USDA Natural Resources
Conservation Service

Ecological site R047XA002UT
Semi-moist Streambank (narrowleaf cottonwood)

Last updated: 2/05/2025
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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.

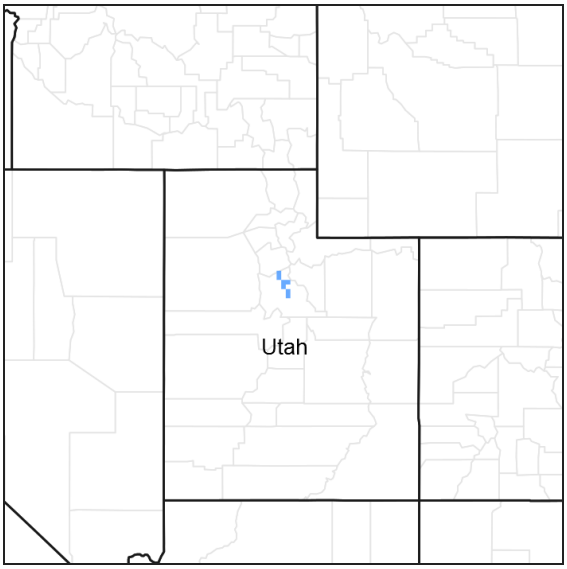

Figure 1. Mapped extent

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): 047X–Wasatch and Uinta Mountains

MLRA 47 occurs in Utah (86 percent), Wyoming (8 percent), Colorado (4 percent), and Idaho (2 percent). It encompasses approximately 23,825 square miles (61,740 square kilometers). The northern half of this area is in the Middle Rocky Mountains Province of the Rocky Mountain System. Parts of the western edge of this MLRA are in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The MLRA includes the Wasatch Mountains, which trend north and south. The steeply sloping, precipitous Wasatch Mountains have narrow crests and deep valleys. Active faulting and erosion are a dominant force in controlling the geomorphology of the area.
The mountains in this area are primarily fault blocks that have been tilted up. Alluvial fans at the base of the mountains are recharge zones for the basin fill aquifers. An ancient shoreline of historic Bonneville Lake is evident on the footslopes along the western edge of the area. Rocks exposed in the mountains are mostly Mesozoic and Paleozoic sediments.
The average precipitation is from 12 to 16 inches in the valleys and can range up to 73 inches in the mountains. Peak precipitation occurs in the winter months. The average annual temperature is 30 to 50 degrees Fahrenheit (-1 to 15 C). The freeze-free period averages 140 days and ranges from 60 to 220 days, generally decreasing in length with elevation.
The dominant soil orders in this MLRA are Entisols, Inceptisols, and Mollisols. The lower elevations are dominated by a frigid temperature regime, while the higher elevations experience cryic temperature regimes. The soil moisture

regime is typically xeric. The minerology is generally mixed and the soils are very shallow to very deep, generally well drained, and loamy or loamy-skeletal.

LRU notes

This LRU includes the Wasatch Mountains which tend to run north and south. These steeply sloping, precipitous mountains have narrow crests and deep valleys. They are primarily fault blocks that have been tilted up. The alluvial fans located at the base of these mountains are important recharge zones for valley aquifers.

Ecological site concept

The soils of this site formed mostly in alluvium from mixed sources. Surface soils are very dark grayish brown and fine sandy loam in texture. Rock fragments may be present on the soil surface and throughout the profile, but make up less than 35 percent of the soil volume. These soils are deep to very deep, well-drained, and have moderately rapid permeability. pH is slightly to moderately alkaline. Available water-holding capacity ranges from 3.1 to 3.9 inches of water in the upper 60 inches of soil. The soil moisture regime is mostly xeric and the soil temperature regime is mesic. Precipitation ranges from 17 to 20 inches annually.

Associated sites

R047XA006UT	**Semi-wet Fresh Streambank (narrowleaf cottonwood)**

Similar sites

R047XA006UT	**Semi-wet Fresh Streambank (narrowleaf cottonwood)**

Table 1. Dominant plant species

Tree	(1) *Populus angustifolia* (2) *Acer negundo*
Shrub	Not specified
Herbaceous	(1) *Elymus glaucus*

Physiographic features

This site occurs on stream terraces near stream channels at elevations between 4,800 and 5,100 feet. The water table fluctuates with streamflow, but is below 20 inches of the surface most of the time. The soil is occasionally flooded and deposition often occurs.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Channel
Flooding frequency	None
Ponding frequency	None
Elevation	4,800–5,100 ft
Slope	1–3%
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by cold, snowy winters and cool, dry summers. Spring and winter is the wettest time of the year recieving about 80 percent of the annual production. The remaining 20 percent of annual precipitation comes in June-September, with July being the driest month.

Table 3. Representative climatic features

Frost-free period (characteristic range)	124-147 days
Freeze-free period (characteristic range)	157-185 days
Precipitation total (characteristic range)	17-20 in
Frost-free period (average)	
Freeze-free period (average)	
Precipitation total (average)	18 in

Influencing water features

The water table fluctuates with streamflow, but is below 20 inches of the surface most of the time. Periodic flooding events occur.

Wetland description

Further review is required.

Soil features

The soils characteristic of this site are deep, dark colored loams that formed in alluvium from mixed sources. Gravels and cobbles are usually present in the subsoil. Soils were classified as cryoborolls, haploborolls, and haploxerolls, with no evidence of mottles in the profiles described. Available water-holding capacity ranges from 3.1 to 3.9 inches of water in the upper 40 inches of soil. The soil moisture regime is xeric and the soil temperature regime is mesic.

This site is correlated to the Pleasant View soil component (PtB) of the Utah County Area soil survey (UT621).

Table 4. Representative soil features

Parent material	(1) Alluvium–metamorphic and sedimentary rock
Surface texture	(1) Fine sandy loam
Family particle size	(1) Coarse-loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Surface fragment cover <=3"	2%
Surface fragment cover >3"	11%
Available water capacity (0-60in)	3.1–3.9 in
Calcium carbonate equivalent (0-60in)	3–15%
Electrical conductivity (0-60in)	0–2 mmhos/cm
Sodium adsorption ratio (0-60in)	0–5
Soil reaction (1:1 water) (0-60in)	7.4–8.4
Subsurface fragment volume <=3" (0-60in)	25%
Subsurface fragment volume >3" (0-60in)	7%

Ecological dynamics

The vegetation of this site usually has a variable overstory of water-loving trees and shrubs of approximately 40 percent of the total production annual on an air-dry basis. Grasses are about 45 percent of the plant composition and forbs 15 percent. The percentages are estimates.

Narrowleaf cottonwood (*Populus angustifolia*) typically dominates the overstory of this community type with ashleaf maple (*Acer negundo*) often a codominant plant; canyon maple (*Acer grandidentatum*) provides a conspicuous low tree layer. Shrubs, when present, are sparse and may include Oregon grape (*Mahonia repens*), mountain lover (*Paxistima myrsinites*), or mountain snowberry (*Symphoricarpos oreophilus*). Herbaceous cover is highly variable, though Kentucky bluegrass (*Poa pratensis*), blue wildrye (*Elymus glaucus*), false solomon's seal (*Maianthemum racemosum*), and sweetroot (Osmorhiza chilensis) are common. Sandberg bluegrass (*Poa secunda*) cover may be quite high in some areas. Adjacent upland communities include those dominated by Douglas fir (Psuedotsuga menziesii) and canyon maple (*Acer grandidentatum*). Forest Service RF-Ecol-89-01, Page 39.

State and transition model

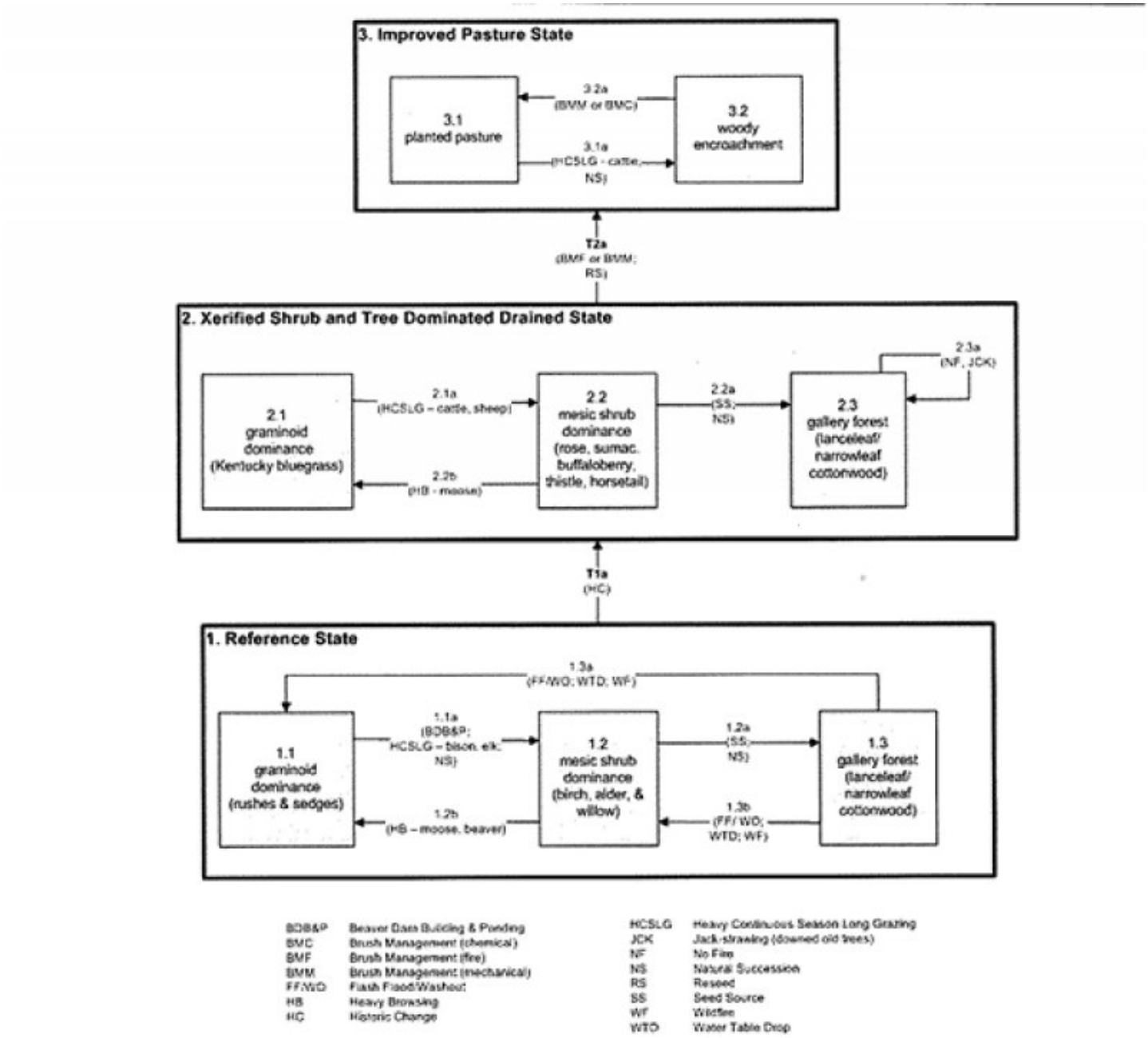

Figure 4. STM

State 1

Reference State

The Reference State is a description of this ecological site just prior to Euro-American settlement but long after the arrival of Native Americans. The description of the Reference State was determined by NRCS Soil Survey Type Site Location information and familiarity with rangeland relict areas where they exist. The Reference State would have been in any of three phases depending on stream gradient and how recently fire had occurred or when beavers had last been present. Along steeper stream gradients, succession would have rapidly proceeded from low-statured graminoids (1.1), to shrubs (1.2), and lastly to trees that reproduce in their own shade (1.3). A list of species by lifeform for the Reference State is available in accompanying tables in the “Plant Community Composition by Weight and Percentage” section of this document. Along gentle gradients beavers would have consumed all the largely deciduous woody stems and constructed dams. Once the nearby food and building materials were exhausted, the colony of beavers would have moved to another reach of the stream, making the abandoned dams and depleted stretch vulnerable to blow out from the next large convectional storm. This phase is short since most of the woody species re-sprout and are dominant again within a decade or so. The resulting drop in the water table would have stressed the moisture-demanding woody species and favored the graminoids, allowing the graminoids to eventually reclaim the drier streamside banks. Thus, rather than one plant community becoming stable, these stretches of stream would have been in a continual state of change. Fur trapping in the 1820s and 1830s resulted in the reduction of beaver by about 95 percent (Parson 1996). Without these animals to maintain their stair-step configuration of dams, the whole hydrologic regime of these drainages changed. What were once small perennial streams became ephemeral, and succession was truncated. Beaver have not returned in number until recent decades. Thus, by the time of the European settlement period, huge changes in these systems had already taken place.

Community 1.1
Graminoid dominance (rushes & sedges)

This early seral phase would have been dominated by rushes (Juncus spp.), sedges (Carex spp.), and native perennial water-demanding species such as reed canarygrass (*Phalaris arundinacea*), mat muhly (*Muhlenbergia richardsonis*), and mountain brome (*Bromus marginatus*). Heavy local utilization by moose or beaver would have kept back the woody species, allowing this graminoid phase to persist.

Table 5. Ground cover

Tree foliar cover	29-31%
Shrub/vine/liana foliar cover	19-21%
Grass/grasslike foliar cover	19-21%
Forb foliar cover	4-6%
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 6. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	–	4-6%
>1 <= 2	–	–	19-21%	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	19-21%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	29-31%	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.2
Mesic shrub dominance (birch, alder, & willow)

A set of mesic shrubs including water birch, yellow willow, and gray alder would have quickly overtopped the graminoids, unless shrubs were cropped by moose or beaver.

Community 1.3
Gallery forest (lanceleaf/ narrowleaf cottonwood)

Without beaver, tree cutting, or fire, a thick streamside (gallery) forest dominated by shade-tolerant lanceleaf and narrowleaf cottonwood would have developed.

Pathway 1.1a
Community 1.1 to 1.2

Along gentler stream gradients, ponding caused by construction of beaver dams would have brought the water table up in areas that would have otherwise been dry. Heavy grazing by bison and elk would have reduced the graminoids, giving way first to some taller forbs such as Missouri goldenrod (*Solidago missouriensis*) and feathery false lily of the valley (*Maianthemum racemosum*). Quickly following were a set of water-loving shrubs and small trees including water birch (*Betula occidentalis*), yellow willow (*Salix lutea*), and gray alder (*Alnus incana*). The same successional process would have taken place along steeper gradients, but at a more rapid rate.

Pathway 1.2b
Community 1.2 to 1.1

As the supply of palatable deciduous shrubs and trees increased, beaver numbers would also have increased. With time, a heavy concentration of beaver and moose would have reduced the woody component, with the exception of the less palatable shrubs (e.g. Woods' rose (*Rosa woodsii*) and hawthorn (*Crataegus douglasii*)), causing the canopy to open up.

Pathway 1.2a
Community 1.2 to 1.3

The presence of lanceleaf cottonwood (*Populus ×acuminata*) and narrowleaf cottonwood (*Populus angustifolia*) seeds being carried by water would have provided for the rapid succession from shrubs to a gallery forest.

Pathway 1.3a
Community 1.3 to 1.1

A strong convectional storm associated with flash flooding would have blown out existing beaver dams. Unless the beavers were still occupying the area and rebuilt their dams, the water table would have eventually returned to

previously lower levels. This would have allowed the graminoids to reclaim the site. Wildfire would have had a similar effect by removing most of the woody vegetation and debris, thereby re-opening the site to graminoids.

Pathway 1.3b
Community 1.3 to 1.2

This community pathway would be similar to 1.2b, except less intense. Flash flooding may blow out existing beaver dams following convectional storm events, but some smaller-statured trees and shrubs would persist, leaving enough woody material such that beavers could subsist and rebuild their dams.

State 2
Xerified Shrub and Tree Dominated Drained State

State 2 is similar to State 1 in form and function, with the exception of the presence of non-native plants and animals, possible extinctions, and a different climate. State 2 is a description of the ecological site shortly following Euro-American settlement. This state can be regarded as the current potential. Depending on the size of the watershed above, the stream could well have changed from a perennial to ephemeral drainage. Many of the same species of plants found in the Reference State continue to exist in the latter situation because of hyporheic (i.e. below ground) movement of water, although the period of greenery and its productivity are lessened. The introduction of cattle put pressure on the graminoids (2.1a) and hastened the conversion to shrubs (2.2). The lack of beaver dams meant that sediment moved more rapidly downstream with flashy (short duration, high intensity) precipitation events. Stream channelization occurred with increased rates of flow, leading to xerification of the streamside. With beaver temporarily absent, livestock numbers relatively reduced due to lack of forage, and lack of natural disturbances (2.2a), the shrubs and trees grow larger and shade out many of the forage species favored by livestock (2.3). The most disturbed phase of this State would be the graminoid-dominant phase (2.1), which occurs if moose effectively browse out the shrubby vegetation (2.2b). Kentucky bluegrass (*Poa pratensis*) was introduced at some sites for livestock forage; however it is not capable of holding the stream banks together during convectional storms.

Community 2.1
Graminoid dominance

This graminoid-dominated phase is frequently dominated by Kentucky bluegrass. The Forest Service regards this as an introduced species, but it is preferred by livestock over other native graminoids. It is, however, less able to protect stream banks than its native counterparts because of its shallower, weaker roots.

Community 2.2
Mesic shrub dominance

This plant community will be dominated by unpalatable mesic shrubs such as Woods' rose, sumac, and silver buffaloberry, with an understory of unpalatable herbs including thistles and horsetail. Species composition will depend upon the type of livestock utilizing the area.

Community 2.3
Gallery forest (lanceleaf/ narrowleaf cottonwood)

This plant community is dominated by lanceleaf and narrowleaf cottonwood, a shade-tolerant species, which will persist in the absence of wildfire, wood cutting, and large storm events. A gallery forest can persist in the absence of fire or wood cutting, creating a jack-strawing of downed trees that will make access to the site difficult for large animals.

Pathway 2.1a
Community 2.1 to 2.2

Heavy season-long use by cattle will diminish the grass component and allow an increase in tall forbs. Sheep will consume most of the forbs and shrubs, but will leave the thistles (Cirsium spp.), horsetail (Equisetum spp.), Woods' rose, skunkbush sumac (*Rhus trilobata*), and silver buffaloberry (*Shepherdia argentea*).

Pathway 2.2b
Community 2.2 to 2.1

Moose have become more abundant and focus their attention on yellow willow and water birch, especially during the winter. This will cause a retardation of the shift to shrub and tree dominance.

Pathway 2.2a
Community 2.2 to 2.3

Without moose and beaver consumption of shrubs and sapling trees, the shrub phase quickly transforms to a gallery forest.

State 3
Improved Pasture State

Some private land owners have bulldozed the streamside vegetation to remove trees needed by beavers to pond up the stream and to remove shade to increase forage production for livestock. Introduced species such as orchardgrass and smooth brome have been planted as the site became xerified, but more conducive to cattle grazing. The early seral vegetation created constitutes Phase 3.1. With time and heavy cattle grazing (3.1a), the tendency is for the original shrubs and trees to return (3.2). If introduced grass dominance is desired, mechanical or chemical retreatment to reduce the woody plants will be required (3.2a).

Community 3.1
Planted pasture

This plant community will be dominated by introduced species such as orchardgrass and smooth brome.

Community 3.2
Woody encroachment

This plant community will be a mix of introduced grasses and native shrubs that have re-established following a period of heavy continuous season-long grazing.

Pathway 3.1a
Community 3.1 to 3.2

In order to maintain an herbaceous-dominant phase, the native woody species may require re-treatment using mechanical or chemical means.

Pathway 3.2a
Community 3.2 to 3.1

Some re-establishment of native shrubs will occur if the site is heavily grazed during the growing season of the grasses.

Transition T1a
State 1 to 2

The simultaneous introduction of European livestock and exotic plant species, the near extirpation of beaver along with its influence on the hydrologic regime, and a warmer drier climate were all factors involved in the transition to State 2. A return to State 1 would not be practical because of these issues.

Transition T2a
State 2 to 3

Since there is diminished forage production in the woody plant-dominated phases of State 2, some private

landholders have, through prescribed fire and mechanical treatments, cleared out the streamside vegetation and planted exotic species such as smooth brome (*Bromus inermis*) or orchardgrass (*Dactylis glomerata*) to replace the native species.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Tree					
0	**Dominant Trees**			270–450	
	narrowleaf cottonwood	POAN3	*Populus angustifolia*	180–270	–
	boxelder	ACNE2	*Acer negundo*	90–180	–
4	**Sub-Dominant Trees**			414–720	
	Tree	2TREE	*Tree*	90–180	–
	subalpine fir	ABLA	*Abies lasiocarpa*	54–90	–
	bigtooth maple	ACGR3	*Acer grandidentatum*	54–90	–
	gray alder	ALIN2	*Alnus incana*	54–90	–
	water birch	BEOC2	*Betula occidentalis*	54–90	–
	quaking aspen	POTR5	*Populus tremuloides*	54–90	–
	Douglas-fir	PSME	*Pseudotsuga menziesii*	54–90	–
Shrub/Vine					
0	**Dominant Shrubs**			144–270	
	chokecherry	PRVI	*Prunus virginiana*	90–180	–
	creeping barberry	MARE11	*Mahonia repens*	54–90	–
3	**Sub-Dominant Shrubs**			90–180	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	18–36	–
	redosier dogwood	COSE16	*Cornus sericea*	18–36	–
	Oregon boxleaf	PAMY	*Paxistima myrsinites*	18–36	–
	Woods' rose	ROWO	*Rosa woodsii*	18–36	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	18–36	–
Grass/Grasslike					
0	**Dominant Grasses**			270–360	
	blue wildrye	ELGL	*Elymus glaucus*	270–360	–
1	**Sub-Dominant Grasses**			216–360	
	Grass, annual	2GA	*Grass, annual*	54–90	–
	Grass, perennial	2GP	*Grass, perennial*	54–90	–
	Geyer's sedge	CAGE2	*Carex geyeri*	54–90	–
	western wheatgrass	PASM	*Pascopyrum smithii*	54–90	–
Forb					
2	**Sub-Dominant Forbs**			738–1170	
	Forb, annual	2FA	*Forb, annual*	180–270	–
	Forb, perennial	2FP	*Forb, perennial*	180–270	–
	red baneberry	ACRU2	*Actaea rubra*	54–90	–
	northern bedstraw	GABO2	*Galium boreale*	54–90	–
	starry false lily of the valley	MAST4	*Maianthemum stellatum*	54–90	–
	common dandelion	TAOF	*Taraxacum officinale*	54–90	–
	Fendler's meadow-rue	THFE	*Thalictrum fendleri*	54–90	–
	stinging nettle	URDI	*Urtica dioica*	54–90	–

Animal community

This site has been grazed heavily since the settlements because it is near communities and ranch headquarters and produces a large volume of very nutritious native forage plants. It provides excellent grazing for sheep, cattle, goats and horses. It is adapted for use in the spring, summer and fall. If grazed in the winter, protein supplement should be provided.

To control soil erosion and degradation of the plant community, this site may be properly grazed early with the animals being removed early to allow key plants to go un-grazed during the last part of the growing season. A stubble height of 4 to 6 inches should be adhered to.
The potential is good to fair for upland habitat, good for woodland habitat. This site is valuable for most species of wildlife due to the variety of grasses, forbs, shrubs and trees and the interspersion of this vegetation with other range sites which in turn provides a great diversity and abundance of food and cover.

It provides valuable habitat for pheasants, mule deer, quail, elk, moose, squirrels, rabbits, coyotes, eagles, hawks, woodpeckers, wading birds and numerous songbirds.

Hydrological functions

Soils in this site are grouped mainly into c hydrologic group. They have moderately high runoff potential. When the vegetation is in climax (potential), the hydrologic curves are 72 to 75. Refer to National Engineering Handbook Section 4 (USDA-NRCS) to determine runoff quantities by use of these curves. Where range condition has declined from climax, field investigation is needed to determine hydrologic curve numbers.

Recreational uses

This site has good values for esthetics and natural beauty. It has a large number of forbs which have flowers in bloom from early spring throughout the summer and into the fall. It has a combination of grasses, forbs, small shrubs, large shrubs and trees which offer excellent possibilities for screening and high value as camping and picnicking areas. Hunting for upland game birds, cottontail rabbits, elk and mule deer is good to excellent on this site. Fishing is opportune on streams through this site. Summer homes are a possibility on this site, but detailed on-site investigation should be made to determine feasibility of the soils for septic tanks and sewage disposal facilities when specific locations are tentatively planned for summer homes or other building sites. Due to the high water table, sewage disposal is extremely difficult.

Wood products

The tree species, except for cottonwood, do not grow large enough to make them valuable for lumber. Occasionally cottonwood and Rocky Mountain juniper have been used for saw timber. No site index determinations have been made to date on these species.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used.

Other references

Alexander, R. R. 1985. Major habitat types, community types, and plant communities in the Rocky Mountains. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-123. 105p.

Alexander 1988. Forest vegetation on National Forests in the Rocky Mountain and Intermountain Regions: Habitat types and community types. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-162. 47p.

Galatowitsch, S.M. 1990. Using the original land survey notes to reconstruct pre-settlement landscapes in the American West. Great Basin Naturalist: 50(2): 181-191. Keywords: [Western U.S., conservation, history, human impact]

Parson, R. E. 1996. A History of Rich County. Utah State Historical Society, County Commission, Rich County, Utah. Keywords: [Rich County, Utah, Historic land use, European settlements]

USDA-NRCS. 2003. National Range and Pasture Handbook. in USDA, editor, USDA-Natural Resources Conservation Service-Grazing Lands Technology Institute. Keywords: [Western US, Federal guidelines, Range pasture management]

Western Regional Climate Center, Western U.S. Climate Historical Summaries. Available at: http://www.wrcc.dri.edu/summary/Climsmut.html. Accessed 15 June 2009.

Web Soil Survey, Official Soil Series Descriptions. Available at: http://soils.usda.gov/technical/classification/osd/index.html. Accessed 15 June 2009.

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Approval

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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.

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Date	11/21/2012
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rill occurrance is highly variable. This site is subject to frequent disturbance caused by seasonal flooding with its' associated soil scouring and deposition activities. Where rills are present they should be less than 1 inch deep, somewhat widely spaced (10 to 15 feet), and may be connected. They will often run the length of the streambank to a point of depositional interruption. An increase in rill development may be observed following large storm events or spring runoff periods. Rill development may also increase where the site is adjacent to other sites that produce large amounts of runoff (i.e. steeper sites, slickrock, etc.)

2. **Presence of water flow patterns:** Water flow patterns are common. They may be stright and/or sinuous and wind around perennial plant bases. They may be long (15 to 25 feet), 1 to 3 feet wide, and spaced from 5 to 20 feet apart. They should become somewhat stable between flooding events. This site will often act as a soil filter and trap large amounts of sediment. These become ideal locations for the establishment of new riparian vegetation.

3. **Number and height of erosional pedestals or terracettes:** Plants are expected to show some pedestalling where they are adjacent to water flow patterns. Exposed roots may be present where scouring has occurred. Terracettes are also typically present following flooding events. They often develop behind debris such as twigs and tree branches that act as dams within water flow patterns.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is variable on this site, but should range from 25 to 40%. Bare ground openings should be approximately 1 to 3 feet in size and may be connected as flow channels. Adapted rhizomatous riparian vegetation will often re-populate these opening between flood events.

5. **Number of gullies and erosion associated with gullies:** None at site level. Widely scattered landscape level gully channels, however, are a normal component of desert environments. Where landscape gullies are present, they should be stable, partially vegetated on their sides and bottoms, with little evidence of head-cutting. Some slight increase in disturbance may be evident following significant weather events or when gullies convey considerable runoff from higher elevation rocky or naturally eroding areas.

6. **Extent of wind scoured, blowouts and/or depositional areas:** No evidence of wind generated soil movement. Wind caused blowouts and depositional areas are not present.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter accumulates in place at the base of plant canopies between flood events. Following significant flood events, litter is expected to be transported downstream by water. Considerable accumulation is observed behind obstructions such as rocks and woody debris.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** This sites soil stability rating is highly variable. A rating of 3 to 5 should occur on areas with stable soils, with a rating of 1 to 4 on depositional materials. The average should be in the 2 to 4 range. Surface textures will typically vary from sands and gravels in depositional areas to sandy loams, loams and clay loams on stable soils.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Pleasant View) Soil surface is typically 0 to 4 inches deep. Surface texture is a loam and structure is weak thick platy. The A-horizon color is dark grayish brown (10YR 4/2). Soils have an Mollic epipedon that extends 34 inches into the soil profile. The A horizon is normally deeper and better developed on the more stable portions of the streambank. Use the specific information for the soil you are assessing found in the published soil survey to supplement this description.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial**

distribution on infiltration and runoff: Perennial vegetation helps anchor streambanks, reducing soil scouring and increasing deposition. Good spatial distribution of plants also slows runoff by obstructing surface flows, allowing time for increased infiltration. With the physiographic location of this site being in low lying areas, it often acts as a terminal accumulation site for runoff.

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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. This site will normally have textural variation within its' soil profile. These should not be mistaken for 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: Trees (Narrowleaf cottonwood) > Sprouting Shrubs (chokecherry, woods rose) >> Perennial Grasses (blue wildrye, western wheatgrass) > Perennial grasslikes (Geyer sedge) > Perennial Forbs (goldenrod, solomonsseal).

    Sub-dominant: Non-sprouting Shrubs (Oregon-grape) > Rhizomatous Grasses (slender wheatgrass) >> Perennial Forbs (Fendler meadowrue).

    Other: 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 where present on this site and is measured as a component of ground cover. Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

    Additional: Disturbance regimes include seasonal flooding, insects, and infrequent fire. Temporal variability can be caused by fires, droughts, insects, etc. Spatial variability can be caused by periodic flooding, soil pH, and topography. Narrowleaf cottonwood appears to be more resistant to fire than Fremont cottonwood, and with repeated fire, may replace that species in the community where both occur. Following a recent disturbance such as drought, or flooding damage that removes woody vegetation, forbs and perennial grasses and grasslikes may dominate the community. If a disturbance has not occurred for an extended period of time, woody species may continue to increase on the site, reducing herbaceous species. Yearly variations in flow and large floods that scour vegetation and deposit sediment on floodplains are ideal microsites for willow and cottonwood seedlings. These conditions may reflect community phases within the reference state.

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** There should be no mortality or decadence in either trees, shrubs or grasses during years with average to above average precipitation. During severe (multi-year) droughts that affect groundwater levels, up to 15% of the trees and shrubs may die. Minor mortality of perennial grasses and grasslikes may also occur during these drought periods. There may be partial mortality of individual grasses, grasslikes and shrubs during less severe droughts.

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14. **Average percent litter cover (%) and depth (in):** Litter cover is highly variable on this site and ranges from 25 to 35%. Depth should be 1 inch thickness in the interspaces and up to 3 inches under perennial plant canopies.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production in air-dry herbage should be approximately 1700 to 1800 pounds per acre on an average year. Production could vary from 1300 to 2200 pounds per acre during drought or above-average years.

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:** cheatgrass, knapweed species, Russian thistle, mustard species, filarie, other non-native annual forbs and grasses.

17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually in most years, except in drought years. Rhizomatous plants including rushes and sedges are often the first to re-establish following flooding, coyote willow and Fremont cottonwood seedlings and saplings should also be present.