

10810

Inter-Mountain Basins Mixed Salt Desert Scrub

BpS Model/Description Version: Aug. 2020

Update: 5/17/18

Modelers		Reviewers	
George Soehn	george_soehn@blm.gov	Eve Warren	eve_warren@blm.gov
George Jones	gpjones@uwyo.edu	None	None
Dennis Knight	dhknight@uwyo.edu	None	None

Reviewer: Alan Sands

Vegetation Type

Shrubland

Map Zones

22

Model Splits or Lumps

This BpS is lumped with: Inter-Mountain Basins Semi-Desert Shrub-Steppe (BpS 11270). The descriptions and models are identical.

Geographic Range

Occurs throughout map zone (MZ) 22 in areas with <10in precipitation (excluding the subsections that are part of M331, Cleland et al. 2007.)

Biophysical Site Description

This type occurs from lower slopes to valley bottoms ranging in elevation from 4,300-6,500ft. Soils are often alkaline or calcareous. Soil permeability ranges from high to low, with more impermeable soils occurring in valley bottoms. Soil texture is variable becoming finer toward valley bottoms. Many soils are derived from colluvium on slopes and residual soils elsewhere. There may be water ponds on alkaline bottoms. Average annual precipitation ranges from 5-10in. Summers are hot and dry. 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 between October and April.

This group generally lies above playas and lakes. It tends to be the lowest vegetation group in elevation. Up slope it is bordered by and can integrate with low elevation big sagebrush groups, commonly Wyoming big sagebrush, low sagebrush, black sagebrush communities and sometimes by juniper woodland.

Vegetation Description

This 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, Wyoming big sagebrush, spiny horsebrush, low rabbitbrush, broom snakeweed and spiny hopsage. Some of these will dominate more than others depending on the site.

Common grass species are Indian ricegrass, needle-and-thread, western wheatgrass, three-awn and Sandberg bluegrass. Prickly pear cactus, hood's phlox, scarlet globemallow, wild onion, Hooker's sandwort and Sego lily are the most common and widespread forbs. The variably abundant understory grasses and forbs are salt and drought-tolerant. 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 production 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 B (more shrub prevalence). Following fire and extended wet periods, the system will tend more toward class A (greater grass prevalence).

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
ATCO	<i>Atriplex confertifolia</i>	Shadscale saltbush
PIDE4	<i>Picrothamnus desertorum</i>	Bud sagebrush
KRLA2	<i>Krascheninnikovia lanata</i>	Winterfat
ATCA2	<i>Atriplex canescens</i>	Fourwing saltbush
TETRA3	<i>Tetradymia</i>	Horsebrush
CHVI8	<i>Chrysothamnus viscidiflorus</i>	Yellow rabbitbrush
GUSA2	<i>Gutierrezia sarothrae</i>	Broom snakeweed
GRSP	<i>Grayia spinosa</i>	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 abnormally high precipitation, 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. During outbreaks, Mormon crickets prefer open, low plant communities. Consequently, 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. Reviewers for MZ16 indicated that there is no evidence for fire in salt desert shrub during presettlement (see Comments for more discussion). Although historic fire regimes in desert shrublands are difficult to quantify, West (1983) believes that on sparsely vegetated salt-desert types, fires were historically rare except under unusual circumstances such as following high precipitation years.

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.

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 B (more shrub prevalence). Following fire and extended wet periods, the system will tend more toward class A (greater grass prevalence).

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	450	100		
Moderate (Mixed)				
Low (Surface)				
All Fires	450	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

This type occurs in patches of <1ac to 100s of acres in size. Disturbance scale was variable during presettlement. Droughts and extended wet periods could be region-wide, or more local. A series of high precipitation years or drought could affect whole basins. Mormon cricket disturbances could affect hundreds of acres for years to 1-2 decades. Most fires were rare and less than one acre, but may exceed hundreds of acres with a good grass crop.

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. A wide range of salt desert shrubs can occur in this group.

Upland salt desert shrub communities are potentially invadable by cheatgrass which could lead to more frequent fire intervals. Other nonnative problematic annuals include Japanese brome, halogeton, Russian thistle, and several mustards.

There are, however, still salt-desert shrublands in the western United States experiencing historic fire regimes. For example, the well-studied salt-desert communities of Raft River Valley, southwestern Idaho, have not experienced fire since at least the 1930s. The vegetation community changes of this area have been monitored since 1951 (see <http://www.cnrhome.uidaho.edu/default.aspx?pid=81934>) with the last photo-documentation done in 2002 showing a significant cheatgrass component.

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 map zones.”

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.

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	B	B	B	UN	UN	UN	UN	UN	UN	UN
Shrub	0.5-1.0	B	B	B	UN	UN	UN	UN	UN	UN	UN
Shrub	1.0-3.0	B	B	B	UN	UN	UN	UN	UN	UN	UN
Shrub	>3.0	B	B	B	UN	UN	UN	UN	UN	UN	UN
Tree	0-5	B	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	5-10	B	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	10-25	B	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	25-50	B	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	>50	B	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 25 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PASM	Pascopyrum smithii	Western wheatgrass	Lower
ACHY	Achnatherum hymenoides	Indian ricegrass	Lower
ATCO	Atriplex confertifolia	Shadscale saltbush	Upper

Description

Community dominated by herbaceous vegetation with widely scattered shrubs. Herbaceous vegetation seldom >20% cover. Extended wet periods can have a stand-replacing effect.

Maximum Tree Size Class

None

Class B 75 Mid Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ATCO	Atriplex confertifolia	Shadscale saltbush	Upper
ACHY	Achnatherum hymenoides	Indian ricegrass	Lower
PASM	Pascopyrum smithii	Western wheatgrass	Lower

Description

Sparser herbaceous vegetation but higher shrub canopy cover than in class A. Extended wet periods could cause a stand replacing transition or could maintain this class with a higher component of grasses with slightly less precipitation. Drought will maintain this class.

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

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
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	Mid1:OPN	0.03	33	No	0
Wind or Weather or Stress	Mid1:OPN	Early1:ALL	0.03	33	Yes	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.

Cleland, D.T.; Freeouf, J.A.; Keys, J.E.; Nowacki, G.J.; Carpenter, C.A.; and McNab, W.H. 2007. Ecological Subregions: Sections and Subsections for the conterminous United States. Gen. Tech. Report WO-76D [Map on CD-ROM] (A.M. Sloan, cartographer). Washington, DC: U.S. Department of Agriculture, Forest Service, presentation scale 1:3,500,000; colored.

Knight, D.H. 1994. Mountains and plains: Ecology of Wyoming landscapes. Yale University Press, New Haven, MA. 338 pp.

McArthur, E.D., E.M. Romney, S.D. Smith and P.T. Tueller. 1990. Symposium on cheatgrass invasions, shrub die-off, and other aspects of shrub biology and management. Gen. Tech. Rep. Int-276. Ogden, Utah: USDA Forest Service.

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

West, N.E. 1983. Intermountain salt-desert shrubland. In: N.E. West, ed. Temperate deserts and semi-deserts. New York: Elsevier Scientific Publishing Company: 375-397. (Goodall, David W., ed. in chief.; Ecosystems of the world; vol. 5).

West, N.E. 1994. Effects of fire on salt-desert shrub rangelands. Pages 71-74 in: S.B. Monsen and S.G. Kitchen, compilers. Proceedings--ecology and management of annual rangelands; 1992 May 18-22; Boise, ID. Gen. Tech. Rep. INT-GTR-313. Ogden, UT: USDA Forest Service, Intermountain Research Station.