10810

Inter-Mountain Basins Mixed Salt Desert Scrub

BpS Model/Description Version: Aug. 2020

Update: 5/17/18

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Annie Brown | annie\_brown@blm.gov | Vic Ecklund | vecklund@csu.org |
| Jolie Pollet | jpollet@blm.gov | Chuck Kostecka | kostecka@webaccess.net |
| Stan Kitchen | skitchen@fs.fed.us | None | None |

Reviewer: Alan Sands

Vegetation Type

Shrubland

Map Zones

15, 16, 23, 24, 28

Geographic Range

The south half of map zone [MZ]27 should be included with this group in the future, but for now it is grouped with MZ33.

Found in the Wasatch and Unita Mountains, the Colorado Plateau, Arizona Plateau, Southern Rockies and Arizona/New Mexico Mountains ecoregions. Also found in the southern half of the Southwestern Tablelands level three ecoregion (EPA 2013; predominately in Upper Canadian Plateau (26l), Central New Mexico Plains (26o) and Pluvial Lake Basins (26p) level 4 ecoregions).

Biophysical Site Description

This type occurs from lower slopes to valley bottoms ranging in elevation from 4,300-6,500ft; MZ28 listed the elevation range from 1,500-2,200m (4,950-7,250ft). 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 5-10in. 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 November through April.

This group generally lies above playas and lakes. It tends to be the lowest vegetation group in elevation. Both to the north and upslope it is bordered by low elevation big sagebrush groups, commonly *Artemisia tridentata* ssp. *wyomingensis, Artemisia arbuscular*, and *Artemisia nova* communities, and sometimes by juniper and pinyon steppe. To the south this group is bordered by Mojave Desert transition communities.

Vegetation Description

This biophysical setting (BpS) includes low (<3ft) and medium-sized shrubs found widely scattered (often 20-30ft apart), to high density (3-4 plants per sq. m) shrubs interspersed with low to mid-height bunch grasses. Common shrubs are shadscale, winterfat, budsage, fourwing saltbush, Nevada ephedra, horsebrush, low rabbitbrush, broom snakeweed, and spiny hopsage. Some of these will dominate more than others depending on the site. Common bunch grass species are Indian ricegrass, needle-and-thread, purple three-awn and bottlebrush squirreltail, whereas common rhizomatous/sod forming grasses are galleta grass, sand dropseed and blue grama. Globe mallows are the most common and widespread forbs. 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, extended wet periods and drought) shift dominance between shrub and grass species. Following drought, the system will tend more toward Class C (more shrub prevalence). Following fire and extended wet periods, the system will tend more toward Class A (greater grass prevalence).

Dominant species for MZs 15, 16, 23 and 24 are listed in the table. MZ28 dominant species are ARTR2 (*Artemisia tridentata*), ATCA2 (*Atriplex canescens*), ATCO (*Atriplex confertifolia*), ATPO (*Atriplex polycarpa*), CHVI8 (*Chrysothamnus viscidiflorus*) and EPHED (*Ephedra*).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ATCO | *Atriplex confertifolia* | Shadscale saltbush |
| PIDE4 | *Picrothamnus desertorum* | Bud Sagebrush |
| KRLA2 | *Krascheninnikovia lanata* | Winterfat |
| ATCA2 | *Atriplex canescens* | Fourwing saltbush |
| TETRA3 | *Tetradymia* | Horsebrush |
| CHVI8 | *Chrysothamnus viscidiflorus* | Yellow rabbitbrush |
| GUSA2 | *Gutierrezia sarothrae* | Broom snakeweed |
| GRSP | *Grayia spinosa* | Spiny hopsage |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Under reference conditions disturbances were unpredictable, but flooding, drought, insects and fire may all occur in these systems. Extended wet periods tended to favor perennial grass development, while extended drought tended to favor shrub development.

Documented Mormon cricket/grasshopper outbreaks since settlement were associated with drought; outbreaks cause shifts in composition amongst dominant species, but do not typically cause shifts to different seral stages. Therefore, insect disturbance was not modeled. 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 extremely rare and limited to more mesic sites (and moist periods) with high grass productivity.

Native American manipulation of salt desert shrub plant communities was minimal. 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.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 614 | 100 |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 614 | 100 |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Disturbance scale was variable during pre-settlement. Droughts and extended wet periods could be region wide, or more local. A series of high water years or drought could affect whole basins.

Mormon cricket disturbances could affect 100s-1,000s of acres for years to 1-2 decades. Fires were rare and most were <1ac in size, but may have exceed 100s of acres with a good grass crop. Modelers of this BpS stated that major fires can occur the year after a wet year that resulted in a large grass crop. A reviewer disagreed stating that “multiple wet years would be needed to provide enough grass to carry fire and even then, fires would be small due to light, discontinuous fuel.”

Adjacency or Identification Concerns

This BpS contains the typical Great Basin salt desert shrub communities. Salt desert shrub is also common in the Wyoming big sagebrush community and there is some species overlap with other BpS, including Inter-Mountain Basins Semi-Desert Shrub Steppe (1127). A wide range of salt desert shrubs can occur in this group.

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

Issues or Problems

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

Since disturbance is rare and unpredictable, the disturbance and successional pathways were difficult to model.

Native Uncharacteristic Conditions

Comments

During the 2017 BpS review, this model was part of a “macro-review” where all models representing this BpS were reviewed and evaluated relative to one another. One goal of the review was to check for logical consistency between the models. Outstanding questions from this review that should be evaluated in the future include:

-What is an appropriate fire frequency and severity for this BpS? There is a wide variance in fire frequencies listed among the model set for this BpS, ranging from a couple hundred to a couple thousand years. Sands stated in his review that this variation “is a reflection of the lack of data and knowledge on this system rather than actual variation among the mapzones.” LANDFIRE National reviewers for MZs 7, 8, 9, 15, 16, 22, 23, 24, 27, and 28 indicated that there is no evidence for fire in salt desert shrub during pre-settlement. Research from the US Forest Service Desert Experimental Range supports this and indicates that the reference condition would have been shifting mosaics of communities based of drought, flooding and insect outbreaks.

-Should the concept represented by this BpS/Ecological System be revised? Sands noted that this type actually includes a number of very different vegetation communities: 1) greasewood communities, occupying seasonally saturated lowland soils, grow large, dense shrublands, sometimes with a dense saltgrass herbaceous layer, and 2) shadscale communities, occupying well drained upland soils, grow, short, widely spaced shrubs with sparse herbaceous interspaces. Kori Blankenship noted that MZs 6/12/13/17, 18/19/21, and 27/33 describe greasewood as an adjacent community, but in MZs 7/8/9 greasewood is included in the Mixed Salt Desert Scrub BpS concept.

Given the lack of information about fire frequencies and successional dynamics in this BpS much of the information in this model is speculative.

MZs15, 16, 23, 24 and 28 were combined during 2015 BpS Review. The primary difference between the original models was in the s-class mapping rules which, for the most part, did not comply with LANDFIRE rules. During LANDFIRE National, MZ28 was reviewed by Vic Ecklund and Chuck Kostecka;

In the future, BpS 10811 from MZ27 should be included with this model group as recommended by Sands. MZ27 was reviewed by Keith Schulz; MZs 23 and 24 did not receive peer review; Mike Babler modified the geographic range description for MZs 23, 24 and 28.

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | A | A | A | UN | UN | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | A | A | A | UN | UN | UN | UN | UN | UN | UN |
| Herb | >1.0 | A | A | A | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0-0.5 | A | B | C | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | A | B | C | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | A | B | C | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | A | B | C | UN | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 22 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ATCO | Atriplex confertifolia | Shadscale saltbush | Upper |

Description

Widely scattered shrubs with lots of bare ground. Extended wet periods can have a stand replacing effect. During a drought vegetation will follow an alternative successional pathway to class C.

*Maximum Tree Size Class*  
None

Class B 47 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ATCO | Atriplex confertifolia | Shadscale saltbush | Upper |

Description

Discontinuous grass patches, and higher shrub canopy cover than in Class A. Extended wet periods will cause a stand replacing transition to Class A. During extended drought periods vegetation will shift to Class C. *Atriplex confertifolia* do not reach 1m in height but *Atriplex canescens* can.

*Maximum Tree Size Class*  
None

Class C 31 Mid Development 2 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ATCO | Atriplex confertifolia | Shadscale saltbush | All |

Description

Grass is lacking, and shrub canopy cover is even higher than Class B. During extended wet periods, vegetation will transition to Class A. Vegetation moves back to Class B through succession. Drought will maintain vegetation in Class C. Fire would not carry in this class. *Atriplex confertifolia* do not reach 1m in height but *Atriplex canescens* can.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:OPN | 9 |
| Mid1:OPN | 10 | Mid1:OPN | 999 |
| Mid2:OPN | 10 | Mid1:OPN | 29 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Alternative Succession | Early1:ALL | Mid2:OPN | 0.03 | 33 | Yes | 0 |
| Wind or Weather or Stress | Early1:ALL | Early1:ALL | 0.03 | 33 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Wind or Weather or Stress | Mid1:OPN | Mid2:OPN | 0.03 | 33 | Yes | 0 |
| Wind or Weather or Stress | Mid1:OPN | Early1:ALL | 0.03 | 33 | Yes | 0 |
| Wind or Weather or Stress | Mid2:OPN | Early1:ALL | 0.03 | 33 | Yes | 0 |
| Wind or Weather or Stress | Mid2:OPN | Mid2:OPN | 0.035 | 29 | No | 0 |

References

Blaisdell, J.P. and R.C. Holmgren. 1984. Managing intermountain rangelands-salt-desert shrub ranges. General Technical Report INT-163. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 52 pp.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

U.S. Environmental Protection Agency. 2013. Level III Ecoregions of the Conterminous United States. U.S. EPA Office of Research and Development – National Health and Environmental Effects Research Laboratory, Corvallis, OR. Available: ftp://ftp.epa.gov/wed/ecoregions/us/us\_eco\_l3.zip, http://edg.epa.gov.