USDA Natural Resources
Conservation Service

Ecological site EX043B23A142
Saline Subirrigated (SS) Absaroka Lower Foothills

Last updated: 4/30/2024
Accessed: 05/07/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

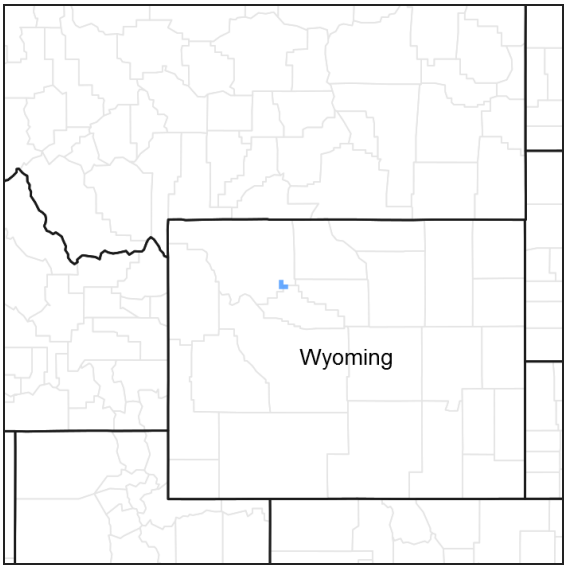


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 043B–Central Rocky Mountains

Major Land Resource Unit (MLRA) 43B: Central Rocky Mountains

43B – Central Rocky Mountains – The Central Rocky Mountains extends from northern Montana to southern extent of Wyoming and from Idaho to central Wyoming. The southern extent of 43B is comprised of a combination of metamorphic, igneous, and sedimentary mountains and foothills. Climatic changes across this extent are broad and create several unique breaks in the landscape.

Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.
Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook.

LRU notes

Land Resource Unit (LRU) 43B23A: Absaroka Lower Foothills

Based on the shifts in geology, precipitation patterns and other climatic factors, as well as elevations and vegetation, the Absaroka Range was divided into LRU 23. Further division of this LRU is necessary due to the gradient moving from the foothills to the summit, as well as aspect shifts (north/east face versus south/west face). Subset A is set for the lower elevations within the foothills with 10 to 14 inches of precipitation. To verify or identify the LRU A (the referenced LRU for this ecological site), refer to the Wyoming LRU matrix key contained within the Ecological Site Key. This particular LRU occurs along the eastern lower foothills of the Absaroka Range. This LRU starts north of Clark, WY and runs to the Thermopolis, WY area. Once the foothills cross into the Northern Beartooth Range, the climatic patterns and elevational changes shifts the plant community and allows for a break in LRU's near the Montana state line. As the LRU follows to the south and tracks east with the intersection of the Absaroka and Owl Creek Ranges, the face changes aspect and geology creating a shift in plant dynamics and a break in the LRU. The extent of soils currently correlated to this ecological site does not fit within the digitized boundary. Many of the noted soils are provisional and will be reviewed and corrected in mapping update projects. Other map units are correlated as small inclusions within other MLRA's/LRU's based on elevation, landform, and biological references.

Moisture Regime: Aquic - [Aridic Ustic or Ustic Aridic] – Progressive Initial mapping has shown that soil correlations completed prior to 2014 were identified as ustic aridic, after further evaluation of climatic and soil taxonomy information the proper moisture regime is aquic for this particular site or in select cases, aridic ustic. All three are recorded here until an update project is completed to correct the previous correlations.

Temperature Regime: Frigid
Dominant Cover: Rangeland – Sagebrush Steppe (major species is Wyoming Big Sagebrush)
Representative Value (RV) Effective Precipitation: 10-14 inches (254 – 355 mm)
RV Frost-Free Days: 80-110 days

Classification relationships

Relationship to Other Established Classification Systems:

National Vegetation Classification System (NVC):
3 Xeromorphic Woodland, Scrub & Herb Vegetation Class
3.B Cool Semi-Desert Scrub & Grassland Subclass
3.B.1 Cool Semi-Desert Scrub & Grassland formation
3.B.1.NE Western North American Cool Semi-Desert Scrub & Grassland Division
M169 Great Basin & Intermountain Tall Sagebrush Shrubland & Steppe Macrogroup

Ecoregions (EPA):
Level I: 10 North American Deserts Level II: 10.1 Cold Deserts
Level III: 10.1.18 Wyoming Basin
Level IV: 10.1.18.b Big Horn Basin and
10.1.18.d Foothills and Low Mountains

Ecological site concept

• Site influence by a water table below soil surface through the entire growing season (within 40 inches), and water may move over the surface from run-in but only for short periods.
• Slope is <6%
• Soils are:
- saline, sodic, or saline-sodic, gypsic
- Moderately deep, deep, or very deep (depth to restrictive layer is greater than 10" (25 cm).
- Poorly to moderately well drained
- Textures usually range from loamy sand to clay loam
- Clay content is < 60% in mineral soil surface 4".
- With an average particle size class < 40% clay

Associated sites

R032XY338WY	**Saline Lowland (SL) 10-14" East Precipitation Zone** Saline Lowland occurs in close association with saline subirrigated. Saline Subbirrigated is the transition from the wettest (wetland) to the drier (saline lowland) sites within a drainage system.
R032XY378WY	**Wetland (WL) 10-14" East Precipitation Zone** Wetland occurs in close association with saline subirrigated. Saline Subbirrigated is the transition from the wettest (wetland) to the drier (saline lowland) sites within a drainage system.

Similar sites

R032XY142WY	**Saline Subirrigated (SS) 5-9” Big Horn Basin Precipitation Zone** Saline Subirrigated Big Horn Basin 5-9" Precipitation Zone has lower production than this site.
R032XY242WY	**Saline Subirrigated (SS) 5-9” Wind River Basin Precipitation Zone** Saline Subirrigated Wind River Basin 5-9" Precipitation Zone has lower production than this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Sarcobatus vermiculatus*
Herbaceous	(1) *Sporobolus airoides* (2) *Puccinellia nuttalliana*

Legacy ID

R043BX542WY

Physiographic features

This site occurs on relatively level lands adjacent to perennial streams, lakes, ponds and springs.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Alluvial fan (2) Foothills > Drainageway (3) Foothills > Flood plain
Runoff class	Negligible to low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to frequent
Elevation	1,646–2,286 m
Slope	0–6%
Ponding depth	0–8 cm
Water table depth	30–102 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation and modeled relative effective annual precipitation ranges from 10 to 14 inches (254 – 355 mm). The normal precipitation pattern shows peaks in May and June and a secondary peak in September. This amounts to about 50% of the mean annual precipitation. Much of the moisture that falls in the latter part of the summer is lost by evaporation and much of the moisture that falls during the winter is lost by sublimation. Average snowfall is about 20 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. High winds are generally blocked from the basin by high mountains, but can occur in conjunction with an occasional thunderstorm. Growth of native cool-season plants begins about April 15th and continues until about July 1st. Cool weather and moisture in September may produce some green up of cool season plants that will continue through late October.

Review of a 30 year trend of data for Average Temperature as well as Average Precipitation, there has been a warming trend, but as the last 12 years graphed, the temperatures have swayed high and low, but overall it has maintained a steady trajectory, neither increasing nor decreasing. Where on the moisture side, the trajectory in trend has been a slow decline. The swings of when spring warm up and first frost hit with the decline in average precipitation have produced a drought effect where the moisture is not being received when the plants and ground is able to utilize the moisture. And in some cases, the late precipitation has encouraged the warm season or mat forming species over the cool season bunchgrasses that are the drivers of the natural system. Early frosts, with dry open winters has created a more arid or desert effect on plants resulting in high rates of winter kill, loss of vigor or overall damage to the plant.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/. “Buffalo Bill Dam", "Cody 21SW", "Thermopolis", "Thermopolis 25WNW" and "Wapiti 1NE" are the representative weather stations within LRU D. The following graphs and charts are a collective sample representing the averaged normals and 30 year annual rainfall data for the selected weather stations from 1981 to 2010.

Table 3. Representative climatic features

Frost-free period (characteristic range)	64-106 days
Freeze-free period (characteristic range)	101-144 days
Precipitation total (characteristic range)	279-305 mm
Frost-free period (actual range)	46-118 days
Freeze-free period (actual range)	88-147 days
Precipitation total (actual range)	254-330 mm
Frost-free period (average)	80 days
Freeze-free period (average)	117 days
Precipitation total (average)	305 mm

Climate stations used

- (1) THERMOPOLIS [USC00488875], Thermopolis, WY
- (2) THERMOPOLIS 25WNW [USC00488888], Thermopolis, WY
- (3) SUNSHINE 3NE [USC00488758], Meeteetse, WY
- (4) CODY 21 SW [USC00481855], Cody, WY
- (5) WAPITI 1NE [USC00489467], Cody, WY
- (6) BUFFALO BILL DAM [USC00481175], Cody, WY

Influencing water features

The characteristics of these soils have influence from ground water that is within 40 inches of the soil surface and will be just below the surface for all of the growing season. Water over the surface from run-in may occur but only for short periods of time. These soils are moderately deep to deep and poorly to somewhat well drained.

Wetland description

No wetland classification was established for this site.
Stream type: C (Rosgen)

Soil features

The soils of this site are moderately deep to very deep (greater than 20” (50 cm) to bedrock) poorly drained to moderately well drained soils formed in alluvium. These soils have water tables below the surface for all of the growing season. These areas may have water over the surface from run-in but only for short periods of time. The soil characteristics having the most influence on the plant community are depth to a water table during the growing season and the amount of soluble salts.

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock
Surface texture	(1) Loam (2) Clay loam (3) Silt loam (4) Sandy clay loam (5) Loamy sand (6) Sandy loam
Drainage class	Somewhat poorly drained to poorly drained
Permeability class	Slow to moderate
Soil depth	51–152 cm
Available water capacity (0-101.6cm)	7.11–15.75 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	4–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	8–40
Soil reaction (1:1 water) (0-101.6cm)	7.4–9

Ecological dynamics

Potential vegetation on this site is dominated by plants that can tolerate soils that are saline and/or alkaline and have a water table near the surface for most of the growing season. The expected potential composition for this site is about 80% grasses, 5% forbs and 15% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

As this site deteriorates, species such as inland saltgrass and greasewood increase and species such as Russian olive, saltcedar and foxtail barley invade the site. Grasses such as alkali sacaton, Nuttall's alkaligrass, and basin wildrye will decrease in frequency and production.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

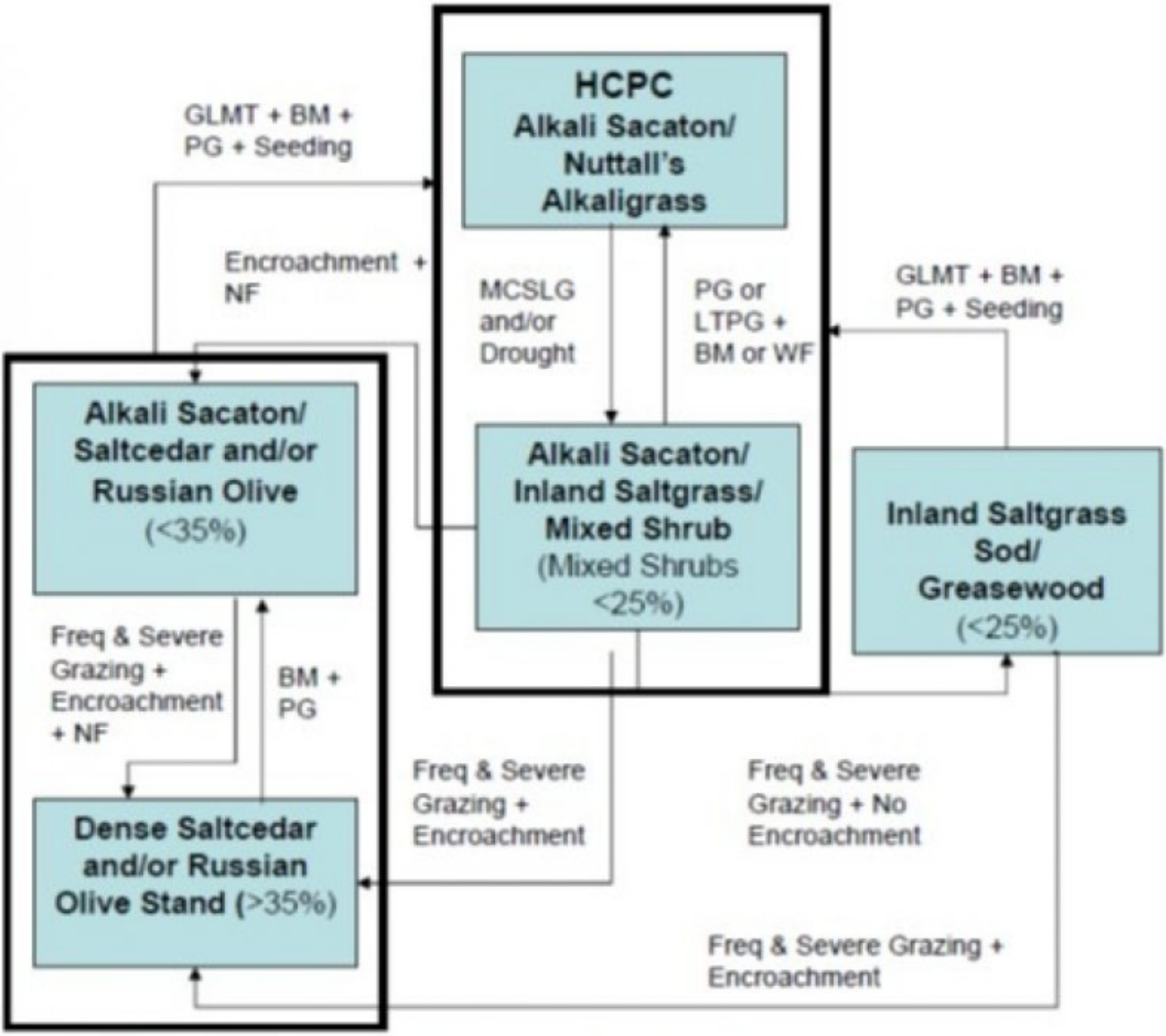
The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

State and transition model

Site Type: Rangeland
MLRA: 32 – Northern Intermountain Desertic Basins

Saline Subirrigated 10-14" E P.Z.
032XY342WY



BM - Brush Management (fire, chemical, mechanical)
Freq. & Severe Grazing - Frequent and Severe Utilization of the Cool-season Mid-grasses during the Growing Season
GLMT - Grazing Land Mechanical Treatment
LTPG - Long-term Prescribed Grazing
MCSLG - Moderate, Continuous Season-long Grazing
NU, NF - No Use and No Fire
PG - Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)
VLTPG - Very Long-term Prescribed Grazing (could possibly take generations)
WF - Wildfire

State 1
Alkali Sacaton/ Nuttall's Alkaligrass

Community 1.1
Alkali Sacaton/ Nuttall's Alkaligrass

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores, periodic fires, supplemental moisture, and saline and/or alkali soils. Potential vegetation is about 80% grasses or grass-like plants, 5% forbs and 15% woody plants. The major grasses include alkali sacaton, Nuttall's alkaligrass, and basin wildrye. Grasses of lesser importance are Baltic rush, Chairmaker's bulrush, western wheatgrass, alkali cordgrass, inland saltgrass, and tufted hairgrass. Woody plants are primarily rubber rabbitbrush, silver buffaloberry, wild rose, and greasewood. A variety of forbs also occurs in this state and plant diversity is high (see Plant Composition Table). The total annual production (air-dry weight) of this state is about 3200 pounds per acre, but it can range from about 2800 lbs./acre in unfavorable years to about 3600 lbs./acre in above average years. The state is stable and well adapted to the Northern Intermountain Desertic Basins climate. The diversity in plant species and the reliable water table allow for high drought resistance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Moderate, continuous season-long grazing will convert this plant community to the Alkali Sacaton/Inland Saltgrass/Mixed Shrub Plant Community. Prolonged drought will exacerbate this transition.

Figure 9. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				15	30	20	15	10	10		

State 2
Alkali Sacaton/ Inland Saltgrass/ Mixed Shrub

Community 2.1
Alkali Sacaton/ Inland Saltgrass/ Mixed Shrub

Historically, this plant community evolved under moderate grazing by domestic livestock and low fire frequency. Currently, this site is normally found under a moderate, season-long grazing regime and in the absence of fire or brush control. Prolonged drought can also play an important role and will exacerbate these conditions. Saline and flood tolerant perennial plants make up the dominant species in this plant community. The dominant grasses include alkali sacaton, inland saltgrass, western wheatgrass, alkali cordgrass, and Baltic rush. Forbs commonly found in this plant community include alkali seepweed, silverweed, American licorice, seaside arrowgrass, and smooth horsetail. Greasewood and rubber rabbitbrush comprise the majority of the woody species and make up less than 25% of the annual production. When compared to the Historical Climax Plant Community, basin wildrye, Nuttall's alkaligrass, and tufted hairgrass have decreased. Inland saltgrass, forbs, greasewood, and rubber rabbitbrush have increased. Annual weedy plants have invaded, but occur in small patches. The total annual production (air-dry weight) of this state is about 2800 pounds per acre, but it can range from about 2200 lbs./acre in unfavorable years to about 3400 lbs./acre in above average years. This state is stable and protected from excessive erosion. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Only minimal occurrences of water flow patterns and litter movement is evident. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing or possibly long-term prescribed grazing will result in a plant community very similar to the Historic Climax Plant Community, except that greasewood will persist without a return to a normal fire regime or some form of brush control. • Frequent and Severe grazing plus no encroachment will convert this plant community to the Inland Saltgrass Sod/Greasewood Plant Community. • Encroachment and no fire will convert this plant community to the Alkali Sacaton/ Saltcedar and/or Russian Olive Plant Community. • Frequent and Severe grazing plus encroachment will convert this plant community to a Dense Saltcedar and/or Russian Olive Stand Plant Community.

Figure 10. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				15	30	20	15	10	10		

State 3
Inland Saltgrass Sod/ Greasewood

Community 3.1
Inland Saltgrass Sod/ Greasewood

This plant community is the result of frequent and severe grazing with periodic overflows and no fire or brush control. This plant community is dominated by a dense short grass sod and includes a mosaic shrub overstory. Greasewood, the primary shrub, comprises less than 25% of the annual production, and shrub numbers are kept in check by the herbaceous sod understory. The dominant grasses are inland saltgrass, mat muhly, big bluegrass, Baltic rush and Chairmaker's bulrush. Forbs such as seaside arrowgrass, licorice root, curly dock, and smooth horsetail are common. Greasewood is the primary overstory species in this plant community, but rubber rabbitbrush can also become abundant. Noxious weeds such as Russian knapweed and Canada thistle often invade the site if a seed source is available. Plant diversity is moderate to poor. When compared to the Historic Climax Plant Community, the tall and medium grasses are significantly reduced or absent. Short warm season grasses are dominant and weedy annuals are common. Shrubs will have increased as a percentage of the total production, but will not dominate as the sod prevents a homogeneous shrub cover. Areas of bare ground may have increased in patches, and total production has decreased as the short grasses have replaced the tall and mid grasses. The total annual production (air-dry weight) of this state is about 1500 pounds per acre, but it can range from about 1200 lbs./acre in unfavorable years to about 2000 lbs./acre in above average years. The sod component of this plant community is extremely resistant to change and continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. The biotic integrity of this state is generally not functional as plant diversity is poor, especially the amount of herbaceous species. The vegetative structure has shifted as the shrubs and short grasses now occupy the majority of the site. This sod bound plant community is very resistant to water infiltration. While this sod protects the site itself, excessive runoff increases erosion on bare ground and can cause rill channels and gully erosion. Water flow patterns are obvious in the bare ground areas and shrubs and sod patches are pedestalled. Rill channels are noticeable in the interspaces and gullies may be establishing where rills have concentrated. The watershed may not be functioning, as runoff is excessive and erosional processes are accelerated. Transitional pathways leading to other plant communities are as follows: • Grazing land mechanical treatment (chiseling, etc.) and brush management followed by prescribed grazing and if necessary seeding will return this plant community to near Historic Climax Plant Community. • Frequent and severe grazing plus encroachment will convert this plant community to the Dense Saltcedar and/or Russian Olive Stand Plant Community. Prolonged drought will exacerbate this transition. Invasion of saltcedar or Russian olive should be consider serious and should be controlled.

Figure 11. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				15	30	20	15	10	10		

State 4
Alkali Sacaton/Saltcedar and/ or Russian Olive

Community 4.1
Alkali Sacaton/Saltcedar and/ or Russian Olive

This plant community occurs where saltcedar and/or Russian olive encroaches into a saline subirrigated site and becomes established. This occurs with or without grazing and is the result of conditions conducive to the colonization of these two plants. An increase in bare ground is likely to increase the potential for colonization. However, areas that have been deferred or removed from grazing and had a healthy stand of alkali sacaton can still be infested. Saline and flood tolerant perennial plants make up the dominant understory species in this plant community. The dominant grasses include alkali sacaton, inland saltgrass, western wheatgrass, alkali cordgrass, and Baltic rush. Forbs commonly found in this plant community include alkali seepweed, silverweed, American licorice, seaside arrowgrass, and smooth horsetail. Saltcedar and/or Russian olive comprise the majority of the woody species and usually make up greater than 35% of the annual production. When compared to the Historical

Climax Plant Community, basin wildrye, Nuttall's alkaligrass, and tufted hairgrass have decreased. Inland Saltgrass and forbs have increased. Saltcedar and/or Russian olive have invaded. Total production is similar to the Alkali Sacaton/Inland Saltgrass/Mixed Shrub plant community. The total annual production (air-dry weight) of this state is about 2200 pounds per acre, but it can range from about 1600 lbs./acre in unfavorable years to about 2600 lbs./acre in above average years. This plant community is mostly resistant to change, but species composition can be altered through long-term overgrazing and further encroachment of saltcedar and/or Russian olive. The herbaceous component is stable and plant vigor and replacement capabilities are sufficient. The biotic community is not intact due to the encroachment of these invasive species. Plant diversity is moderate. Soils are mostly stabilized. Only minimal occurrences of water flow patterns and litter movement is evident. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. The watershed may or may not be functional. Transitions or pathways leading to other plant communities are as follows: • Frequent and severe grazing plus more Encroachment will convert the plant community to the Dense Saltcedar and/or Russian Olive Stand Plant Community. • Grazing land mechanical treatment, brush management, and prescribed grazing may convert this plant community to the Historic Climax Plant Community, but recovery is mostly impractical as removal of salt cedar and/or Russian olive is expensive and total removal is typically not obtainable. Salt cedar and Russian olive will still probably persist as suppression and containment of this plant is optimal. Any methods of control should be followed by revegetation to reduce regeneration of these plants and other weedy species.

Figure 12. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				15	30	20	15	10	10		

State 5
Dense Saltcedar and / or Russian Olive stand

Community 5.1
Dense Saltcedar and / or Russian Olive stand

This plant community evolved under frequent and severe grazing with the absence of fire and encroachment of saltcedar and/or Russian olive. Saltcedar and/or Russian olive dominate this plant community. Most of the tall and medium grasses are eliminated and an understory of weedy herbaceous plants is prevalent. The interspaces between woody plants have expanded leaving more soil surface exposed to erosive elements or invaders. The weedy plants, such as foxtail barley, curly dock, kochia, halogeton, swainsonpea, Russian knapweed, and Russian thistle, make up the dominant understory. Total annual production is mostly from shrubs and these weedy plants. Saltcedar and/or Russian olive make up greater than 35% of the total annual production. When compared with the HCPC, the annual production is less due to the removal of the perennial grasses and the amount of bare ground. The increase in woody species compensates for some of this loss. The total annual production (air-dry weight) of this state is about 1800 pounds per acre, but it can range from about 1500 lbs./acre in unfavorable years to about 2000 lbs./acre in above average years. This plant community is resistant to change as the stand becomes denser. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the shrubs is increased. Continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. Saltcedar, Russian olive, annual grasses, weedy species and bare ground compromise the biotic integrity. Plant diversity is poor and the potential for native grasses to reproduce is absent. The shift in the vegetative structure and function is extreme and the biotic integrity is lost. The soil of this state is not protected as erosion has accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated. The watershed is not functional due to excessive runoff, erosion and bare ground. Transitional pathways leading to other plant communities are as follows: • Brush management and prescribed grazing will result in an Alkali Sacaton/ Saltcedar and/or Russian Olive Plant Community. Controlling both Saltcedar and Russian olive is a priority when these species have invaded. Any methods of control should be followed by revegetation to reduce regeneration of these two species and other weedy plants. • Grazing land mechanical treatment, brush management, and prescribed grazing may convert this plant community to the Historic Climax Plant Community, but recovery is mostly impractical as removal of salt cedar and/or Russian olive is both expensive and total removal is typically not obtainable. Salt cedar and Russian olive will still probably persist as suppression and containment of this plant is optimal. Any methods of control should be followed by revegetation to reduce regeneration of this plant and other weedy species.

Figure 13. Plant community growth curve (percent production by month). WY0703, 1014E Free water sites - WL, Sb, SS.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				15	30	20	15	10	10		

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				1076–1435	
	alkali sacaton	SPAI	*Sporobolus airoides*	1076–1435	–
2				897–1076	
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	897–1076	–
3				179–538	
	basin wildrye	LECI4	*Leymus cinereus*	179–538	–
4				0–359	
	alkali cordgrass	SPGR	*Spartina gracilis*	0–359	–
5				0–359	
	Grass, perennial	2GP	*Grass, perennial*	0–179	–
	saltgrass	DISP	*Distichlis spicata*	0–179	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–179	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–179	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–179	–
	chairmaker's bulrush	SCAM6	*Schoenoplectus americanus*	0–179	–
Forb					
6				0–359	
	Forb, perennial	2FP	*Forb, perennial*	0–179	–
	silverweed cinquefoil	ARAN7	*Argentina anserina*	0–179	–
	horsetail	EQUIS	*Equisetum*	0–179	–
	povertyweed	IVAX	*Iva axillaris*	0–179	–
	common plantain	PLMA2	*Plantago major*	0–179	–
	dock	RUMEX	*Rumex*	0–179	–
	seepweed	SUAED	*Suaeda*	0–179	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–179	–
	arrowgrass	TRIGL	*Triglochin*	0–179	–
Shrub/Vine					
7				179–538	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–179	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–179	–
	Woods' rose	ROWOW	*Rosa woodsii var. woodsii*	0–179	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–179	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–179	–

Animal community

Animal Community – Wildlife Interpretations

Historic Climax Plant Community: The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. This plant community may provide brood rearing/foraging areas for sage grouse. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here.

Alkali Sacaton/Inland Saltgrass/Mixed Shrub: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds.

Inland Saltgrass Sod/Mixed Shrub: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds.

Alkali Sacaton/Saltcedar and/or Russian Olive: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community is less productive, and thus, less apt to meet the seasonal needs of these animals. The shrub cover does provide good thermal and escape cover for both large animals and upland birds. Russian olive may provide a good source of food for some upland game birds and large animals. Many grassland obligate small mammals would occur here.

Dense Saltcedar and/or Russian Olive Stand Plant Community: This plant community can provide important winter cover for mule deer and antelope during that time and some foraging value if Russian olive trees are present. The plant community composition comprises little diversity, and thus, less apt to meet the seasonal needs of large grazers. The dense shrub cover does provide good thermal and escape cover for both large animals and upland birds. Russian olive may provide a good source of food for some upland game birds and large animals. Many grassland obligate small mammals would occur here.

Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

Plant Community	Production (lb./ac)	Carrying Capacity* (AUM/ac)
Historic Climax Plant Community	2800-3600	1.8
Alkali Sacaton/Inland Saltgrass/Mixed Shrub	2200-3400	1.3
Inland Saltgrass Sod/Greasewood	1200-2000	0.8
Alkali Sacaton/Saltcedar and/or Russian Olive	1600-2600	0.4
Dense Saltcedar and/or Russian Olive Stand	1500-2000	1.0

* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Climate is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from moderately slow to moderately rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide varieties of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

none noted

Inventory data references

Information presented in the original site description was derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing the original site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, USDI and USDA Interpreting Indicators of Rangeland Health Version 3, and USDA NRCS Soil Surveys from various counties.

Information presented here has been derived from NRCS inventory data, Field observations from range trained personnel, and the existing range site descriptions. Those involved in developing the Loamy range site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist.

Those involved in the development of the new concept for Loamy and Loamy Calcareous Ecological site include: Ray Gullion, Area Range Management Specialist, NRCS; Jim Wolf, Resource Manager, USDI-BLM; Jack Mononi, Range Management Specialist, USDI-BLM; Daniel Wood, MLRA Soil Survey Leader, NRCS; Jane Karinen, Soil Data Quality Specialist, NRCS; and Marji Patz, Ecological Site Specialist, NRCS.

Inventory Data References:
Ocular field estimations observed by trained personnel were completed at each site. Then sites were selected where a 100 foot tape was stretched and the following sample procedures were completed by inventory staff. For full sampling protocol and guidelines with forms please refer to the Wyoming ESI Operating Procedures, compiled in 2012 for the Powell and Rock Springs Soil Survey Office, USDA-NRCS.
• Double Sampling Production Data (9.6 hoop used to estimate 10 points, clipped a minimum of 3 of these estimated points, with two 21 foot X 21 foot square extended shrub plots).
• Line Point Intercept (over story and understory captured with soil cover). Height of herbaceous and woody cover is collected every three feet along established transect.)
• Continuous Line Intercept (Woody Canopy Cover, with minimum gap of 0.2 of a foot for all woody species and succulents. Intercept height collected at each measurement.),

• Gap Intercept (Basal Gap measured with a minimum gap requirement of 0.7 foot.),
• Sample Point (10 – 1 meter square point photographs taken at set distances on transect. Red using the sample point computer program established by the High Plains Agricultural Research Center, WY).
• Soil Stability (Slake Test – surface and subsurface samples collected and processed according to the soil stability guidelines provided by the Jornada Research Center, NM.)

Other references

Baker, William L. 2006. Fire and Restoration of Sagebrush Ecosystems. Wildlife Society Bulletin 34(1): 177-185.

Bestelmeyer, B., and J. R. Brown. 2005. State-and-transition models 101: a fresh look at vegetation change. The Quivira Coalition Newsletter, Vol. 7, No. 3.

Bestelmeyer, B., J. R. Brown, K. M. Havstad, B. Alexander, G. Chavez, J. E. Herrick. 2003. Development and use of state and transition models for rangelands. Journal of Range Management 56(2):114-126.

Bestelmeyer, B., J. E. Herrick, J. R. Brown, D. A. Trujillo, and K. M. Havstad. 2004. Land management in the American Southwest: a state-and-transition approach to ecosystem complexity. Environmental Management 34(1):38-51.

Herrick, J. E., J. W. Van Zee, K. M. Havstad, L. M. Burkett, and W. G. Whitford. 2005. Monitoring manual for grassland, shrubland and savanna Ecosystems. Volume I Quick Start. USDA - ARS Jornada Experimental Range, Las Cruces, New Mexico.

Herrick, J. E., J. W. Van Zee, K. M. Havstad, L. M. Burkett, and W. G. Whitford. 2005. Monitoring manual for grassland, shrubland and savanna Ecosystems. Volume II: Design, supplementary methods and interpretation. USDA - ARS Jornada Experimental Range, Las Cruces, New Mexico.

NRCS. 2014. (electronic) National Water and Climate Center. Available online at http://www.wcc.nrcs.usda.gov/

NRCS. 2014. (electronic) Field Office Technical Guide. Available online at http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=WY NRCS. 2009. Plant Guide: Cheatgrass. Prepared by Skinner et al., National Plant Data Center.

Pellant, M., P. Shaver, D. A. Pyke, and J. E. Herrick. 2005. Interpreting indicators of rangeland health. Version 4. Technical Reference 1734-6. USDI-BLM. Ricketts, M. J., R. S. Noggles, and B. Landgraf-Gibbons. 2004. Pryor Mountain Wild Horse Range Survey and Assessment. USDA-Natural Resources Conservation Service.

Schoeneberger, P. J., D. A. Wysocki, E. C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE. (http://soils.usda.gov/technical/fieldbook/)

Stringham, T. K. and W. C. Krueger. 2001. States, transitions, and thresholds: Further refinement for rangeland applications. Agricultural Experiment Station, Oregon State University. Special Report 1024.

Stringham, T. K., W. C. Kreuger, and P. L Shaver. 2003. State and transition modeling: an ecological process approach. Journal of Range Management 56(2):106-113.

United States Department of Agriculture. Soil Survey Division Staff. 1993. Soil Survey Manual, United States Department of Agriculture Handbook No. 18, Chapter 3: Examination and Description of Soils. Pg.192-196.

USDA, NRCS. 1997. National Range and Pasture Handbook. (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html)

Trlica, M. J. 1999. Grass growth and response to grazing. Colorado State University. Cooperative Extension. Range. Natural Resource Series. No. 6.108.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS). 2007. The PLANTS

Database (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS), Soil Survey Staff. 2010. Keys to Soil Taxonomy, Eleventh Edition, 2010.

USDA/NRCS Soil survey manuals for appropriate counties within MLRA 32X.

Western Regional Climate Center. (2014) (electronic) Station Metadata. Available online at: http://www.wrcc.dri.edu/summary/climsmwy.html.

Contributors

Ray Gullion

Approval

Kirt Walstad, 4/30/2024

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Ray Gullion, E. Bainter
Contact for lead author	ray.gullion@wy.usda.gov or 307-347-2456
Date	05/01/2008
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rare to nonexistent.

---

2. **Presence of water flow patterns:** Barely observable.

---

3. **Number and height of erosional pedestals or terracettes:** Rare to nonexistent.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 0-5%.

---

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

---

6. **Extent of wind scoured, blowouts and/or depositional areas:** Minimal to nonexistent.

---

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter not expected to move.

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 3 (interspaces) to 6 (under plant canopy), but average values should be 4.0 or greater.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Typically an A-horizon of greater than 2 inches (5 cm) with massive structure and color hues of 10YR or 2.5Y, values of 5-6, and chromas of 2-3. Organic matter typically is 1-2%.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 75-90% grasses, 10% forbs, and 0-15% shrubs. Dense plant canopy (80-100%) and litter plus moderate infiltration rates result in minimal to nonexistent runoff. Basal cover is typically greater than 5% for this site and effectively reduces runoff on this site.

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer exists.

---

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: warm season bunchgrasses

    Sub-dominant: tall, cool season bunchgrasses

    Other: perennial forbs = mid-size, cool season bunchgrasses = cool season rhizomatous grasses = warm season rhizomatous grasses perennial shrubs

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence.

---

14. **Average percent litter cover (%) and depth (in):** Litter ranges from 0-20% of total canopy measurement with total litter (including beneath the plant canopy) from 80-100% expected. Herbaceous litter depth typically ranges from 10-25 mm.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-**

production): English: 2800-3600 lb/ac (3200 lb/ac average); Metric: 3136-4032 kg/ha (3584 kg/ha average).

---

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Bare ground greater than 20% is the most common indicator of a threshold being crossed. Greasewood and inland saltgrass are common increasers. Russian olive, saltcedar, and foxtail barley may invade the site.

---

17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in drought years.
