USDA Natural Resources
Conservation Service

Ecological site R028AY024UT
Wet Saline Meadow (Saltgrass)

Accessed: 05/05/2024

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.

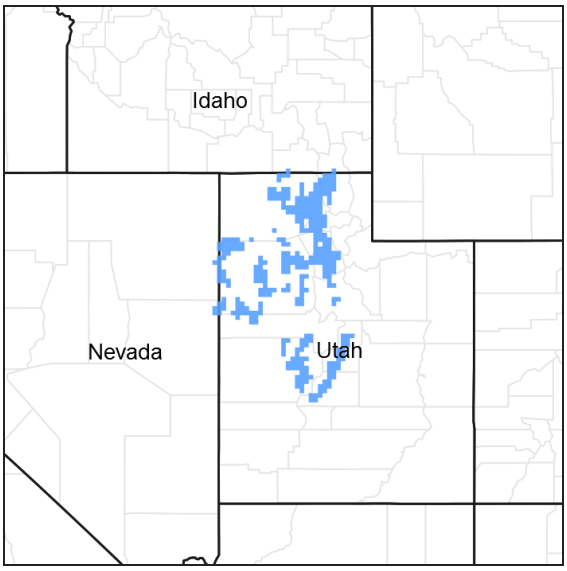


Figure 1. Mapped extent

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): 028A–Ancient Lake Bonneville

MLRA-D28A, Great Salt Lake Area, occurs in the eastern portion of the Basin and Range Province. This area is composed of nearly level basins located between widely separated mountain ranges that run mostly north and south. Basin edges are often bordered by gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes.

Associated sites

R028AY001UT	**Alkali Bottom (Alkali Sacaton)**
R028AY004UT	**Alkali Flat (Black Greasewood)** This is also a similar site with water and soil differentiae.
R028AY025UT	**Lakeshore Marsh**
R028AY131UT	**Desert Salty Silt (Pickleweed)**
R028AY132UT	**Desert Salty Silt (Iodinebush)**

Similar sites

R028AY001UT	**Alkali Bottom (Alkali Sacaton)**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Distichlis spicata* (2) *Juncus arcticus*

Physiographic features

This site is typically located on lake plains, lake terraces, flood plains, and in depressional areas within lake terraces. It typically occupies the elevational area just above lakeshore marshes and just below the alkali bottom ecological sites. Slopes typically range from 0 to 3 percent but may occasionally reach 4 percent. This sites flooding frequency ranges from occasional to frequent during runoff periods. Runoff potential ranges from medium to very high. This site may pond to a depth of 1 to 3 (ocasionally 6) inches during the spring months.

Table 2. Representative physiographic features

Landforms	(1) Lake plain (2) Lake terrace (3) Flood plain
Flooding duration	Brief (2 to 7 days) to very long (more than 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	1,277–1,829 m
Slope	0–3%
Ponding depth	3–8 cm
Water table depth	0–76 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site is dry subhumid and semiarid. It is characterized by cold, snowy winters and warm, dry summers. The average annual precipitation ranges from 8 to 12 inches. April and May are typically the wettest months with July and August being the driest. The most reliable sources of moisture for plant growth are the snow that accumulates over the winter, and spring rains. Summer thunderstorms are intermittent and sporadic in nature, and thus are not reliable sources of moisture to support vegetative growth on this site. The mean annual air temperature is 45 to 54 degrees. Mean Annual Soil Temperature is 50-55.

Table 3. Representative climatic features

Frost-free period (average)	156 days
Freeze-free period (average)	184 days
Precipitation total (average)	305 mm

Influencing water features

This site typically ponds for periods ranging from brief to very long during the months of March thru July. Ponding depth is typically 1 to 3 inches. A water table is present during much of the year at a depth of 0 to 20 inches.

Soil features

Characteristic soils in this site are very deep and very poorly to poorly drained. The soil moisture and temperature regimes are aquic and mesic respectively. The dry surface color is typically a very dark gray. These soils formed in alluvium and/or lacustrine deposits derived mainly from mixed sources including limestone, sandstone, shale and sedimentry rock parent material. Soil textures are typically silty clay loams or silt loams but may occasionally include silty clays. They are moderately to strongly saline and moderately to strongly alkaline. Available water capacity is 0.80 to 7.1 inches.

This site has been used in the following soil surveys and has been correlated to the following components:

UT602 – Box Elder County, Eastern Part – Arave, Eimarsh, Gooch, Lakeshore, Logan, Woods Cross.
UT603 – Cache Valley Area - Cache, Greenson, Salt Lake.
UT607 - Davis-Weber - Abbott, Airport-shallow water table, Eimarsh, Ford, Lakeshore, Logan, Warm Springs, Woods Cross.
UT611 - Tooele County Area - Logan.
UT612 - Salt Lake Area - Eimarsh, Magna.
UT617 - West Millard-Juab Area - Needle Peak.
UT618 - Millard County, East - Green River, Poganeab.
UT626 - Beaver County, Western Part -
UT627 - Sanpete Valley Area - Abcal, Cache, Kjar, Poganeak.
UT632 - Delta Area - Abbott, Cache, Kanosh, Pahranagat, Saltair.
UT634 - Iron-Washington Area -

Typical Profile (Eimarsh):
Azg – 0-5 inches; silt loam; violently effervescent; moderately saline, strongly alkaline.
Bz1 – 5-10 inches; silty clay; strongly effervesent; strongly saline; moderately alkaline.
Bz2 – 10-15 inches; silty clay; violently effervescent; strongly saline; moderately alkaline.
Czg1 – 15-34 inches; silty clay; violently effervescent; strongly saline; moderately alkaline.
Czg2 - 34-45 inches; silty clay; violently effervescent; strongly saline; moderately alkaline.
Czg3 - 45-60 inches; silty clay; violently effervescent; strongly saline; moderately alkaline.

The water supplying capacity is 5 to 10 inches. Average annual soil loss in potential is approximately 1 ton/acre.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone, sandstone, and shale (2) Lacustrine deposits–sandstone
Surface texture	(1) Silty clay loam (2) Silt loam (3) Silty clay
Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow to slow
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	2.03–18.03 cm
Calcium carbonate equivalent (0-101.6cm)	0–40%
Electrical conductivity (0-101.6cm)	2–32 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–35

Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This ecological site occurs in Major Land Resource Area (MLRA) D28A—The Great Salt Lake Area and was influenced by the natural disturbances typically associated with that MLRA. Modern disturbances such as improper livestock grazing, fluctuating water tables, herbicide applications, and the introduction of invasive species have impacted the resilience of this ecological site and its associated plant communities.

There is little evidence to indicate that this site historically maintained a short burn frequency. Therefore, this ecological site description will not include fire as a disturbance mechanism in the reference state.

During periods of low standing water, total site production often decreases, but will return to normal amounts during years with average or above average site ponding.

Much of this site occurs around the Great Salt Lake, this inland water body has no outlet and is thus highly affected by weather patterns that cause it the grow or shrink in size. As its shoreline moves up or down, ecological sites found along its shore must also migrate in their relationship to its shore. Man has caused additional changes to the areas ecology by developing a series of canals, dikes and diversions designed to control and manage the lakes incoming water. In spite of these natural and human caused impacts, distinct ecological sites can be found surrounding this body of water. This ecological sites soils are moderately to strongly saline and normally typically have a water table within 20 inches of the surface.

This site can be grazed by cattle and sheep grazing during spring, summer, fall, or winter and grazing suitability is good. It has been grazed by domestic livestock since they were first introduced into the area around 1860. This livestock introduction, including the use of fencing, and the development of reliable water sources, has had a major influence on the disturbance regime historically associated with this ecological site. This site often served, and still serves as wintering pastures for sheep and cattle producers.

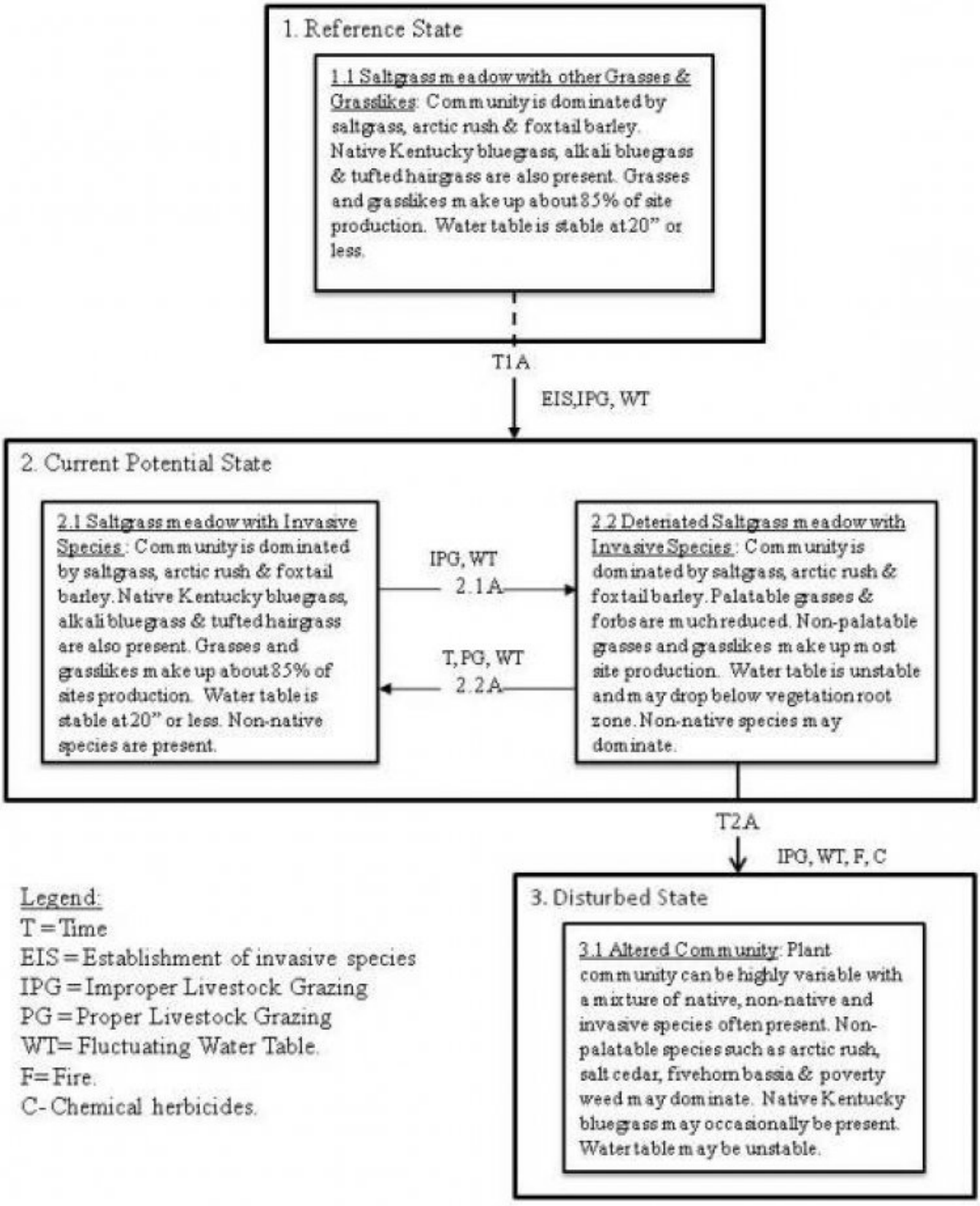
Improperly managed livestock grazing, (continuous season long grazing, heavy stocking rates, repeated early spring grazing, etc.) can cause this site to depart from its reference plant community. During periods of continous winter grazing, tufted hairgrass, alkali bluegrass and other palatable perennial grasses will decrease and saltgrass and arctic rush will often increase.

As vegetative communities respond to changes in management or natural influences that move them from one state to another, a return to previous states may not be possible. The amount of energy needed to affect these vegetative shifts depends on present biotic and abiotic features and the desired results.

The following state and transition model diagram depicts some of the most commonly occurring plant communities found on this ecological site. These communities may not represent every possibility, but they are the most prevalent and repeatable. As more data are collected, some of these plant communities may be revised or removed, and new ones may be added. This model was developed using range data collected for publication of the Box Elder County, Eastern Part, Soil Survey and the recent Eastern Shores update. Both ocular and measured data was collected and utilized. Range data collected by the NRCS since 1983 was also used.

State and transition model

State and Transition Model
State: Utah
Site Type: Rangeland
MLRA: D-28A - Basin and Range Province
R028AY024UT – Wet Saline Meadow (Saltgrass).



Legend:
T = Time
EIS = Establishment of invasive species
IPG = Improper Livestock Grazing
PG = Proper Livestock Grazing
WT = Fluctuating Water Table.
F = Fire.
C - Chemical herbicides.

State 1
Reference State

The reference state represents the plant communities and ecological dynamics of the wet saline meadow site. This state includes the biotic communities that become established on the ecological site if all successional sequences are completed under the natural disturbance regime. The reference state is generally dominated by saltgrass and arctic rush. The reference state is self sustaining and resistant to change due to high resistance to natural disturbances and high resilience following natural disturbances. When natural disturbances occur, the rate of recovery is variable due to disturbance intensity. Once invasive plants establish, return to the reference state may not be possible. Reference State: Saltgrass/arctic rush state with natural fluctuations that form either a mixed grass meadow or a saltgrass dominated meadow depending on the sites natural disturbance history. Indicators: A community dominated by saltgrass and arctic rush. Feedbacks: Improper livestock grazing of perennial grasses and/or other disturbances that may allow for the establishment of invasive species. At-risk Community Phase: This state is at risk when palatable native plants are stressed and nutrients become available for invasive plants to establish. Trigger: The establishment of invasive plant species.

Community 1.1
Saltgrass meadow with other Grasses & Grasslikes.

Figure 4. Community Phase 1.1

This community is characterized by an open grassland aspect with saltgrass, arctic rush, and foxtail barley dominating the herbaceous layer. Other commonly occurring grasses and grasslikes include native Kentucky bluegrass, alkali bluegrass, spikerush, and tufted hairgrass. Other perennial grasses, shrubs, and forbs are also present. A stable water table is present at 20 inches or less, providing season long moisture for plant growth. Species composition by air-dry weight is approximately 85 percent perennial grasses, 10 percent forbs, and 5 percent shrubs. Bare ground is variable (20-40%) depending on the amount of biological crust (0 to 15), and plant cover. The following tables provide an example the typical vegetative floristics of a community phase 1.1 plant community.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1345	2522	3587
Forb	168	280	392
Shrub/Vine	56	112	168
Total	**1569**	**2914**	**4147**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-3%
Grass/grasslike foliar cover	50-70%

Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	–
>0.3 <= 0.6	–	0-5%	65-75%	5-15%
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 6. Plant community growth curve (percent production by month). UT0241, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	40	30	5	5	0	0	0	0

State 2
Current Potential Community

The current potential state is similar to the reference state, however invasive grasses and/ or forbs are now present in all community phases. This state still has the visual aspect of a saltgrass meadow. Foxtail barley, arctic rush and alkali bluegrass are other primary perennial grass or grasslike species present. Fivehorn bassia, povertyweed and other less palatable species now make up a large portion of the herbaceous layer. Primary disturbance mechanisms include native herbivore and domestic livestock grazing. Timing of these disturbances dictates the ecological dynamics that occur. The current potential state is still self sustaining; but is losing resistance to change due to lower resilience following disturbances. When disturbances occur, the rate of recovery is variable depending on severity. Current Potential State: Saltgrass meadow state with various other native and non-native grasses and forbs present. Indicators: A community dominated by saltgrass and arctic rush where other native perennial grasses and forbs are also present. Invasive grasses and/or forbs are present. Feedbacks: Frequent disturbances that may allow annual invasive species such as fivehook bassia to dominate. At-risk Community Phase: As increased disturbance frequency allows for the increase and/or dominance of annual grasses and forbs, this community is at greater risk. Trigger: Reoccurring disturbance that results in a dominance of annual grasses and/or forbs in the herbaceous layer.

Community 2.1
Saltgrass meadow with Invasive Species.

Figure 7. Community Phase 2.1

This community is characterized by an open grassland aspect with saltgrass, arctic rush, and foxtail still dominating the herbaceous layer. Other commonly occurring grasses and grasslikes include native Kentucky bluegrass, alkali bluegrass, spikerush, and tufted hairgrass. Non-native species including fivehorn bassia, poverty weed,and/or salt cedar are also present. A stable water table is present at 20 inches or less, providing season long moisture for plant growth. Species composition by air-dry weight is approximately 85 percent perennial grasses, 10 percent forbs, and 5 percent shrubs. Bare ground is variable (20-50%) depending on the amount of biological crust (0 to 10), and plant cover. The following tables provide an example the typical vegetative floristics of a community phase 2.1 plant community.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1345	2522	3587
Forb	168	280	392
Shrub/Vine	56	112	168
Total	**1569**	**2914**	**4147**

Table 9. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-3%
Grass/grasslike foliar cover	50-70%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 10. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	–
>0.3 <= 0.6	–	0-5%	65-75%	5-15%
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 9. Plant community growth curve (percent production by month). UT0241, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	40	30	5	5	0	0	0	0

Community 2.2
Deteriated Saltgrass meadow with Invasive Species.

Figure 10. Community Phase 2.2

This community is characterized by an open grassland aspect with saltgrass, arctic rush, and foxtail still dominating the herbaceous layer. Palatable grasses and grasslikes including native Kentucky bluegrass, alkali bluegrass, spikerush, and tufted hairgrass are much reduced. Non-native species including fivehorn bassia, poverty weed,and/or salt cedar are also present and may dominate the site. Water table may be unstable and when deeper than 30 inches may allow annuals to out compete perennials. Species composition by air-dry weight is approximately 65 percent perennial grasses, 30 percent forbs, and 5 percent shrubs. Bare ground is variable (20-70%) depending on the amount of biological crust (0 to 5), and plant cover. The following tables provide an example the typical vegetative floristics of a community phase 2.2 plant community.

Table 11. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1233	2410	3475
Forb	280	392	504
Shrub/Vine	56	112	168
Total	**1569**	**2914**	**4147**

Table 12. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	2-5%
Grass/grasslike foliar cover	50-60%
Forb foliar cover	10-20%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 13. Canopy structure (% cover)

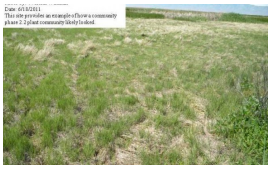
Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	–
>0.3 <= 0.6	–	0-5%	65-75%	5-15%
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 12. Plant community growth curve (percent production by month). UT0241, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	40	30	5	5	0	0	0	0

Pathway 2.1A
Community 2.1 to 2.2

Saltgrass meadow with Invasive Species.



Deteriated Saltgrass meadow with Invasive Species.

This pathway occurs when events favor a decrease in palatable perennial grasses and grasslikes and an increase in less palatable species such as saltgrass and baltic rush. Non-native annuals including mustards and fivehorn smotherweed may eventually dominate the community. Events may include, improper livestock grazing, and a declining water table that may favor annuals and decrease desirable perennials.

Pathway 2.2A

Community 2.2 to 2.1

Deteriated Saltgrass meadow with Invasive Species.

Saltgrass meadow with Invasive Species.

This pathway occurs when events favor a increase in palatable perennial grasses and grasslikes and a decrease in less palatable species such as saltgrass and baltic rush. Non-native annuals including mustards and fivehorn smotherweed may eventually be reduced in the community. Events may include, carefully managed livestock grazing over long periods, and a stable water table that is within 20 inches of the soil surface. Yhese conditiond generally favor desireable perennials and decrease annual weeds.

State 3
Disturbed State.

This state occurs when the site is burned or chemically treated to reduce saltgrass and other unwanted herbaceous species. The resulting plant communities can be highly variable ranging from the recovery of desired native species to the dominance of of invasive weeds such as salt cedar, fivehorn bassia, poverty weed and various mustard species. Invasive Forb State: Burned or chemically treated community phases influenced by livestock grazing practices and fluctuating water tables. Indicators: Perennial, annual, invasive grasses, grasslikes and forbs present in various amounts. Feedbacks: Livestock grazing practices and fluctuating water tables that maintain or degrade or desireable species and increase non-native, weedy species present in the community. Trigger: The further establishment of salt cedar, fivehorned bassia and/or other weedy species decrease perennial production and increase bare ground.

Community 3.1
Altered Community.

Figure 13. Community Phase 3.1

This community phase occurs when the site is chemically treated and/or furned to remove unwanted species. Results can be highly variable ranging from a mixture of native, non-native and invasive species being present. Non-palatable species such as arctic rush, salt cedar, fivehorn bassia & poverty weed may dominate. Native Kentucky bluegrass may occasionally be present. Water table may be unstable and when deeper than 30 inches may allow annuals to out compete perennials. Species composition by air-dry weight is approximately 65 percent perennial grasses, 30 percent forbs, and 5 percent shrubs. Bare ground is variable (20-70%) depending on the amount of biological crust (0 to 5), and plant cover. The following tables provide an example the typical vegetative floristics of a community phase 3.1 plant community

Table 14. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1345	2466	3587
Forb	168	308	448
Shrub/Vine	84	155	224
Total	**1597**	**2929**	**4259**

Table 15. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-3%
Grass/grasslike foliar cover	50-70%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 16. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	–
>0.3 <= 0.6	–	0-5%	65-75%	5-15%
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 15. Plant community growth curve (percent production by month). UT0241, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	40	30	5	5	0	0	0	0

Transition T1A
State 1 to 2

This transition is from the native perennial grass and grasslike community in the reference state to a state that contains non-native, invasive species. Events typically include the establishment of invasive grasses and forbs, and an increase in saltgrass,arctic rush and other less palatable species. Factors that drive such events may include any combination of improper livestock grazing, a fluctuating water table, and the presence of a seed source for

invasive species. Invasive species such as fivehorn bassia however have been known to invade intact perennial plant communities with little to no disturbance. Once invasive species are found in the plant community a threshold has been crossed.

Transition T2A
State 2 to 3

This transition is from the current potential state to an altered state created by chemical treatment or fire. Results can vary widely from little site production to a healthy mixed perennial grass and grasslike community.Non-native, invasive species may also dominate the site. Factors that drive such events include, improper livestock grazing of palatable perennial grasses, fluctuating water tables and the availability of invasive weeds. Once site is converted, a threshold has been crossed.

Additional community tables

Table 17. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
0	**Primary Grasses**			1681–2802	
	saltgrass	DISP	*Distichlis spicata*	336–673	–
	arctic rush	JUAR2	*Juncus arcticus*	224–448	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	168–336	–
	weeping alkaligrass	PUDI	*Puccinellia distans*	168–336	–
	saltmarsh alkaligrass	PUFA	*Puccinellia fasciculata*	168–336	–
	meadow barley	HOBR2	*Hordeum brachyantherum*	168–336	–
	foxtail barley	HOJU	*Hordeum jubatum*	168–336	–
	clustered field sedge	CAPR5	*Carex praegracilis*	168–336	–
1	**Seconary Grasses**			112–168	
	Nebraska sedge	CANE2	*Carex nebrascensis*	34–101	–
	common spikerush	ELPA3	*Eleocharis palustris*	34–101	–
	beardless wildrye	LETR5	*Leymus triticoides*	34–101	–
	common reed	PHAU7	*Phragmites australis*	34–101	–
	annual rabbitsfoot grass	POMO5	*Polypogon monspeliensis*	34–101	–
	alkali cordgrass	SPGR	*Spartina gracilis*	34–101	–
	prairie wedgescale	SPOB	*Sphenopholis obtusata*	34–101	–
Forb					
2	**Forbs**			336–504	
	silverweed cinquefoil	ARAN7	*Argentina anserina*	34–101	–
	meadow milkvetch	ASDI5	*Astragalus diversifolius*	34–101	–
	showy milkweed	ASSP	*Asclepias speciosa*	34–101	–
	spear saltbush	ATPA4	*Atriplex patula*	34–101	–
	cutleaf waterparsnip	BEER	*Berula erecta*	34–101	–
	nodding beggartick	BICE	*Bidens cernua*	34–101	–
	giant red Indian paintbrush	CAMI12	*Castilleja miniata*	34–101	–
	red goosefoot	CHRU	*Chenopodium rubrum*	34–101	–
	meadow thistle	CISC2	*Cirsium scariosum*	34–101	–

	fiddleleaf hawksbeard	CRRUG	*Crepis runcinata ssp. glauca*	34–101	–
	spreading alkaliweed	CRTR5	*Cressa truxillensis*	34–101	–
	darkthroat shootingstar	DOPU	*Dodecatheon pulchellum*	34–101	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	34–101	–
	sea milkwort	GLMA	*Glaux maritima*	34–101	–
	Nuttall's sunflower	HENU	*Helianthus nuttallii*	34–101	–
	alkali mallow	MALE3	*Malvella leprosa*	34–101	–
	seep monkeyflower	MIGU	*Mimulus guttatus*	34–101	–
	boraxweed	NIOC2	*Nitrophila occidentalis*	34–101	–
	finebranched popcornflower	PLLE	*Plagiobothrys leptocladus*	34–101	–
	lanceleaf goldenweed	PYLAL	*Pyrrocoma lanceolata var. lanceolata*	34–101	–
	alkali buttercup	RACY	*Ranunculus cymbalaria*	34–101	–
	slender grasswort	SAMA11	*Salicornia maritima*	34–101	–
	stiff blue-eyed grass	SIDE4	*Sisyrinchium demissum*	34–101	–
Shrub/Vine					
3	**Shrubs**			168–336	
	iodinebush	ALOC2	*Allenrolfea occidentalis*	34–101	–
	whiteflower rabbitbrush	CHAL9	*Chrysothamnus albidus*	34–101	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	34–101	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	34–101	–
	Woods' rose	ROWO	*Rosa woodsii*	34–101	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	34–101	–

Table 18. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
0	**Primary Grasses**			1681–2802	
	saltgrass	DISP	*Distichlis spicata*	336–673	–
	arctic rush	JUAR2	*Juncus arcticus*	224–448	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	168–336	–
	weeping alkaligrass	PUDI	*Puccinellia distans*	168–336	–
	saltmarsh alkaligrass	PUFA	*Puccinellia fasciculata*	168–336	–
	meadow barley	HOBR2	*Hordeum brachyantherum*	168–336	–
	foxtail barley	HOJU	*Hordeum jubatum*	168–336	–
	clustered field sedge	CAPR5	*Carex praegracilis*	168–336	–
1	**Seconary Grasses**			112–168	
	common spikerush	ELPA3	*Eleocharis palustris*	34–101	–
	beardless wildrye	LETR5	*Leymus triticoides*	34–101	–
	common reed	PHAU7	*Phragmites australis*	34–101	–
	annual rabbitsfoot grass	POMO5	*Polypogon monspeliensis*	34–101	–
	alkali cordgrass	SPGR	*Spartina gracilis*	34–101	–
	prairie wedgescale	SPOB	*Sphenopholis obtusata*	34–101	–
Forb					

Forb					
2	**Forbs**			336–504	
	silverweed cinquefoil	ARAN7	*Argentina anserina*	34–101	–
	meadow milkvetch	ASDI5	*Astragalus diversifolius*	34–101	–
	showy milkweed	ASSP	*Asclepias speciosa*	34–101	–
	spear saltbush	ATPA4	*Atriplex patula*	34–101	–
	fivehorn smotherweed	BAHY	*Bassia hyssopifolia*	34–101	–
	cutleaf waterparsnip	BEER	*Berula erecta*	34–101	–
	nodding beggartick	BICE	*Bidens cernua*	34–101	–
	giant red Indian paintbrush	CAMI12	*Castilleja miniata*	34–101	–
	lambsquarters	CHAL7	*Chenopodium album*	34–101	–
	red goosefoot	CHRU	*Chenopodium rubrum*	34–101	–
	meadow thistle	CISC2	*Cirsium scariosum*	34–101	–
	fiddleleaf hawksbeard	CRRUG	*Crepis runcinata ssp. glauca*	34–101	–
	spreading alkaliweed	CRTR5	*Cressa truxillensis*	34–101	–
	herb sophia	DESO2	*Descurainia sophia*	34–101	–
	darkthroat shootingstar	DOPU	*Dodecatheon pulchellum*	34–101	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	34–101	–
	sea milkwort	GLMA	*Glaux maritima*	34–101	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	34–101	–
	Nuttall's sunflower	HENU	*Helianthus nuttallii*	34–101	–
	povertyweed	IVAX	*Iva axillaris*	34–101	–
	prickly lettuce	LASE	*Lactuca serriola*	34–101	–
	alkali mallow	MALE3	*Malvella leprosa*	34–101	–
	seep monkeyflower	MIGU	*Mimulus guttatus*	34–101	–
	boraxweed	NIOC2	*Nitrophila occidentalis*	34–101	–
	finebranched popcornflower	PLLE	*Plagiobothrys leptocladus*	34–101	–
	lanceleaf goldenweed	PYLAL	*Pyrrocoma lanceolata var. lanceolata*	34–101	–
	alkali buttercup	RACY	*Ranunculus cymbalaria*	34–101	–
	slender grasswort	SAMA11	*Salicornia maritima*	34–101	–
	tall tumblemustard	SIAL2	*Sisymbrium altissimum*	34–101	–
	stiff blue-eyed grass	SIDE4	*Sisyrinchium demissum*	34–101	–
Shrub/Vine					
3	**Shrubs**			168–336	
	iodinebush	ALOC2	*Allenrolfea occidentalis*	34–101	–
	whiteflower rabbitbrush	CHAL9	*Chrysothamnus albidus*	34–101	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	34–101	–
	Russian olive	ELAN	*Elaeagnus angustifolia*	34–101	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	34–101	–
	Woods' rose	ROWO	*Rosa woodsii*	34–101	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	34–101	–
	saltcedar	TARA	*Tamarix ramosissima*	34–101	–

Table 19. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
0	**Primary Grasses**			1681–2802	
	saltgrass	DISP	*Distichlis spicata*	336–673	–
	arctic rush	JUAR2	*Juncus arcticus*	224–448	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	168–336	–
	weeping alkaligrass	PUDI	*Puccinellia distans*	168–336	–
	saltmarsh alkaligrass	PUFA	*Puccinellia fasciculata*	168–336	–
	meadow barley	HOBR2	*Hordeum brachyantherum*	168–336	–
	foxtail barley	HOJU	*Hordeum jubatum*	168–336	–
	clustered field sedge	CAPR5	*Carex praegracilis*	168–336	–
1	**Seconary Grasses**			112–168	
	common spikerush	ELPA3	*Eleocharis palustris*	34–101	–
	beardless wildrye	LETR5	*Leymus triticoides*	34–101	–
	common reed	PHAU7	*Phragmites australis*	34–101	–
	annual rabbitsfoot grass	POMO5	*Polypogon monspeliensis*	34–101	–
	alkali cordgrass	SPGR	*Spartina gracilis*	34–101	–
	prairie wedgescale	SPOB	*Sphenopholis obtusata*	34–101	–
Forb					
2	**Forbs**			336–504	
	fivehorn smotherweed	BAHY	*Bassia hyssopifolia*	67–224	–
	povertyweed	IVAX	*Iva axillaris*	67–224	–
	prickly lettuce	LASE	*Lactuca serriola*	34–101	–
	alkali mallow	MALE3	*Malvella leprosa*	34–101	–
	seep monkeyflower	MIGU	*Mimulus guttatus*	34–101	–
	boraxweed	NIOC2	*Nitrophila occidentalis*	34–101	–
	finebranched popcornflower	PLLE	*Plagiobothrys leptocladus*	34–101	–
	lanceleaf goldenweed	PYLAL	*Pyrrocoma lanceolata var. lanceolata*	34–101	–
	alkali buttercup	RACY	*Ranunculus cymbalaria*	34–101	–
	slender grasswort	SAMA11	*Salicornia maritima*	34–101	–
	tall tumblemustard	SIAL2	*Sisymbrium altissimum*	34–101	–
	stiff blue-eyed grass	SIDE4	*Sisyrinchium demissum*	34–101	–
	cutleaf waterparsnip	BEER	*Berula erecta*	34–101	–
	nodding beggartick	BICE	*Bidens cernua*	34–101	–
	giant red Indian paintbrush	CAMI12	*Castilleja miniata*	34–101	–
	lambsquarters	CHAL7	*Chenopodium album*	34–101	–
	red goosefoot	CHRU	*Chenopodium rubrum*	34–101	–
	meadow thistle	CISC2	*Cirsium scariosum*	34–101	–
	fiddleleaf hawksbeard	CRRUG	*Crepis runcinata ssp. glauca*	34–101	–
	spreading alkaliweed	CRTR5	*Cressa truxillensis*	34–101	–

	spreading dalea	DAVI3	*Dalea villosa*	34–101	–
	herb sophia	DESO2	*Descurainia sophia*	34–101	–
	darkthroat shootingstar	DOPU	*Dodecatheon pulchellum*	34–101	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	34–101	–
	sea milkwort	GLMA	*Glaux maritima*	34–101	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	34–101	–
	Nuttall's sunflower	HENU	*Helianthus nuttallii*	34–101	–
	silverweed cinquefoil	ARAN7	*Argentina anserina*	34–101	–
	meadow milkvetch	ASDI5	*Astragalus diversifolius*	34–101	–
	showy milkweed	ASSP	*Asclepias speciosa*	34–101	–
	spear saltbush	ATPA4	*Atriplex patula*	34–101	–
Shrub/Vine					
3	**Shrubs**			168–336	
	Russian olive	ELAN	*Elaeagnus angustifolia*	67–224	–
	saltcedar	TARA	*Tamarix ramosissima*	67–224	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	34–101	–
	Woods' rose	ROWO	*Rosa woodsii*	34–101	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	34–101	–
	iodinebush	ALOC2	*Allenrolfea occidentalis*	34–101	–
	whiteflower rabbitbrush	CHAL9	*Chrysothamnus albidus*	34–101	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	34–101	–

Table 20. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
0	**Primary Grasses**			1749–2858	
	Nebraska sedge	CANE2	*Carex nebrascensis*	336–504	–
	clustered field sedge	CAPR5	*Carex praegracilis*	336–504	–
	saltgrass	DISP	*Distichlis spicata*	336–504	–
	meadow barley	HOBR2	*Hordeum brachyantherum*	336–504	–
	arctic rush	JUAR2	*Juncus arcticus*	336–504	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	336–504	–
	weeping alkaligrass	PUDI	*Puccinellia distans*	336–504	–
	saltmarsh alkaligrass	PUFA	*Puccinellia fasciculata*	336–504	–
1	**Seconary Grasses**			101–168	
	common spikerush	ELPA3	*Eleocharis palustris*	34–101	–
	beardless wildrye	LETR5	*Leymus triticoides*	34–101	–
	common reed	PHAU7	*Phragmites australis*	34–101	–
	annual rabbitsfoot grass	POMO5	*Polypogon monspeliensis*	34–101	–
	alkali cordgrass	SPGR	*Spartina gracilis*	34–101	–
	prairie wedgescale	SPOB	*Sphenopholis obtusata*	34–101	–
Forb					
2	**Forbs**			336–504	
	silverweed cinquefoil	ARAN7	*Argentina anserina*	34–101	–

	meadow milkvetch	ASDI5	*Astragalus diversifolius*	34–101	–
	showy milkweed	ASSP	*Asclepias speciosa*	34–101	–
	spear saltbush	ATPA4	*Atriplex patula*	34–101	–
	cutleaf waterparsnip	BEER	*Berula erecta*	34–101	–
	nodding beggartick	BICE	*Bidens cernua*	34–101	–
	giant red Indian paintbrush	CAMI12	*Castilleja miniata*	34–101	–
	red goosefoot	CHRU	*Chenopodium rubrum*	34–101	–
	meadow thistle	CISC2	*Cirsium scariosum*	34–101	–
	fiddleleaf hawksbeard	CRRUG	*Crepis runcinata ssp. glauca*	34–101	–
	spreading alkaliweed	CRTR5	*Cressa truxillensis*	34–101	–
	darkthroat shootingstar	DOPU	*Dodecatheon pulchellum*	34–101	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	34–101	–
	sea milkwort	GLMA	*Glaux maritima*	34–101	–
	Nuttall's sunflower	HENU	*Helianthus nuttallii*	34–101	–
	alkali mallow	MALE3	*Malvella leprosa*	34–101	–
	seep monkeyflower	MIGU	*Mimulus guttatus*	34–101	–
	boraxweed	NIOC2	*Nitrophila occidentalis*	34–101	–
	finebranched popcornflower	PLLE	*Plagiobothrys leptocladus*	34–101	–
	lanceleaf goldenweed	PYLAL	*Pyrrocoma lanceolata var. lanceolata*	34–101	–
	alkali buttercup	RACY	*Ranunculus cymbalaria*	34–101	–
	slender grasswort	SAMA11	*Salicornia maritima*	34–101	–
	stiff blue-eyed grass	SIDE4	*Sisyrinchium demissum*	34–101	–
Shrub/Vine					
3	**Shrubs**			168–336	
	iodinebush	ALOC2	*Allenrolfea occidentalis*	34–101	–
	whiteflower rabbitbrush	CHAL9	*Chrysothamnus albidus*	34–101	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	34–101	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	34–101	–
	Woods' rose	ROWO	*Rosa woodsii*	34–101	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	34–101	–

Animal community

--Threatened and Endangered Species--
This section will be populated as more information becomes available.

--Wildlife Interpretation--
This ecological site, in its reference state, produces large amounts of nutritious forage that can be utilized by native herbivores including deer and antelope who lived here along their associated predators. Although much of this site is presently different from the reference state, it is still very important as wildlife habitat. Other wildlife commonly observed using this site include rabbit, coyote, badger, fox, and various waterfowl species.

In many locations, this ecological site and its associated wetland ecological sites provide critical habitat for migrating birds from both the Pacific and Central Flyways of North America. These areas contain abundant food for birds.

The following statistics were provided by the Bear River Migratory Bird Refuge where much of this ecological site is located:

1. Breeding colonies of white-faced ibis contain as many as 18,000 birds.

2. Up to 10,000 American avocets breed at the Refuge annually.

3. One of North America's three largest American white pelican breeding colonies, containing in excess of 50,000 birds, is found on Gunnison Island in Great Salt Lake.

4. Northern Utah marshes host up to 60 percent of the continental breeding population of cinnamon teal.

5. The Great Salt Lake boasts the largest fall staging concentration of Wilson's phalaropes in the world, at approximately 500,000 birds. Red-necked phalaropes number nearly 100,000.

6. The Great Salt Lake area hosts greater than 50 percent of the continental breeding population of snowy plovers.

7. The Great Salt Lake area hosts 26 percent of the global population of marbled godwits during migration.

8. Bear River Refuge may attract over 65,000 black-necked stilts in the fall, more than anywhere else in the country.

--Grazing Interpretations--
This is one of Utah's highest yielding range sites. The plants are predominantly grasses and grasslike plants with a few forbs and practically no shrubs. This site provides good spring, fall, and winter grazing conditions for domestic livestock due to its accessibility and its supply of nutritious forage. The plant community is primarily composed of grasses with saltgrass, alkali bluegrass, foxtail barley most dominant. Improper livestock grazing can cause the more palatable species to decrease while saltgrass, arctic rush and other less palatable to increase.

To control soil erosion and degradation of the plant community, this site may be properly grazed early, with animals being removed early, to allow key plants to go ungrazed during the last part of the growing season. A stubble height of 4 to 6 inches should be adhered to.

Hydrological functions

The soil is in hydrologic group C. The hydrologic curve number is 74 when the vegetation is in good condition.

Recreational uses

Recreation activities are bird watching, hiking and hunting. Natural beauty exists in the more favorable plant growth condition on this site when compared to adjacent sites.

Wood products

None

Other information

--Poisonous/Toxic Plant Species--
The toxic plant associated with this site include is mainly Russian thistle.

Russian thistle can cause nitrate and to a lesser extent oxalate poisoning, which affects all classes of livestock. The buildup of nitrates in these plants is highly dependent upon environmental factors, such as after a rain storm during a drought, cool/cloudy days, and soils high in nitrogen and low in sulfur and phosphorus, all which cause increased nitrate accumulation. Nitrate collects in the stems and can persist throughout the growing season. Clinical signs of nitrate poisoning include drowsiness, weakness, muscular tremors, increased heart and respiratory rates, staggering gait, and death. Conversely, oxalate poisoning causes kidney failure; clinical signs include muscle

tremors, tetany, weakness, and depression. Poisoning generally occurs when livestock consume and are not accustomed to grazing oxalate-containing plants. Animals with prior exposure to oxalates have increased numbers of oxalate-degrading rumen microflora and thus are able to degrade the toxin before clinical poisoning can occur. (Knight and Walter, 2001)

--Invasive Plant Communities--
Generally, as ecological conditions deteriorate and perennial vegetation decreases due to disturbance (fire, over grazing, drought, off road vehicle overuse, erosion, etc.) annual forbs and grasses will invade the site. Of particular concern in this site are fivehorn smotherweed, Russian thistle, kochia, halogeton, and annual mustards. The presence of these species depends on soil properties and moisture availability; however, these invaders are highly adaptive and can flourish in many locations. Once established, complete removal is difficult but suppression may possible.

--Fire Ecology--
The ability for an ecological site to carry fire depends primarily on the present fuel load and plant moisture content. Fire was a typical disturbance in the historic climax plant community for this ecological site. The natural fire return interval is 30-100 years, where fires typically occur in the fall. When the site is degraded by the presence of invasive plants, the fire return interval may be shortened due to increased flashy fuels. The shortened fire return interval in the presence of invasive annual species is often sufficient to suppress the native plant community.

Type locality

Location 1: Juab County, UT	
General legal description	Type Location: Fish Springs Wildlife Refuge. Northwest Juab County

Other references

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Contributors

N/A
Unknown
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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)	Jack Alexander, Range Specialist, Synergy Resource Solutions, Inc. Julia Kluck, Soil Scientist, Synergy Resource Solutions, Inc. Shane Green, State Range Specialist, Utah NRCS
Contact for lead author	Shane Green, Shane.Green@ut.usda.gov
Date	02/08/2010
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** No rills present. Very minor rill development may occur in sparsely vegetated areas. If rills are present, they should be widely spaced and not connected. Rill development may increase following large storm events, but should begin to heal during the following growing season. Frost heaving will accelerate recovery. Rill development may increase when run inflow enters site from adjacent sites that produce large amounts of runoff (i.e. steeper sites, slickrock, rock outcrop). Site is essentially level and rills do not form.

2. **Presence of water flow patterns:** Essentially none. Site is essentially level, water flow patterns are not expected to form.

3. **Number and height of erosional pedestals or terracettes:** Plants may have small pedestals (1-3”) where they are adjacent to water flow patterns, but without exposed roots. Terracettes should be few and stable. Terracettes should be small (1-3”) and show little sign of active erosion. Some plants may appear to have a pedestal but rather than be formed by erosion, the only place litter accumulates and soil collects is at plant bases forming the appearance of a pedestal.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Essentially none. Litter or other ground cover fills all plant interspaces.

5. **Number of gullies and erosion associated with gullies:** No gullies present.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Very minor evidence of active wind-generated soil movement. Wind scoured (blowouts) and depositional areas are rarely present. If present they have muted features and are mostly stabilized with vegetation and/or biological crust. Gravel or desert pavement protects the site from wind scour.

7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water and wind movement. Very minor litter removal may occur in flow patterns and rills with deposition occurring at points of obstruction. The majority of litter accumulates at the base of plants. Some leaves, stems, and small twigs may accumulate in soil depressions adjacent to plants. Woody stems are not likely to move.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface is moderately stable (average soil stability score of 3.5 -5).

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** This description is based on the modal soil (Bramwell SiL, soil survey area: 611, Tooele). This site has 3 correlated soils, resulting in variation of each of these attributes. Unless working on a location with the modal soil, it is critical to supplement this description with the soil-specific information from the published soil survey.

   Soil surface horizon is typically 10 inches deep. Structure is typically moderate thin platy. Color is typically light gray (10YR 6/1), dark gray (10YR 4/1) moist. An ochric horizon extends to a depth of 10 inches. An ochric horizon typically extends to a depth of 2 to 10 inches. The ochric horizon is a surface horizon lacking fine stratification and which is either light colored, or thin, or has an low organic carbon content, or is massive and (very) hard when dry. The A horizon would be expected to be more strongly developed under plant canopies. It is important if you are sampling to observe the A horizon under plant canopies as well as the interspaces.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Vascular plants and any well-developed biological soil crusts (where present) will break raindrop impact and splash erosion. Spatial distribution of vascular plants and interspaces between well-developed biological soil crusts (where present) provide detention storage and surface roughness that slows runoff allowing time for infiltration. Since site is level and well covered, infiltration is very high and runoff very low.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Naturally occurring soil horizons may be harder than the surface because of an accumulation calcium carbonate and should not be considered as compaction layers.

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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: Perennial Grasses and Grass-likes (sedges, rushes, alakaligrass, saltgrass, scratchgrass).

    Sub-dominant: Perennial Forbs

    Other: other grasses, shrubs

    Additional: Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. Biological soil crust is variable in its expression on this site and is measured as a component of ground cover. Forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

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

decadence): During years with average to above average precipitation, there should be very little recent mortality or decadence apparent in either the shrubs or grasses. Some mortality of bunchgrass and other shrubs may occur during very severe (long-term) droughts. There may be partial mortality of individual bunchgrasses and shrubs during less severe drought. Long-lived species dominate site. Open spaces from disturbance are quickly filled by new plants through seedlings and reproductive reproduction (tillering).

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14. **Average percent litter cover (%) and depth (in):** Litter cover includes litter under plants. Most litter will be fine litter. Depth should be 1-2 leaf thickness in the interspaces and up to 1/2" under canopies. Litter cover may increase to 25-30% following years with favorable growing conditions. Excess litter may accumulate in absence of disturbance. Vegetative production may be reduced if litter cover exceeds 40%.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 2600#/acre.
    Even the most stable communities exhibit a range of production values. Production will vary between communities and across the MRLA. Refer to the community descriptions in the ESD. Production will differ across the MLRA due to the naturally occurring variability in weather, soils, and aspect. The biological processes on this site are complex; therefore, representative values are presented in a land management context.

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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:** Halogeton, kochia, smotherweed, whitetop, and salt cedar

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17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually, except in drought years. Density of plants indicates that plants reproduce at level sufficient to fill available resource. Within capability of site there are no restrictions on seed or vegetative reproductive capacity.
