | Surface | 2500 | | | 0.0004 | 5 |
| | Min 10 | All Fires | 115 | | | 0.0087 | |

Max 10000

Sources of Fire Regime Data

- Literature
 Local Data
 Expert Estimate

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.

Additional Disturbances Modeled

- Insects/Disease Native Grazing Other (optional 1)
 Wind/Weather/Stress Competition Other (optional 2)

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