Classification and Mapping of the Vegetation on Selected Valley-Floor and Alluvial Fan Areas in Spring Valley (Hydrographic Area 184), Nevada

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Southern Nevada Water Authority

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1.0 INTRODUCTION

This report summarizes the 2008–2009 vegetation mapping effort by KS2 Ecological Field Services, BIO-WEST, Inc., and the Southern Nevada Water Authority (SNWA) in the Spring Valley hydrographic area (#184), Nevada. The objective of the project was to map vegetation on the valley floor and valley floor-alluvial fan interface that is or appears to be supported by springs and/or groundwater (i.e., phreatophytic vegetation), including aquatic vegetation, wetlands, grasslands, and woodlands. Phreatophytic shrublands were not an objective for mapping in this project due to their more extensive occurrence in the valley; however, some phreatophytic shrublands, as well as dry shrublands, were mapped when they connected nearby portions of areas targeted for mapping. Vegetation that is supported by springs and/or groundwater would be the first to experience vegetation change associated with groundwater withdrawal, should such changes happen.

Monitoring of biological fluctuations and changes over a landscape scale, such as Spring Valley, requires that biological units be recognized and delineated. One category of biological units that is of particular interest for monitoring in Spring Valley is groundwater-influenced ecosystems, including those vegetation units whose characteristics are strongly affected by depth to groundwater and outflow of groundwater into springs. Before these vegetation units can be monitored, they must be identified. To accomplish this task, SNWA implemented a vegetation classification and mapping program in 2008 focused on springs, wetlands, meadows, and woodlands on the valley floor and valley floor-alluvial fan interface of Spring Valley. Areas that support these types of vegetation were mapped in the summers of 2008 and 2009 (Figure 1-1). This document presents the results of this vegetation mapping effort.

Spring Valley, located in the Great Basin Desert in the Basin and Range Province, covers approximately 4,100 km^2 (1,600 mi^2) in east-central Nevada. The Southern Nevada Water Authority (SNWA) owns approximately 8,900 ha (22,000 acres) of deeded lands in Spring Valley. These deeded lands are base properties to federal grazing allotments that include approximately 227,000 ha (560,000 acres) of allotments on which SNWA holds grazing permits in Spring Valley. These land holdings and land management responsibilities provide SNWA with the ability to implement adaptive integrated resource management to support the Clark, Lincoln, and White Pine Counties Groundwater Development Project. This vegetation mapping effort was contracted by SNWA to provide information on the current resources on the landscape and to aid in environmental planning.

Under a Stipulated Agreement between SNWA, the United States Fish and Wildlife Service, the United States Bureau of Indian Affairs, the United States Bureau of Land Management, and the National Park Service regarding SNWA groundwater applications in Spring Valley (Stipulation for Withdrawal of Protests 2006), the Biological Monitoring Plan for the Spring Valley Stipulation designated 18 biological monitoring sites in Spring Valley (Biological Working Group 2009). The sites include springs, wetlands, meadows, greasewood-dominated phreatophytic shrublands, and Rocky Mountain juniper (*Juniperus scopulorum*) populations, and mostly occur on the valley floor or valley floor-alluvial fan interface. This vegetation mapping effort included all of the aquatic, wetland, meadow, and woodland areas in Spring Valley that are monitored under the Stipulation (Figure 1-1), and informed the design and establishment of permanent vegetation transects under the Biological Monitoring Plan. While this vegetation mapping effort was conducted outside of the Stipulation, the results have informed and will continue to inform biological monitoring in Spring Valley.

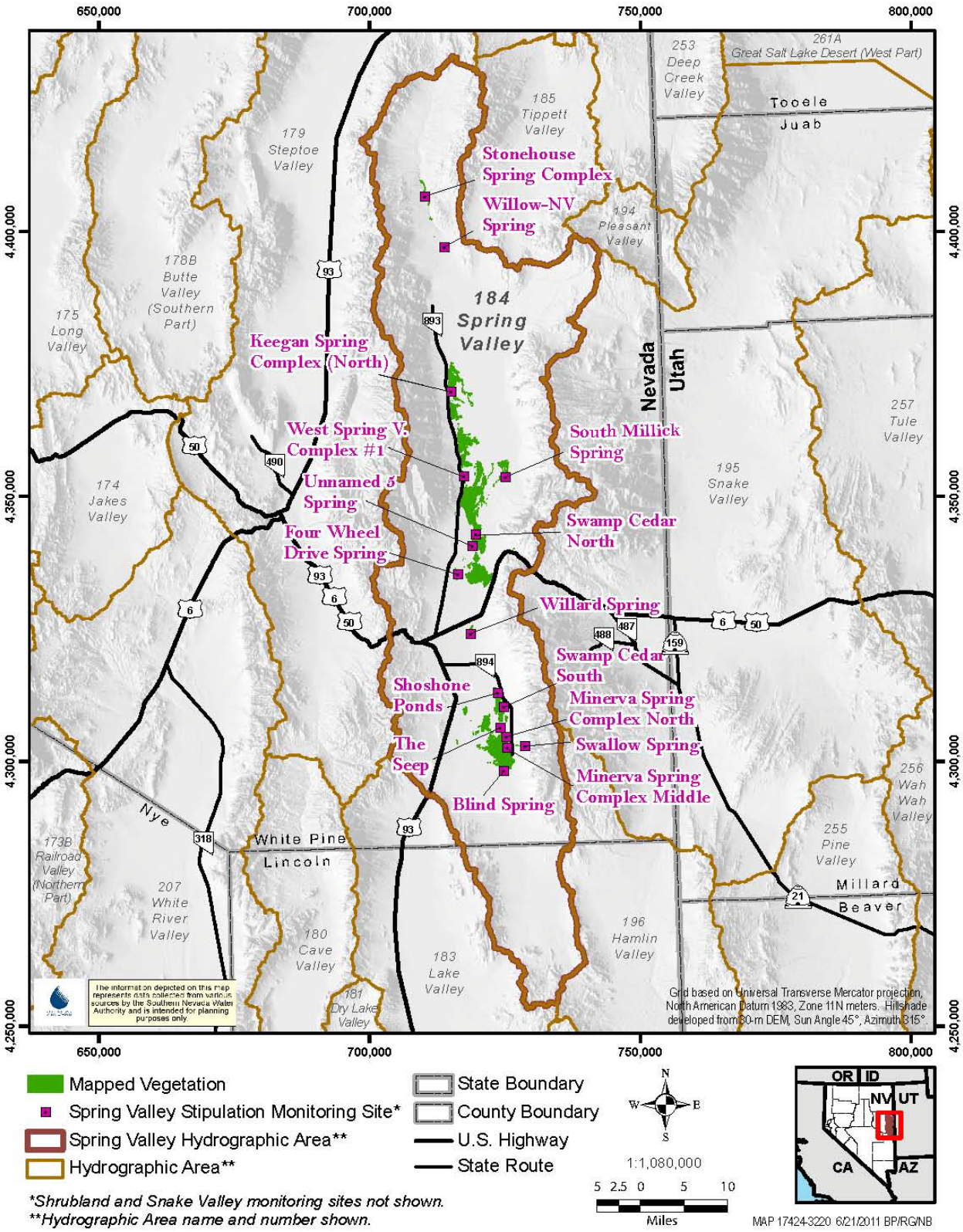

Figure 1-1. Mapped vegetation in Spring Valley, Nevada. Areas mapped in Spring Valley include Stipulation Monitoring Springs, and wetlands, meadows, and woodlands specified in the Stipulation (Stipulation for Withdrawal of Protests 2006), as well as some phreatophytic and dry shrublands.

2.0 METHODS

Vegetation is a general term used in plant ecology to denote the total plant assemblage within a specified area (Vankat 1979:3). Vegetation in most areas consists of a mosaic across the area, with the mosaic formed by variations in species abundance caused by variations in environmental factors across the landscape (Daubenmire 1968:4). No two units of the mosaic are exactly alike. However, there are similarities among the units, with the similarity generally increasing as the area of interest becomes smaller and the environmental heterogeneity becomes less pronounced. Although no two units of vegetation are exactly alike, it is often useful to group these units of vegetation into groups based on their degree of similarity. Such efforts result in the need for classification systems for the various groups that reflect the perceived relationships among the groups. It should be kept in mind that classifications are abstractions of the real world. As such, there will always be some inaccuracy and ambiguity in the use of vegetation classifications and in vegetation mapping based on these classifications, especially in the assignment of some observations (e.g., polygons) into a specific unit (e.g., plant associations).

2.1 FIELD MAPPING AND GIS METHODS

Map production and GIS work were conducted by SNWA in 2008–2010, and KS2 and BIO-WEST conducted field mapping in June–September 2008 and June, August, and September 2009. SNWA chose areas to be mapped (aquatic vegetation, wetlands, grasslands, and woodlands considered likely to be phreatophytic) based on aerial images, biological data, and on-the-ground knowledge. Some phreatophytic and dry shrubland areas were also mapped if they connected nearby portions of valley-floor woodland, grassland, wetland or aquatic vegetation. Areas mapped were primarily SNWA-owned or public lands. Privately-owned lands were mapped with permission of the land owners, but access was not gained to all private lands. Mapped lands are shown in Figure 1-1.

The vegetation was mapped in the field by visual inspection. The maps provided by SNWA for field work displayed 6-inch resolution aerial imagery (captured by Digital Mapping, Inc. for SNWA in May of 2007) overlaid with a 100-meter UTM Zone 11N NAD83 Grid. Most maps were produced at a 1:2,500 scale, a small number of maps were produced at a 1:5,000 scale, and maps of select spring areas were produced at a 1:250 scale. Staff experienced in vegetation mapping and with the vegetation of the region walked across the areas to be mapped and used these high-resolution images to delineate plant communities that were visually recognized in the field. The person mapping drew polygons on the images corresponding to the boundaries of each plant community. A plant community was defined on the basis of relative amounts of canopy cover of the three most abundant species, with order of the species being important (e.g., A-B-C considered different from B-A-C). Once the polygon corresponding to the community was drawn on the image, a temporary number was assigned to the polygon and visual estimates were made of total canopy cover of vegetation and relative cover of the three most abundant species. Minimum size of vegetation units mapped (i.e., polygons) was approximately 0.0001 ha (1 m^2), and these small polygons were confined to areas of highest concern (e.g., springs).

Once a set of field maps was completed, the maps were reviewed and boundary lines were checked, especially where two sets of maps connected. The mapped communities were compared and adjustments in boundary lines were made if necessary to assure agreement across map boundaries. Data sets (i.e., community names and species composition) were reviewed to assure that the community described for a given polygon was logically sound (e.g., aquatic species were not listed in an area covered by shrubs), and final attribute tables were created. Once these data validation procedures were completed, the polygons drawn on the final field maps were submitted to SNWA for electronic digitizing.

After completion of field work by KS2 and BIO-WEST, the final field maps were scanned and archived in a secure SNWA database. Using ArcView, the digital scans were rectified and the lines (i.e., polygon boundaries) were extracted. Line work topology was checked for dangles, pseudo nodes, and self intersections, and screen shots of such problem areas were sent to KS2 for correction and subsequently edited in ArcView. Once the spatial data were error-free, the lines were converted to polygons, an acreage field was added and calculated, and the spatial data were joined to attribute tables provided by KS2. Hectare estimates within this report are presented to two decimal places, and as such, slight rounding errors may be observed when comparing calculations made directly from the more precise values contained in the final GIS database (SNWA et al. 2011) and those presented in this report. The final GIS database[1] includes 9,450 polygons mapped in Spring Valley and two neighboring valleys (Snake and Hamlin), a complete data attribute table, and complete metadata (SNWA et al. 2011). Of these 9,450 polygons, 9,331 reside in Spring Valley and are the focus of this report.

2.2 CLASSIFICATION SYSTEM

The vegetation classification system used was hierarchical. Hierarchical systems are especially useful for vegetation classification (Whittaker 1975:130). In hierarchical systems, each successively lower level is more site-specific and is based on more lower-order taxonomic groups. Higher levels are geographically broader and based on higher-order taxonomic groups, regional categories, or broad vegetation categories. Four levels are included in the classification system for Spring Valley, Nevada: biome, alliance, association, and community (Table 2-1).

Table 2-1. Levels of the hierarchical vegetation classification system used in the mapping of the vegetation of Spring Valley, Nevada.

Classification Level	Example
BIOME	Shrubland
ALLIANCE	Greasewood
ASSOCIATION	Greasewood-rabbitbrush
COMMUNITY	Greasewood-rabbitbrush-saltgrass

Vegetation units (e.g., communities or associations) generally do not occur across landscapes as discrete units with sharp boundaries. Instead, the center portions of the vegetation units tend to occur as recognizable and often re-occurring units across the landscape. Their boundaries, however, tend to merge in zones of overlap called ecotones. The ecotones are sharp where

[1] The GIS database will continue to be updated as new information becomes available. This report is based on data from the GIS database as of 12 July 2010, with some additional edits made as of 21 June 2011.

changes in environmental conditions occur over short distances and are gradual where changes in environmental conditions occur over longer distances. Therefore, the dividing lines between mapped vegetation units can be somewhat arbitrary. As a result, professional judgment is used to determine whether two units should be classified as the same vegetation unit or should be considered as separate units. Still, generating a hierarchical vegetation classification allows us to group similar vegetation units into meaningful categories. Below, we define these categories, our framework for assigning categories, and their use in this mapping effort for Spring Valley, Nevada.

The **community** is the lowest classification category of vegetation used in this project, and the highest order subdivision of the association. The community is based on the relative composition of the three most abundant plant species in terms of vegetation canopy cover. A change in order of the respective species (most abundant, second-most abundant, third-most abundant) results in different communities. This species order was mapped in the field and was retained in the community designations. Recording the order of species allows vegetation change over time to be tracked as the relative abundances of the respective species shift.

The **association** is the next highest order of the classification system above community, is the highest order of subdivision of the alliance, and includes all communities with a given pair of species occurring as either the dominant or subdominant species. Order of dominance between the dominant and subdominant species was not the primary consideration in defining associations.

To illustrate, consider the following examples. The vegetation of an area with 90% relative cover of saltgrass (*Distichlis spicata*) is very different from the vegetation of an area with 10% relative cover of saltgrass, and the two areas would be classified into different associations. But what about an area with 55% saltgrass and an area with 45% saltgrass? How different are they? The vegetation on the area with 55% saltgrass is probably more similar to the vegetation on the area with 45% saltgrass than it is to the area with 90% saltgrass, and yet saltgrass is the dominant species on both the 55% and the 90% areas and may not be the dominant species on the 45% area. Strictly adhering to order of dominance in this instance, would mean assigning the community with 45% saltgrass to a different association than the one with 55% saltgrass.

Thus, to simplify our vegetation classification system and pool similar communities into the same association, species identity (e.g., saltgrass and big sagebrush [*Artemisia tridentata*]) was the primary consideration in designating associations, not order of dominance (55% saltgrass and 40% big sagebrush versus 55% big sagebrush and 40% saltgrass). Thus, an association was considered to include all communities with a given pair of species occurring as either the dominant or subdominant species. Further, for purposes of classification nomenclature, the species with the biome hierarchical position of the highest rank (e.g., shrubs over grasses; Table 2-2) was given preference in the naming of an association. If, for example, a grass species (e.g., saltgrass) was dominant and a shrub species (e.g., big sagebrush) was subdominant for a particular community and the same shrub species was dominant and the same grass species subdominant in a second community, both communities were considered to be the same association and that association was named with the shrub being dominant and the grass being subdominant (e.g., big sagebrush-saltgrass association). In cases where two species of the same

biome were dominant and subdominant in more than one community, the communities were placed in the same association with the association classified on the basis of which of the two species was dominant most frequently.

This process of combining similar communities into the same association is also supported by the fact that the species composition of many of the communities mapped were strongly influenced by past land use practices and are likely to shift in composition over relatively short time periods if the practices are modified. If so, separating associations on the basis of relatively small differences in relative composition does not seem prudent because of the dynamic aspect of vegetation succession.

The **alliance** is the next highest order of the classification system above association, is the highest order of subdivision of the biome, and is based on the first species (or genus) given in the name of an association. This species is the most abundant, or second most abundant, in the association. The common name of the species is used to name an alliance, rather than scientific name, to increase the practicality of usage. An alliance includes all associations with the same first species.

The **biome** is the highest level of the classification system and is based on the general structural category of the species defining the alliance (Whittaker 1975:135) or on a major environmental characteristic of the ecosystem (e.g., wetland). Six biomes are included in this classification: woodland, shrubland, grassland, wetland, aquatic, and early-seral (Table 2-2 and Appendix C). Overlap can exist in assigning the vegetation to one of these six biomes. For example, the characteristic habitat of some species of grasses, such as the wetland or wet meadow grasses redtop (*Agrostis gigantea*) and meadow fescue (*Schedonorus pratensis*), is areas of saturated soil with standing water for considerable periods of time each year. These species, therefore, could be assigned to either the grassland biome, given the presence of grasses, or the wetland biome, given the presence of saturated soil and standing water. In such cases, the species was assigned to the highest rank (top to bottom in Table 2-2) applicable.

Table 2-2. General description of the six biomes, listed from highest to lowest rank, included in the vegetation classification system used in the mapping of the vegetation of Spring Valley, Nevada.

Biome	Description
Woodland:	area where trees (woody plants > 3 m tall) are the dominant or sub-dominant species.
Shrubland:	area where shrubs (woody plants < 3 m tall) are the dominant species.
Grassland:	area dominated by grasses and not perennially covered by water
Wetland:	area where the soil is saturated for most of the year, but not perennially covered by water, and not dominated by grasses.
Aquatic:	area perennially covered by water and often supporting plants.
Early-seral:	area devoid of plant cover or supporting only plants characteristic of early stages of succession.

The premise of assigning rank to each biome, from the lowest rank of early-seral biome to the highest rank of woodland biome (Table 2-2), is based on two aspects of plant ecology. First, lifeforms with greater structure tend to have greater effects on the functional characteristics of a plant community than those with less structure. For example, a shrub has a greater effect than a

grass and a tree greater than a shrub. In addition, over time ecosystems tend toward greater structure (e.g., grasslands tend toward shrublands). This is a basic aspect of plant succession (Odum 1971; Kormondy 1996). These two patterns are reflected in the structure of traditional vegetation classifications, with species of lifeforms with greater structure assigned to higher ranks within the vegetation classifications than those species with less structure (e.g., shrubs over grasses). In our classification system, if the subdominant species is a lifeform with greater structure than that of the dominant species, the vegetation unit generally was classified with the subdominant first, thereby reflecting the higher rank of that species within our classification system.

2.3 MAP DESIGNATIONS

Each mapped vegetation unit appears on a map as a polygon. Each polygon has two designations associated with it, one consisting of a six-letter map code (explained below), and the other consisting of a polygon identifier (1 to 9,331), which are numbered in order roughly from north to south in Spring Valley. Detailed information about the vegetation in each polygon is provided in the final GIS database (SNWA et al. 2011).

The six-letter map code for each polygon is a short hand designation for the association. The first three letters refer to the dominant (or first-ranked) species and the second three letters refer to the sub-dominant (or second-ranked) species. The first letter of each three-letter sequence refers to the biome-type (Table 2-2) of the respective species (T = woodland, S = shrubland, G = grassland, W = wetland, A = aquatic, E = early-seral), and the last two letters refers to the species. An example of a six letter designation is: TOR-SSB, which corresponds to the association Russian olive-big sagebrush (Tree, Olive, Russian-Shrub, Sagebrush, Big).

The assignment of a characteristic biome-type for each species within the map code was based on the highest level (Table 2-2) that the species typically occurs in. Some species occur in very wet meadows and along the edges of standing water. Although these species can exist in standing water, and therefore could be considered aquatic, they also exist in areas that periodically dry out at the surface. In general, if a species is not an obligate aquatic species, it was classified as a wetland species. Similarly, some species are wetland species but are characteristic of lower successional stage wetlands. Examples include silver cinquefoil (*Argentina anserina*) and sumpweed (*Iva axillaris*). These two species could be considered as wetland species and as early-seral (or earlier-seral) species. In such cases, unless the species was distinctly characteristic of early-seral conditions (e.g., cheatgrass, sweetclover, Canada thistle), it was designated as a shrubland, grassland, wetland, or aquatic species, rather than early-seral.

The second- and third-letter of each sequence refer to respective species, based on common names. A total of 159 taxons (species, genera, lifeforms, bare ground, and open water) are included in the polygon names (association designations; Table 2-3) (188 total taxons were identified at the level of the community; Appendix B). These three-letter codes are listed in Table 2-3 along with their corresponding scientific name codes and common names, by their respective biome. The left-hand portion of Table 2-3 lists this information alphabetized in order of the species code and the right-hand portion lists the same information alphabetized in order of the three-letter map code. This dual listing is provided to allow for rapid referencing by either species name to corresponding map code or by map code to species name.

Table 2-3. Map code, species code, and common name for individual species used to define mapping units for the plant associations in Spring Valley, Nevada, grouped by biomes from highest to lowest rank.

LISTED BY SPECIES CODE			LISTED BY MAP CODE		
Map Code	**Species Code**	**Common Name**	**Map Code**	**Species Code**	**Common Name**
	TREES			**TREES**	
T-OR	ELAN	Russian olive	T-CE	PODE	Eastern cottonwood
T-JR	JUSC	Rocky Mountain juniper	T-JR	JUSC	Rocky Mountain juniper
T-PW	POAL	White poplar	T-OR	ELAN	Russian olive
T-PN	POAN	Narrowleaf poplar	T-PN	POAN	Narrowleaf poplar
T-CE	PODE	Eastern cottonwood	T-PW	POAL	White poplar
	SHRUBS			**SHRUBS**	
S-SB	ARTR	Big sagebrush	S-BW	HYLE	Lemmon's bitterweed
S-SH	ATCO	Shadscale	S-CU	RIBE	Currant
S-RA	CHAL	Alkali rabbitbrush	S-GR	SAVE	Greasewood
S-RD	CHVI	Douglas rabbitbrush	S-GW	PYLA	Goldenweed
S-TF	COUM	Bastard toadflax	S-PP	DAFR	Shrubby potentilla
S-PP	DAFR	Shrubby potentilla	S-RA	CHAL	Alkali rabbitbrush
S-RR	ERNA	Rabbitbrush	S-RD	CHVI	Douglas rabbitbrush
S-BW	HYLE	Lemmon's bitterweed	S-RR	ERNA	Rabbitbrush
S-GW	PYLA	Goldenweed	S-RW	ROWO	Woods' rose
S-SK	RHTR	Skunkbush	S-SB	ARTR	Big sagebrush
S-CU	RIBE	Currant	S-SH	ATCO	Shadscale
S-RW	ROWO	Woods' rose	S-SK	RHTR	Skunkbush
S-WC	SAEX	Coyote willow	S-TF	COUM	Bastard toadflax
S-WW	SALX	Willow	S-WC	SAEX	Coyote willow
S-GR	SAVE	Greasewood	S-WW	SALX	Willow
	GRASSES			**GRASSES**	
G-WR	AGCR	Crested wheatgrass	G-AA	PUCC	Alkaligrass
G-RT	AGGI	Redtop	G-AL	PULE	Lemmon's alkaligrass
G-WG	AGRO	Wheatgrass	G-AT	PUFA	Torrey alkaligrass
G-FS	ALAE	Shortawn foxtail	G-AW	PUDI	Weeping alkaligrass
G-BI	BRIN	Smooth brome	G-BB	POA	Bluegrass
G-BR	BROM	Brome	G-BG	CYDA	Bermudagrass
G-BG	CYDA	Bermudagrass	G-BI	BRIN	Smooth brome
G-OR	DAGL	Orchardgrass	G-BK	POPR	Kentucky bluegrass
G-HT	DECE	Tufted hairgrass	G-BM	HOBR	Meadow barley
G-ST	DISP	Saltgrass	G-BR	BROM	Brome
G-WS	ELTR	Slender wheatgrass	G-BS	POSE	Sandberg bluegrass
G-BM	HOBR	Meadow barley	G-CA	SPGR	Alkali cordgrass
G-VG	HOLA	Velvetgrass	G-CR	PHAR	Reed canarygrass
G-WB	LECI	Basin wildrye	G-CZ	PHAU	Carrizo
G-WC	LETR	Creeping wildrye	G-FM	SCPR	Meadow fescue
G-MA	MUAS	Alkali muhly	G-FS	ALAE	Shortawn foxtail
G-MM	MURI	Mat muhly	G-HT	DECE	Tufted hairgrass
G-CR	PHAR	Reed canarygrass	G-MA	MUAS	Alkali muhly
G-CZ	PHAU	Carrizo	G-MM	MURI	Mat muhly
G-TM	PHPR	Timothy	G-OR	DAGL	Orchardgrass
G-BB	POA	Bluegrass	G-RT	AGGI	Redtop
G-BK	POPR	Kentucky bluegrass	G-SA	SPAI	Sacaton
G-BS	POSE	Sandberg bluegrass	G-ST	DISP	Saltgrass
G-AA	PUCC	Alkaligrass	G-TM	PHPR	Timothy
G-AW	PUDI	Weeping alkaligrass	G-VG	HOLA	Velvetgrass

LISTED BY SPECIES CODE			LISTED BY MAP CODE		
Map Code	**Species Code**	**Common Name**	**Map Code**	**Species Code**	**Common Name**
G-AT	PUFA	Torrey alkaligrass	G-WB	LECI	Basin wildrye
G-AL	PULE	Lemmon's alkaligrass	G-WC	LETR	Creeping wildrye
G-FM	SCPR	Meadow fescue	G-WG	AGRO	Wheatgrass
G-SA	SPAI	Sacaton	G-WR	AGCR	Crested wheatgrass
G-CA	SPGR	Alkali cordgrass	G-WS	ELTR	Slender wheatgrass
G-WT	THPO	Tall wheatgrass	G-WT	THPO	Tall wheatgrass
WETLAND			**WETLAND**		
W-YR	ACMI	Yarrow	W-AG	TRMA	Seaside arrowgrass
W-IB	ALOC	Iodinebush	W-AP	NIOC	Alkali pink
W-CS	ARAN	Silver cinquefoil	W-AR	SACU	Duck potato
W-MW	ASSP	Milkweed	W-BA	SCAM	American bulrush
W-BO	BORA	Borage	W-BC	RACY	Shore buttercup
W-SD	CADO	Douglas' sedge	W-BG	SPEU	Giant bur-reed
W-SN	CANE	Nebraska sedge	W-BL	SCIR	Bulrush
W-SP	CAPA	Parry's sedge	W-BO	BORA	Borage
W-SF	CAPR	Fieldclustered sedge	W-BR	SPAR	Bur-reed
W-SC	CAPY	Chamisso sedge	W-BT	SCAC	Tule bulrush
W-SB	CARO	Beaked sedge	W-CB	TRFR	Strawberry clover
W-SS	CARX	Sedge	W-CC	TRIF	Clover
W-SA	CASI	Analogue sedge	W-CN	HEPU	Western centaur
W-TE	CISC	Elk thistle	W-CR	TRPR	Red clover
W-HB	CRRU	Hawksbeard	W-CS	ARAN	Silver cinquefoil
W-CY	CRYP	Cryptantha	W-CT	TYLA	Cattail
W-ST	DODE	Shooting star	W-CW	TRRE	White clover
W-DW	DOLA	Downingia	W-CY	CRYP	Cryptantha
W-EN	ELAC	Needle spikerush	W-DW	DOLA	Downingia
W-EE	ELEO	Spikerush	W-EB	ELRO	Beaked spikerush
W-EC	ELPA	Creeping spikerush	W-EC	ELPA	Creeping spikerush
W-EB	ELRO	Beaked spikerush	W-EE	ELEO	Spikerush
W-WH	EPIL	Willow weed	W-EN	ELAC	Needle spikerush
W-HT	EQAR	Horsetail	W-FN	FERN	Fern
W-FN	FERN	Fern	W-GB	SONA	Baby goldenrod
W-SM	GLMA	Sea milkwort	W-GO	SOLI	Goldenrod
W-CN	HEPU	Western centaur	W-GW	SALI	Glasswort
W-MT	HIVU	Marestail	W-HB	CRRU	Hawksbeard
W-IR	IRMI	Rocky Mountain iris	W-HT	EQAR	Horsetail
W-SW	IVAX	Sumpweed	W-IA	IVKI	Alkali ivesia
W-IA	IVKI	Alkali ivesia	W-IB	ALOC	Iodinebush
W-RB	JUAR	Baltic rush	W-IR	IRMI	Rocky Mountain iris
W-RF	JUAT	Fine rush	W-MA	MALE	Alkali mallow
W-RS	JUEN	Swordleaf rush	W-MF	MIGU	Common monkeyflower
W-RR	JUNC	Rush	W-MO	MOSS	Moss
W-RN	JUNE	Nevada rush	W-MT	HIVU	Marestail
W-RM	JUSA	Rocky Mountain rush	W-MW	ASSP	Milkweed
W-MA	MALE	Alkali mallow	W-NM	SINE	New Mexico sida
W-SL	MARA	Solomon plume	W-NS	URDI	Stinging nettle
W-MF	MIGU	Common monkeyflower	W-PN	POGR	Northwest cinquefoil
W-MO	MOSS	Moss	W-PT	PHPU	Tufted phlox
W-AP	NIOC	Alkali pink	W-RB	JUAR	Baltic rush
W-PT	PHPU	Tufted phlox	W-RF	JUAT	Fine rush
W-PN	POGR	Northwest cinquefoil	W-RM	JUSA	Rocky Mountain rush

LISTED BY SPECIES CODE			LISTED BY MAP CODE		
Map Code	**Species Code**	**Common Name**	**Map Code**	**Species Code**	**Common Name**
W-BC	RACY	Shore buttercup	W-RN	JUNE	Nevada rush
W-AR	SACU	Duck potato	W-RR	JUNC	Rush
W-GW	SALI	Glasswort	W-RS	JUEN	Swordleaf rush
W-BT	SCAC	Tule bulrush	W-SA	CASI	Analogue sedge
W-BA	SCAM	American bulrush	W-SB	CARO	Beaked sedge
W-BL	SCIR	Bulrush	W-SC	CAPY	Chamisso sedge
W-SQ	SCPU	Common threesquare	W-SD	CADO	Douglas' sedge
W-NM	SINE	New Mexico sida	W-SF	CAPR	Fieldclustered sedge
W-GO	SOLI	Goldenrod	W-SL	MARA	Solomon plume
W-GB	SONA	Baby goldenrod	W-SM	GLMA	Sea milkwort
W-BR	SPAR	Bur-reed	W-SN	CANE	Nebraska sedge
W-BG	SPEU	Giant bur-reed	W-SP	CAPA	Parry's sedge
W-TG	THRH	Thermopsis	W-SQ	SCPU	Common threesquare
W-CB	TRFR	Strawberry clover	W-SS	CARX	Sedge
W-CC	TRIF	Clover	W-ST	DODE	Shooting star
W-AG	TRMA	Seaside arrowgrass	W-SW	IVAX	Sumpweed
W-CR	TRPR	Red clover	W-TE	CISC	Elk thistle
W-CW	TRRE	White clover	W-TG	THRH	Thermopsis
W-CT	TYLA	Cattail	W-WH	EPIL	Willow weed
W-NS	URDI	Stinging nettle	W-YR	ACMI	Yarrow
	AQUATIC			**AQUATIC**	
A-AL	ALGA	Algae	A-AL	ALGA	Algae
A-WP	ALPL	Water plantain	A-CT	CEDE	Coon's tail
A-PR	BEER	Water parsnip	A-CW	RAAQ	White water crowfoot
A-SG	BESY	Sloughgrass	A-DW	LEMI	Duckweed
A-WW	CAAQ	Water whorlgrass	A-HW	CIDO	Water hemlock
A-CT	CEDE	Coon's tail	A-KW	POAM	Water knotweed
A-HW	CIDO	Water hemlock	A-OW	WATR	Open water
A-DW	LEMI	Duckweed	A-PF	STFI	Fineleaf pondweed
A-WC	NAOF	Watercress	A-PH	ZAPA	Horned pondweed
A-KW	POAM	Water knotweed	A-PR	BEER	Water parsnip
A-PW	POTA	Pondweed	A-PW	POTA	Pondweed
A-CW	RAAQ	White water crowfoot	A-SG	BESY	Sloughgrass
A-PF	STFI	Fineleaf pondweed	A-WC	NAOF	Watercress
A-WS	VEAN	Water speedwell	A-WP	ALPL	Water plantain
A-OW	WATR	Open water	A-WS	VEAN	Water speedwell
A-PH	ZAPA	Horned pondweed	A-WW	CAAQ	Water whorlgrass
	EARLY-SERAL			**EARLY-SERAL**	
E-SB	ARBI	Biennial sagewort	E-AL	MESA	Alfalfa
E-BD	ARCT	Burdock	E-BD	ARCT	Burdock
E-SL	ARLU	Louisiana sagewort	E-BF	HOJU	Foxtail barley
E-BG	BARE	Bare ground	E-BG	BARE	Bare ground
E-KO	BASC	Kochia	E-BT	BICE	Beggars ticks
E-BT	BICE	Beggars ticks	E-BW	COAR	Bindweed
E-CH	BRTE	Cheatgrass	E-CB	POBI	Biennial cinquefoil
E-PW	CADR	Pepperweed	E-CD	RUCR	Curly dock
E-TC	CIAR	Canada thistle	E-CG	GRSQ	Curlycup gumweed
E-TT	CIRS	Thistle	E-CH	BRTE	Cheatgrass
E-TB	CIVU	Bull thistle	E-CS	MEOF	Sweetclover
E-BW	COAR	Bindweed	E-HG	HAGL	Halogeton
E-CG	GRSQ	Curlycup gumweed	E-HS	HECU	Salt heliotrope

LISTED BY SPECIES CODE			LISTED BY MAP CODE		
Map Code	**Species Code**	**Common Name**	**Map Code**	**Species Code**	**Common Name**
E-HG	HAGL	Halogeton	E-KO	BASC	Kochia
E-HS	HECU	Salt heliotrope	E-KP	POAV	Prostrate knotweed
E-SF	HENU	Nuttall's sunflower	E-KW	POLY	Knotweed
E-BF	HOJU	Foxtail barley	E-ML	VETH	Mullein
E-CS	MEOF	Sweetclover	E-PF	PLSC	Popcorn flower
E-AL	MESA	Alfalfa	E-PW	CADR	Pepperweed
E-PF	PLSC	Popcorn flower	E-RF	POMO	Rabbitsfoot grass
E-KP	POAV	Prostrate knotweed	E-SB	ARBI	Biennial sagewort
E-CB	POBI	Biennial cinquefoil	E-SF	HENU	Nuttall's sunflower
E-KW	POLY	Knotweed	E-SL	ARLU	Louisiana sagewort
E-RF	POMO	Rabbitsfoot grass	E-TB	CIVU	Bull thistle
E-CD	RUCR	Curly dock	E-TC	CIAR	Canada thistle
E-UN	UNID	Unidentified plant	E-TT	CIRS	Thistle
E-VP	VEBR	Prostrate verbena	E-UN	UNID	Unidentified plant
E-ML	VETH	Mullein	E-VP	VEBR	Prostrate verbena

3.0 ECOLOGICAL DESCRIPTIONS

3.1 GENERAL DESCRIPTION OF THE VEGETATION OF SPRING VALLEY

A total of 9,331 polygons were mapped in Spring Valley, Nevada in 2008–2009 (SNWA et al. 2011). These polygons were classified into 107 alliances, 752 associations (Table 3-1), and 2,671 communities (Appendix A). There were 5 woodland alliances containing 30 associations, 11 shrubland alliances with 113 associations, 26 grassland alliances with 230 associations, 36 wetland alliances with 296 associations, 14 aquatic alliances with 48 associations, and 15 early-seral alliances with 35 associations. There were two mapping groups that had no vegetation present, bare ground and open water, which were included as alliances for accounting purposes.

Table 3-1. Vegetation biomes, alliances, and associations mapped in Spring Valley, Nevada, 2008–2009, with the number of polygons and total area covered by each association.

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
WOODLAND BIOME (T)					
	ELAN	Russian olive	T-OR		
	ELAN-ARTR	Russian olive-big sagebrush	TOR-SSB	2	0.15
	ELAN-RIBE	Russian olive-currant	TOR-SCU	1	0.10
	ELAN-AGGI	Russian olive-redtop	TOR-GRT	3	0.52
	ELAN-DISP	Russian olive-saltgrass	TOR-GST	11	3.11
	ELAN-CIAR	Russian olive-Canada thistle	TOR-ETC	1	< 0.01
	JUSC	Rocky Mountain juniper	T-JR		
	JUSC-JUSC	Rocky Mountain juniper-Rocky Mountain juniper	TJR-TJR	9	0.04
	JUSC-ARTR	Rocky Mountain juniper-big sagebrush	TJR-SSB	17	36.19
	JUSC-CHVI	Rocky Mountain juniper-Douglas rabbitbrush	TJR-SRD	3	2.60
	JUSC-ERNA	Rocky Mountain juniper-rabbitbrush	TJR-SRR	37	177.40
	JUSC-ROWO	Rocky Mountain juniper-Woods' rose	TJR-SRW	4	0.56
	JUSC-SAVE	Rocky Mountain juniper-greasewood	TJR-SGR	2	3.97
	JUSC-AGGI	Rocky Mountain juniper-redtop	TJR-GRT	1	1.64
	JUSC-DISP	Rocky Mountain juniper-saltgrass	TJR-GST	3	14.38
	JUSC-LETR	Rocky Mountain juniper-creeping wildrye	TJR-GWC	3	0.54
	JUSC-MURI	Rocky Mountain juniper-mat muhly	TJR-GMM	2	0.40
	JUSC-POA	Rocky Mountain juniper-bluegrass	TJR-GBB	1	0.61
	JUSC-POSE	Rocky Mountain juniper-Sandberg bluegrass	TJR-GBS	6	44.54
	JUSC-PUCC	Rocky Mountain juniper-alkaligrass	TJR-GAA	8	22.85
	JUSC-PUFA	Rocky Mountain juniper-Torrey alkaligrass	TJR-GAT	3	2.03
	JUSC-SPAI	Rocky Mountain juniper-sacaton	TJR-GSA	18	78.00
	JUSC-SPGR	Rocky Mountain juniper-alkali cordgrass	TJR-GCA	4	12.59
	JUSC-CANE	Rocky Mountain juniper-Nebraska sedge	TJR-WSN	6	0.63
	JUSC-CARX	Rocky Mountain juniper-sedge	TJR-WSS	11	21.37
	JUSC-ELEO	Rocky Mountain juniper-spikerush	TJR-WEE	2	0.04
	JUSC-ELPA	Rocky Mountain juniper-creeping spikerush	TJR-WEC	2	0.02
	JUSC-JUAR	Rocky Mountain juniper-Baltic rush	TJR-WRB	6	35.29
	JUSC-THRH	Rocky Mountain juniper-thermopsis	TJR-WTG	1	< 0.01
	POAL	White poplar	T-PW		
	POAL-POAL	White poplar-white poplar	TPW-TPW	1	0.03
	POAN	Narrowleaf poplar	T-PN		
	POAN-ROWO	Narrowleaf poplar-Woods' rose	TPN-SRW	4	0.40
	PODE	Eastern cottonwood	T-CE		
	PODE-PODE	Eastern cottonwood-eastern cottonwood	TCE-TCE	1	0.03

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
SHRUBLAND BIOME (S)					
	ARTR	Big sagebrush	S-SB		
	ARTR-ARTR	Big sagebrush-big sagebrush	SSB-SSB	1	0.30
	ARTR-CHVI	Big sagebrush-Douglas rabbitbrush	SSB-SRD	8	20.71
	ARTR-ERNA	Big sagebrush-rabbitbrush	SSB-SRR	56	56.15
	ARTR-SAVE	Big sagebrush-greasewood	SSB-SGR	38	41.02
	ARTR-AGGI	Big sagebrush-redtop	SSB-GRT	2	0.05
	ARTR-DISP	Big sagebrush-saltgrass	SSB-GST	2	1.70
	ARTR-LECI	Big sagebrush-basin wildrye	SSB-GWB	9	7.38
	ARTR-MURI	Big sagebrush-mat muhly	SSB-GMM	2	0.32
	ARTR-SPAI	Big sagebrush-sacaton	SSB-GSA	22	49.50
	ARTR-CAPR	Big sagebrush-fieldclustered sedge	SSB-WSF	1	0.06
	ARTR-CARX	Big sagebrush-sedge	SSB-WSS	5	2.20
	ARTR-IVAX	Big sagebrush-sumpweed	SSB-WSW	4	1.60
	ARTR-JUAR	Big sagebrush-Baltic rush	SSB-WRB	2	0.80
	ARTR-SALI	Big sagebrush-glasswort	SSB-WGW	1	4.23
	CHAL	Alkali rabbitbrush	S-RA		
	CHAL-SAVE	Alkali rabbitbrush-greasewood	SRA-SGR	2	4.45
	CHAL-DISP	Alkali rabbitbrush-saltgrass	SRA-GST	3	5.93
	CHAL-MURI	Alkali rabbitbrush-mat muhly	SRA-GMM	1	3.64
	CHAL-PHAU	Alkali rabbitbrush-carrizo	SRA-GCZ	1	0.63
	CHAL-POSE	Alkali rabbitbrush-Sandberg bluegrass	SRA-GBS	1	4.74
	CHAL-PULE	Alkali rabbitbrush-Lemmon's alkaligrass	SRA-GAL	4	12.37
	CHAL-SPAI	Alkali rabbitbrush-sacaton	SRA-GSA	7	10.65
	CHVI	Douglas rabbitbrush	S-RD		
	CHVI-ERNA	Douglas rabbitbrush-rabbitbrush	SRD-SRR	11	97.96
	CHVI-SAVE	Douglas rabbitbrush-greasewood	SRD-SGR	5	51.33
	CHVI-DISP	Douglas rabbitbrush-saltgrass	SRD-GST	23	55.12
	CHVI-PUCC	Douglas rabbitbrush-alkaligrass	SRD-GAA	14	91.74
	CHVI-PUFA	Douglas rabbitbrush-Torrey alkaligrass	SRD-GAT	2	20.93
	CHVI-SPAI	Douglas rabbitbrush-sacaton	SRD-GSA	9	11.86
	CHVI-SPGR	Douglas rabbitbrush-alkali cordgrass	SRD-GCA	5	21.11
	CHVI-CARX	Douglas rabbitbrush-sedge	SRD-WSS	1	6.05
	CHVI-SALI	Douglas rabbitbrush-glasswort	SRD-WGW	5	89.88
	DAFR	Shrubby potentilla	S-PP		
	DAFR-SCPR	Shrubby potentilla-meadow fescue	SPP-GFM	1	0.12
	DAFR-CANE	Shrubby potentilla-Nebraska sedge	SPP-WSN	2	0.24
	ERNA	Rabbitbrush	S-RR		
	ERNA-ERNA	Rabbitbrush-rabbitbrush	SRR-SRR	75	35.57
	ERNA-ROWO	Rabbitbrush-Woods' rose	SRR-SRW	2	0.27
	ERNA-AGCR	Rabbitbrush-crested wheatgrass	SRR-GWR	2	4.00
	ERNA-DISP	Rabbitbrush-saltgrass	SRR-GST	255	170.77
	ERNA-LECI	Rabbitbrush-basin wildrye	SRR-GWB	2	6.68
	ERNA-LETR	Rabbitbrush-creeping wildrye	SRR-GWC	4	2.61
	ERNA-MURI	Rabbitbrush-mat muhly	SRR-GMM	1	0.34
	ERNA-POA	Rabbitbrush-bluegrass	SRR-GBB	1	12.71
	ERNA-POSE	Rabbitbrush-Sandberg bluegrass	SRR-GBS	16	43.12
	ERNA-PUCC	Rabbitbrush-alkaligrass	SRR-GAA	27	78.75
	ERNA-PUFA	Rabbitbrush-Torrey alkaligrass	SRR-GAT	1	0.67
	ERNA-PULE	Rabbitbrush-Lemmon's alkaligrass	SRR-GAL	5	2.24
	ERNA-SPAI	Rabbitbrush-sacaton	SRR-GSA	677	951.47
	ERNA-SPGR	Rabbitbrush-alkali cordgrass	SRR-GCA	9	2.38
	ERNA-THPO	Rabbitbrush-tall wheatgrass	SRR-GWT	6	1.06
	ERNA-CAPR	Rabbitbrush-fieldclustered sedge	SRR-WSF	12	1.72
	ERNA-CARX	Rabbitbrush-sedge	SRR-WSS	61	64.55
	ERNA-EQAR	Rabbitbrush-horsetail	SRR-WHT	1	0.29
	ERNA-IRMI	Rabbitbrush-Rocky Mountain iris	SRR-WIR	1	1.30
	ERNA-IVAX	Rabbitbrush-sumpweed	SRR-WSW	5	2.22
	ERNA-JUAR	Rabbitbrush-Baltic rush	SRR-WRB	25	32.88
	ERNA-SALI	Rabbitbrush-glasswort	SRR-WGW	1	1.88
	ERNA-CIAR	Rabbitbrush-Canada thistle	SRR-ETC	1	0.03

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	PYLA	Goldenweed	S-GW		
	PYLA-POSE	Goldenweed-Sandberg bluegrass	SGW-GBS	3	3.25
	PYLA-PULE	Goldenweed-Lemmon's alkaligrass	SGW-GAL	7	4.21
	PYLA-IVKI	Goldenweed-alkali ivesia	SGW-WIA	1	0.36
	RHTR	Skunkbush	S-SK		
	RHTR-AGGI	Skunkbush-redtop	SSK-GRT	1	0.05
	ROWO	Woods' rose	S-RW		
	ROWO-ARTR	Woods' rose-big sagebrush	SRW-SSB	4	0.20
	ROWO-ROWO	Woods' rose-Woods' rose	SRW-SRW	2	0.02
	ROWO-AGGI	Woods' rose-redtop	SRW-GRT	1	0.02
	ROWO-DECE	Woods' rose-tufted hairgrass	SRW-GHT	2	0.29
	ROWO-ELTR	Woods' rose-slender wheatgrass	SRW-GWS	1	0.24
	ROWO-MURI	Woods' rose-mat muhly	SRW-GMM	2	0.51
	ROWO-PHAU	Woods' rose-carrizo	SRW-GCZ	1	0.04
	ROWO-POPR	Woods' rose-Kentucky bluegrass	SRW-GBK	1	< 0.01
	ROWO-POSE	Woods' rose-Sandberg bluegrass	SRW-GBS	1	0.02
	ROWO-SPGR	Woods' rose-alkali cordgrass	SRW-GCA	4	1.78
	ROWO-CARX	Woods' rose-sedge	SRW-WSS	16	2.13
	ROWO-IVAX	Woods' rose-sumpweed	SRW-WSW	1	0.13
	ROWO-JUAR	Woods' rose-Baltic rush	SRW-WRB	4	0.01
	ROWO-MOSS	Woods' rose-moss	SRW-WMO	1	< 0.01
	ROWO-HOJU	Woods' rose-foxtail barley	SRW-EBF	4	32.48
	SAEX	Coyote willow	S-WC		
	SAEX-ARTR	Coyote willow-big sagebrush	SWC-SSB	3	4.39
	SAEX-ROWO	Coyote willow-Woods' rose	SWC-SRW	15	1.92
	SAEX-AGGI	Coyote willow-redtop	SWC-GRT	4	0.19
	SAEX-DECE	Coyote willow-tufted hairgrass	SWC-GHT	2	2.50
	SAEX-DISP	Coyote willow-saltgrass	SWC-GST	2	1.53
	SAEX-LETR	Coyote willow-creeping wildrye	SWC-GWC	10	1.81
	SAEX-MURI	Coyote willow-mat muhly	SWC-GMM	1	0.12
	SAEX-PHAU	Coyote willow-carrizo	SWC-GCZ	1	0.09
	SAEX-SCPR	Coyote willow-meadow fescue	SWC-GFM	5	1.07
	SAEX-SPAI	Coyote willow-sacaton	SWC-GSA	4	1.48
	SAEX-ASSP	Coyote willow-milkweed	SWC-WMW	2	0.24
	SAEX-CANE	Coyote willow-Nebraska sedge	SWC-WSN	4	3.26
	SAEX-CARX	Coyote willow-sedge	SWC-WSS	5	4.19
	SAEX-ELPA	Coyote willow-creeping spikerush	SWC-WEC	1	0.06
	SAEX-JUAR	Coyote willow-Baltic rush	SWC-WRB	19	14.46
	SAEX-MOSS	Coyote willow-moss	SWC-WMO	1	0.18
	SAEX-SCAC	Coyote willow-tule bulrush	SWC-WBT	4	2.88
	SALX	Willow	S-WW		
	SALX-LETR	Willow-creeping wildrye	SWW-GWC	1	0.19
	SALX-SCPR	Willow-meadow fescue	SWW-GFM	4	1.56
	SALX-CANE	Willow-Nebraska sedge	SWW-WSN	2	0.13
	SALX-ELPA	Willow-creeping spikerush	SWW-WEC	1	0.11
	SAVE	Greasewood	S-GR		
	SAVE-ATCO	Greasewood-shadscale	SGR-SSH	3	8.64
	SAVE-ERNA	Greasewood-rabbitbrush	SGR-SRR	137	355.78
	SAVE-SAVE	Greasewood-greasewood	SGR-SGR	18	5.99
	SAVE-DISP	Greasewood-saltgrass	SGR-GST	341	336.54
	SAVE-ELTR	Greasewood-slender wheatgrass	SGR-GWS	1	0.10
	SAVE-LECI	Greasewood-basin wildrye	SGR-GWB	4	2.99
	SAVE-LETR	Greasewood-creeping wildrye	SGR-GWC	9	1.43
	SAVE-MURI	Greasewood-mat muhly	SGR-GMM	3	9.26
	SAVE-PUCC	Greasewood-alkaligrass	SGR-GAA	1	0.02
	SAVE-PULE	Greasewood-Lemmon's alkaligrass	SGR-GAL	1	0.26
	SAVE-SPAI	Greasewood-sacaton	SGR-GSA	51	62.49
	SAVE-CAPR	Greasewood-fieldclustered sedge	SGR-WSF	14	1.19
	SAVE-IVAX	Greasewood-sumpweed	SGR-WSW	2	0.75
	SAVE-JUAR	Greasewood-Baltic rush	SGR-WRB	12	10.40
	SAVE-NIOC	Greasewood-alkali pink	SGR-WAP	1	0.13

BIOME	SPECIES CODE	COMMON NAME	MAP CODE	POLYGONS	AREA[1]
	Alliance	**Alliance**	**Alliance**	**(#)**	**(ha)**
	Association	**Association**	**Association**		
	SAVE-SALI	Greasewood-glasswort	SGR-WGW	3	5.58
	SAVE-BASC	Greasewood-kochia	SGR-EKO	2	1.08
	SAVE-HOJU	Greasewood-foxtail barley	SGR-EBF	5	6.83
GRASSLAND BIOME (G)					
	AGGI	Redtop	G-RT		
	AGGI-DECE	Redtop-tufted hairgrass	GRT-GHT	3	1.20
	AGGI-HOLA	Redtop-velvetgrass	GRT-GVG	1	0.01
	AGGI-MUAS	Redtop-alkali muhly	GRT-GMA	1	0.13
	AGGI-MURI	Redtop-mat muhly	GRT-GMM	4	3.42
	AGGI-PHPR	Redtop-timothy	GRT-GTM	6	3.33
	AGGI-SPGR	Redtop-alkali cordgrass	GRT-GCA	1	0.06
	AGGI-ARAN	Redtop-silver cinquefoil	GRT-WCS	3	1.64
	AGGI-CANE	Redtop-Nebraska sedge	GRT-WSN	69	30.05
	AGGI-CAPR	Redtop-fieldclustered sedge	GRT-WSF	2	1.19
	AGGI-CARX	Redtop-sedge	GRT-WSS	17	5.44
	AGGI-CISC	Redtop-elk thistle	GRT-WTE	1	0.49
	AGGI-ELEO	Redtop-spikerush	GRT-WEE	2	0.50
	AGGI-ELRO	Redtop-beaked spikerush	GRT-WEB	3	0.70
	AGGI-EQAR	Redtop-horsetail	GRT-WHT	1	0.21
	AGGI-JUAR	Redtop-Baltic rush	GRT-WRB	78	46.01
	AGGI-SPAR	Redtop-bur-reed	GRT-WBR	1	0.39
	AGGI-THRH	Redtop-thermopsis	GRT-WTG	3	0.68
	AGGI-TRIF	Redtop-clover	GRT-WCC	4	1.83
	AGGI-TRPR	Redtop-red clover	GRT-WCR	3	4.42
	AGGI-TRRE	Redtop-white clover	GRT-WCW	12	7.99
	AGGI-TYLA	Redtop-cattail	GRT-WCT	1	0.02
	AGGI-CIDO	Redtop-water hemlock	GRT-AHW	1	0.09
	ALAE	Shortawn foxtail	G-FS		
	ALAE-JUAR	Shortawn foxtail-Baltic rush	GFS-WRB	3	0.25
	ALAE-JUNE	Shortawn foxtail-Nevada rush	GFS-WRN	1	0.03
	ALAE-SACU	Shortawn foxtail-duck potato	GFS-WAR	1	0.07
	BRIN	Smooth brome	G-BI		
	BRIN-MURI	Smooth brome-mat muhly	GBI-GMM	1	1.33
	BRIN-IVAX	Smooth brome-sumpweed	GBI-WSW	1	0.18
	BRIN-THRH	Smooth brome-thermopsis	GBI-WTG	1	0.24
	BRIN-MESA	Smooth brome-alfalfa	GBI-EAL	2	3.95
	DAGL	Orchardgrass	G-OR		
	DAGL-POSE	Orchardgrass-Sandberg bluegrass	GOR-GBS	1	0.34
	DAGL-CANE	Orchardgrass-Nebraska sedge	GOR-WSN	1	0.07
	DAGL-CARX	Orchardgrass-sedge	GOR-WSS	2	0.41
	DAGL-JUAR	Orchardgrass-Baltic rush	GOR-WRB	1	0.11
	DAGL-MESA	Orchardgrass-alfalfa	GOR-EAL	3	15.22
	DECE	Tufted hairgrass	G-HT		
	DECE-ELTR	Tufted hairgrass-slender wheatgrass	GHT-GWS	1	0.19
	DECE-HOBR	Tufted hairgrass-meadow barley	GHT-GBM	1	1.04
	DECE-POSE	Tufted hairgrass-Sandberg bluegrass	GHT-GBS	11	3.41
	DECE-PULE	Tufted hairgrass-Lemmon's alkaligrass	GHT-GAL	5	1.00
	DECE-ARAN	Tufted hairgrass-silver cinquefoil	GHT-WCS	4	1.52
	DECE-CAPA	Tufted hairgrass-Parry's sedge	GHT-WSP	1	0.61
	DECE-CARX	Tufted hairgrass-sedge	GHT-WSS	17	30.51
	DECE-EQAR	Tufted hairgrass-horsetail	GHT-WHT	2	0.82
	DECE-IRMI	Tufted hairgrass-Rocky Mountain iris	GHT-WIR	2	3.86
	DECE-JUNC	Tufted hairgrass-rush	GHT-WRR	1	0.32
	DECE-CIAR	Tufted hairgrass-Canada thistle	GHT-ETC	2	0.31
	DISP	Saltgrass	G-ST		
	DISP-AGGI	Saltgrass-redtop	GST-GRT	2	0.32
	DISP-DECE	Saltgrass-tufted hairgrass	GST-GHT	4	0.69
	DISP-DISP	Saltgrass-saltgrass	GST-GST	3	2.04
	DISP-ELTR	Saltgrass-slender wheatgrass	GST-GWS	3	0.81
	DISP-HOBR	Saltgrass-meadow barley	GST-GBM	2	1.00

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	DISP-LECI	Saltgrass-basin wildrye	GST-GWB	1	5.69
	DISP-LETR	Saltgrass-creeping wildrye	GST-GWC	137	37.95
	DISP-MUAS	Saltgrass-alkali muhly	GST-GMA	4	1.00
	DISP-MURI	Saltgrass-mat muhly	GST-GMM	12	10.53
	DISP-POA	Saltgrass-bluegrass	GST-GBB	1	0.04
	DISP-POSE	Saltgrass-Sandberg bluegrass	GST-GBS	10	21.46
	DISP-PULE	Saltgrass-Lemmon's alkaligrass	GST-GAL	46	14.68
	DISP-SCPR	Saltgrass-meadow fescue	GST-GFM	2	0.15
	DISP-SPAI	Saltgrass-sacaton	GST-GSA	283	260.04
	DISP-SPGR	Saltgrass-alkali cordgrass	GST-GCA	64	29.31
	DISP-ACMI	Saltgrass-yarrow	GST-WYR	1	0.53
	DISP-ALOC	Saltgrass-iodinebush	GST-WIB	1	0.65
	DISP-ARAN	Saltgrass-silver cinquefoil	GST-WCS	13	39.04
	DISP-CANE	Saltgrass-Nebraska sedge	GST-WSN	3	0.74
	DISP-CAPR	Saltgrass-fieldclustered sedge	GST-WSF	23	4.86
	DISP-CARX	Saltgrass-sedge	GST-WSS	78	114.55
	DISP-HEPU	Saltgrass-western centaur	GST-WCN	2	0.56
	DISP-IRMI	Saltgrass-Rocky Mountain iris	GST-WIR	2	0.87
	DISP-IVAX	Saltgrass-sumpweed	GST-WSW	24	24.53
	DISP-IVKI	Saltgrass-alkali ivesia	GST-WIA	10	5.84
	DISP-JUAR	Saltgrass-Baltic rush	GST-WRB	324	343.84
	DISP-NIOC	Saltgrass-alkali pink	GST-WAP	23	10.60
	DISP-THRH	Saltgrass-thermopsis	GST-WTG	4	0.36
	DISP-BASC	Saltgrass-kochia	GST-EKO	4	2.68
	DISP-HAGL	Saltgrass-halogeton	GST-EHG	2	2.02
	DISP-HECU	Saltgrass-salt heliotrope	GST-EHS	1	0.15
	DISP-HENU	Saltgrass-Nuttall's sunflower	GST-ESF	1	0.02
	DISP-HOJU	Saltgrass-foxtail barley	GST-EBF	5	2.32
	DISP-PLSC	Saltgrass-popcorn flower	GST-EPF	5	2.95
	ELTR	Slender wheatgrass	G-WS		
	ELTR-AGGI	Slender wheatgrass-redtop	GWS-GRT	1	3.27
	ELTR-CARX	Slender wheatgrass-sedge	GWS-WSS	5	4.89
	ELTR-IRMI	Slender wheatgrass-Rocky Mountain iris	GWS-WIR	3	2.40
	ELTR-IVKI	Slender wheatgrass-alkali ivesia	GWS-WIA	1	0.61
	ELTR-JUAR	Slender wheatgrass-Baltic rush	GWS-WRB	9	0.65
	ELTR-MESA	Slender wheatgrass-alfalfa	GWS-EAL	1	0.28
	HOBR	Meadow barley	G-BM		
	HOBR-PUCC	Meadow barley-alkaligrass	GBM-GAA	1	2.13
	LECI	Basin wildrye	G-WB		
	LECI-THPO	Basin wildrye-tall wheatgrass	GWB-GWT	1	0.22
	LECI-IVAX	Basin wildrye-sumpweed	GWB-WSW	2	0.62
	LECI-ARLU	Basin wildrye-Louisiana sagewort	GWB-ESL	1	0.04
	LETR	Creeping wildrye	G-WC		
	LETR-AGGI	Creeping wildrye-redtop	GWC-GRT	1	0.08
	LETR-MUAS	Creeping wildrye-alkali muhly	GWC-GMA	2	0.65
	LETR-PUCC	Creeping wildrye-alkaligrass	GWC-GAA	2	12.74
	LETR-ARAN	Creeping wildrye-silver cinquefoil	GWC-WCS	10	1.81
	LETR-CANE	Creeping wildrye-Nebraska sedge	GWC-WSN	1	0.22
	LETR-CAPR	Creeping wildrye-fieldclustered sedge	GWC-WSF	28	19.34
	LETR-CARX	Creeping wildrye-sedge	GWC-WSS	10	10.71
	LETR-EQAR	Creeping wildrye-horsetail	GWC-WHT	2	0.15
	LETR-IVAX	Creeping wildrye-sumpweed	GWC-WSW	4	3.21
	LETR-JUAR	Creeping wildrye-Baltic rush	GWC-WRB	44	24.59
	LETR-SALI	Creeping wildrye-glasswort	GWC-WGW	1	0.46
	LETR-THRH	Creeping wildrye-thermopsis	GWC-WTG	7	1.28
	LETR-CADR	Creeping wildrye-pepperweed	GWC-EPW	1	0.10
	MUAS	Alkali muhly	G-MA		
	MUAS-CAPR	Alkali muhly-fieldclustered sedge	GMA-WSF	2	0.12
	MURI	Mat muhly	G-MM		
	MURI-DECE	Mat muhly-tufted hairgrass	GMM-GHT	1	0.29
	MURI-LETR	Mat muhly-creeping wildrye	GMM-GWC	1	0.23

BIOME	SPECIES CODE	COMMON NAME	MAP CODE	POLYGONS	AREA[1]
	Alliance	Alliance	Alliance	(#)	(ha)
	Association	Association	Association		
	MURI-MUAS	Mat muhly-alkali muhly	GMM-GMA	1	0.02
	MURI-POSE	Mat muhly-Sandberg bluegrass	GMM-GBS	3	4.57
	MURI-SPAI	Mat muhly-sacaton	GMM-GSA	29	14.47
	MURI-ARAN	Mat muhly-silver cinquefoil	GMM-WCS	4	5.74
	MURI-CANE	Mat muhly-Nebraska sedge	GMM-WSN	2	0.69
	MURI-CAPR	Mat muhly-fieldclustered sedge	GMM-WSF	40	27.20
	MURI-CARX	Mat muhly-sedge	GMM-WSS	44	101.85
	MURI-IRMI	Mat muhly-Rocky Mountain iris	GMM-WIR	3	0.50
	MURI-JUAR	Mat muhly-Baltic rush	GMM-WRB	134	172.69
	MURI-TRRE	Mat muhly-white clover	GMM-WCW	1	0.43
	MURI-BRTE	Mat muhly-cheatgrass	GMM-ECH	1	0.03
	MURI-HOJU	Mat muhly-foxtail barley	GMM-EBF	4	0.52
	MURI-MESA	Mat muhly-alfalfa	GMM-EAL	4	6.79
	MURI-VEBR	Mat muhly-prostrate verbena	GMM-EVP	1	0.14
	PHAR	Reed canarygrass	G-CR		
	PHAR-HOBR	Reed canarygrass-meadow barley	GCR-GBM	1	0.03
	PHAR-SCPR	Reed canarygrass-meadow fescue	GCR-GFM	2	0.09
	PHAR-ELPA	Reed canarygrass-creeping spikerush	GCR-WEC	1	0.12
	PHAR-SCAC	Reed canarygrass-tule bulrush	GCR-WBT	1	0.06
	PHAU	Carrizo	G-CZ		
	PHAU-PHAU	Carrizo-carrizo	GCZ-GCZ	1	0.01
	PHAU-CARX	Carrizo-sedge	GCZ-WSS	1	0.04
	PHAU-JUAR	Carrizo-Baltic rush	GCZ-WRB	1	0.44
	PHAU-SCAC	Carrizo-tule bulrush	GCZ-WBT	5	0.70
	PHAU-TYLA	Carrizo-cattail	GCZ-WCT	1	0.03
	PHPR	Timothy	G-TM		
	PHPR-ELTR	Timothy-slender wheatgrass	GTM-GWS	2	0.09
	PHPR-SCPR	Timothy-meadow fescue	GTM-GFM	4	9.12
	PHPR-CARX	Timothy-sedge	GTM-WSS	8	13.44
	PHPR-JUAR	Timothy-Baltic rush	GTM-WRB	1	0.38
	POA	Bluegrass	G-BB		
	POA-CARX	Bluegrass-sedge	GBB-WSS	2	1.85
	POPR	Kentucky bluegrass	G-BK		
	POPR-AGGI	Kentucky bluegrass-redtop	GBK-GRT	1	0.17
	POPR-ELPA	Kentucky bluegrass-creeping spikerush	GBK-WEC	1	0.01
	POSE	Sandberg bluegrass	G-BS		
	POSE-COUM	Sandberg bluegrass-bastard toadflax	GBS-STF	1	11.79
	POSE-ELTR	Sandberg bluegrass-slender wheatgrass	GBS-GWS	14	8.74
	POSE-LETR	Sandberg bluegrass-creeping wildrye	GBS-GWC	34	26.93
	POSE-PULE	Sandberg bluegrass-Lemmon's alkaligrass	GBS-GAL	5	2.29
	POSE-SCPR	Sandberg bluegrass-meadow fescue	GBS-GFM	1	2.94
	POSE-SPGR	Sandberg bluegrass-alkali cordgrass	GBS-GCA	23	55.18
	POSE-CAPR	Sandberg bluegrass-fieldclustered sedge	GBS-WSF	1	0.25
	POSE-DODE	Sandberg bluegrass-shooting star	GBS-WST	3	0.27
	POSE-EQAR	Sandberg bluegrass-horsetail	GBS-WHT	5	0.59
	POSE-IRMI	Sandberg bluegrass-Rocky Mountain iris	GBS-WIR	2	3.43
	POSE-IVKI	Sandberg bluegrass-alkali ivesia	GBS-WIA	25	16.01
	POSE-JUAR	Sandberg bluegrass-Baltic rush	GBS-WRB	71	63.49
	POSE-PHPU	Sandberg bluegrass-tufted phlox	GBS-WPT	5	6.04
	POSE-SONA	Sandberg bluegrass-baby goldenrod	GBS-WGB	1	0.64
	POSE-HOJU	Sandberg bluegrass-foxtail barley	GBS-EBF	1	0.16
	POSE-PLSC	Sandberg bluegrass-popcorn flower	GBS-EPF	10	9.59
	PUCC	Alkaligrass	G-AA		
	PUCC-DISP	Alkaligrass-saltgrass	GAA-GST	7	17.64
	PUCC-POSE	Alkaligrass-Sandberg bluegrass	GAA-GBS	4	0.17
	PUCC-SPGR	Alkaligrass-alkali cordgrass	GAA-GCA	18	50.59
	PUCC-EQAR	Alkaligrass-horsetail	GAA-WHT	2	12.17
	PUCC-IVKI	Alkaligrass-alkali ivesia	GAA-WIA	1	0.67
	PUCC-JUAR	Alkaligrass-Baltic rush	GAA-WRB	24	73.24
	PUCC-PHPU	Alkaligrass-tufted phlox	GAA-WPT	2	1.80

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	PUDI	Weeping alkaligrass	G-AW		
	PUDI-HEPU	Weeping alkaligrass-western centaur	GAW-WCN	4	0.69
	PUDI-IVKI	Weeping alkaligrass-alkali ivesia	GAW-WIA	8	3.41
	PUFA	Torrey alkaligrass	G-AT		
	PUFA-LETR	Torrey alkaligrass-creeping wildrye	GAT-GWC	1	0.24
	PUFA-POSE	Torrey alkaligrass-Sandberg bluegrass	GAT-GBS	2	0.31
	PULE	Lemmon's alkaligrass	G-AL		
	PULE-BRIN	Lemmon's alkaligrass-smooth brome	GAL-GBI	1	0.20
	PULE-LETR	Lemmon's alkaligrass-creeping wildrye	GAL-GWC	13	1.99
	PULE-SPGR	Lemmon's alkaligrass-alkali cordgrass	GAL-GCA	66	55.00
	PULE-CAPA	Lemmon's alkaligrass-Parry's sedge	GAL-WSP	2	3.39
	PULE-CARX	Lemmon's alkaligrass-sedge	GAL-WSS	8	15.86
	PULE-GLMA	Lemmon's alkaligrass-sea milkwort	GAL-WSM	7	0.52
	PULE-IRMI	Lemmon's alkaligrass-Rocky Mountain iris	GAL-WIR	2	1.24
	PULE-IVKI	Lemmon's alkaligrass-alkali ivesia	GAL-WIA	12	11.08
	PULE-JUAR	Lemmon's alkaligrass-Baltic rush	GAL-WRB	42	32.96
	PULE-PHPU	Lemmon's alkaligrass-tufted phlox	GAL-WPT	5	4.08
	PULE-SINE	Lemmon's alkaligrass-New Mexico sida	GAL-WNM	1	0.09
	PULE-THRH	Lemmon's alkaligrass-thermopsis	GAL-WTG	2	2.64
	PULE-TRIF	Lemmon's alkaligrass-clover	GAL-WCC	2	1.37
	PULE-TRPR	Lemmon's alkaligrass-red clover	GAL-WCR	1	0.28
	SCPR	Meadow fescue	G-FM		
	SCPR-AGGI	Meadow fescue-redtop	GFM-GRT	6	2.91
	SCPR-BRIN	Meadow fescue-smooth brome	GFM-GBI	2	1.77
	SCPR-DAGL	Meadow fescue-orchardgrass	GFM-GOR	1	10.03
	SCPR-HOBR	Meadow fescue-meadow barley	GFM-GBM	2	5.89
	SCPR-LETR	Meadow fescue-creeping wildrye	GFM-GWC	1	2.22
	SCPR-POPR	Meadow fescue-Kentucky bluegrass	GFM-GBK	10	28.88
	SCPR-ASSP	Meadow fescue-milkweed	GFM-WMW	1	0.11
	SCPR-CANE	Meadow fescue-Nebraska sedge	GFM-WSN	10	14.95
	SCPR-CAPR	Meadow fescue-fieldclustered sedge	GFM-WSF	1	0.26
	SCPR-CARX	Meadow fescue-sedge	GFM-WSS	34	46.20
	SCPR-ELPA	Meadow fescue-creeping spikerush	GFM-WEC	1	0.09
	SCPR-IRMI	Meadow fescue-Rocky Mountain iris	GFM-WIR	2	1.00
	SCPR-JUAR	Meadow fescue-Baltic rush	GFM-WRB	35	31.32
	SCPR-THRH	Meadow fescue-thermopsis	GFM-WTG	8	4.28
	SCPR-TRIF	Meadow fescue-clover	GFM-WCC	1	0.09
	SCPR-TRPR	Meadow fescue-red clover	GFM-WCR	8	8.54
	SCPR-TRRE	Meadow fescue-white clover	GFM-WCW	1	0.50
	SCPR-BEER	Meadow fescue-water parsnip	GFM-APR	1	0.04
	SCPR-VEAN	Meadow fescue-water speedwell	GFM-AWS	5	0.71
	SCPR-MEOF	Meadow fescue-sweetclover	GFM-ECS	1	0.06
	SCPR-MESA	Meadow fescue-alfalfa	GFM-EAL	3	4.08
	SCPR-POLY	Meadow fescue-knotweed	GFM-EKW	2	0.08
	SPAI	Sacaton	G-SA		
	SPAI-AGRO	Sacaton-wheatgrass	GSA-GWG	1	0.37
	SPAI-ELTR	Sacaton-slender wheatgrass	GSA-GWS	2	2.09
	SPAI-LETR	Sacaton-creeping wildrye	GSA-GWC	3	0.13
	SPAI-POSE	Sacaton-Sandberg bluegrass	GSA-GBS	32	39.73
	SPAI-PUCC	Sacaton-alkaligrass	GSA-GAA	13	54.27
	SPAI-PULE	Sacaton-Lemmon's alkaligrass	GSA-GAL	17	16.30
	SPAI-SPAI	Sacaton-sacaton	GSA-GSA	1	0.04
	SPAI-SPGR	Sacaton-alkali cordgrass	GSA-GCA	74	66.53
	SPAI-ARAN	Sacaton-silver cinquefoil	GSA-WCS	4	5.43
	SPAI-CAPR	Sacaton-fieldclustered sedge	GSA-WSF	14	2.95
	SPAI-CARX	Sacaton-sedge	GSA-WSS	26	47.29
	SPAI-EQAR	Sacaton-horsetail	GSA-WHT	2	2.10
	SPAI-IVAX	Sacaton-sumpweed	GSA-WSW	9	5.33
	SPAI-IVKI	Sacaton-alkali ivesia	GSA-WIA	3	20.34
	SPAI-JUAR	Sacaton-Baltic rush	GSA-WRB	125	207.94
	SPAI-JUNC	Sacaton-rush	GSA-WRR	8	2.46

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	SPAI-PHPU	Sacaton-tufted phlox	GSA-WPT	1	2.24
	SPGR	Alkali cordgrass	G-CA		
	SPGR-COUM	Alkali cordgrass-bastard toadflax	GCA-STF	1	1.48
	SPGR-DECE	Alkali cordgrass-tufted hairgrass	GCA-GHT	17	5.83
	SPGR-ELTR	Alkali cordgrass-slender wheatgrass	GCA-GWS	5	0.48
	SPGR-LETR	Alkali cordgrass-creeping wildrye	GCA-GWC	13	7.58
	SPGR-MURI	Alkali cordgrass-mat muhly	GCA-GMM	8	2.14
	SPGR-CAPA	Alkali cordgrass-Parry's sedge	GCA-WSP	4	7.50
	SPGR-IVAX	Alkali cordgrass-sumpweed	GCA-WSW	3	0.95
	SPGR-IVKI	Alkali cordgrass-alkali ivesia	GCA-WIA	34	5.18
	SPGR-JUAR	Alkali cordgrass-Baltic rush	GCA-WRB	103	39.14
	SPGR-NIOC	Alkali cordgrass-alkali pink	GCA-WAP	2	0.16
	SPGR-THRH	Alkali cordgrass-thermopsis	GCA-WTG	4	0.41
	THPO	Tall wheatgrass	G-WT		
	THPO-AGGI	Tall wheatgrass-redtop	GWT-GRT	3	0.82
	THPO-DISP	Tall wheatgrass-saltgrass	GWT-GST	8	11.11
	THPO-SCPR	Tall wheatgrass-meadow fescue	GWT-GFM	3	10.79
	THPO-JUAR	Tall wheatgrass-Baltic rush	GWT-WRB	1	3.31
WETLAND BIOME (W)					
	ACMI	Yarrow	W-YR		
	ACMI-PULE	Yarrow-Lemmon's alkaligrass	WYR-GAL	2	2.98
	ARAN	Silver cinquefoil	W-CS		
	ARAN-HOBR	Silver cinquefoil-meadow barley	WCS-GBM	1	0.15
	ARAN-MUAS	Silver cinquefoil-alkali muhly	WCS-GMA	6	2.45
	ARAN-POPR	Silver cinquefoil-Kentucky bluegrass	WCS-GBK	3	0.11
	ARAN-POSE	Silver cinquefoil-Sandberg bluegrass	WCS-GBS	15	3.57
	ARAN-SPGR	Silver cinquefoil-alkali cordgrass	WCS-GCA	1	0.75
	ARAN-ARAN	Silver cinquefoil-silver cinquefoil	WCS-WCS	2	1.66
	ARAN-CAPR	Silver cinquefoil-fieldclustered sedge	WCS-WSF	27	11.86
	ARAN-CARX	Silver cinquefoil-sedge	WCS-WSS	24	16.36
	ARAN-ELEO	Silver cinquefoil-spikerush	WCS-WEE	7	1.69
	ARAN-ELPA	Silver cinquefoil-creeping spikerush	WCS-WEC	50	68.88
	ARAN-EQAR	Silver cinquefoil-horsetail	WCS-WHT	16	1.87
	ARAN-IVAX	Silver cinquefoil-sumpweed	WCS-WSW	13	6.44
	ARAN-ARBI	Silver cinquefoil-biennial sagewort	WCS-ESB	2	4.07
	ARAN-HOJU	Silver cinquefoil-foxtail barley	WCS-EBF	7	11.98
	ARAN-PLSC	Silver cinquefoil-popcorn flower	WCS-EPF	6	0.37
	ARAN-POBI	Silver cinquefoil-biennial cinquefoil	WCS-ECB	1	0.93
	CANE	Nebraska sedge	W-SN		
	CANE-ALAE	Nebraska sedge-shortawn foxtail	WSN-GFS	6	1.01
	CANE-DECE	Nebraska sedge-tufted hairgrass	WSN-GHT	15	14.13
	CANE-HOBR	Nebraska sedge-meadow barley	WSN-GBM	2	1.07
	CANE-PHAR	Nebraska sedge-reed canarygrass	WSN-GCR	1	0.24
	CANE-PHAU	Nebraska sedge-carrizo	WSN-GCZ	6	0.47
	CANE-PHPR	Nebraska sedge-timothy	WSN-GTM	5	0.66
	CANE-POPR	Nebraska sedge-Kentucky bluegrass	WSN-GBK	5	1.37
	CANE-POSE	Nebraska sedge-Sandberg bluegrass	WSN-GBS	1	0.17
	CANE-SPAI	Nebraska sedge-sacaton	WSN-GSA	1	0.03
	CANE-ARAN	Nebraska sedge-silver cinquefoil	WSN-WCS	17	4.89
	CANE-CANE	Nebraska sedge-Nebraska sedge	WSN-WSN	12	0.77
	CANE-CAPR	Nebraska sedge-fieldclustered sedge	WSN-WSF	70	26.81
	CANE-CARX	Nebraska sedge-sedge	WSN-WSS	198	273.53
	CANE-CASI	Nebraska sedge-analogue sedge	WSN-WSA	31	11.69
	CANE-ELAC	Nebraska sedge-needle spikerush	WSN-WEN	2	0.01
	CANE-ELEO	Nebraska sedge-spikerush	WSN-WEE	18	17.45
	CANE-ELPA	Nebraska sedge-creeping spikerush	WSN-WEC	169	53.93
	CANE-EPIL	Nebraska sedge-willow weed	WSN-WWH	2	0.13
	CANE-FERN	Nebraska sedge-fern	WSN-WFN	1	0.34
	CANE-HIVU	Nebraska sedge-marestail	WSN-WMT	6	1.16
	CANE-IRMI	Nebraska sedge-Rocky Mountain iris	WSN-WIR	4	0.84

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	CANE-IVAX	Nebraska sedge-sumpweed	WSN-WSW	1	3.56
	CANE-JUAR	Nebraska sedge-Baltic rush	WSN-WRB	441	465.63
	CANE-JUNC	Nebraska sedge-rush	WSN-WRR	11	0.89
	CANE-JUNE	Nebraska sedge-Nevada rush	WSN-WRN	13	11.14
	CANE-MIGU	Nebraska sedge-common monkeyflower	WSN-WMF	2	0.06
	CANE-MOSS	Nebraska sedge-moss	WSN-WMO	7	0.01
	CANE-SCAM	Nebraska sedge-American bulrush	WSN-WBA	9	2.73
	CANE-SCIR	Nebraska sedge-bulrush	WSN-WBL	2	0.14
	CANE-SPAR	Nebraska sedge-bur-reed	WSN-WBR	1	0.01
	CANE-SPEU	Nebraska sedge-giant bur-reed	WSN-WBG	2	0.14
	CANE-THRH	Nebraska sedge-thermopsis	WSN-WTG	4	2.07
	CANE-TRIF	Nebraska sedge-clover	WSN-WCC	1	0.14
	CANE-TRMA	Nebraska sedge-seaside arrowgrass	WSN-WAG	1	0.02
	CANE-TRPR	Nebraska sedge-red clover	WSN-WCR	3	0.14
	CANE-TRRE	Nebraska sedge-white clover	WSN-WCW	19	8.31
	CANE-ALPL	Nebraska sedge-water plantain	WSN-AWP	3	0.31
	CANE-BESY	Nebraska sedge-sloughgrass	WSN-ASG	2	0.40
	CANE-LEMI	Nebraska sedge-duckweed	WSN-ADW	1	0.01
	CANE-RAAQ	Nebraska sedge-white water crowfoot	WSN-ACW	1	0.01
	CANE-ARCT	Nebraska sedge-burdock	WSN-EBD	1	0.86
	CANE-CIVU	Nebraska sedge-bull thistle	WSN-ETB	1	0.15
	CANE-PLSC	Nebraska sedge-popcorn flower	WSN-EPF	5	0.27
	CANE-POAV	Nebraska sedge-prostrate knotweed	WSN-EKP	2	0.20
	CANE-RUCR	Nebraska sedge-curly dock	WSN-ECD	12	4.97
	CAPR	Fieldclustered sedge	W-SF		
	CAPR-DECE	Fieldclustered sedge-tufted hairgrass	WSF-GHT	2	0.48
	CAPR-PULE	Fieldclustered sedge-Lemmon's alkaligrass	WSF-GAL	9	2.61
	CAPR-EQAR	Fieldclustered sedge-horsetail	WSF-WHT	2	1.01
	CAPR-HIVU	Fieldclustered sedge-marestail	WSF-WMT	1	0.02
	CAPR-IVAX	Fieldclustered sedge-sumpweed	WSF-WSW	22	14.56
	CAPR-JUEN	Fieldclustered sedge-swordleaf rush	WSF-WRS	1	0.04
	CAPR-JUNE	Fieldclustered sedge-Nevada rush	WSF-WRN	4	3.55
	CAPR-MIGU	Fieldclustered sedge-common monkeyflower	WSF-WMF	1	0.08
	CAPR-TRIF	Fieldclustered sedge-clover	WSF-WCC	1	0.46
	CAPR-TRRE	Fieldclustered sedge-white clover	WSF-WCW	9	2.97
	CAPR-TYLA	Fieldclustered sedge-cattail	WSF-WCT	2	0.21
	CAPR-HOJU	Fieldclustered sedge-foxtail barley	WSF-EBF	2	1.85
	CAPR-MEOF	Fieldclustered sedge-sweetclover	WSF-ECS	1	0.11
	CARO	Beaked sedge	W-SB		
	CARO-CANE	Beaked sedge-Nebraska sedge	WSB-WSN	1	0.18
	CARO-ELPA	Beaked sedge-creeping spikerush	WSB-WEC	8	0.29
	CARO-JUAR	Beaked sedge-Baltic rush	WSB-WRB	4	0.38
	CARO-SCAC	Beaked sedge-tule bulrush	WSB-WBT	1	0.12
	CARO-THRH	Beaked sedge-thermopsis	WSB-WTG	1	0.07
	CARO-TYLA	Beaked sedge-cattail	WSB-WCT	1	0.10
	CARX	Sedge	W-SS		
	CARX-HYLE	Sedge-Lemmon's bitterweed	WSS-SBW	2	5.87
	CARX-BRIN	Sedge-smooth brome	WSS-GBI	3	2.37
	CARX-LECI	Sedge-basin wildrye	WSS-GWB	5	2.07
	CARX-PHAR	Sedge-reed canarygrass	WSS-GCR	3	0.39
	CARX-POPR	Sedge-Kentucky bluegrass	WSS-GBK	4	1.41
	CARX-POSE	Sedge-Sandberg bluegrass	WSS-GBS	19	22.77
	CARX-PUCC	Sedge-alkaligrass	WSS-GAA	18	10.47
	CARX-PUFA	Sedge-Torrey alkaligrass	WSS-GAT	1	0.23
	CARX-SPGR	Sedge-alkali cordgrass	WSS-GCA	16	12.54
	CARX-THPO	Sedge-tall wheatgrass	WSS-GWT	7	5.34
	CARX-ASSP	Sedge-milkweed	WSS-WMW	1	0.09
	CARX-CARX	Sedge-sedge	WSS-WSS	1	0.70
	CARX-DODE	Sedge-shooting star	WSS-WST	1	0.25
	CARX-ELEO	Sedge-spikerush	WSS-WEE	13	1.76
	CARX-ELPA	Sedge-creeping spikerush	WSS-WEC	29	4.38

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	CARX-ELRO	Sedge-beaked spikerush	WSS-WEB	13	3.16
	CARX-IRMI	Sedge-Rocky Mountain iris	WSS-WIR	25	74.27
	CARX-IVAX	Sedge-sumpweed	WSS-WSW	4	11.71
	CARX-IVKI	Sedge-alkali ivesia	WSS-WIA	2	1.53
	CARX-JUSA	Sedge-Rocky Mountain rush	WSS-WRM	1	0.16
	CARX-SCPU	Sedge-common threesquare	WSS-WSQ	1	0.05
	CARX-SONA	Sedge-baby goldenrod	WSS-WGB	1	0.11
	CARX-THRH	Sedge-thermopsis	WSS-WTG	16	10.35
	CARX-TRIF	Sedge-clover	WSS-WCC	1	4.42
	CARX-TRPR	Sedge-red clover	WSS-WCR	2	8.08
	CARX-TYLA	Sedge-cattail	WSS-WCT	12	8.28
	CARX-VEAN	Sedge-water speedwell	WSS-AWS	3	0.14
	CARX-COAR	Sedge-bindweed	WSS-EBW	2	0.91
	CARX-HOJU	Sedge-foxtail barley	WSS-EBF	3	14.06
	CASI	Analogue sedge	W-SA		
	CASI-AGGI	Analogue sedge-redtop	WSA-GRT	2	0.51
	CASI-DECE	Analogue sedge-tufted hairgrass	WSA-GHT	2	0.57
	CASI-MURI	Analogue sedge-mat muhly	WSA-GMM	1	0.81
	CASI-CARO	Analogue sedge-beaked sedge	WSA-WSB	11	3.66
	CASI-ELPA	Analogue sedge-creeping spikerush	WSA-WEC	2	0.18
	CASI-ELRO	Analogue sedge-beaked spikerush	WSA-WEB	3	0.43
	CASI-JUNE	Analogue sedge-Nevada rush	WSA-WRN	3	1.62
	CASI-TRMA	Analogue sedge-seaside arrowgrass	WSA-WAG	1	< 0.01
	CASI-VEAN	Analogue sedge-water speedwell	WSA-AWS	1	0.12
	CISC	Elk thistle	W-TE		
	CISC-PULE	Elk thistle-Lemmon's alkaligrass	WTE-GAL	1	0.11
	CISC-CAPR	Elk thistle-fieldclustered sedge	WTE-WSF	1	0.56
	ELEO	Spikerush	W-EE		
	ELEO-DECE	Spikerush-tufted hairgrass	WEE-GHT	5	0.34
	ELEO-ELEO	Spikerush-spikerush	WEE-WEE	1	0.59
	ELEO-JUAR	Spikerush-Baltic rush	WEE-WRB	25	46.79
	ELEO-RUCR	Spikerush-curly dock	WEE-ECD	1	0.25
	ELPA	Creeping spikerush	W-EC		
	ELPA-AGGI	Creeping spikerush-redtop	WEC-GRT	3	0.52
	ELPA-ALAE	Creeping spikerush-shortawn foxtail	WEC-GFS	7	1.60
	ELPA-DECE	Creeping spikerush-tufted hairgrass	WEC-GHT	9	3.87
	ELPA-LETR	Creeping spikerush-creeping wildrye	WEC-GWC	1	0.30
	ELPA-MURI	Creeping spikerush-mat muhly	WEC-GMM	2	0.12
	ELPA-CANE	Creeping spikerush-Nebraska sedge	WEC-WSN	4	0.16
	ELPA-CAPR	Creeping spikerush-fieldclustered sedge	WEC-WSF	15	2.93
	ELPA-DOLA	Creeping spikerush-downingia	WEC-WDW	4	1.63
	ELPA-ELPA	Creeping spikerush-creeping spikerush	WEC-WEC	6	0.74
	ELPA-HIVU	Creeping spikerush-marestail	WEC-WMT	2	0.01
	ELPA-IRMI	Creeping spikerush-Rocky Mountain iris	WEC-WIR	1	0.02
	ELPA-JUAR	Creeping spikerush-Baltic rush	WEC-WRB	86	59.60
	ELPA-JUAT	Creeping spikerush-fine rush	WEC-WRF	1	0.09
	ELPA-JUNE	Creeping spikerush-Nevada rush	WEC-WRN	8	0.86
	ELPA-MIGU	Creeping spikerush-common monkeyflower	WEC-WMF	7	5.97
	ELPA-RACY	Creeping spikerush-shore buttercup	WEC-WBC	1	0.01
	ELPA-SACU	Creeping spikerush-duck potato	WEC-WAR	2	0.05
	ELPA-SCAM	Creeping spikerush-American bulrush	WEC-WBA	1	< 0.01
	ELPA-SPAR	Creeping spikerush-bur-reed	WEC-WBR	1	0.17
	ELPA-SPEU	Creeping spikerush-giant bur-reed	WEC-WBG	3	0.15
	ELPA-TRRE	Creeping spikerush-white clover	WEC-WCW	1	0.06
	ELPA-TYLA	Creeping spikerush-cattail	WEC-WCT	2	3.48
	ELPA-ALPL	Creeping spikerush-water plantain	WEC-AWP	1	0.11
	ELPA-BEER	Creeping spikerush-water parsnip	WEC-APR	2	0.01
	ELPA-POAM	Creeping spikerush-water knotweed	WEC-AKW	3	0.75
	ELPA-STFI	Creeping spikerush-fineleaf pondweed	WEC-APF	1	0.02
	ELPA-HOJU	Creeping spikerush-foxtail barley	WEC-EBF	1	2.81
	ELPA-PLSC	Creeping spikerush-popcorn flower	WEC-EPF	6	1.87

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	ELRO	Beaked spikerush	W-EB		
	ELRO-DECE	Beaked spikerush-tufted hairgrass	WEB-GHT	25	5.81
	ELRO-CANE	Beaked spikerush-Nebraska sedge	WEB-WSN	14	1.89
	ELRO-JUNE	Beaked spikerush-Nevada rush	WEB-WRN	4	1.95
	ELRO-TRRE	Beaked spikerush-white clover	WEB-WCW	3	0.74
	ELRO-BEER	Beaked spikerush-water parsnip	WEB-APR	2	0.18
	ELRO-NAOF	Beaked spikerush-watercress	WEB-AWC	3	0.02
	EQAR	Horsetail	W-HT		
	EQAR-MURI	Horsetail-mat muhly	WHT-GMM	1	0.72
	HIVU	Marestail	W-MT		
	HIVU-CASI	Marestail-analogue sedge	WMT-WSA	1	0.01
	HIVU-ELEO	Marestail-spikerush	WMT-WEE	1	0.01
	HIVU-HIVU	Marestail-marestail	WMT-WMT	2	0.01
	HIVU-SCAC	Marestail-tule bulrush	WMT-WBT	2	0.03
	HIVU-SCAM	Marestail-American bulrush	WMT-WBA	2	0.09
	HIVU-SCPU	Marestail-common threesquare	WMT-WSQ	1	0.03
	HIVU-SPAR	Marestail-bur-reed	WMT-WBR	1	0.03
	HIVU-CEDE	Marestail-coon's tail	WMT-ACT	1	< 0.01
	HIVU-NAOF	Marestail-watercress	WMT-AWC	1	0.02
	IRMI	Rocky Mountain iris	W-IR		
	IRMI-AGGI	Rocky Mountain iris-redtop	WIR-GRT	1	0.69
	IRMI-SPGR	Rocky Mountain iris-alkali cordgrass	WIR-GCA	1	0.03
	IRMI-ARAN	Rocky Mountain iris-silver cinquefoil	WIR-WCS	2	1.90
	IRMI-CAPR	Rocky Mountain iris-fieldclustered sedge	WIR-WSF	12	3.48
	IRMI-JUAR	Rocky Mountain iris-Baltic rush	WIR-WRB	39	55.06
	IRMI-MARA	Rocky Mountain iris-solomon plume	WIR-WSL	1	0.01
	IRMI-PHPU	Rocky Mountain iris-tufted phlox	WIR-WPT	1	4.53
	IRMI-THRH	Rocky Mountain iris-thermopsis	WIR-WTG	13	7.00
	IVAX	Sumpweed	W-SW		
	IVAX-MURI	Sumpweed-mat muhly	WSW-GMM	4	4.09
	IVAX-POA	Sumpweed-bluegrass	WSW-GBB	2	1.11
	IVAX-POSE	Sumpweed-Sandberg bluegrass	WSW-GBS	1	1.13
	IVAX-ELPA	Sumpweed-creeping spikerush	WSW-WEC	1	0.04
	IVAX-HOJU	Sumpweed-foxtail barley	WSW-EBF	10	3.93
	IVAX-PLSC	Sumpweed-popcorn flower	WSW-EPF	6	0.56
	IVAX-POAV	Sumpweed-prostrate knotweed	WSW-EKP	1	0.84
	IVKI	Alkali ivesia	W-IA		
	IVKI-DODE	Alkali ivesia-shooting star	WIA-WST	1	4.57
	JUAR	Baltic rush	W-RB		
	JUAR-CYDA	Baltic rush-bermudagrass	WRB-GBG	1	0.15
	JUAR-DECE	Baltic rush-tufted hairgrass	WRB-GHT	25	14.35
	JUAR-MUAS	Baltic rush-alkali muhly	WRB-GMA	6	0.60
	JUAR-POA	Baltic rush-bluegrass	WRB-GBB	1	0.07
	JUAR-POPR	Baltic rush-Kentucky bluegrass	WRB-GBK	9	2.41
	JUAR-PUFA	Baltic rush-Torrey alkaligrass	WRB-GAT	1	0.09
	JUAR-ARAN	Baltic rush-silver cinquefoil	WRB-WCS	197	174.04
	JUAR-CANE	Baltic rush-Nebraska sedge	WRB-WSN	2	0.16
	JUAR-CAPA	Baltic rush-Parry's sedge	WRB-WSP	1	0.11
	JUAR-CAPR	Baltic rush-fieldclustered sedge	WRB-WSF	273	210.62
	JUAR-CAPY	Baltic rush-chamisso sedge	WRB-WSC	1	0.06
	JUAR-CARX	Baltic rush-sedge	WRB-WSS	556	1,014.64
	JUAR-CASI	Baltic rush-analogue sedge	WRB-WSA	9	0.78
	JUAR-CISC	Baltic rush-elk thistle	WRB-WTE	2	0.34
	JUAR-CRRU	Baltic rush-hawksbeard	WRB-WHB	1	0.50
	JUAR-CRYP	Baltic rush-cryptantha	WRB-WCY	1	2.50
	JUAR-DODE	Baltic rush-shooting star	WRB-WST	5	1.19
	JUAR-ELPA	Baltic rush-creeping spikerush	WRB-WEC	2	0.01
	JUAR-ELRO	Baltic rush-beaked spikerush	WRB-WEB	4	1.38
	JUAR-EQAR	Baltic rush-horsetail	WRB-WHT	2	0.75
	JUAR-GLMA	Baltic rush-sea milkwort	WRB-WSM	4	0.32
	JUAR-HEPU	Baltic rush-western centaur	WRB-WCN	8	1.58

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	JUAR-HIVU	Baltic rush-marestail	WRB-WMT	1	0.03
	JUAR-IVAX	Baltic rush-sumpweed	WRB-WSW	34	29.71
	JUAR-IVKI	Baltic rush-alkali ivesia	WRB-WIA	17	3.05
	JUAR-JUAR	Baltic rush-Baltic rush	WRB-WRB	18	5.61
	JUAR-MALE	Baltic rush-alkali mallow	WRB-WMA	1	0.65
	JUAR-MOSS	Baltic rush-moss	WRB-WMO	1	< 0.01
	JUAR-SCAC	Baltic rush-tule bulrush	WRB-WBT	7	0.78
	JUAR-THRH	Baltic rush-thermopsis	WRB-WTG	45	11.86
	JUAR-TRIF	Baltic rush-clover	WRB-WCC	3	2.07
	JUAR-URDI	Baltic rush-stinging nettle	WRB-WNS	1	< 0.01
	JUAR-ALGA	Baltic rush-algae	WRB-AAL	1	0.01
	JUAR-RAAQ	Baltic rush-white water crowfoot	WRB-ACW	1	< 0.01
	JUAR-CIAR	Baltic rush-Canada thistle	WRB-ETC	2	0.40
	JUAR-CIRS	Baltic rush-thistle	WRB-ETT	7	1.45
	JUAR-CIVU	Baltic rush-bull thistle	WRB-ETB	2	0.10
	JUAR-HOJU	Baltic rush-foxtail barley	WRB-EBF	9	11.54
	JUAR-PLSC	Baltic rush-popcorn flower	WRB-EPF	34	11.21
	JUEN	Swordleaf rush	W-RS		
	JUEN-JUAR	Swordleaf rush-Baltic rush	WRS-WRB	1	0.08
	JUEN-BEER	Swordleaf rush-water parsnip	WRS-APR	1	< 0.01
	JUNC	Rush	W-RR		
	JUNC-CASI	Rush-analogue sedge	WRR-WSA	1	0.30
	JUNC-ALGA	Rush-algae	WRR-AAL	1	0.81
	JUNE	Nevada rush	W-RN		
	JUNE-SACU	Nevada rush-duck potato	WRN-WAR	2	1.31
	JUNE-SPEU	Nevada rush-giant bur-reed	WRN-WBG	1	1.30
	JUNE-BEER	Nevada rush-water parsnip	WRN-APR	1	0.21
	MIGU	Common monkeyflower	W-MF		
	MIGU-EPIL	Common monkeyflower-willow weed	WMF-WWH	1	< 0.01
	MIGU-MIGU	Common monkeyflower-common monkeyflower	WMF-WMF	1	0.03
	MIGU-NAOF	Common monkeyflower-watercress	WMF-AWC	6	0.05
	MOSS	Moss	W-MO		
	MOSS-MOSS	Moss-moss	WMO-WMO	1	< 0.01
	MOSS-BEER	Moss-water parsnip	WMO-APR	2	0.01
	NIOC	Alkali pink	W-AP		
	NIOC-LETR	Alkali pink-creeping wildrye	WAP-GWC	1	0.04
	NIOC-SPAI	Alkali pink-sacaton	WAP-GSA	2	0.50
	PHPU	Tufted phlox	W-PT		
	PHPU-SPGR	Tufted phlox-alkali cordgrass	WPT-GCA	1	7.77
	PHPU-IVKI	Tufted phlox-alkali ivesia	WPT-WIA	4	3.54
	PHPU-SONA	Tufted phlox-baby goldenrod	WPT-WGB	2	0.97
	POGR	Northwest cinquefoil	W-PN		
	POGR-CAPR	Northwest cinquefoil-fieldclustered sedge	WPN-WSF	4	0.90
	SALI	Glasswort	W-GW		
	SALI-DISP	Glasswort-saltgrass	WGW-GST	2	1.67
	SALI-SPAI	Glasswort-sacaton	WGW-GSA	1	5.26
	SALI-SPGR	Glasswort-alkali cordgrass	WGW-GCA	1	0.59
	SALI-BORA	Glasswort-borage	WGW-WBO	2	0.38
	SCAC	Tule bulrush	W-BT		
	SCAC-ARAN	Tule bulrush-silver cinquefoil	WBT-WCS	4	16.78
	SCAC-CANE	Tule bulrush-Nebraska sedge	WBT-WSN	29	6.49
	SCAC-CAPR	Tule bulrush-fieldclustered sedge	WBT-WSF	3	8.79
	SCAC-CARX	Tule bulrush-sedge	WBT-WSS	19	8.98
	SCAC-DOLA	Tule bulrush-downingia	WBT-WDW	1	0.12
	SCAC-ELPA	Tule bulrush-creeping spikerush	WBT-WEC	28	24.28
	SCAC-SCAC	Tule bulrush-tule bulrush	WBT-WBT	2	3.82
	SCAC-SCAM	Tule bulrush-American bulrush	WBT-WBA	2	0.09
	SCAC-SPEU	Tule bulrush-giant bur-reed	WBT-WBG	1	0.06
	SCAC-THRH	Tule bulrush-thermopsis	WBT-WTG	1	0.01
	SCAC-TYLA	Tule bulrush-cattail	WBT-WCT	18	6.84
	SCAC-BEER	Tule bulrush-water parsnip	WBT-APR	18	0.06

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	SCAC-NAOF	Tule bulrush-watercress	WBT-AWC	1	0.06
	SCAC-VEAN	Tule bulrush-water speedwell	WBT-AWS	1	0.20
	SCAM	American bulrush	W-BA		
	SCAM-ARAN	American bulrush-silver cinquefoil	WBA-WCS	1	2.10
	SCAM-CAPR	American bulrush-fieldclustered sedge	WBA-WSF	4	0.13
	SCAM-CARX	American bulrush-sedge	WBA-WSS	2	0.64
	SCAM-ELAC	American bulrush-needle spikerush	WBA-WEN	1	0.02
	SCAM-ELEO	American bulrush-spikerush	WBA-WEE	3	2.66
	SCAM-JUAR	American bulrush-Baltic rush	WBA-WRB	7	2.54
	SCAM-SCAM	American bulrush-American bulrush	WBA-WBA	2	0.01
	SCAM-TYLA	American bulrush-cattail	WBA-WCT	4	0.69
	SCAM-NAOF	American bulrush-watercress	WBA-AWC	4	0.01
	SCIR	Bulrush	W-BL		
	SCIR-SPAI	Bulrush-sacaton	WBL-GSA	1	7.23
	SCIR-ELAC	Bulrush-needle spikerush	WBL-WEN	1	1.29
	SCIR-ELEO	Bulrush-spikerush	WBL-WEE	4	0.67
	SOLI	Goldenrod	W-GO		
	SOLI-JUAR	Goldenrod-Baltic rush	WGO-WRB	1	1.30
	SPAR	Bur-reed	W-BR		
	SPAR-MIGU	Bur-reed-common monkeyflower	WBR-WMF	1	0.01
	SPAR-SPAR	Bur-reed-bur-reed	WBR-WBR	1	< 0.01
	SPAR-BEER	Bur-reed-water parsnip	WBR-APR	2	0.01
	SPAR-BICE	Bur-reed-beggars ticks	WBR-EBT	1	0.07
	THRH	Thermopsis	W-TG		
	THRH-ACMI	Thermopsis-yarrow	WTG-WYR	1	0.02
	THRH-CAPR	Thermopsis-fieldclustered sedge	WTG-WSF	2	0.41
	THRH-CISC	Thermopsis-elk thistle	WTG-WTE	3	0.69
	THRH-CIAR	Thermopsis-Canada thistle	WTG-ETC	6	0.38
	THRH-CIVU	Thermopsis-bull thistle	WTG-ETB	1	0.01
	TRFR	Strawberry clover	W-CB		
	TRFR-AGGI	Strawberry clover-redtop	WCB-GRT	2	0.57
	TRFR-JUAR	Strawberry clover-Baltic rush	WCB-WRB	1	0.07
	TRPR	Red clover	W-CR		
	TRPR-CANE	Red clover-Nebraska sedge	WCR-WSN	5	5.20
	TRRE	White clover	W-CW		
	TRRE-ALAE	White clover-shortawn foxtail	WCW-GFS	1	0.09
	TRRE-EQAR	White clover-horsetail	WCW-WHT	1	0.08
	TRRE-JUAR	White clover-Baltic rush	WCW-WRB	16	4.15
	TYLA	Cattail	W-CT		
	TYLA-CANE	Cattail-Nebraska sedge	WCT-WSN	23	3.11
	TYLA-CASI	Cattail-analogue sedge	WCT-WSA	4	0.02
	TYLA-ELEO	Cattail-spikerush	WCT-WEE	1	0.70
	TYLA-HIVU	Cattail-marestail	WCT-WMT	1	0.62
	TYLA-JUAR	Cattail-Baltic rush	WCT-WRB	4	0.04
	TYLA-TYLA	Cattail-cattail	WCT-WCT	7	0.49
	TYLA-BEER	Cattail-water parsnip	WCT-APR	3	0.43
	TYLA-BICE	Cattail-beggars ticks	WCT-EBT	2	0.08
AQUATIC BIOME (A)					
	ALGA	Algae	A-AL		
	ALGA-HIVU	Algae-marestail	AAL-WMT	2	0.02
	ALGA-ALGA	Algae-algae	AAL-AAL	2	0.01
	ALPL	Water plantain	A-WP		
	ALPL-SACU	Water plantain-duck potato	AWP-WAR	2	0.07
	BEER	Water parsnip	A-PR		
	BEER-AGGI	Water parsnip-redtop	APR-GRT	3	0.04
	BEER-ALAE	Water parsnip-shortawn foxtail	APR-GFS	2	0.06
	BEER-CANE	Water parsnip-Nebraska sedge	APR-WSN	33	1.26
	BEER-CAPR	Water parsnip-fieldclustered sedge	APR-WSF	1	< 0.01
	BEER-CARX	Water parsnip-sedge	APR-WSS	4	0.26
	BEER-EPIL	Water parsnip-willow weed	APR-WWH	1	< 0.01

BIOME	SPECIES CODE	COMMON NAME	MAP CODE	POLYGONS	AREA[1]
	Alliance	Alliance	Alliance	(#)	(ha)
	Association	Association	Association		
	BEER-JUAR	Water parsnip-Baltic rush	APR-WRB	15	0.27
	BEER-MIGU	Water parsnip-common monkeyflower	APR-WMF	7	0.18
	BEER-SCAM	Water parsnip-American bulrush	APR-WBA	8	0.11
	BEER-SCPU	Water parsnip-common threesquare	APR-WSQ	4	0.23
	BEER-BEER	Water parsnip-water parsnip	APR-APR	2	2.25
	BEER-CEDE	Water parsnip-coon's tail	APR-ACT	1	0.02
	BEER-LEMI	Water parsnip-duckweed	APR-ADW	1	< 0.01
	BEER-POAM	Water parsnip-water knotweed	APR-AKW	1	0.03
	BEER-RAAQ	Water parsnip-white water crowfoot	APR-ACW	5	0.03
	BEER-VEAN	Water parsnip-water speedwell	APR-AWS	3	0.32
	CAAQ	Water whorlgrass	A-WW		
	CAAQ-RACY	Water whorlgrass-shore buttercup	AWW-WBC	1	< 0.01
	CIDO	Water hemlock	A-HW		
	CIDO-CANE	Water hemlock-Nebraska sedge	AHW-WSN	1	0.16
	LEMI	Duckweed	A-DW		
	LEMI-LEMI	Duckweed-duckweed	ADW-ADW	1	0.01
	NAOF	Watercress	A-WC		
	NAOF-ALAE	Watercress-shortawn foxtail	AWC-GFS	2	0.08
	NAOF-CANE	Watercress-Nebraska sedge	AWC-WSN	14	0.06
	NAOF-ELPA	Watercress-creeping spikerush	AWC-WEC	2	0.02
	NAOF-EPIL	Watercress-willow weed	AWC-WWH	1	< 0.01
	NAOF-JUAR	Watercress-Baltic rush	AWC-WRB	6	0.08
	NAOF-JUEN	Watercress-swordleaf rush	AWC-WRS	1	< 0.01
	NAOF-JUNE	Watercress-Nevada rush	AWC-WRN	2	0.07
	NAOF-MOSS	Watercress-moss	AWC-WMO	2	0.02
	NAOF-BEER	Watercress-water parsnip	AWC-APR	9	0.09
	NAOF-CAAQ	Watercress-water whorlgrass	AWC-AWW	1	< 0.01
	NAOF-LEMI	Watercress-duckweed	AWC-ADW	6	0.31
	NAOF-NAOF	Watercress-watercress	AWC-AWC	26	0.20
	NAOF-VEAN	Watercress-water speedwell	AWC-AWS	1	0.02
	POAM	Water knotweed	A-KW		
	POAM-PHPR	Water knotweed-timothy	AKW-GTM	1	0.07
	POTA	Pondweed	A-PW		
	POTA-ALAE	Pondweed-shortawn foxtail	APW-GFS	2	0.12
	POTA-JUAR	Pondweed-Baltic rush	APW-WRB	1	0.06
	POTA-ALGA	Pondweed-algae	APW-AAL	1	0.20
	POTA-LEMI	Pondweed-duckweed	APW-ADW	1	0.01
	RAAQ	White water crowfoot	A-CW		
	RAAQ-TYLA	White water crowfoot-cattail	ACW-WCT	1	0.01
	RAAQ-RAAQ	White water crowfoot-white water crowfoot	ACW-ACW	1	< 0.01
	STFI	Fineleaf pondweed	A-PF		
	STFI-STFI	Fineleaf pondweed-fineleaf pondweed	APF-APF	1	0.12
	VEAN	Water speedwell	A-WS		
	VEAN-CANE	Water speedwell-Nebraska sedge	AWS-WSN	26	5.96
	VEAN-JUAR	Water speedwell-Baltic rush	AWS-WRB	1	0.11
	VEAN-JUNE	Water speedwell-Nevada rush	AWS-WRN	1	0.04
	VEAN-BICE	Water speedwell-beggars ticks	AWS-EBT	2	0.33
	WATR	Open water	A-OW		
	ZAPA	Horned pondweed	A-PH		
	ZAPA-ZAPA	Horned pondweed-horned pondweed	APH-APH	1	< 0.01
EARLY-SERAL (E)					
	ARLU	Louisiana sagewort	E-SL		
	ARLU-LETR	Louisiana sagewort-creeping wildrye	ESL-GWC	1	0.08
	ARLU-IVAX	Louisiana sagewort-sumpweed	ESL-WSW	1	0.51
	CIAR	Canada thistle	E-TC		
	CIAR-AGGI	Canada thistle-redtop	ETC-GRT	1	< 0.01
	CIAR-CADO	Canada thistle-Douglas' sedge	ETC-WSD	1	0.05
	CIRS	Thistle	E-TT		
	CIRS-POSE	Thistle-Sandberg bluegrass	ETT-GBS	1	0.04
	CIRS-CIRS	Thistle-thistle	ETT-ETT	2	0.45

BIOME	SPECIES CODE Alliance Association	COMMON NAME Alliance Association	MAP CODE Alliance Association	POLYGONS (#)	AREA[1] (ha)
	CIVU	Bull thistle	E-TB		
	CIVU-CANE	Bull thistle-Nebraska sedge	ETB-WSN	1	0.13
	HAGL	Halogeton	E-HG		
	HAGL-HOJU	Halogeton-foxtail barley	EHG-EBF	1	12.35
	HECU	Salt heliotrope	E-HS		
	HECU-CARX	Salt heliotrope-sedge	EHS-WSS	2	4.46
	HECU-IVAX	Salt heliotrope-sumpweed	EHS-WSW	2	2.06
	HECU-JUAR	Salt heliotrope-Baltic rush	EHS-WRB	2	11.88
	HOJU	Foxtail barley	E-BF		
	HOJU-CANE	Foxtail barley-Nebraska sedge	EBF-WSN	1	0.05
	HOJU-ELEO	Foxtail barley-spikerush	EBF-WEE	1	0.14
	HOJU-TRIF	Foxtail barley-clover	EBF-WCC	1	0.09
	HOJU-CIAR	Foxtail barley-Canada thistle	EBF-ETC	1	0.21
	HOJU-POLY	Foxtail barley-knotweed	EBF-EKW	1	1.69
	HOJU-VETH	Foxtail barley-mullein	EBF-EML	2	0.65
	MEOF	Sweetclover	E-CS		
	MEOF-DECE	Sweetclover-tufted hairgrass	ECS-GHT	1	0.90
	MEOF-LETR	Sweetclover-creeping wildrye	ECS-GWC	1	1.70
	MEOF-CARX	Sweetclover-sedge	ECS-WSS	2	0.07
	MESA	Alfalfa	E-AL		
	MESA-BROM	Alfalfa-brome	EAL-GBR	1	1.10
	MESA-LETR	Alfalfa-creeping wildrye	EAL-GWC	1	0.11
	MESA-POA	Alfalfa-bluegrass	EAL-GBB	4	7.50
	MESA-CAPR	Alfalfa-fieldclustered sedge	EAL-WSF	1	0.26
	MESA-JUAR	Alfalfa-Baltic rush	EAL-WRB	1	0.36
	MESA-GRSQ	Alfalfa-curlycup gumweed	EAL-ECG	1	0.30
	PLSC	Popcorn flower	E-PF		
	PLSC-HOBR	Popcorn flower-meadow barley	EPF-GBM	1	0.03
	PLSC-LETR	Popcorn flower-creeping wildrye	EPF-GWC	1	0.07
	PLSC-DOLA	Popcorn flower-downingia	EPF-WDW	1	0.48
	PLSC-HOJU	Popcorn flower-foxtail barley	EPF-EBF	1	0.06
	POLY	Knotweed	E-KW		
	POLY-ARAN	Knotweed-silver cinquefoil	EKW-WCS	1	0.36
	POLY-POLY	Knotweed-knotweed	EKW-EKW	12	5.46
	POMO	Rabbitsfoot grass	E-RF		
	POMO-JUAR	Rabbitsfoot grass-Baltic rush	ERF-WRB	2	0.08
	VEBR	Prostrate verbena	E-VP		
	VEBR-HOJU	Prostrate verbena-foxtail barley	EVP-EBF	1	0.95
	BARE	Bare ground	E-BG		
	UNID	Unidentified plant	E-UN		
	UNID-UNID	Unidentified plant-unidentified plant	EUN-EUN	3	5.92

[1]Area estimates are rounded to the nearest hundredth of a hectare.

The vegetation on the floor of Spring Valley consists of a mosaic of predominately shrubland, interspersed with grasslands and wetlands. Many of these shrublands are dry shrublands, and therefore, were not mapped in 2008–2009. The grasslands and wetlands are associated with springs, seeps, ponds (many of which are human-made), and irrigation canals dispersed throughout the valley. Aquatic communities occur at the springs and ponds and along some of the canals. Small groves of Russian olive, white poplar, narrowleaf poplar, and eastern cottonwood occur at a few of the wetlands and there are two sizeable populations of Rocky Mountain juniper, locally referred to as swamp cedars, extending from the base of the uplands onto the valley floor.

Depth to groundwater and outflow of groundwater into springs is a primary factor affecting the distribution of vegetation in Spring Valley. Aquatic and wetland associations occur wherever

groundwater nears or reaches the soil surface. As depth to groundwater increases, the vegetation transitions to grassland and then to shrubland, with both mesic (phreatophytic) and xeric (upland) shrublands present. Some shrublands, such as coyote willow associations, occur along the edges of standing or flowing water. Woodlands are not common, but do occur on the valley floor and valley floor-alluvial fan interface. Russian olive, white poplar, narrowleaf poplar, and eastern cottonwood woodlands occur along edges of standing water, and two populations of valley-floor Rocky Mountain junipers occur near springs, wetlands, and outflow of artesian wells, as well as some adjacent areas where groundwater does not appear to be near the soil surface.

A typical topographic-associated vegetation gradient in Spring Valley is illustrated in Figure 3-1. In this example, upland sites where groundwater is relatively deep are dominated by big sagebrush and rabbitbrush. Depth to groundwater decreases downslope, resulting in an increase first in grasses and then in wetland species. At the bottom of the topographic gradient, groundwater reaches the surface and the vegetation transitions from redtop and Nebraska sedge at the water edge, to bulrush-cattail and watercress-water parsnip associations in shallow water, and, in some instances where deep spring pools exists, to open water where no vegetation is present (Figure 3-1). In Spring Valley, most spring systems are rather shallow, and characterized by aquatic vegetation surrounded by wetland and grassland species.

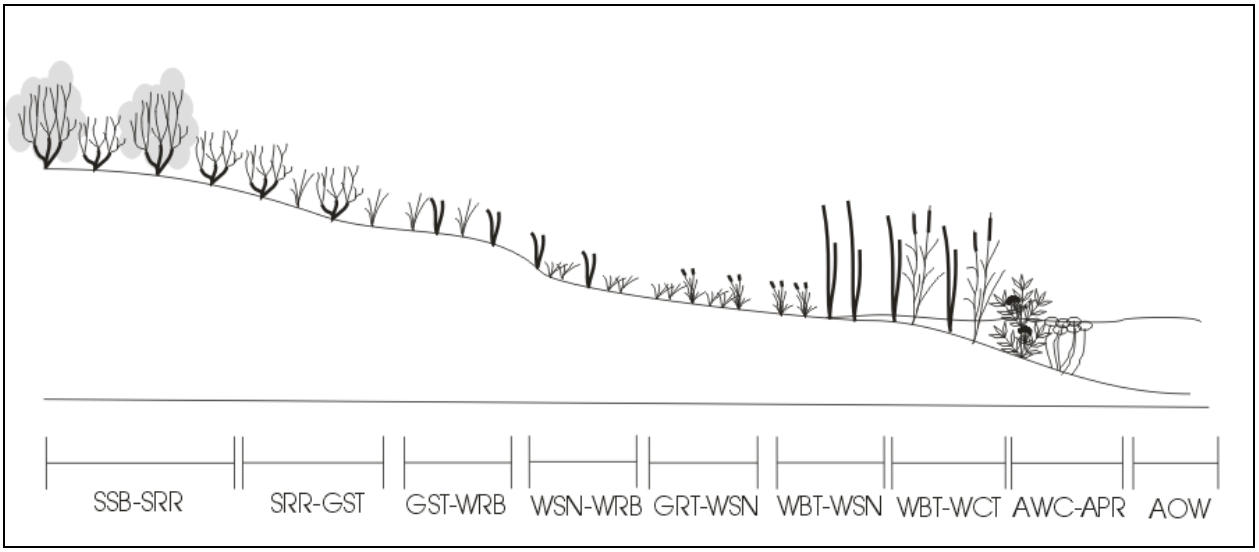

Figure 3-1. Example schematic diagram of a topographic-associated vegetation gradient in Spring Valley, Nevada. Association codes: SSB-SRR = big sagebrush-rabbitbrush, SRR-GST = rabbitbrush-saltgrass, GST-WRB = saltgrass-Baltic rush, WSN-WRB = Nebraska sedge-Baltic rush, GRT-WSN = redtop-Nebraska sedge, WBT-WSN = tule bulrush-Nebraska sedge, WBT-WCT = tule bulrush-cattail, AWC-APR = Watercress-water parsnip, AOW = open water.

Salinity is also an important factor affecting the distribution of vegetation in Spring Valley. Moderate- to highly-saline areas exist in numerous locations throughout the valley and these sites support saline-tolerant shrubland, grassland, and wetland communities. Most commonly, the more saline areas exist as depressions where surface water accumulates and then evaporates, leaving previously-dissolved salts in the soil surface. A typical salinity-induced vegetation gradient is illustrated in Figure 3-2.

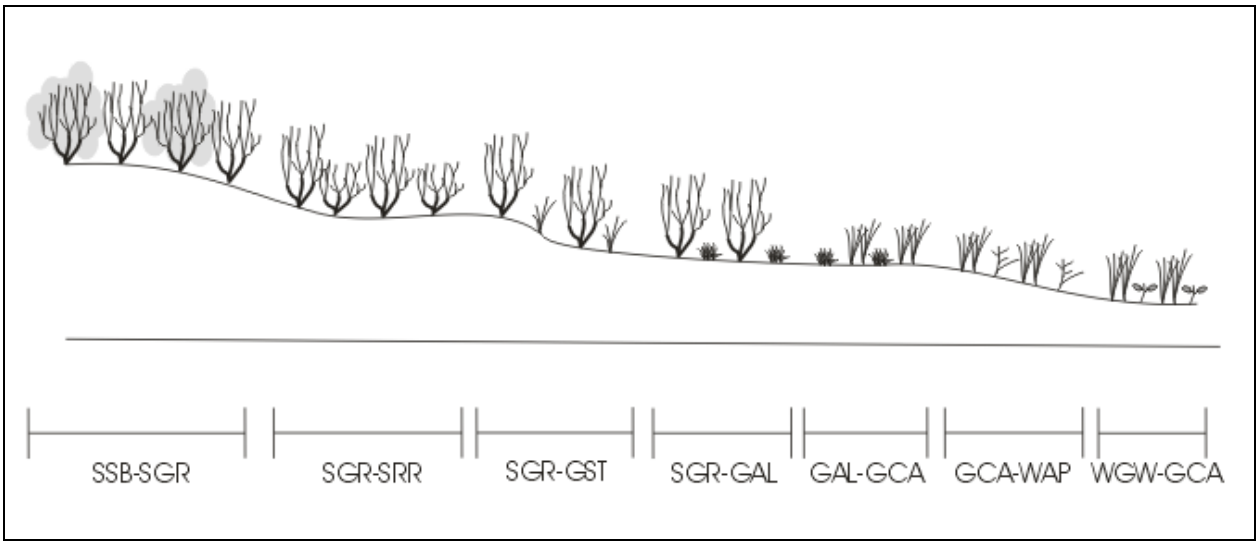

Figure 3-2. Schematic diagram of a typical salinity-induced vegetation gradient in Spring Valley, Nevada, with surface soil salinity increasing from left to right. Association codes: SSB-SGR = big sagebrush-greasewood, SGR-SRR = greasewood-rabbitbrush, SGR-GST = greasewood-saltgrass, SGR-GAL = greasewood-Lemmon's alkaligrass, GAL-GCA = Lemmon's alkaligrass-alkali cordgrass, GCA-WAP = alkali cordgrass-alkali pink, WGW-GCA = glasswort-alkali cordgrass.

A third major factor affecting vegetation distribution in Spring Valley is disturbance related to past and current land use. Some areas have been heavily grazed by livestock for many years and are currently characterized by early-seral vegetation, and in some cases, bare ground. Other land use practices, such as construction or abandonment of irrigation canals, heavy use by vehicles or as camp sites, have resulted in localized early-seral vegetation. Early-seral communities also occur as a result of natural processes, such as periodic flooding and drying of ponds. Irrigation has been a common practice in many parts of Spring Valley for almost a century. This has resulted in the presence of certain grassland and wetland alliances, such as meadow fescue and Nebraska sedge, in locations where they likely would not occur without irrigation. Should the supply of irrigation water to these locations be modified in the future, the vegetation at these locations will likely change.

In the following subsections, each of the biomes is briefly discussed. The most frequent alliance and association is described first, and then a brief description of associational variations in the alliance, or community variance within the association, is provided. In addition, the frequency of occurrence (number of polygons) and abundance (number of hectares), while often in close agreement, is provided.

3.2 WOODLAND VEGETATION

The woodland biome consists of those areas where woody vegetation that is greater than three meters in height is dominant or sub-dominant. Woodlands are infrequent on the floor of Spring Valley, represented by 173 polygons covering 460.02 ha. The Russian olive, white poplar, narrowleaf poplar, and eastern cottonwood alliances occur adjacent to wetland and/or aquatic alliances, or near the wetland-aquatic ecotones at a small number of locations (18 polygons, 1

polygon, 4 polygons, and 1 polygon, respectively; 3.88, 0.03, 0.40, 0.03 ha, respectively). These sites support a total of eight different associations, each association differing in respect to the sub-dominant understory species (Table 3-1). Four of the Russian olive polygons are located in wetland sites, as evidenced by their sub-dominant species within the associations (currant and redtop). The single narrowleaf poplar association, narrowleaf poplar-Woods' rose, represented by four polygons, is also located in a wetland site adjacent to a spring. These eight polygons are typical of these woodlands in that they occur along the wetland-aquatic ecotone. The remaining three Russian olive associations, Russian olive-big sagebrush, Russian olive-saltgrass, and Russian olive-Canada thistle, occur on sites where groundwater appears to be near the surface but not at the surface, based on understory vegetation. The Russian olive-big sagebrush is the driest of these three associations.

The most extensive woodlands on the lower elevations of Spring Valley are those of the Rocky Mountain juniper alliance (455.69 ha). Recent evidence from field and laboratory work by SNWA suggests that a small number of the polygons currently classified as Rocky Mountain juniper on the valley floor in Spring Valley (e.g., polygon 7535; SNWA et al. 2011) are in fact Utah juniper (pers. comm. Nancy Beecher 2011). For the purposes of this report, all polygons containing juniper are labeled as Rocky Mountain juniper, but the reader is cautioned that accumulating evidence may eventually reclassify some of these polygons into a new alliance for Utah juniper.

The Rocky Mountain juniper alliance occurs in two areas of the valley and at both locations it extends as a more or less continuous woodland from the lower slopes out onto the valley floor. The overstory trees vary in density along this topographic gradient, with density generally increasing as elevation (and presumably depth to water) decreases. Size of trees however, does not change substantially along the gradient.

The primary change in this alliance along the topographic gradient occurs in the understory species, as indicated by the various associations (Table 3-2). The topographic positions listed in Table 3-2 are those most commonly affiliated with each association. Associations commonly found on upper and middle topographic positions can also occur on lower topographic sites. The moisture regimes listed are those most commonly found at the soil surface. Dry sites can have standing water following heavy rains or spring runoff and the surface soils of the wet sites can temporarily become dry.

Table 3-2. Associations within the Rocky Mountain juniper alliance in Spring Valley, Nevada and their typical relationship to a topographic gradient and associated moisture regime at the soil surface.

Topographic Position	Moisture Regime	Association	Species Code	Map Code	Polygon (#)	Area[1] (ha)
Upper	Dry	Rocky Mountain juniper-big sagebrush	JUSC-ARTR	TJRSSB	17	36.19
Upper	Dry	Rocky Mountain juniper-rabbitbrush	JUSC-ERNA	TJRSRR	37	177.40
Upper	Dry	Rocky Mountain juniper-Douglas rabbitbrush	JUSC-CHVI	TJRSRD	3	2.60
Middle	Dry	Rocky Mountain juniper-Sandberg bluegrass	JUSC-POSE	TJRGBS	6	44.54
Lower	Dry	Rocky Mountain juniper-sacaton	JUSC-SPAI	TJRGSA	18	78.00
Lower	Dry	Rocky Mountain juniper-greasewood	JUSC-SAVE	TJRSGR	2	3.97
Lower	Dry	Rocky Mountain juniper-saltgrass	JUSC-DISP	TJRGST	3	14.38
Lower	Dry	Rocky Mountain juniper-mat muhly	JUSC-MURI	TJRGMM	2	0.40
Lower	Dry	Rocky Mountain juniper-alkali cordgrass	JUSC-SPGR	TJRGCA	4	12.59
Lower	Dry	Rocky Mountain juniper-alkaligrass	JUSC-PUCC	TJRGAA	8	22.85
Lower	Dry	Rocky Mountain juniper-Torrey alkaligrass	JUSC-PUFA	TJRGAT	3	2.03
Lower	Moist	Rocky Mountain juniper-bluegrass	JUSC-POA	TJRGBB	1	0.61
Lower	Moist	Rocky Mountain juniper-creeping wildrye	JUSC-LETR	TJRGWC	3	0.54
Lower	Moist	Rocky Mountain juniper-Woods' rose	JUSC-ROWO	TJRSRW	4	0.56
Lower	Wet	Rocky Mountain juniper-redtop	JUSC-AGGI	TJRGRT	1	1.64
Lower	Wet	Rocky Mountain juniper-sedge	JUSC-CARX	TJRWSS	11	21.37
Lower	Wet	Rocky Mountain juniper-Nebraska sedge	JUSC-CANE	TJRWSN	6	0.63
Lower	Wet	Rocky Mountain juniper-Baltic rush	JUSC-JUAR	TJRWRB	6	35.29
Lower	Wet	Rocky Mountain juniper-spikerush	JUSC-ELEO	TJRWEE	2	0.04
Lower	Wet	Rocky Mountain juniper-creeping spikerush	JUSC-ELPA	TJRWEC	2	0.02
Lower	Wet	Rocky Mountain juniper-thermopsis	JUSC-THRH	TJRWTG	1	< 0.01

[1]Area estimates are rounded to the nearest hundredth of a hectare.
Species names associated with Species Code are presented in Appendix B.
Species names associated with Map Codes are presented in Table 2-3.
Note: The JUSC-JUSC association, with 9 polygons covering 0.04 ha, is not shown, as moisture regime for this association is ambiguous.

The Rocky Mountain juniper-rabbitbrush association is the most common association occurring in the Rocky Mountain juniper alliance (37 out of 149 polygons, 177.40 out of 455.69 ha; Table 3-2). Rabbitbrush is adapted to a wider range of conditions than big sagebrush and is also typically an earlier successional species than big sagebrush (Redente et al. 1992; Tueller 1994; Stevenson et al. 2000). In particular, rabbitbrush tolerates a higher water table than does big sagebrush (Miller et al. 1982; Dobrowolski et al. 1990). The Rocky Mountain juniper-sacaton association is the second-most frequent association in this alliance (18 out of 149 polygons; 78.00 out of 455.69 ha; Table 3-2).

The major factors separating the associations at the lower end of the topographic gradient covered by this alliance are depth to groundwater and salinity, two factors which are closely related. Lower elevation sites with dry surface soils generally have the water table near, but not

at, the surface. These sites are periodically flooded, but then their surfaces dry out. As a result, the surface soils tend to be more saline than sites where the soil surface remains moist or wet.

The 10 associations with either moist or wet surface soils form a moisture gradient generally corresponding to their relative position in Table 3-2 and are non-saline. The moist sites cover 8 polygons for a total of 1.71 ha (0.4% of the Rocky Mountain juniper alliance area), and the wet sites cover 29 polygons for a total of 58.99 ha (13% of the alliance area) (Table 3-2).

The diversity of habitats within this alliance is an indicator of tolerance of Rocky Mountain juniper to a wide range of environmental conditions. The alliance is found on 149 polygons, 42% of which have understory vegetation characteristic of relatively dry upland conditions (upper, dry and middle, dry habitats), 27% of dry saline surface soils (lower, dry habitats), 5% of moist non-saline surface soils (lower, moist habitats), 19% of wet non-saline soils (lower, wet habitats), and 6% of which contain only Rocky Mountain juniper. When compared on an area basis, 260.73 ha (57% of the alliance) have understory vegetation characteristic of relatively dry upland conditions, 134.22 ha (29% of the alliance) of dry saline surface soils, 1.71 ha (0.4% of the alliance) of moist non-saline surface soils, 58.99 ha (13% of the alliance) of wet non-saline soils, and 0.04 ha (0.01% of the alliance) of only Rocky Mountain juniper.

The presence of the Rocky Mountain juniper alliance on so many different types of sites raises the question of why it does not occur over a wider area in Spring Valley. Rocky Mountain juniper certainly requires more water than is supplied by precipitation in most years, but groundwater is at or near the surface at other locations throughout Spring Valley, and yet Rocky Mountain juniper is absent from most of these sites. Associations and communities occur in various parts of the valley that are similar to the understory communities found within this alliance, suggesting that environmental conditions are also similar. The reason for the absence of the alliance at other sites with similar conditions remains unknown.

3.3 SHRUBLAND VEGETATION

Shrublands occur extensively in Spring Valley, and most of these were not mapped. Shrublands were mapped most often when they connected nearby portions of areas targeted for mapping. The shrubland biome consists of those areas dominated by shrubs (woody plants less than three meters in height). The shrubland biome contains 113 of the 752 mapped associations (15%) in Spring Valley and 2,988.63 ha of the 9,977.41 ha (30%) mapped in Spring Valley (Table 3-3). There are 11 alliances, 4 of which (shrubby potentilla, goldenweed, skunkbush, and willow) are infrequent, each containing 11 or fewer polygons and covering a total of 10.23 ha (less than 0.34% of the shrubland biome area). There are 7 more frequent alliances covering a total of and often defined on the basis of various combinations of 11 species: alkali rabbitbrush (*Chrysothamnus albidus*), alkaligrass (*Puccinellia*), Baltic rush (*Juncus arcticus*), big sagebrush (*Artemisia tridentata*), Douglas rabbitbrush (*Chrysothamnus viscidiflorus*), greasewood (*Sarcobatus vermiculatus*), rabbitbrush (*Ericameria nauseosa*), sacaton (*Sporobolus airoides*), saltgrass (*Distichlis spicata*), sedge (*Carex*), and Woods' rose (*Rosa woodsii*).

Table 3-3. The major associations within the shrubland biome of Spring Valley, Nevada, listed in order of frequency, with number of associations, number of polygons, and area covered.

Species Code	Map Code	Alliance	Major Associations	Associations (#)	Polygons (#)	Area[1] (ha)
ARTR	SSB	Big sagebrush		**14**	**153**	**186.02**
			Big sagebrush-rabbitbrush		56	56.15
			Big sagebrush-greasewood		38	41.02
			Big sagebrush-sacaton		22	49.50
CHAL	SRA	Alkali rabbitbrush		**7**	**19**	**42.42**
			Alkali rabbitbrush-sacaton		7	10.65
CHVI	SRD	Douglas rabbitbrush		**9**	**75**	**445.98**
			Douglas rabbitbrush-saltgrass		23	55.12
			Douglas rabbitbrush-alkaligrass		14	91.74
			Douglas rabbitbrush-rabbitbrush		11	97.96
			Douglas rabbitbrush-sacaton		9	11.86
DAFR	SPP	Shrubby potentilla		**2**	**3**	**0.36**
ERNA	SRR	Rabbitbrush		**23**	**1190**	**1417.49**
			Rabbitbrush-sacaton		677	951.47
			Rabbitbrush-saltgrass		255	170.77
			Rabbitbrush-rabbitbrush		75	35.57
			Rabbitbrush-sedge		61	64.55
			Rabbitbrush-alkaligrass		27	78.75
			Rabbitbrush-Baltic rush		25	32.88
			Rabbitbrush-Sandberg bluegrass		16	43.12
PYLA	SGW	Goldenweed		**3**	**11**	**7.82**
RHTR	SSK	Skunkbush		**1**	**1**	**0.05**
ROWO	SRW	Woods' rose		**15**	**45**	**37.88**
			Woods' rose-sedge		16	2.13
SAEX	SWC	Coyote willow		**17**	**83**	**40.39**
			Coyote willow-Baltic rush		19	14.46
			Coyote willow-Woods' rose		15	1.92
			Coyote willow-creeping wildrye		10	1.81
SALX	SWW	Willow		**4**	**8**	**1.99**
SAVE	SGR	Greasewood		**18**	**608**	**808.22**
			Greasewood-saltgrass		341	336.54
			Greasewood-rabbitbrush		137	355.78
			Greasewood-sacaton		51	62.49
			Greasewood-greasewood		18	5.99
			Greasewood-fieldclustered sedge		14	1.19
			Greasewood-Baltic rush		12	10.40
SHRUBLAND TOTALS				**113**	**2,196**	**2,988.63**

[1]Area estimates are rounded to the nearest hundredth of a hectare.
Species names associated with Species Code are presented in Appendix B.
Species names associated with Map Codes are presented in Table 2-3.

The rabbitbrush alliance is the most frequently occurring shrubland, containing over 20% of the shrubland associations (23 of 113) and over half of the polygons (1,190 of 2,196), and is the most abundant (1,417.49 of 2,988.63 ha, or 47% of the shrubland biome area) (Table 3-3). Rabbitbrush is a wide-spread species in the Great Basin region, both geographically and ecologically, occurring on a wide range of ecological sites, from dry uplands to relatively wet lowlands. It is a rapidly-growing shrub that quickly dominates sites during the early-middle stages of secondary succession and dominating sites for 20–50 years or longer. The major factor

separating the various associations in this alliance is soil moisture, both amount and degree of salinity.

The most frequent association within the rabbitbrush alliance is the rabbitbrush-sacaton association, which accounts for 57% of the polygons (677 of 1,190 polygons) and covers 67% of the area (951.47 ha of 1,417.49 ha) included in the alliance (Table 3-3). This association occurs on sites throughout the Great Basin where groundwater is at moderate depths (2–4 m) or that receive moderate amounts of surface runoff (Meinzer 1927; McLendon et al. 2008). The second-most frequent rabbitbrush association is the rabbitbrush-saltgrass association (255 polygons; 170.77 ha). This association occurs on sites where depth to groundwater is less (1–3 m) than those of the rabbitbrush-sacaton association, that receive more surface runoff, or that have higher salinity levels (Meinzer 1927; Miller et al. 1984; Comstock and Ehleringer 1992; Nichols 1994; McLendon et al. 2008). Other high-salinity rabbitbrush associations are the three rabbitbrush-alkaligrass associations (ERNA-PUCC, ERNA-PUFA, and ERNA-PULE; Table 3-1), rabbitbrush-alkali cordgrass, and rabbitbrush-glasswort. The rabbitbrush-sedge and the rabbitbrush-Baltic rush associations appear to occur on sites where groundwater is near the surface and salinity is low. Most of the remaining rabbitbrush associations also appear to occur where groundwater is near the surface and these various associations exist as a result of differences in the amount of available water and the amount of surface disturbance that has occurred at the site.

The second-most frequent shrubland alliance is the greasewood alliance. It contains 18 of the 113 associations (16%), 608 of the 2,196 polygons (28%), and 808.22 ha of the 2,988.63 ha of the shrubland biome (27%; Table 3-3). The greasewood alliance occurs on sites where groundwater is relatively shallow (2–6 m) but where the first meter does not remain saturated for long periods of time, or on sites that receive substantial surface runoff (Miller et al. 1982; Donart 1994; Nichols 1994; McLendon et al. 2008). Greasewood tends to dominate sites with soils that have relatively high clay contents. Greasewood is also relatively salt-tolerant (Branson et al. 1988). Six associations comprise most (573 out of 608 polygons; 772.39 out of 808.22 ha) of the greasewood alliance. Of these six, the greasewood-saltgrass association occurs on sites with the highest salinity content and, generally, an intermediate depth to groundwater. The greasewood-rabbitbrush and greasewood-sacaton associations most often occur on sites with slightly deeper groundwater and lower surface salinity, or in the case of the greasewood-rabbitbrush association, on sites that have been more heavily grazed historically. The greasewood-Baltic rush and greasewood-fieldclustered sedge associations occur on sites with higher groundwater than the other four associations, and the soils are often, but not always, less saline.

The big sagebrush alliance contains 14 of the 113 associations (12%), 153 of the 2,196 polygons (7%), and 186.02 ha of the 2,988.63 ha of mapped shrublands (6%; Table 3-3). Over 75% of the big sagebrush polygons (covering 146.67 ha, which is 79% of the alliance area), are contained in 3 associations: big sagebrush-rabbitbrush, big sagebrush-greasewood, and big sagebrush-sacaton. The big sagebrush-rabbitbrush is one of the most common associations in the Great Basin, occurring on both uplands and lowlands. On many of these sites, big sagebrush is the late-seral dominant, eventually replacing rabbitbrush, the mid-seral dominant. The relative proportions of big sagebrush and rabbitbrush are often a good indication of how far secondary succession has proceeded on the site. Big sagebrush is well adapted to sites with moderate to deep groundwater,

but is also adapted to sites where the water table is within 1–2 m of the surface, but not where the upper soil profile is frequently saturated (Meinzer 1927; Ganskopp 1986; Dobrowolski et al. 1990). Because big sagebrush is not well adapted to frequent surface saturation, the big sagebrush-saltgrass association is an uncommon association (2 polygons, 1.70 ha = 1 % of the alliance area), while the big sagebrush-sacaton association is relatively more frequent (22 polygons, 49.50 ha = 27 % of the alliance area). The big sagebrush-greasewood association is common (22% of the alliance area) where the water table is below 1 m and where the soils may be somewhat fine-textured (e.g., loams and clay loams), but not high in clay content. On high-clay sites, greasewood becomes the dominant alliance.

The Douglas rabbitbrush (3% of the polygons and 15% of the area for the shrubland biome) and the alkali rabbitbrush (1% of the polygons and 1% of the area for the shrubland biome) alliances are somewhat similar to the rabbitbrush alliance but are more tolerant of higher salinity levels, with alkali rabbitbrush being the most tolerant of the three species. The most frequent Douglas rabbitbrush associations are the Douglas rabbitbrush-saltgrass association (31% of the polygons and 12% of the area in the alliance) and the Douglas rabbitbrush-alkaligrass association (19% of the polygons and 21% of the area in the alliance). Both of these associations occur on moderate- to high-saline areas with shallow groundwater.

The coyote willow and the Woods' rose alliances (4% and 2% of the polygons, and 1% and 1% of the area, respectively, of the shrubland biome) occur on wet sites, primarily along the banks of streams, irrigation canals, and ponds. The coyote willow alliance contains 17 associations, 14 of which are strongly characteristic of wetlands or wet meadows (Table 3-1). The exceptions are the coyote willow-big sagebrush, coyote willow-saltgrass, and the coyote willow-sacaton associations. These 3 associations contain only 9 of the 83 polygons (7.40 of the 40.39 ha) included in the alliance and occur in transitional areas from the wetlands to dry meadows (saltgrass and sacaton) and lowland stands of big sagebrush. Woods' rose can form dense thickets along ecotones between wetlands or wet meadows and adjacent aquatic communities. Most of the associations in the Woods' rose alliance are wetland or wet meadow associations, with the differences among them largely determined by water availability (amount, depth, and permanency) and land use (degree of disturbance). The Woods' rose-redtop, Woods' rose-slender wheatgrass, Woods' rose-carrizo, and Woods' rose-Baltic rush associations occur at the wettest of the sites and the Woods' rose-mat muhly and Woods' rose-alkali cordgrass associations are examples where conditions are drier. The Woods' rose-sumpweed and Woods' rose-foxtail barley associations occur on more disturbed sites.

Of the 4 infrequent shrubland alliances, the shrubby potentilla and willow alliances compared to the skunkbush and goldenweed alliances occur on the wettest sites, where groundwater is at or near the surface. The sub-dominant species found associated with shrubby potentilla and/or willow (i.e., creeping wildrye, meadow fescue, Nebraska sedge, and creeping spikerush) are indicators of perennially wet conditions. The skunkbush alliance is represented in the mapped area by only one association, the skunkbush-redtop association, and it also occurs in wet areas, redtop being a major dominant species in the wet meadows of Spring Valley. The goldenweed alliance occurs on more saline areas than the other three alliances.

3.4 GRASSLAND VEGETATION

The grassland biome consists of those areas dominated by grasses, but not perennially covered by water. The grassland biome is the second-most frequently occurring biome in Spring Valley, covering 230 of the 752 mapped associations (31%) and 28% of the area that was mapped. The biome includes 26 alliances, 2,947 polygons, and covers 2,804.59 ha, with the saltgrass alliance being most common, containing 15% of the associations (34 of 230), 37% of the polygons (1,100 of 2,947), and 33% of the area (939.39 of 2,804.59 ha).

Water availability (depth to groundwater, amount and frequency of seasonal flooding, and irrigation) is the primary factor accounting for the distribution of the grassland alliances, associations, and communities. Salinity and land use are important secondary factors. The grasslands in Spring Valley can be divided into wet meadows and dry meadows, based on the amount of water available as indicated by species composition. The dry meadows tend to be more saline than the wet meadows, in large part because of surface soil moisture dynamics. The dry meadows generally are flooded only seasonally, if at all. Subsequently, much of the surface moisture is evaporated leaving the salts in the upper soil horizon. Although groundwater is generally within the rooting zone of these grasses, the saline surface horizon affects establishment and productivity in these dry meadows. In the wet meadows, the abundance of surface or near-surface water dilutes or flushes the salts allowing these meadows to remain less saline.

Although the separation into wet and dry meadow is clear in most cases, there are cases where the placement of an alliance, association, or community into these two groups is somewhat arbitrary. Moisture availability across these grasslands is a gradient and as with all ecological gradients, there can be ambiguity as to where to establish a boundary. In particular, this wet meadow-dry meadow gradient can exist within an alliance, with some associations within an alliance tending toward wet meadow classification and some tending toward dry meadow classification. In general, most associations within an alliance are included in the same wet- or dry-meadow category as the alliance. But at the extreme environmental edges of areas dominated by the alliance, there may be a transition to grassland associations that belong to another alliance. At that ecotone, a particular association can have characteristics of the alliances on both sides of the ecotone. The redtop alliance (GRT), for example, is a wet meadow grassland. However, the redtop-alkali muhly association (GRT-GMA) occurs where the availability of water is decreasing and the resulting salinity of the upper soil is increasing. As long as there is sufficient redtop present, the site can be included in the redtop alliance although it becomes more of a dry meadow as the amount of redtop decreases and the amount of alkali muhly increases. Whether a specific location (polygon) of a redtop-alkali muhly should be considered a wet meadow or a dry meadow is dependent on the relative amounts of these two species.

Much of Spring Valley is currently, and has been historically, used for livestock grazing. The livestock commonly found in Spring Valley (cattle, sheep, horses) are heavy users of grasses and grass-like plants (e.g., sedges). Consequently, the grassland communities have been impacted by livestock grazing and the degree of these impacts varies across the valley. At some sites, grazing has been excessive and the grasslands are in a deteriorated condition. At other sites, grazing has been more compatible with the ecological carrying capacity and impacts have been less

pronounced. The plant communities at some sites have also been affected by establishment of non-native species, either purposely or as a result of grazing practices or other human impacts. Non-livestock land use impacts have also affected species composition at some sites. A common example of this is the placement of irrigation ditches and their history of usage. Some of the wet meadows in Spring Valley appear to be the direct result of these irrigation practices.

A broad classification of the 26 grassland alliances into dry or wet meadows is presented in Table 3-4. This classification is based on the basic ecology of these grass species in the western United States and professional experience working with vegetation in these regions. As with all classification systems, dividing grassland alliances into wet and dry meadows may be somewhat arbitrary, and it should be kept in mind that some associations within an alliance may more correctly be classified into a different dry- or wet-meadow designation than that given to the alliance. Agricultural or disturbance factors may also be more important in describing the species composition than whether the site is a dry or wet site.

Table 3-4. Grassland alliances in Spring Valley, Nevada classified into dry or wet meadows, with number of associations, number of polygons, and area covered.

Species Code	Map Code	Alliance	Associations (#)	Polygons (#)	Area[1] (ha)
Dry Meadows[2]					
BRIN	GBI	Smooth brome	4	5	5.70
DISP	GST	Saltgrass	34	1,100	939.39
MUAS	GMA	Alkali muhly	1	2	0.12
MURI	GMM	Mat muhly	16	273	336.16
POA	GBB	Bluegrass	1	2	1.85
POSE	GBS	Sandberg bluegrass	16	202	208.36
PUCC	GAA	Alkaligrass	7	58	156.29
PUDI	GAW	Weeping alkaligrass	2	12	4.10
PUFA	GAT	Torrey alkaligrass	2	3	0.55
PULE	GAL	Lemmon's alkaligrass	14	164	130.71
SPAI	GSA	Sacaton	17	335	475.43
SPGR	GCA	Alkali cordgrass	11	194	70.86
TOTAL DRY MEADOW			125	2,350	2,329.52
Wet Meadows[2]					
AGGI	GRT	Redtop	22	217	109.80
ALAE	GFS	Shortawn foxtail	3	5	0.35
DAGL	GOR	Orchardgrass	5	8	16.15
DECE	GHT	Tufted hairgrass	11	47	43.56
ELTR	GWS	Slender wheatgrass	6	20	12.11
HOBR	GBM	Meadow barley	1	1	2.13
LECI	GWB	Basin wildrye	3	4	0.87
LETR	GWC	Creeping wildrye	13	113	75.34
PHAR	GCR	Reed canarygrass	4	5	0.29
PHAU	GCZ	Carrizo	5	9	1.22
PHPR	GTM	Timothy	4	15	23.03
POPR	GBK	Kentucky bluegrass	2	2	0.18
SCPR	GFM	Meadow fescue	22	136	164.01
THPO	GWT	Tall wheatgrass	4	15	26.02
TOTAL WET MEADOW			105	597	475.06

[1]Area estimates are rounded to the nearest hundredth of a hectare.
[2]Alliances are assigned to wet or dry meadow classification based on basic ecology of the grasses in the western United States and professional experience.
Species names associated with Species Code are presented in Appendix B.
Species names associated with Map Codes are presented in Table 2-3

The number of alliances were about equal between dry and wet meadows (12 and 14, respectively; Table 3-4). Diversity (average number of associations per alliance) was greater for dry meadows than for wet meadows (10.3 and 7.5, respectively) and the frequency of occurrence and abundance was much greater for dry meadows than for wet meadows (2,350 and 597 polygons; 2,333.06 and 475.06 ha, respectively; Table 3-4), as was the average frequency and average abundance for an association (195.8 and 42.6 polygons on average; 194.42 and 33.93 ha on average, respectively). This greater diversity in dry meadows is probably the result of greater environmental heterogeneity in the areas supporting the dry meadows. Although the wet meadow environments are very different from the surrounding xeric landscapes, the number of unique habitats is somewhat limited and these are further limited by the effects of agricultural management.

3.4.1 Dry Meadows

The most common grassland alliance, either dry or wet meadow, is the saltgrass alliance, whether measured by number of associations (34), number of polygons (1,100), or number of hectares (939.39) included in the alliance (Table 3-4). Over 37% of all grassland mapped polygons were saltgrass associations. Saltgrass communities typically occur on relatively flat landscapes, generally at or near the end of a topographic gradient. These sites tend to have moderately high groundwater (0.5–2.5 m; Meinzer 1927, Miller et al. 1982, Nichols 1994, McLendon et al. 2008) and receive runoff from adjacent areas. Salinity is moderate to moderately high (Miller et al. 1982).

There were only three polygons mapped as a near monoculture of saltgrass. A very common dry meadow saltgrass association in Spring Valley is the saltgrass-sacaton association (Table 3-1). Sacaton is a frequent co-dominant with saltgrass throughout the Great Basin. Distribution of these two species within this association is largely on the basis of micro-topography. Sacaton tends to occur more frequently on slightly higher micro-relief and saltgrass tends to dominate the lower, flatter, and more saline depressions.

A saltgrass association that is more frequent than the saltgrass-sacaton association is the saltgrass-Baltic rush association (Table 3-1). This association occurred on 324 polygons covering 343.84 ha, compared to 283 polygons covering 260.04 ha for the saltgrass-sacaton association. The saltgrass-Baltic rush association occurs on sites that have a higher water table or that receive more surface runoff than sites supporting the saltgrass-sacaton association. Surface soil salinity is lower in the saltgrass-Baltic rush association and this association is often transitional to wet meadow or wetland associations.

The saltgrass alliance contains 32 additional associations (34 total; Table 3-1). Twelve of the 32 additional associations are transitional to wet meadows or wetlands (i.e., the subdominant species is characteristic of wet meadows or wetlands). The most frequent of these 12 are the saltgrass-creeping wildrye and saltgrass-sedge associations (137 and 78 polygons, respectively; Table 3-1), covering 37.95 and 114.55 ha, respectively. Ten of the additional 32 associations are characteristic of high saline conditions and the differentiation among these 10 associations is largely the result of differences in surface soil salinity. The most frequent of these 10 high-saline associations are the saltgrass-alkali cordgrass association (64 polygons covering 29.31 ha), the saltgrass-Lemmon's alkaligrass association (46 polygons covering 14.68 ha), and the saltgrass-alkali pink association (23 polygons, covering 10.60 ha) (Table 3-1). The 10 remaining associations are mostly saltgrass associations at various early-seral stages, resulting from various disturbances. Frequently occurring examples include the saltgrass-sumpweed association (24 polygons covering 24.53 ha), the saltgrass-silver cinquefoil association (13 polygons covering 39.04 ha), the saltgrass-foxtail barley association (5 polygons covering 2.32 ha), and the saltgrass-popcorn flower association (5 polygons covering 2.95 ha).

Five other dry meadow alliances occur frequently in Spring Valley (Table 3-4). The sacaton alliance contains 17 associations on 335 polygons covering 475.43 ha. The most frequent associations in this alliance are the sacaton-Baltic rush association (125 polygons covering 207.94 ha), which is transitional to both wet meadows and wetlands, the sacaton-alkali cordgrass association (74 polygons covering 66.53 ha), the sacaton-Sandberg bluegrass association (32

polygons covering 39.73 ha), and the sacaton-sedge association (26 polygons covering 47.29 ha), which is transitional to wet meadows. The Sandberg bluegrass alliance contains 16 associations and occurs on 202 polygons covering 208.36 ha. The most frequent association in this alliance is the Sandberg bluegrass-Baltic rush association (71 polygons covering 63.49 ha), which is transitional to wet meadows and wetlands, as are the Sandberg bluegrass-slender wheatgrass (14 polygons covering 8.74 ha) and Sandberg bluegrass-creeping wildrye (34 polygons covering 26.93 ha) associations. Two associations, the Sandberg bluegrass-alkali cordgrass (23 polygons covering 55.18 ha) and Sandberg bluegrass-alkali ivesia (25 polygons covering 16.01 ha), are transitional to saline sites.

The mat muhly alliance (16 associations on 273 polygons covering 336.16 ha) is characteristically found on alkaline or saline sites that are relatively moist. Almost half (134 polygons covering 172.69) of the occurrences of this alliance are the mat muhly-Baltic rush association, which is transitional to wet meadows or wetlands. Most of the remaining polygons of this alliance are also transitional to wetlands; the mat muhly-sedge association is found on 44 polygons covering 101.85 ha and the mat muhly-fieldclustered sedge association is found on 40 polygons covering 27.20 ha.

The two other frequently-occurring dry meadow alliances are characteristic of alkaline soils. The Lemmon's alkaligrass alliance contains 14 associations on 164 polygons covering 130.71 ha (Table 3-4). Two associations comprise most of its occurrence. The Lemmon's alkaligrass-alkali cordgrass association (66 polygons covering 55.00 ha) occurs on alkaline sites and the Lemmon's alkaligrass-Baltic rush association (42 polygons covering 32.96 ha) is transitional from alkaline sites to wetlands. The alkali cordgrass alliance contains 11 associations on 194 polygons covering 70.86 ha, the primary association being the alkali cordgrass-Baltic rush association (103 polygons covering 39.14 ha).

3.4.2 Wet Meadows

Wet meadows occur on about one-quarter as many polygons in Spring Valley as do dry meadows (Table 3-4). Fourteen wet meadow alliances were mapped in Spring Valley but three comprise over 75% of the frequency and 73% of the abundance of these wet meadows: the redtop alliance (217 polygons covering 109.80 ha), the meadow fescue alliance (136 polygons covering 164.01 ha), and the creeping wildrye alliance (113 polygons covering 75.34 ha). Of the remaining alliances, the tufted hairgrass (47 polygons covering 43.56 ha), slender wheatgrass (20 polygons covering 12.11 ha), timothy (15 polygons covering 23.03 ha), and tall wheatgrass (15 polygons covering 26.02 ha) are most frequent.

The redtop alliance is the most frequent wet meadow type in Spring Valley. This alliance contains 21% of the wet meadow associations, 36% of the wet meadow polygons, and 23% of the wet meadow area. It commonly occurs along the meadow-wetland ecotone along irrigation ditches, pond edges, and wet seep areas. Redtop is a large grass (up to 1.5 m tall) that is adapted to saturated soils varying from dry surfaces with saturated subsurface horizons to standing water. Although the alliance contains 22 associations, two (redtop-Baltic rush association and redtop-Nebraska sedge association) contain over 67% of the polygons. The redtop-Nebraska sedge association is a wide-spread association in Spring Valley (69 polygons covering 30.05 ha) and is transitional between wet meadow and wetland, with many of the sites having shallow standing

water most of the time. The redtop-Baltic rush association (78 polygons covering 46.01 ha) tends to be a slightly drier association, often flooded but with the surface generally drying out at least once each year.

The meadow fescue alliance, a diverse wet meadow type, is the second-most frequent wet meadow alliance in Spring Valley, with the same number of associations as the redtop alliance (22 each; Table 3-4) but with two-thirds as many polygons covering over half again as many hectares (136 polygons covering 164.01 ha versus 217 polygons covering 109.80 ha). The meadow fescue alliance contains similar associations to both the redtop and the creeping wildrye alliances, the most frequent being the meadow fescue-Baltic rush association (35 polygons covering 31.32 ha) and the meadow fescue-sedge association (34 polygons covering 46.20 ha). Like redtop, meadow fescue can occupy sites that vary from those with surface soil being occasionally flooded to those with shallow, perennial standing water.

The creeping wildrye alliance is the third-most frequent wet meadow alliance in Spring Valley, occurring in about half as many polygons as the redtop alliance and covering about two-thirds the area (Table 3-4). This alliance typically occurs on sites slightly drier than those occupied by the redtop alliance. The most frequent association of the creeping wildrye alliance is the creeping wildrye-Baltic rush association (44 polygons covering 24.59 ha), which is typically found on slightly drier sites than the redtop-Baltic rush association. The second-most frequent association of the creeping wildrye alliance is the creeping wildrye-fieldclustered sedge (28 polygons covering 19.34 ha), which continues this wet-to-dry gradient, occurring on sites slightly drier than those of the creeping wildrye-Baltic rush association.

The tufted hairgrass alliance tends to occupy sites that are drier than those of the previous three alliances, although this alliance does occasionally occur on very wet sites (tufted hairgrass-field horsetail and tufted hairgrass-rush associations). The slender wheatgrass, timothy, and the tall wheatgrass alliances mostly occur on sites similar to those of the redtop and meadow fescue alliances, i.e., wet meadows transitional to wetlands.

3.5 WETLAND VEGETATION

The wetland biome consists of those areas where the soil is saturated during most of the year, but not perennially covered by water, and where the dominant vegetation is non-grass herbaceous species (Table 2-2). This biome is the most frequent biome in the mapped area of Spring Valley, containing 296 of the 752 mapped associations (39%) and 3,569 of the 9,331 polygons (38%), with a combined area of 3,173.54 of the 9,977.41 ha (32%; Table 3-1). The wetland biome included 36 alliances, two of which (Baltic rush and Nebraska sedge) contained 28% of the wetland associations (Table 3-5).

Micro-topography is a major factor affecting the distribution of associations and communities within the wetland biome. The wetland areas can be divided into three general categories based on micro-topography: those occurring on areas of slightly higher elevation, those occurring on areas of intermediate elevations, and those occurring on areas of slightly lower elevation. Here, we term these three micro-topographic zones the upper, intermediate, and lower zones. Water is supplied to most of these wetlands as groundwater at or near the surface, spring outflow, and irrigation, as well as precipitation and surface run-off. In wetlands adjacent to continual water

supplies, the lower zones have a more or less continually saturated soil surface whereas the upper zones have saturated soil near, but not at, the soil surface. In wetlands where the water supply is seasonal or intermittent (e.g., spring runoff, runoff following heavy rains, seasonal overflow from ditches and streams), the surface soils begin drying out when the water supply is reduced or ceases. At these sites, the surfaces of the upper zones tend to dry out more frequently and for longer periods of time than the lower zones. Thus, the vegetation mosaic characteristic of wetlands is principally a product of surface water availability as influenced by micro-topography.

The amount of water available at the soil surface in some of these wetlands is insufficient to remove accumulating salts, resulting in saline conditions in the upper soil layers. Subsurface layers remain saturated most of the time and the surfaces may become flooded occasionally, but the surface layers often dry out and remain saline. These wetlands support alliances or associations dominated by more salt-tolerant wetland species.

Also increasing the complexity of the wetland mosaic is past and present land use. Livestock grazing has not been uniform across these wetlands and some have been grazed more heavily than others. This differential grazing pressure has affected the vegetation composition in some wetlands. Alterations in irrigation practices have also impacted some areas more than others, as has recreational use.

A general classification of the wetland alliances on the basis of micro-topographic distribution is presented in Table 3-5. Similar to the classification of grasslands into wet and dry meadows, this classification is based on the ecology of the wetland species and professional experience working with vegetation in the western United States. This is a broad-level classification, with exceptions occurring because of the relative amount of water supplied to the site and because of salinity or land use. Variations also occur within the alliances, especially the larger alliances. The Nebraska sedge alliance, for example, is most characteristic of intermediate-zone wetlands between the drier upper zone and the wetter lower zone, with the majority of hectares occupied by this alliance occurring in the intermediate zone (793.10 of 912.87 hectares). This alliance, however, contains 45 mapped associations with 1,117 polygons (Table 3-5), and of these 45 associations, 11 are more frequent on upper-zone wetlands, 12 on intermediate, and 22 on lower-zone wetlands.

Overall, the number of associations contained in each of the three micro-topographic wetland groups are more similar than are the number of polygons and area covered (Table 3-5). Intermediate- and lower-zone wetlands contain more associations than the upper-zone wetlands. Alliances designated as intermediate-zone contain 71% of the wetland polygons and 78% of the wetland area. The combination of lower number of polygons but more equal number of associations in the upper- and the lower-zone wetlands, compared to the intermediate wetlands, indicates a much higher diversity of associations in both the upper and lower zones. This diversity in the upper zone is largely the result of increased salinity effect combined with relatively heavy land use impacts. The diversity in the lower zone wetlands is largely the result of differences in depth of standing water when it occurs, frequency of flooding, and frequency of surface saturation.

Table 3-5. Wetland alliances in Spring Valley, Nevada, listed by their characteristic micro-topographic position (upper, intermediate, lower zones), with number of associations, number of polygons, and area covered.

Position	Species Code	Map Code	Alliance	Associations (#)	Polygons (#)	Area[1] (ha)
Upper[2]						
	ACMI	WYR	Yarrow	1	2	2.98
	ARAN	WCS	Silver cinquefoil	16	181	133.12
	CARX	WSS	Sedge	29	209	207.84
	CISC	WTE	Elk thistle	2	2	0.67
	IRMI	WIR	Rocky Mountain iris	8	70	72.71
	IVKI	WIA	Alkali ivesia	1	1	4.57
	NIOC	WAP	Alkali pink	2	3	0.53
	PHPU	WPT	Tufted phlox	3	7	12.28
	POGR	WPN	Northwest cinquefoil	1	4	0.89
	SALI	WGW	Glasswort	4	6	7.90
	SOLI	WGO	Goldenrod	1	1	1.30
	THRH	WTG	Thermopsis	5	13	1.51
	TOTAL UPPER WETLANDS			73	499	446.30
Intermediate[2]						
	CANE	WSN	Nebraska sedge	45	1,117	912.87
	CAPR	WSF	Fieldclustered sedge	13	57	27.95
	IVAX	WSW	Sumpweed	7	25	11.70
	JUAR	WRB	Baltic rush	39	1,295	1,504.27
	MIGU	WMF	Common monkeyflower	3	8	0.08
	MOSS	WMO	Moss	2	3	0.01
	SPAR	WBR	Bur-reed	4	5	0.09
	TRFR	WCB	Strawberry clover	2	3	0.64
	TRPR	WCR	Red clover	1	5	5.20
	TRRE	WCW	White clover	3	18	4.33
	TOTAL INTERMEDIATE WETLANDS			119	2,536	2,467.14
Lower[2]						
	CARO	WSB	Beaked sedge	6	16	1.13
	CASI	WSA	Analogue sedge	9	26	7.91
	ELEO	WEE	Spikerush	4	32	47.98
	ELPA	WEC	Creeping spikerush	28	181	87.90
	ELRO	WEB	Beaked spikerush	6	51	10.58
	EQAR	WHT	Horsetail	1	1	0.72
	HIVU	WMT	Marestail	9	12	0.23
	JUEN	WRS	Swordleaf rush	2	2	0.08
	JUNC	WRR	Rush	2	2	1.11
	JUNE	WRN	Nevada rush	3	4	2.82
	SCAC	WBT	Tule bulrush	14	128	76.58
	SCAM	WBA	American bulrush	9	28	8.82
	SCIR	WBL	Bulrush	3	6	9.19
	TYLA	WCT	Cattail	8	45	5.48
	TOTAL LOWER WETLANDS			104	534	260.53

[1]Area estimates are rounded to the nearest hundredth of a hectare.
[2]Alliances are assigned to upper, intermediate, or lower zones in wetland classification based on basic ecology of the wetland species in the western United States and professional experience.
Species names associated with Species Code are presented in Appendix B.
Species names associated with Map Codes are presented in Table 2-3.

3.5.1 Upper-Zone Wetlands

Three alliances (sedge, silver cinquefoil, Rocky Mountain iris) comprise most of the alliances classified as upper-zone wetlands. Combined, these three alliances contain 73% of the upper-zone associations, 92% of the polygons, and 93% of the area (Table 3-5).

The sedge alliance contains those associations dominated by species of sedge that were not identified to species during the mapping effort, generally because of immaturity of the inflorescences. As such, this alliance is a somewhat artificial alliance and is more diverse in associations than it would likely have been had the sedge species been identified. Typical associations include the sedge-creeping spikerush (although this association covers only 4.38 ha) and the sedge-Rocky Mountain iris associations (Table 3-1). The sedge-spikerush and the sedge-creeping spikerush associations occur on lower-zone sites receiving more water. The sedge-cattail and sedge-water speedwell associations occur on much wetter sites than typical for the alliance in general. Frequently occurring associations on saline areas include the sedge-alkaligrass and the sedge-alkali cordgrass associations. The sedge-thermopsis, sedge-smooth brome, sedge-bindweed, and sedge-foxtail barley associations are typical of more heavily-impacted areas.

The silver cinquefoil alliance is a frequent upper-zone wetland that is characteristic of early-middle stages of secondary succession. These sites typically have been substantially impacted by some disturbance factor in the recent past. The silver cinquefoil-creeping spikerush, silver cinquefoil-fieldclustered sedge, and the silver cinquefoil-sedge associations are most typical. Somewhat wetter sites occupied by this alliance most frequently support silver cinquefoil-creeping spikerush, silver cinquefoil-field horsetail, and silver cinquefoil-sumpweed associations, with this last association being most indicative of disturbance. On more saline sites, this alliance is most frequently represented by the silver cinquefoil-alkali muhly association.

The Rocky Mountain iris alliance typically occurs on slightly wetter sites than the sliver cinquefoil alliance. The primary association in this alliance is the Rocky Mountain iris-Baltic rush association, which contains 56% of its polygons and covers 76% of its area (Table 3-1). Slightly drier sites occupied by this alliance support the Rocky Mountain iris-fieldclustered sedge association, and the Rocky Mountain iris-thermopsis association occurs on even drier sites.

Three alliances are most frequent on upper-zone saline sites. These are the glasswort, alkali ivesia, and alkali pink alliances, with the glasswort alliance typically occurring on the most saline sites of the three. The most common subdominants in these alliances are sacaton, saltgrass, and borage (Table 3-1), with the glasswort-saltgrass associations occurring on more saline sites than the glasswort-sacaton or alkali pink-sacaton associations.

3.5.2 Intermediate-Zone Wetlands

The intermediate-zone wetlands are the most frequent wetlands mapped in Spring Valley (Table 3-5). Of these, most were included in either the Nebraska sedge alliance or the Baltic rush alliance (44% and 51% of the polygons; 37% and 61% of the intermediate-zone wetland area, respectively). Nebraska sedge and Baltic rush are both adapted to a wide-range of wetland

conditions, ranging from nearly perennial standing water to relatively dry surface soil, with Baltic rush probably being adapted to a slightly wider range of environments. These two species frequently occur together in these wetlands (as the dominant and sub-dominant, in whichever combination) as the Nebraska sedge-Baltic rush association, which occurs on 441 polygons covering 465.63 ha (Table 3-1).

The Nebraska sedge alliance contains 45 associations, including the Nebraska sedge-Baltic rush association (Table 3-1). Twelve of these 45 occur most frequently on intermediate-zone wetlands. The most common of these 12 are the Nebraska sedge-Baltic rush and the Nebraska sedge-sedge associations. Together, these two associations contain 639 polygons covering 739.16 ha. The Nebraska sedge-fieldclustered sedge (70 polygons) and the Nebraska sedge-tufted hairgrass (15 polygons) associations are the next two most-frequently occurring associations of this alliance on intermediate-zone sites, covering 26.81 and 14.13 ha, respectively. There are 11 Nebraska sedge associations in the upper-zone wetlands. The Nebraska sedge-silver cinquefoil association is the most common upper-zone association of this alliance (17 polygons covering 4.89 ha). It occurs on drier sites and on sites that have had greater land use impacts. There are 22 lower-zone (wetter) Nebraska sedge associations. The most common of these are the Nebraska sedge-creeping spikerush (169 polygons covering 53.93 ha) and Nebraska sedge-analogue sedge (31 polygons covering 11.69 ha).

The Baltic rush alliance contains 39 associations with 1,295 polygons covering 1,504.27 ha, or 36% of all polygons and 47% of the area of wetland vegetation mapped in Spring Valley. The Baltic rush-sedge and the Baltic rush-fieldclustered sedge associations are the most frequent (556 and 273 polygons; 1,014.64 and 210.62 ha, respectively), and both are most common on intermediate-zone sites or on sites transitional from intermediate- to lower-zones. The Baltic rush-tufted hairgrass association (25 polygons covering 14.35 ha) also occurs most commonly on intermediate sites, but on sites slightly drier than sites occupied by the Baltic rush-fieldclustered sedge association. The Baltic rush-silver cinquefoil (197 polygons covering 174.04 ha), the Baltic rush-sumpweed (34 polygons covering 29.71 ha), and the Baltic rush-popcorn flower (34 polygons covering 11.21 ha) associations are all characteristic of more disturbed sites, with the former being more common on upper-zone wetlands and the later two on intermediate sites. The Baltic rush associations most indicative of disturbance are the Baltic rush-Canada thistle, Baltic rush-foxtail barley, and Baltic rush-popcorn flower associations.

The fieldclustered sedge alliance is also a common alliance on intermediate-zone wetlands (57 polygons covering 27.95 ha; Table 3-5). The most common association of this alliance (22 polygons covering 14.56 ha) is the fieldclustered sedge-sumpweed association, which is transitional to lower-zone (wetter) sites and is often indicative of previous disturbance. The fieldclustered sedge-white clover association is also indicative of previous heavy livestock use, but on more intermediate-zone sites. Similarly, the fieldclustered sedge-foxtail barley and the fieldclustered sedge-sweetclover associations are indicative of heavy use on the upper-zone wetlands of this alliance. The fieldclustered sedge-Lemmon's alkaligrass association occurs on more saline sites than those of the other associations of this alliance.

The other seven intermediate-zone wetland alliances (Table 3-5) are indicative of heavy livestock use or other types of disturbance (sumpweed, strawberry clover, red clover, and white

clover), or of wetter sites (common monkeyflower, moss, bur-reed). Of these, the sumpweed alliance is the most frequent. It contains 7 associations and was mapped on 25 polygons covering 11.70 ha. The sumpweed-foxtail barley is the association of this alliance most common on upper-zone wetlands and it is strongly indicative of heavy use. The sumpweed-popcorn flower association is most common on intermediate-zone wetlands and the sumpweed-creeping spikerush association on lower (wetter) sites. The sumpweed alliance is not found on strongly saline sites, the sumpweed-mat muhly association being the most salt-tolerant.

3.5.3 Lower-Zone Wetlands

Lower-zone wetlands in Spring Valley are very diverse. The alliances classified as lower-zone wetlands include 104 associations found on 534 polygons covering 260.53 ha, almost as many associations (119) contained within the alliances classified as intermediate-zone wetlands, but found on only about 20% as many polygons and only 10% as many hectares. These wetlands are transitional between the typical intermediate-zone wetlands and the aquatic associations (Figure 3-3). As such, they have characteristics of both wetlands and aquatic sites. Because of the wetter conditions in these lower-zone wetlands, they are almost exclusively freshwater wetlands. A few saline tolerant associations occur (analogue sedge-mat muhly, creeping spikerush-mat muhly, bulrush-sacaton), but they are the exceptions (3 associations out of 104) and are not characteristically saline-tolerant.

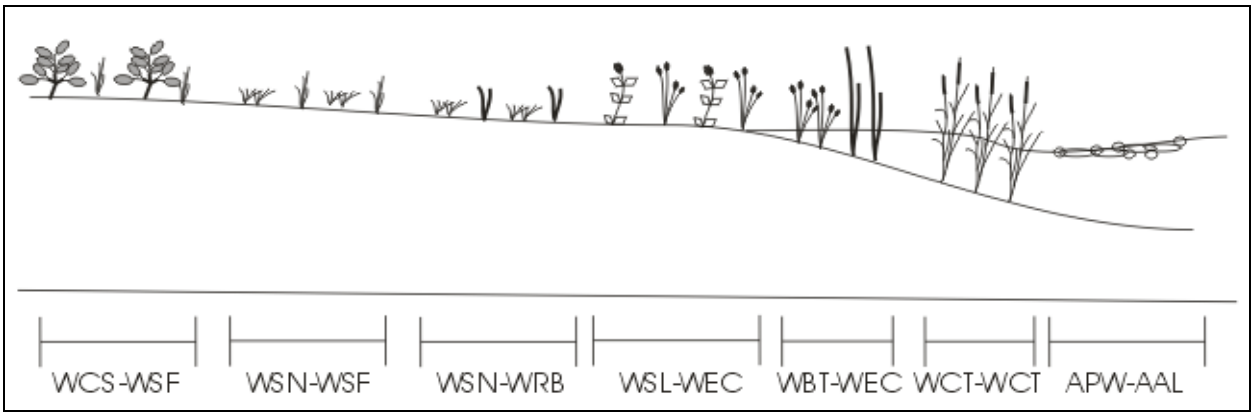

Figure 3-3. Schematic diagram of a simplified gradient in associations from upper-zone wetlands to an aquatic association in Spring Valley, Nevada. Association codes: WCS-WSF: silver cinquefoil-fieldclustered sedge, WSN-WSF: Nebraska sedge-fieldclustered sedge, WSN-WRB: Nebraska sedge-Baltic rush, WSL-WEC: Solomon plume-creeping spikerush, WBT-WEC: tule bulrush-creeping spikerush, WCT-WCT: cattail-cattail, APW-AAL: pondweed-algae.

The beaked sedge and analogue sedge alliances form the drier portion of the gradient between the typical wetlands and the aquatic associations. These are similar alliances, with the analogue sedge alliance the more common. This alliance contains some associations (3, with 5 polygons covering 1.89 ha; Table 3-1) characteristic of intermediate wetlands (analogue sedge-mat muhly, analogue sedge-tufted hairgrass, analogue sedge-redtop), but most of its associations (6, with 21 polygons covering 6.02 ha) are wetlands characteristic of very wet environments (e.g., analogue sedge-beaked spikerush, analogue sedge-Nevada rush, analogue sedge-water speedwell).

The most abundant alliances of the lower-zone wetlands are the spikerush alliances, and these form the next zone of the wetland-aquatic gradient. These three alliances contain 38 associations with 264 polygons covering 146.46 ha, representing nearly half of all the lower-zone polygons and 56% of the lower-zone wetland area (Table 3-5). The most common of these three alliances is the creeping spikerush alliance. It contains 28 associations, with 181 polygons covering 87.90 ha. The creeping spikerush alliance most typically occurs on sites slightly wetter than those of the Baltic rush alliance, and the most common association is the creeping spikerush-Baltic rush association (86 polygons covering 59.60 ha, Table 3-1). The next most frequent associations are the creeping spikerush-fieldclustered sedge (15 polygons covering 2.93 ha) and the creeping spikerush-tufted hairgrass (9 polygons covering 3.87 ha) on more intermediate-zone sites and the creeping spikerush-Nevada rush (8 polygons covering 0.86 ha), creeping spikerush-shortawn foxtail (7 polygons covering 1.60 ha) and creeping spikerush-common monkeyflower (7 polygons covering 5.97 ha) on wetter sites. The creeping spikerush-water knotweed (3 polygons covering 0.75 ha), creeping spikerush-water parsnip (2 polygons covering 0.01 ha), creeping spikerush-water plantain (1 polygon covering 0.11 ha), and creeping spikerush-fineleaf pondweed (1 polygon covering 0.02 ha) associations occur on sites that are more aquatic than wetland. The most common associations of the beaked spikerush alliance are the beaked spikerush-tufted hairgrass (25 polygons covering 5.81 ha) and the beaked spikerush-Nebraska sedge (14 polygons covering 1.89 ha), both of which are most common on intermediate-zone wetland sites, as is the most common association of the spikerush alliance, the spikerush-Baltic rush association (25 polygons covering 46.79 ha).

The wetter end of the wetland gradient is represented by the bulrush and cattail alliances. There are three bulrush alliances, of which the tule bulrush is the most common (Table 3-5). This alliance contains 14 associations on 128 polygons covering 76.58 ha. The typical association of this alliance is the tule bulrush-creeping spikerush association (28 polygons covering 24.28 ha), which occurs on sites that are wetter for longer periods of time than typical for the creeping spikerush alliance. The tule bulrush-Nebraska sedge association (29 polygons covering 6.49 ha) occurs on slightly higher sites, while the tule bulrush-silver cinquefoil association (4 polygons covering 16.78 ha) occurs on sties with a greater level of disturbance. The tule bulrush-cattail association (18 polygons covering 6.84 ha) occurs where the water level and duration of flooding increases over that for the tule bulrush-creeping spikerush association. Also typical of this wetter end of the gradient is the cattail alliance, which most frequently occurs as the cattail-Nebraska sedge association (23 polygons covering 3.11 ha) or as monocultures (cattail-cattail, 7 polygons covering 0.49 ha).

3.6 AQUATIC VEGETATION

The aquatic biome consists of those areas that are perennially covered with water (continual standing water) and that often support vegetation (Table 2-2). It can be difficult to precisely distinguish between aquatic associations and some of the lower-zone wetland associations (e.g., some associations in the bulrush and cattail alliances). By definition, an aquatic association has standing water year-round, whereas a wetland can have standing water most of the year. Some wetland associations may indeed have standing water year-round and therefore should be included as aquatic vegetation. However, in general, most of the associations in that particular wetland alliance do not have perennial standing water, so the alliance, and all associations in it,

is classified as a wetland. Conversely, some aquatic associations (e.g., water parsnip-redtop) might have the surface dry for short periods of the year.

As defined in this document, 14 alliances were mapped as being aquatic (Table 3-6). This biome contains the relatively few alliances (14) and associations (48), and is represented by a grand total of 243 polygons (30 of which are the WATR alliance) covering 28.41 ha (15.11 ha of which are the WATR alliance). Of these, 30 polygons covering 15.11 ha are classified as the WATR alliance and are characterized by open water without visible vegetation above or below the water. The woodland (173 polygons) and early-seral biomes (67 polygons) had fewer polygons compared to the aquatic biome, but covered a greater area (460.02 and 77.38, respectively), suggesting that the aquatic biome is relatively heterogeneous within the localities with perennial water in Spring Valley.

Table 3-6. Aquatic associations mapped in Spring Valley, Nevada, separated as to typically occurring in lotic (flowing water) or lentic (standing water) systems, with number of polygons and area covered.

Species Code	Map Code	Association	Polygons (#)	Area[1] (ha)
LOTIC SYSTEMS				
ALPL-SACU	AWP-WAR	Water plantain-duck potato	2	0.07
BEER-AGGI	APR-GRT	Water parsnip-redtop	3	0.04
BEER-ALAE	APR-GFS	Water parsnip-shortawn foxtail	2	0.06
BEER-CANE	APR-WSN	Water parsnip-Nebraska sedge	33	1.26
BEER-CAPR	APR-WSF	Water parsnip-fieldclustered sedge	1	< 0.01
BEER-CARX	APR-WSS	Water parsnip-sedge	4	0.26
BEER-EPIL	APR-WWH	Water parsnip-willow weed	1	< 0.01
BEER-JUAR	APR-WRB	Water parsnip-Baltic rush	15	0.27
BEER-MIGU	APR-WMF	Water parsnip-common monkeyflower	7	0.18
BEER-SCAM	APR-WBA	Water parsnip-American bulrush	8	0.11
BEER-SCPU	APR-WSQ	Water parsnip-common threesquare	4	0.23
BEER-BEER	APR-APR	Water parsnip-water parsnip	2	2.25
BEER-CEDE	APR-ACT	Water parsnip-coon's tail	1	0.02
BEER-LEMI	APR-ADW	Water parsnip-duckweed	1	< 0.01
BEER-POAM	APR-AKW	Water parsnip-water knotweed	1	0.03
BEER-RAAQ	APR-ACW	Water parsnip-white water crowfoot	5	0.03
BEER-VEAN	APR-AWS	Water parsnip-water speedwell	3	0.32
CIDO-CANE	AHW-WSN	Water hemlock-Nebraska sedge	1	0.16
NAOF-ALAE	AWC-GFS	Watercress-shortawn foxtail	2	0.08
NAOF-CANE	AWC-WSN	Watercress-Nebraska sedge	14	0.06
NAOF-ELPA	AWC-WEC	Watercress-creeping spikerush	2	0.02
NAOF-EPIL	AWC-WWH	Watercress-willow weed	1	< 0.01
NAOF-JUAR	AWC-WRB	Watercress-Baltic rush	6	0.08
NAOF-JUEN	AWC-WRS	Watercress-swordleaf rush	1	< 0.01
NAOF-JUNE	AWC-WRN	Watercress-Nevada rush	2	0.07
NAOF-MOSS	AWC-WMO	Watercress-moss	2	0.02
NAOF-BEER	AWC-APR	Watercress-water parsnip	9	0.09
NAOF-CAAQ	AWC-AWW	Watercress-water whorlgrass	1	< 0.01
NAOF-LEMI	AWC-ADW	Watercress-duckweed	6	0.31

Species Code	Map Code	Association	Polygons (#)	Area[1] (ha)
NAOF-NAOF	AWC-AWC	Watercress-watercress	26	0.20
NAOF-VEAN	AWC-AWS	Watercress-water speedwell	1	0.02
POAM-PHPR	AKW-GTM	Water knotweed-timothy	1	0.07
VEAN-CANE	AWS-WSN	Water speedwell-Nebraska sedge	26	5.96
VEAN-JUAR	AWS-WRB	Water speedwell-Baltic rush	1	0.11
VEAN-JUNE	AWS-WRN	Water speedwell-Nevada rush	1	0.04
VEAN-BICE	AWS-EBT	Water speedwell-beggars ticks	2	0.33
LENTIC SYSTEMS				
ALGA-HIVU	AAL-WMT	Algae-marestail	2	0.02
ALGA-ALGA	AAL-AAL	Algae-algae	2	0.01
CAAQ-RACY	AWW-WBC	Water whorlgrass-shore buttercup	1	< 0.01
LEMI-LEMI	ADW-ADW	Duckweed-duckweed	1	0.01
POTA-ALAE	APW-GFS	Pondweed-shortawn foxtail	2	0.12
POTA-JUAR	APW-WRB	Pondweed-Baltic rush	1	0.06
POTA-ALGA	APW-AAL	Pondweed-algae	1	0.20
POTA-LEMI	APW-ADW	Pondweed-duckweed	1	0.01
RAAQ-TYLA	ACW-WCT	White water crowfoot-cattail	1	0.01
RAAQ-RAAQ	ACW-ACW	White water crowfoot-white water crowfoot	1	< 0.01
STFI-STFI	APF-APF	Fineleaf pondweed-fineleaf pondweed	1	0.12
ZAPA-ZAPA	APH-APH	Horned pondweed-horned pondweed	1	< 0.01

[1]Area estimates are rounded to the nearest hundredth of a hectare.
Species names associated with Species Code are presented in Appendix B.
Species names associated with Map Codes are presented in Table 2-3.
Note: The WATR alliance, containing 30 polygons and covering 15.11 ha, is not included in this table.

Two factors that are important in differentiating the aquatic alliances are depth of water and whether the water is flowing (lotic systems) or standing (lentic systems). Most of the aquatic associations in Spring Valley occur in lotic systems. These include the spring pools, spring channels, and irrigation ditches. The primary lentic system in Spring Valley is a pond, mostly associated with irrigation systems. The effect of depth of water on vegetation distribution is most significant in the lentic systems. The division of alliances and associations into lotic or lentic should not be considered as absolute. There are areas of flowing water where typically lentic species have established. For example, some edges of slow-flowing ditches have cattails and bulrushes, which are more typically found in ponds. Similarly, water parsnip, a typically lotic species, can be found in some pond margins, especially near the point of water flow into the pond. Flow rate and seasonality of flow can also be important factors affecting the distribution of the associations.

The water parsnip alliance is the most common aquatic alliance that was mapped in Spring Valley. It contained 91 of the 243 aquatic polygons (37%) and covered 18% of the area (Table 3-6). This alliance commonly forms the transition between lower-zone wetlands and obligate

aquatic associations. Water parsnip most often is an emergent species in relatively shallow lotic systems, but some plants can be found rooted in the wetland edges along the stream or ditch. The most frequent association of the alliance is the water parsnip-Nebraska sedge association (33 polygons covering 1.26 ha), which is very characteristic of this wetland-aquatic ecotone, with the relative abundance of water parsnip increasing in the direction of the aquatic portion of the area and the relative abundance of Nebraska sedge increasing in the direction of the wetland. Other associations characteristic of this wetland-aquatic ecotone are the water parsnip-sedge, water parsnip-common monkeyflower, water parsnip-common threesquare, and water parsnip-American bulrush associations, roughly listed in order of increasing depth of water. The water parsnip-Baltic rush, water parsnip-shortawn foxtail, and water parsnip-redtop associations occur on slightly drier sites where the water parsnip is more restricted to lower depressions and the grasses and Baltic rush more abundant on slightly higher areas. As depth of water increases, the water parsnip-water parsnip, water parsnip-coon's tail, water parsnip-duckweed, water parsnip-water knotweed, water parsnip-white water crowfoot, and water parsnip-water speedwell occur.

The watercress alliance, which contains 73 polygons and covers 3% of the area within the aquatic biome (Table 3-6), is the second-most frequent aquatic alliance mapped. This alliance also occurs in the aquatic-wetland ecotone, with watercress most abundant in the aquatic portion of the area covered and the subdominant species more abundant in the wetland edge. This alliance is commonly found in shallow, but more rapidly flowing systems, often with rock or gravel beds. Common associations include watercress-watercress and watercress-water parsnip in areas with deeper water, and watercress-Nebraska sedge and watercress-Baltic rush in areas spanning the ecotone between aquatic and wetland biomes.

The water speedwell alliance was the third-most frequent aquatic alliance mapped, containing 30 polygons (Table 3-6) and covering 23% of the area within the aquatic biome. This alliance occurs in similar habitats to the water parsnip alliance, with greater abundance in the shallower aquatic systems and more transitional to lower-zone wetlands. In most cases (26 polygons covering 5.96 ha), this alliance is represented by the water speedwell-Nebraska sedge association.

The pondweed alliance (5 polygons covering 0.39 ha) is typically found in lentic systems, often neighboring bulrush or cattail alliances. In such cases, the bulrush or cattail alliances are more frequent along the pond margins and the pondweed alliance is more frequent in deeper standing water. However, some pondweed associations, for example the pondweed-shortawn foxtail and pondweed-Baltic rush associations, can also occur in shallow lentic systems that are transitional to wetlands.

3.7 EARLY-SERAL VEGETATION

A number of the grassland and wetland associations exist because of heavy land use (e.g., grazing, recreation, cultivation). These are indicated by an "E" as the first letter of the second trinomial in the map code designation. The alliances and associations discussed in this section (3.7) have been even more heavily impacted. These impacts have been sufficiently heavy or long-term that the dominant species of these alliances and associations are early-seral species.

The early-seral vegetation in Spring Valley is very heterogeneous, with site-specific conditions often defining the alliance or association. Overall, these sites were mapped into 15 alliances and 35 associations with a grand total of 67 polygons, with 25 of the associations represented by only one polygon and with 12 polygons the maximum number of polygons in a given association (Table 3-7). In addition, 9 polygons had no vegetation present (BARE alliance), covering 16.81 ha (22% of the 77.38 ha covered by the early-seral biome). Polygons supporting early-seral vegetation may undergo substantial vegetation change over the next 5–20 years. If the factors causing the disturbance are lessened or eliminated, the sites should undergo secondary succession, causing the vegetation to shift to associations similar to those currently existing on grassland or wetland sites.

Table 3-7. Early-seral associations mapped in Spring Valley, Nevada, listed in order (among alliances and then within alliances) of increasing estimated degree of disturbance, with number of polygons and area covered.

Species Code	Map Code	Association	Polygons (#)	Area[1] (ha)
HECU-JUAR	EHS-WRB	Salt heliotrope-Baltic rush	2	11.88
HECU-CARX	EHS-WSS	Salt heliotrope-sedge	2	4.46
HECU-IVAX	EHS-WSW	Salt heliotrope-sumpweed	2	2.06
CIVU-CANE	ETB-WSN	Bull thistle-Nebraska sedge	1	0.13
CIRS-POSE	ETT-GBS	Thistle-Sandberg bluegrass	1	0.04
CIRS-CIRS	ETT-ETT	Thistle-thistle	2	0.45
CIAR-AGGI	ETC-GRT	Canada thistle-redtop	1	< 0.01
CIAR-CADO	ETC-WSD	Canada thistle-Douglas sedge	1	0.05
MEOF-DECE	ECS-GHT	Sweetclover-tufted hairgrass	1	0.90
MEOF-LETR	ECS-GWC	Sweetclover-creeping wildrye	1	1.70
MEOF-CARX	ECS-WSS	Sweetclover-sedge	2	0.07
MESA-LETR	EAL-GWC	Alfalfa-creeping wildrye	1	0.11
MESA-JUAR	EAL-WRB	Alfalfa-Baltic rush	1	0.36
MESA-CAPR	EAL-WSF	Alfalfa-fieldclustered sedge	1	0.26
MESA-POA	EAL-GBB	Alfalfa-bluegrass	4	7.50
MESA-BROM	EAL-GBR	Alfalfa-brome	1	1.10
MESA-GRSQ	EAL-ECG	Alfalfa-curlycup gumweed	1	0.30
ARLU-LETR	ESL-GWC	Louisiana sagewort-creeping wildrye	1	0.08
ARLU-IVAX	ESL-WSW	Louisiana sagewort-sumpweed	1	0.51
POMO-JUAR	ERF-WRB	Rabbitsfoot grass-Baltic rush	2	0.08
PLSC-LETR	EPF-GWC	Popcorn flower-creeping wildrye	1	0.07
PLSC-HOBR	EPF-GBM	Popcorn flower-meadow barley	1	0.03
PLSC-DOLA	EPF-WDW	Popcorn flower-downingia	1	0.48
PLSC-HOJU	EPF-EBF	Popcorn flower-foxtail barley	1	0.06
POLY-ARAN	EKW-WCS	Knotweed-silver cinquefoil	1	0.36
POLY-POLY	EKW-EKW	Knotweed-knotweed	12	5.46
VEBR-HOJU	EVP-EBF	Prostrate verbena-foxtail barley	1	0.95

Species Code	Map Code	Association	Polygons (#)	Area[1] (ha)
HOJU-ELEO	EBF-WEE	Foxtail barley-spikerush	1	0.14
HOJU-CANE	EBF-WSN	Foxtail barley-Nebraska sedge	1	0.05
HOJU-TRIF	EBF-WCC	Foxtail barley-clover	1	0.09
HOJU-CIAR	EBF-ETC	Foxtail barley-Canada thistle	1	0.21
HOJU-POLY	EBF-EKW	Foxtail barley-knotweed	1	1.69
HOJU-VETH	EBF-EML	Foxtail barley-mullein	2	0.65
HAGL-HOJU	EHG-EBF	Halogeton-foxtail barley	1	12.35
BARE	EBG		9	16.81

[1]Area estimates are rounded to the nearest hundredth of a hectare.
Species names associated with Species Code are presented in Appendix B.
Species names associated with Map Codes are presented in Table 2-3.
Note: One association (UNID-UNID), containing 3 polygons and covering 5.92 ha, is not included in this table.

Relative degree of disturbance can be estimated in this vegetation on the basis of the subdominant species of an association (Table 3-7). If the subdominant species is also an early-seral species, impact has been greater than if the subdominant species is not an early-seral species. In addition, an annual species as either a dominant or subdominant species indicates greater impact than if these species were perennials.

Salt heliotrope is a species adapted to high salinity levels and it is difficult to know if this alliance is the result of disturbance or simply relatively high salinity levels. It was placed in the early-seral group under the assumption that other, later successional, salt-tolerant species would probably dominant the site over time. The subdominants in this alliance are not always species indicative of particularly high salt levels, suggesting that salt heliotrope was not dominant just because of high salt levels.

The bull thistle-Nebraska sedge and thistle-Sandberg bluegrass associations are likely to be moderately impacted versions of other Nebraska sedge and bluegrass associations. Thistles are species that commonly increase on moderately disturbed wetland sites. Canada thistle is an aggressive invading species on wetland sites, especially when the later-seral communities have been disturbed.

Sweetclover is a common early-seral species in many shrubland and grassland communities in the Great Basin. The presence of subdominants in this alliance that are mid- to late-seral species suggests that the disturbance on these sites was not particularly heavy or that there has been sufficient time since disturbance for these species to substantially increase.

The alfalfa alliance is indicative of previous cultivation, either on these sites or adjacent to them. Native species are the subdominants in three of the associations (alfalfa-creeping wildrye, alfalfa-Baltic rush, and alfalfa-fieldclustered sedge) suggesting that substantial time has passed since cultivation or that the alfalfa established from adjacent sites. Two associations, alfalfa-bluegrass and alfalfa-brome, may have been cultivated more recently because the subdominants are introduced species. The alfalfa-curlycup gumweed association is either the most recently cultivated or has been heavily impacted in the recent past. Curlycup gumweed is an early-seral species.

The Louisiana sagewort, rabbitsfoot grass, and popcorn flower alliances appear to be intermediate-aged disturbed sites or the disturbance was only moderate. With the exception of the popcorn flower-foxtail barley association, many of the subdominant species suggest moderate disturbance.

The silver cinquefoil alliance is a wetland alliance that indicates heavy land use. The prostrate knotweed-silver cinquefoil association is a version of this alliance that has received greater levels of, or more recent, disturbance. The prostrate verbena association also is indicative of heavy impacts.

Foxtail barley is an annual grass that is common on heavily disturbed sites. The six foxtail barley associations suggest several disturbance levels or disturbance over several time periods. The foxtail barley-spikerush and foxtail barley-Nebraska sedge associations are the least impacted (or have had the longest time to recover). Disturbance was not heavy enough to eliminate these two mid- to late-seral subdominants. The foxtail barley-clover and foxtail barley-Canada thistle associations indicate earlier seral stages than the previous two associations. Clover and Canada thistle are early-seral species, but they are perennials, suggesting that either some recovery has taken place on these sites or the impacts were not sufficiently heavy to reduce the vegetation to only annuals. The last two associations (foxtail barley-knotweed and foxtail barley-mullein) indicate either very heavy impacts to the site or very recent disturbance.

The halogeton-foxtail barley association indicates very degraded conditions. Both are annuals that are indicators of high levels of, and probably prolonged, disturbance. The bare ground alliance is suggestive of very intense or very recent disturbance or land use that has eliminated all above-ground vegetation.

4.0 RECOMMENDATIONS FOR FUTURE WORK

4.1 EXPAND MAPPING AREA

Portions of Spring Valley were not mapped in this effort. Of most interest to SNWA regarding the Clark, Lincoln, and White Pine Counties Groundwater Development Project are: 1) springs and wetlands on privately-owned lands where access was not granted for this project and 2) groundwater-influenced shrublands on the valley floor and valley-floor/alluvial fan interface. Additional effort should be made to gain access to any remaining unmapped, privately-owned lands, especially the meadows and wetlands, and these areas should be mapped. Such an effort would make the overall mapped area more complete, especially for those areas with the highest potential for impact from groundwater withdrawal.

Many of the valley floor shrublands were not mapped in this present effort. This, along with the lack of mapping privately-owned land, makes for an incomplete vegetation map of the Spring Valley lowlands. Although the dry shrubland vegetation is less likely to potentially be affected by groundwater withdrawal, changes are likely to occur as the result of other factors (e.g., climatic fluctuations, grazing management, irrigation practices on adjacent areas). Long-term management of SNWA owned and leased lands in Spring Valley will benefit from knowledge of what these vegetation units are.

Uplands were not mapped in this effort because they are not likely to be affected by groundwater withdrawal. However, SNWA also owns or leases some of these areas and development of long-term management plans will benefit from knowing specifically what these vegetation units are, along with their composition. The current effort has mapped the lowland areas on the plant community level. It may be that a less-intensive mapping program would be sufficient for the upland areas, perhaps at the association level.

4.2 REVIEW THE VEGETATION UNITS OVER TIME

Vegetation is dynamic; it changes over time. A number of factors cause these changes, three very important factors being climatic fluctuations, succession, and changes in land use. The current effort has mapped vegetation conditions as they existed in 2008–2009. With or without groundwater withdrawal, the vegetation will change over time. To account for these changes, a similar mapping effort should be conducted on a regular basis. Such an effort would increase the ability to identify the source of vegetation change in Spring Valley. Those areas considered to be most sensitive to potential impacts from management (e.g., wetlands, meadows) and those areas likely to undergo the most rapid successional changes (e.g., early-seral, meadows) should be re-mapped more frequently, perhaps at 10-year intervals. The remaining areas might be re-mapped at less frequent intervals, perhaps every 20 years.

4.3 REVIEW THE ECOLOGICAL DESCRIPTIONS

Section 3 of this report contains descriptions of the ecological relationships among many of the vegetation associations. These were based on the relative locations of the vegetation units and on experience working with vegetation in the Great Basin. As with all ecological interpretations, as more information becomes available more informed interpretations can be made. As new data

become available, in part from a potential re-mapping effort over time, these data should be reviewed, compared to the interpretations presented in this report, and when necessary these interpretations modified or corrected. Just as vegetation is dynamic, this document should be viewed as something that changes over time.

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APPENDIX A

PLANT BIOMES, ALLIANCES, ASSOCIATIONS, AND COMMUNITIES MAPPED IN SPRING VALLEY, NEVADA IN 2008–2009

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
Woodland Biome						
	Russian olive (ELAN)					
		Russian olive-big sagebrush				
			ELAN-ARTR-ERNA			
		Russian olive-currant				
			RIBE-ELAN-ROWO			
		Russian olive-redtop				
			ELAN-AGGI-CANE			
		Russian olive-saltgrass				
			ELAN-DISP-ERNA			
		Russian olive-Canada thistle				
			ELAN-CIAR			
	Rocky Mountain juniper (JUSC)					
		Rocky Mountain juniper-Rocky Mountain juniper				
			JUSC			
		Rocky Mountain juniper-big sagebrush				
			ARTR-JUSC-ACHY	ARTR-JUSC-SAVE	JUSC-ARTR-CHVI	
			ARTR-JUSC-DISP	ARTR-JUSC-SPAI	JUSC-ARTR-SPAI	
		Rocky Mountain juniper-Douglas rabbitbrush				
			CHVI-JUSC-SALI	CHVI-JUSC-SAVE		
		Rocky Mountain juniper-rabbitbrush				
			ERNA-JUSC-ARTR	ERNA-JUSC-POSE	ERNA-JUSC-SPAI	JUSC-ERNA-COUM
			ERNA-JUSC-DISP	ERNA-JUSC-PUCC	ERNA-JUSC-THME	JUSC-ERNA-PUCC
			ERNA-JUSC-LETR	ERNA-JUSC-SAVE	ERNA-JUSC-UNID	JUSC-ERNA-SPAI
		Rocky Mountain juniper-Woods' rose				
			JUSC-ROWO-IRMI	JUSC-ROWO-LETR	ROWO-JUSC-CARX	
		Rocky Mountain juniper-greasewood				
			JUSC-SAVE-ERNA	SAVE-JUSC-ERNA		
		Rocky Mountain juniper-redtop				
			AGGI-JUSC-JUAR			
		Rocky Mountain juniper-saltgrass				
			DISP-JUSC-ERNA	DISP-JUSC-JUAR	JUSC-DISP-SPGR	
		Rocky Mountain juniper-creeping wildrye				
			JUSC-LETR-JUAR	JUSC-LETR-PUCC	LETR-JUSC-ERNA	
		Rocky Mountain juniper-mat muhly				
			JUSC-MURI-IRMI			
		Rocky Mountain juniper-bluegrass				
			POA-JUSC-BRIN			
		Rocky Mountain juniper-Sandberg bluegrass				
			JUSC-POSE-ERNA	JUSC-POSE-SPAI	POSE-JUSC-EQAR	
			JUSC-POSE-JUAR		POSE-JUSC-SPAI	
		Rocky Mountain juniper-alkaligrass				
			JUSC-PUCC-CHVI	JUSC-PUCC-JUAR	PUCC-JUSC-ERNA	
			JUSC-PUCC-ERNA		PUCC-JUSC-JUAR	
		Rocky Mountain juniper-Torrey alkaligrass				
			PUFA-JUSC-IRMI	PUFA-JUSC-LETR		
		Rocky Mountain juniper-sacaton				
			JUSC-SPAI-CARX	JUSC-SPAI-JUAR	SPAI-JUSC-ERNA	SPAI-JUSC-PUCC
			JUSC-SPAI-ERNA	SPAI-JUSC-CHAL	SPAI-JUSC-JUAR	SPAI-JUSC-SAVE

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Rocky Mountain juniper-alkali cordgrass				
			JUSC-SPGR-JUAR	JUSC-SPGR-PULE	SPGR-JUSC-PUCC	
		Rocky Mountain juniper-Nebraska sedge				
			CANE-JUSC-ROWO	JUSC-CANE-JUAR		
		Rocky Mountain juniper-sedge				
			CARX-JUSC-JUAR	JUSC-CARX-DISP	JUSC-CARX-JUAR	JUSC-CARX-SPGR
				JUSC-CARX-IRMI	JUSC-CARX-POSE	
		Rocky Mountain juniper-spikerush				
			ELEO-JUSC-CARX			
		Rocky Mountain juniper-creeping spikerush				
			JUSC-ELPA-CAPR			
		Rocky Mountain juniper-Baltic rush				
			JUAR-JUSC-POA	JUAR-JUSC-SPAI	JUSC-JUAR	
			JUAR-JUSC-SOLI			
		Rocky Mountain juniper-thermopsis				
			JUSC-THRH-JUAR			
	White poplar (POAL)					
		White poplar-white poplar				
			POAL			
	Narrowleaf poplar (POAN)					
		Narrowleaf poplar-Woods' rose				
			POAN-ROWO-POPR	ROWO-POAN-RHTR		
	Eastern cottonwood (PODE)					
		Eastern cottonwood-eastern cottonwood				
			PODE			
Shrubland Biome						
	Big sagebrush (ARTR)					
		Big sagebrush-big sagebrush				
			ARTR			
		Big sagebrush-Douglas rabbitbrush				
			ARTR-CHVI-ERNA	ARTR-CHVI-LECI	ARTR-CHVI-SPAI	CHVI-ARTR-JUSC
			ARTR-CHVI-JUSC	ARTR-CHVI-SAVE		
		Big sagebrush-rabbitbrush				
			ARTR-ERNA	ARTR-ERNA-JUAR	ERNA-ARTR	ERNA-ARTR-MUAS
			ARTR-ERNA-CARX	ARTR-ERNA-JUSC	ERNA-ARTR-CARX	ERNA-ARTR-PULE
			ARTR-ERNA-DISP	ARTR-ERNA-SAVE	ERNA-ARTR-DISP	ERNA-ARTR-SAVE
			ARTR-ERNA-IVAX	ARTR-ERNA-SPAI	ERNA-ARTR-JUSC	ERNA-ARTR-SPAI
		Big sagebrush-greasewood				
			ARTR-SAVE-CHVI	ARTR-SAVE-ERNA	ARTR-SAVE-SPAI	SAVE-ARTR-DISP
			ARTR-SAVE-DISP	ARTR-SAVE-na	SAVE-ARTR-CHAL	SAVE-ARTR-ERNA
		Big sagebrush-redtop				
			AGGI-ARTR-ERNA	ARTR-AGGI-JUAR		
		Big sagebrush-saltgrass				
			ARTR-DISP-ERNA			
		Big sagebrush-basin wildrye				
			ARTR-LECI-ELAN	ARTR-LECI-ERNA	LECI-ARTR-SAVE	
		Big sagebrush-mat muhly				
			MURI-ARTR-ERNA	MURI-ARTR-POSE		

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Big sagebrush-sacaton				
			ARTR-SPAI-CHVI	ARTR-SPAI-ERNA	ARTR-SPAI-SAVE	SPAI-ARTR-JUAR
			ARTR-SPAI-DISP	ARTR-SPAI-JUSC	SPAI-ARTR-ERNA	SPAI-ARTR-SAVE
		Big sagebrush-fieldclustered sedge				
			CAPR-ARTR-JUAR			
		Big sagebrush-sedge				
			CARX-ARTR-ERNA			
		Big sagebrush-sumpweed				
			ARTR-IVAX-MURI	IVAX-ARTR-SPAI		
		Big sagebrush-Baltic rush				
			ARTR-JUAR-ERNA	ARTR-JUAR-IVAX		
		Big sagebrush-glasswort				
			ARTR-SALI-ERNA			
	Alkali rabbitbrush (CHAL)					
		Alkali rabbitbrush-greasewood				
			CHAL-SAVE-JUSC			
		Alkali rabbitbrush-saltgrass				
			CHAL-DISP-SPGR	DISP-CHAL-SAVE		
		Alkali rabbitbrush-mat muhly				
			CHAL-MURI-ERNA			
		Alkali rabbitbrush-carrizo				
			CHAL-PHAU-SAVE			
		Alkali rabbitbrush-Sandberg bluegrass				
			CHAL-POSE-JUAR			
		Alkali rabbitbrush-Lemmon's alkaligrass				
			CHAL-PULE-JUAR	CHAL-PULE-SPGR		
		Alkali rabbitbrush-sacaton				
			CHAL-SPAI-JUAR	SPAI-CHAL-ERNA	SPAI-CHAL-JUAR	SPAI-CHAL-SAVE
	Douglas rabbitbrush (CHVI)					
		Douglas rabbitbrush-rabbitbrush				
			CHVI-ERNA-DISP	CHVI-ERNA-SAVE	ERNA-CHVI-HEVI	ERNA-CHVI-SALI
			CHVI-ERNA-JUSC	CHVI-ERNA-SPGR	ERNA-CHVI-LECI	ERNA-CHVI-SPAI
		Douglas rabbitbrush-greasewood				
			CHVI-SAVE-DISP	CHVI-SAVE-JUSC	SAVE-CHVI-JUSC	
		Douglas rabbitbrush-saltgrass				
			CHVI-DISP-JUSC	CHVI-DISP-SAVE	DISP-CHVI-ERNA	DISP-CHVI-SAVE
			CHVI-DISP-LETR		DISP-CHVI-SALI	
		Douglas rabbitbrush-alkaligrass				
			CHVI-PUCC-DISP	CHVI-PUCC-PHAU	PUCC-CHVI-ERNA	PUCC-CHVI-SPGR
			CHVI-PUCC-JUSC	CHVI-PUCC-SPGR	PUCC-CHVI-JUSC	
		Douglas rabbitbrush-Torrey alkaligrass				
			CHVI-PUFA-JUAR	CHVI-PUFA-SPAI		
		Douglas rabbitbrush-sacaton				
			CHVI-SPAI-DISP	CHVI-SPAI-SALI	SPAI-CHVI-DISP	SPAI-CHVI-SAVE
		Douglas rabbitbrush-alkali cordgrass				
			CHVI-SPGR-DISP	CHVI-SPGR-LETR	SPGR-CHVI-PUCC	
			CHVI-SPGR-JUSC	CHVI-SPGR-PUCC		
		Douglas rabbitbrush-sedge				
			CHVI-CARX-MURI			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Douglas rabbitbrush-glasswort				
			CHVI-SALI-JUSC	CHVI-SALI-SPAI	CHVI-SALI-SPGR	SALI-CHVI-ERNA
	Shrubby potentilla (DAFR)					
		Shrubby potentilla-meadow fescue				
			SCPR-DAFR-JUAR			
		Shrubby potentilla-Nebraska sedge				
			CANE-DAFR-ELRO			
	Rabbitbrush (ERNA)					
		Rabbitbrush-rabbitbrush				
			ERNA			
		Rabbitbrush-Woods' rose				
			ERNA-ROWO	ROWO-ERNA-SAEX		
		Rabbitbrush-crested wheatgrass				
			ERNA-AGCR-GUSA			
		Rabbitbrush-saltgrass				
			DISP-ERNA-CAPR	DISP-ERNA-SPAI	ERNA-DISP-CHVI	ERNA-DISP-PULE
			DISP-ERNA-CARX	DISP-ERNA-SPGR	ERNA-DISP-IVAX	ERNA-DISP-SAVE
			DISP-ERNA-JUAR	DISP-ERNA-THRH	ERNA-DISP-JUAR	ERNA-DISP-SPAI
			DISP-ERNA-JUSC	ERNA-DISP-ARTR	ERNA-DISP-JUSC	ERNA-DISP-SPGR
			DISP-ERNA-NIOC	ERNA-DISP-ATTR	ERNA-DISP-LETR	
			DISP-ERNA-SAVE	ERNA-DISP-CARX	ERNA-DISP-NIOC	
		Rabbitbrush-basin wildrye				
			ERNA-LECI-CARX	LECI-ERNA-CHVI		
		Rabbitbrush-creeping wildrye				
			ERNA-LETR-DISP	ERNA-LETR-MUAS	LETR-ERNA-DISP	LETR-ERNA-SAVE
		Rabbitbrush-mat muhly				
			MURI-ERNA-JUAR			
		Rabbitbrush-bluegrass				
			ERNA-POA-JUSC			
		Rabbitbrush-Sandberg bluegrass				
			ERNA-POSE-CHAL	ERNA-POSE-JUAR	POSE-ERNA-EQAR	POSE-ERNA-JUSC
			ERNA-POSE-HYLE	ERNA-POSE-JUSC	POSE-ERNA-JUAR	POSE-ERNA-LETR
			ERNA-POSE-IVAX	ERNA-POSE-SPAI		
		Rabbitbrush-alkaligrass				
			ERNA-PUCC-JUSC	PUCC-ERNA-JUAR	PUCC-ERNA-SPAI	
			ERNA-PUCC-SPAI	PUCC-ERNA-JUSC		
		Rabbitbrush-Torrey alkaligrass				
			PUFA-ERNA-JUSC			
		Rabbitbrush-Lemmon's alkaligrass				
			ERNA-PULE-JUAR	PULE-ERNA-DISP	PULE-ERNA-LETR	PULE-ERNA-SPAI
		Rabbitbrush-sacaton				
			ERNA-SPAI-ARTR	ERNA-SPAI-LETR	ERNA-SPAI-SAVE	SPAI-ERNA-na
			ERNA-SPAI-ATCO	ERNA-SPAI-na	SPAI-ERNA-ARTR	SPAI-ERNA-POSE
			ERNA-SPAI-CAPR	ERNA-SPAI-PHAU	SPAI-ERNA-CARX	SPAI-ERNA-PUCC
			ERNA-SPAI-CHAL	ERNA-SPAI-POSE	SPAI-ERNA-DISP	SPAI-ERNA-SAEX
			ERNA-SPAI-DISP	ERNA-SPAI-PUCC	SPAI-ERNA-JUAR	SPAI-ERNA-SAVE
			ERNA-SPAI-JUAR	ERNA-SPAI-PUFA	SPAI-ERNA-JUSC	SPAI-ERNA-SPGR
			ERNA-SPAI-JUSC	ERNA-SPAI-SALI	SPAI-ERNA-LETR	

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Rabbitbrush-alkali cordgrass				
			ERNA-SPGR-DISP	ERNA-SPGR-SAVE	SPGR-ERNA-POSE	SPGR-ERNA-SAVE
		Rabbitbrush-tall wheatgrass				
			ERNA-THPO-DISP	THPO-ERNA-EQAR	THPO-ERNA-SAVE	
		Rabbitbrush-fieldclustered sedge				
			CAPR-ERNA-ARTR	CAPR-ERNA-SPAI	ERNA-CAPR-JUAR	ERNA-CAPR-SPCR
		Rabbitbrush-sedge				
			CARX-ERNA-ARTR	CARX-ERNA-JUAR	CARX-ERNA-ROWO	ERNA-CARX-JUAR
			CARX-ERNA-ATCO	CARX-ERNA-LECI	CARX-ERNA-SPAI	ERNA-CARX-JUSC
			CARX-ERNA-DISP	CARX-ERNA-PUCC		
		Rabbitbrush-horsetail				
			ERNA-EQAR-SAVE			
		Rabbitbrush-Rocky Mountain iris				
			ERNA-IRMI-PULE			
		Rabbitbrush-sumpweed				
			ERNA-IVAX-SAVE	IVAX-ERNA-LECI		
		Rabbitbrush-Baltic rush				
			ERNA-JUAR-ARTR	ERNA-JUAR-DISP	JUAR-ERNA-DISP	JUAR-ERNA-LETR
			ERNA-JUAR-CAPR	ERNA-JUAR-SPAI	JUAR-ERNA-JUSC	JUAR-ERNA-MURI
			ERNA-JUAR-CARX	ERNA-JUAR-SPGR		JUAR-ERNA-SPAI
		Rabbitbrush-glasswort				
			SALI-ERNA-DISP			
		Rabbitbrush-Canada thistle				
			ERNA-CIAR			
	Goldenweed (PYLA)					
		Goldenweed-Sandberg bluegrass				
			POSE-PYLA-JUSC	PYLA-POSE-ELTR	PYLA-POSE-IVKI	
		Goldenweed-Lemmon's alkaligrass				
			PULE-PYLA-ARAN	PULE-PYLA-ELTR	PULE-PYLA-JUSC	
		Goldenweed-alkali ivesia				
			IVKI-PYLA-PULE			
	Skunkbush (RHTR)					
		Skunkbush-redtop				
			RHTR-AGGI-JUAR			
	Woods' rose (ROWO)					
		Woods' rose-big sagebrush				
			ROWO-ARTR	ROWO-ARTR-JUSC		
		Woods' rose-Woods' rose				
			ROWO			
		Woods' rose-redtop				
			AGGI-ROWO-ARLU			
		Woods' rose-tufted hairgrass				
			DECE-ROWO-JUAR	DECE-ROWO-JUSC		
		Woods' rose-slender wheatgrass				
			ROWO-ELTR-CARX			
		Woods' rose-mat muhly				
			MURI-ROWO-JUAR	ROWO-MURI-LETR		
		Woods' rose-carrizo				
			ROWO-PHAU-PUDI			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Woods' rose-Kentucky bluegrass				
			ROWO-POPR			
		Woods' rose-Sandberg bluegrass				
			POSE-ROWO-CARX			
		Woods' rose-alkali cordgrass				
			ROWO-SPGR-JUSC	SPGR-ROWO-ERNA	SPGR-ROWO-JUSC	
		Woods' rose-sedge				
			CARX-ROWO-ELEO	CARX-ROWO-JUSC	ROWO-CARX-IRMI	ROWO-CARX-LECI
			CARX-ROWO-JUAR		ROWO-CARX-JUAR	ROWO-CARX-VEAN
		Woods' rose-sumpweed				
			ROWO-IVAX-ARLU			
		Woods' rose-Baltic rush				
			ROWO-JUAR	ROWO-JUAR-CANE	ROWO-JUAR-IRMI	
		Woods' rose-moss				
			ROWO-MOSS			
		Woods' rose-foxtail barley				
			HOJU-ROWO-ARCA	HOJU-ROWO-HECU	ROWO-HOJU-ARAN	ROWO-HOJU-ARCA
	Coyote willow (SAEX)					
		Coyote willow-big sagebrush				
			SAEX-ARTR-SPAI			
		Coyote willow-Woods' rose				
			ROWO-SAEX-AGGI	SAEX-ROWO-ARTR	SAEX-ROWO-HOBR	SAEX-ROWO-PHPR
				SAEX-ROWO-BRIN	SAEX-ROWO-HOJU	SAEX-ROWO-THRH
		Coyote willow-redtop				
			SAEX-AGGI-CAPR	SAEX-AGGI-ELPA	SAEX-AGGI-JUAR	
		Coyote willow-tufted hairgrass				
			DECE-SAEX-SPGR			
		Coyote willow-saltgrass				
			SAEX-DISP-SPAI			
		Coyote willow-creeping wildrye				
			SAEX-LETR-IVAX	SAEX-LETR-POPR	SAEX-LETR-ROWO	
		Coyote willow-mat muhly				
			SAEX-MURI-CAPR			
		Coyote willow-carrizo				
			PHAU-SAEX-CARX			
		Coyote willow-meadow fescue				
			SAEX-SCPR-AGGI			
		Coyote willow-sacaton				
			SAEX-SPAI-SPGR			
		Coyote willow-milkweed				
			SAEX-ASSP-AGGI			
		Coyote willow-Nebraska sedge				
			CANE-SAEX-JUAR	CANE-SAEX-SCPR	SAEX-CANE-JUAR	
		Coyote willow-sedge				
			CARX-SAEX-JUAR	SAEX-CARX-CANE	SAEX-CARX-JUAR	
		Coyote willow-creeping spikerush				
			SAEX-ELPA-PHPR			
		Coyote willow-Baltic rush				
			SAEX-JUAR-CANE	SAEX-JUAR-MOSS	SAEX-JUAR-ROWO	
			SAEX-JUAR-CARX	SAEX-JUAR-MURI	SAEX-JUAR-TYLA	

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Coyote willow-moss				
			SAEX-MOSS-CANE			
		Coyote willow-tule bulrush				
			SAEX-SCAC-JUAR			
	Willow (SALX)					
		Willow-creeping wildrye				
			SALX-LETR-MESA			
		Willow-meadow fescue				
			SALX-SCPR-PHPR			
		Willow-Nebraska sedge				
			SALX-CANE-POSE			
		Willow-creeping spikerush				
			SALX-ELPA-SPAR			
	Greasewood (SAVE)					
		Greasewood-shadscale				
			SAVE-ATCO	SAVE-ATCO-DISP	SAVE-ATCO-ERNA	
		Greasewood-rabbitbrush				
			ERNA-SAVE-ARTR	ERNA-SAVE-LETR	SAVE-ERNA-ARTR	SAVE-ERNA-LETR
			ERNA-SAVE-ATCO	ERNA-SAVE-PUCC	SAVE-ERNA-ATCO	SAVE-ERNA-SPAI
			ERNA-SAVE-DISP	ERNA-SAVE-SPAI	SAVE-ERNA-DISP	SAVE-ERNA-SPCR
			ERNA-SAVE-JUAR	ERNA-SAVE-TACH	SAVE-ERNA-JUAR	
			ERNA-SAVE-JUSC		SAVE-ERNA-JUSC	
		Greasewood-greasewood				
			SAVE			
		Greasewood-saltgrass				
			DISP-SAVE	DISP-SAVE-LETR	SAVE-DISP	SAVE-DISP-JUAR
			DISP-SAVE-CARX	DISP-SAVE-NIOC	SAVE-DISP-ARTR	SAVE-DISP-LECI
			DISP-SAVE-CHVI	DISP-SAVE-SALI	SAVE-DISP-CHVI	SAVE-DISP-LETR
			DISP-SAVE-ERNA	DISP-SAVE-SPAI	SAVE-DISP-ERNA	SAVE-DISP-NIOC
			DISP-SAVE-IVAX		SAVE-DISP-HOJU	SAVE-DISP-SPAI
			DISP-SAVE-JUAR		SAVE-DISP-IVAX	
		Greasewood-slender wheatgrass				
			ELTR-SAVE-IVAX			
		Greasewood-basin wildrye				
			LECI-SAVE-ERNA	SAVE-LECI-ARTR		
		Greasewood-creeping wildrye				
			SAVE-LETR	SAVE-LETR-ERNA	SAVE-LETR-JUAR	
		Greasewood-mat muhly				
			MURI-SAVE-ERNA	MURI-SAVE-JUAR	MURI-SAVE-UNID	
		Greasewood-alkaligrass				
			PUCC-SAVE-ERNA			
		Greasewood-Lemmon's alkaligrass				
			PULE-SAVE-DISP			
		Greasewood-sacaton				
			SAVE-SPAI-CARX	SAVE-SPAI-ERNA	SPAI-SAVE-CHAL	SPAI-SAVE-IVAX
			SAVE-SPAI-DISP	SAVE-SPAI-JUSC	SPAI-SAVE-DISP	SPAI-SAVE-JUAR
					SPAI-SAVE-ERNA	
		Greasewood-fieldclustered sedge				
			SAVE-CAPR-DISP	SAVE-CAPR-JUAR	SAVE-CAPR-SPAI	

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Greasewood-sumpweed				
			IVAX-SAVE-SAEX	SAVE-IVAX-JUAR		
		Greasewood-Baltic rush				
			JUAR-SAVE-CHVI	JUAR-SAVE-DISP	JUAR-SAVE-ERNA	SAVE-JUAR-DISP
		Greasewood-alkali pink				
			SAVE-NIOC-IVAX			
		Greasewood-glasswort				
			SAVE-SALI-ERNA			
		Greasewood-kochia				
			SAVE-BASC-HOJU			
		Greasewood-foxtail barley				
			HOJU-SAVE-DISP	SAVE-HOJU-ERNA		
Grassland Biome						
	Redtop (AGGI)					
		Redtop-tufted hairgrass				
			AGGI-DECE-JUNE	DECE-AGGI-ELPA		
		Redtop-velvetgrass				
			HOLA-AGGI-ELPA			
		Redtop-alkali muhly				
			AGGI-MUAS-ELRO			
		Redtop-mat muhly				
			MURI-AGGI-CAPR	MURI-AGGI-JUAR	MURI-AGGI-JUNE	
		Redtop-timothy				
			AGGI-PHPR-ALAE	AGGI-PHPR-EQAR	PHPR-AGGI-ELPA	
			AGGI-PHPR-CANE	AGGI-PHPR-JUAR		
		Redtop-alkali cordgrass				
			AGGI-SPGR-ROWO			
		Redtop-silver cinquefoil				
			AGGI-ARAN-JUAR	ARAN-AGGI-HOJU	ARAN-AGGI-JUAR	
		Redtop-Nebraska sedge				
			AGGI-CANE-CARX	CANE-AGGI	CANE-AGGI-ELEO	CANE-AGGI-JUNE
			AGGI-CANE-ELPA	CANE-AGGI-ALAE	CANE-AGGI-ELPA	CANE-AGGI-MIGU
			AGGI-CANE-JUAR	CANE-AGGI-ARAN	CANE-AGGI-ELRO	CANE-AGGI-NAOF
			AGGI-CANE-MURI	CANE-AGGI-BEER	CANE-AGGI-EPIL	CANE-AGGI-PHPR
			AGGI-CANE-SCPR	CANE-AGGI-CAPR	CANE-AGGI-HOBR	CANE-AGGI-SCAC
			AGGI-CANE-TRRE	CANE-AGGI-CARX	CANE-AGGI-HOJU	CANE-AGGI-TRIF
				CANE-AGGI-DECE	CANE-AGGI-JUAR	CANE-AGGI-TRRE
		Redtop-fieldclustered sedge				
			AGGI-CAPR-JUAR	AGGI-CAPR-TRRE		
		Redtop-sedge				
			AGGI-CARX-ELEO	CARX-AGGI-CANE	CARX-AGGI-SALX	CARX-AGGI-VEAN
			AGGI-CARX-JUAR	CARX-AGGI-JUAR	CARX-AGGI-SCPR	
		Redtop-elk thistle				
			AGGI-CISC-SAVE			
		Redtop-spikerush				
			AGGI-ELEO-PHAR	ELEO-AGGI-CARX		
		Redtop-beaked spikerush				
			AGGI-ELRO-CARX	ELRO-AGGI-JUAR		

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Redtop-horsetail	`			
			AGGI-EQAR-PHPR			
		Redtop-Baltic rush				
			AGGI-JUAR-CANE	AGGI-JUAR-THRH	JUAR-AGGI-ELAN	JUAR-AGGI-PHPR
			AGGI-JUAR-CARX	JUAR-AGGI	JUAR-AGGI-ELPA	JUAR-AGGI-POPR
			AGGI-JUAR-ELPA	JUAR-AGGI-ARAN	JUAR-AGGI-ELTR	JUAR-AGGI-SCPR
			AGGI-JUAR-MURI	JUAR-AGGI-CANE	JUAR-AGGI-ERNA	JUAR-AGGI-TRFR
			AGGI-JUAR-POPR	JUAR-AGGI-CAPR	JUAR-AGGI-HEPU	JUAR-AGGI-TRRE
			AGGI-JUAR-RUCR	JUAR-AGGI-CARX	JUAR-AGGI-MUAS	
			AGGI-JUAR-SCPR	JUAR-AGGI-CIDO	JUAR-AGGI-MURI	
		Redtop-bur-reed				
			AGGI-SPAR-CANE			
		Redtop-thermopsis				
			AGGI-THRH-POPR	THRH-AGGI-CAPR	THRH-AGGI-JUAR	
		Redtop-clover				
			TRIF-AGGI-CANE	TRIF-AGGI-JUAR	TRIF-AGGI-PHPR	
		Redtop-red clover				
			AGGI-TRPR-JUAR	TRPR-AGGI-DISP		
		Redtop-white clover				
			AGGI-TRRE-CANE	AGGI-TRRE-JUAR	TRRE-AGGI-CANE	TRRE-AGGI-JUNC
			AGGI-TRRE-CAPR	AGGI-TRRE-JUNE	TRRE-AGGI-JUAR	TRRE-AGGI-SCPR
		Redtop-cattail				
			AGGI-TYLA-ELPA			
		Redtop-water hemlock				
			AGGI-CIDO-MEOF			
	Shortawn foxtail (ALAE)					
		Shortawn foxtail-Baltic rush				
			ALAE-JUAR-AGGI	ALAE-JUAR-CANE		
		Shortawn foxtail-Nevada rush				
			ALAE-JUNE-ELPA			
		Shortawn foxtail-duck potato				
			ALAE-SACU-ELPA			
	Smooth brome (BRIN)					
		Smooth brome-mat muhly				
			BRIN-MURI-JUAR			
		Smooth brome-sumpweed				
			BRIN-IVAX-COAR			
		Smooth brome-thermopsis				
			BRIN-THRH-JUAR			
		Smooth brome-alfalfa				
			BRIN-MESA-CARX	BRIN-MESA-SCPR		
	Orchardgrass (DAGL)					
		Orchardgrass-Sandberg bluegrass				
			DAGL-POSE-JUAR			
		Orchardgrass-Nebraska sedge				
			DAGL-CANE-POSE			
		Orchardgrass-sedge				
			DAGL-CARX-CANE	DAGL-CARX-MESA		
		Orchardgrass-Baltic rush				
			DAGL-JUAR-CARX			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Orchardgrass-alfalfa				
			DAGL-MESA-SCPR	MESA-DAGL-PHPR	MESA-DAGL-POA	
	Tufted hairgrass (DECE)					
		Tufted hairgrass-slender wheatgrass				
			DECE-ELTR-JUAR			
		Tufted hairgrass-meadow barley				
			DECE-HOBR-CANE			
		Tufted hairgrass-Sandberg bluegrass				
			DECE-POSE-JUAR	DECE-POSE-LETR	DECE-POSE-SPGR	POSE-DECE-LETR
		Tufted hairgrass-Lemmon's alkaligrass				
			DECE-PULE-POSE	DECE-PULE-PYLA		
		Tufted hairgrass-silver cinquefoil				
			DECE-ARAN-AGGI	DECE-ARAN-ELPA	DECE-ARAN-ROWO	
		Tufted hairgrass-Parry's sedge				
			DECE-CAPA-JUAR			
		Tufted hairgrass-sedge				
			CARX-DECE-CANE	CARX-DECE-JUAR	DECE-CARX-ELPA	DECE-CARX-POSE
			CARX-DECE-IRMI		DECE-CARX-JUAR	DECE-CARX-SPGR
		Tufted hairgrass-horsetail				
			DECE-EQAR-PULE			
		Tufted hairgrass-Rocky Mountain iris				
			DECE-IRMI-ELTR	IRMI-DECE-MURI		
		Tufted hairgrass-rush				
			DECE-JUNC-ARAN			
		Tufted hairgrass-Canada thistle				
			DECE-CIAR-MEOF			
	Saltgrass (DISP)					
		Saltgrass-redtop				
			DISP-AGGI-JUAR	DISP-AGGI-TRPR		
		Saltgrass-tufted hairgrass				
			DECE-DISP-ARAN	DISP-DECE-JUAR		
		Saltgrass-saltgrass				
			DISP			
		Saltgrass-slender wheatgrass				
			DISP-ELTR-JUAR	ELTR-DISP-POGR		
		Saltgrass-meadow barley				
			DISP-HOBR-SPAI	HOBR-DISP-SCPR		
		Saltgrass-basin wildrye				
			DISP-LECI-IVAX			
		Saltgrass-creeping wildrye				
			DISP-LETR-CAPR	DISP-LETR-JUAR	DISP-LETR-SPAI	LETR-DISP-SPAI
			DISP-LETR-EQAR	DISP-LETR-JUSC	LETR-DISP-EQAR	LETR-DISP-SPGR
			DISP-LETR-ERNA	DISP-LETR-POMO	LETR-DISP-JUAR	
			DISP-LETR-HOBR	DISP-LETR-PULE	LETR-DISP-NIOC	
			DISP-LETR-IVAX	DISP-LETR-SAVE	LETR-DISP-POSE	
		Saltgrass-alkali muhly				
			DISP-MUAS-JUAR	DISP-MUAS-LETR		
		Saltgrass-mat muhly				
			DISP-MURI-SPGR	MURI-DISP-ELAN	MURI-DISP-JUAR	MURI-DISP-LETR

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Saltgrass-bluegrass				
			DISP-POA-LETR			
		Saltgrass-Sandberg bluegrass				
			DISP-POSE-ERNA	DISP-POSE-JUAR	POSE-DISP-CARX	POSE-DISP-JUAR
			DISP-POSE-IRMI	DISP-POSE-SPGR	POSE-DISP-IVKI	POSE-DISP-SPAI
		Saltgrass-Lemmon's alkaligrass				
			DISP-PULE-CAPR	DISP-PULE-LETR	DISP-PULE-SPGR	PULE-DISP-CARX
			DISP-PULE-JUAR	DISP-PULE-NIOC		PULE-DISP-JUAR
		Saltgrass-meadow fescue				
			SCPR-DISP-THRH			
		Saltgrass-sacaton				
			DISP-SPAI-CHVI	DISP-SPAI-JUSC	SPAI-DISP-CARX	SPAI-DISP-LETR
			DISP-SPAI-DECE	DISP-SPAI-LETR	SPAI-DISP-CHAL	SPAI-DISP-POSE
			DISP-SPAI-ERNA	DISP-SPAI-SAVE	SPAI-DISP-CHVI	SPAI-DISP-PULE
			DISP-SPAI-HOJU	DISP-SPAI-SPGR	SPAI-DISP-ERNA	SPAI-DISP-SAVE
			DISP-SPAI-JUAR	DISP-SPAI-THPO	SPAI-DISP-JUAR	SPAI-DISP-SPGR
					SPAI-DISP-JUSC	
		Saltgrass-alkali cordgrass				
			DISP-SPGR-CAPR	DISP-SPGR-POSE	SPGR-DISP-ARAN	SPGR-DISP-JUAR
			DISP-SPGR-IVKI	DISP-SPGR-PUCC	SPGR-DISP-CARX	SPGR-DISP-LETR
			DISP-SPGR-JUAR	DISP-SPGR-SPAI	SPGR-DISP-GLMA	
			DISP-SPGR-LETR		SPGR-DISP-IVAX	
		Saltgrass-yarrow				
			DISP-ACMI-JUAR			
		Saltgrass-iodinebush				
			DISP-ALOC-SAVE			
		Saltgrass-silver cinquefoil				
			ARAN-DISP-HOJU	ARAN-DISP-JUAR	ARAN-DISP-LETR	DISP-ARAN-JUAR
		Saltgrass-Nebraska sedge				
			CANE-DISP	DISP-CANE-JUAR		
		Saltgrass-fieldclustered sedge				
			CAPR-DISP-IVAX	CAPR-DISP-LETR	CAPR-DISP-SPAI	DISP-CAPR-SPAI
			CAPR-DISP-JUAR	CAPR-DISP-PULE	DISP-CAPR-JUAR	
		Saltgrass-sedge				
			CARX-DISP-EQAR	CARX-DISP-POLY	DISP-CARX-CRRU	DISP-CARX-MURI
			CARX-DISP-ERNA	CARX-DISP-POSE	DISP-CARX-ERNA	DISP-CARX-SPAI
			CARX-DISP-JUAR	CARX-DISP-SCPR	DISP-CARX-IRMI	
			CARX-DISP-MURI		DISP-CARX-JUAR	
		Saltgrass-western centaur				
			DISP-HEPU-JUAR	DISP-HEPU-LETR		
		Saltgrass-Rocky Mountain iris				
			DISP-IRMI-THRH	IRMI-DISP-JUAR		
		Saltgrass-sumpweed				
			DISP-IVAX-HOBR	DISP-IVAX-LETR	IVAX-DISP-CAPR	IVAX-DISP-LETR
			DISP-IVAX-JUAR	DISP-IVAX-PLSC	IVAX-DISP-JUAR	IVAX-DISP-MURI
		Saltgrass-alkali ivesia				
			DISP-IVKI-JUAR	DISP-IVKI-SPAI	DISP-IVKI-SPGR	

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Saltgrass-Baltic rush				
			DISP-JUAR	DISP-JUAR-LETR	JUAR-DISP-AGGI	JUAR-DISP-LETR
			DISP-JUAR-AGGI	DISP-JUAR-MURI	JUAR-DISP-ARAN	JUAR-DISP-MUAS
			DISP-JUAR-ARAN	DISP-JUAR-NIOC	JUAR-DISP-CANE	JUAR-DISP-MURI
			DISP-JUAR-CANE	DISP-JUAR-PLSC	JUAR-DISP-CAPR	JUAR-DISP-PLSC
			DISP-JUAR-CAPR	DISP-JUAR-POSE	JUAR-DISP-CARX	JUAR-DISP-POAN
			DISP-JUAR-CARX	DISP-JUAR-PUCC	JUAR-DISP-DECE	JUAR-DISP-PYLA
			DISP-JUAR-ELTR	DISP-JUAR-PULE	JUAR-DISP-ELPA	JUAR-DISP-SAVE
			DISP-JUAR-ERNA	DISP-JUAR-SAVE	JUAR-DISP-ERNA	JUAR-DISP-SCNE
			DISP-JUAR-GLMA	DISP-JUAR-SPAI	JUAR-DISP-HEPU	JUAR-DISP-SPAI
			DISP-JUAR-HOJU	DISP-JUAR-SPGR	JUAR-DISP-HOJU	JUAR-DISP-SPGR
			DISP-JUAR-IVAX	DISP-JUAR-UNID	JUAR-DISP-IVAX	JUAR-DISP-TRMA
			DISP-JUAR-JUSC	JUAR-DISP	JUAR-DISP-IVKI	JUAR-DISP-TRRE
		Saltgrass-alkali pink				
			DISP-NIOC-EQAR	DISP-NIOC-PUCC	DISP-NIOC-SPAI	NIOC-DISP-JUAR
			DISP-NIOC-JUAR	DISP-NIOC-PULE	DISP-NIOC-SPGR	NIOC-DISP-PULE
			DISP-NIOC-LETR	DISP-NIOC-SAVE		NIOC-DISP-SAVE
		Saltgrass-thermopsis				
			DISP-THRH	THRH-DISP-ARAN	THRH-DISP-JUAR	
		Saltgrass-kochia				
			DISP-BASC-HOJU			
		Saltgrass-halogeton				
			DISP-HAGL-JUAR			
		Saltgrass-salt heliotrope				
			DISP-HECU-JUAR			
		Saltgrass-Nuttall's sunflower				
			DISP-HENU-LETR			
		Saltgrass-foxtail barley				
			DISP-HOJU-JUAR	DISP-HOJU-LETR	DISP-HOJU-SAVE	HOJU-UNID-DISP
		Saltgrass-popcorn flower				
			DISP-PLSC-HOJU	DISP-PLSC-POSE	PLSC-DISP-JUAR	PLSC-DISP-POSE
	Slender wheatgrass (ELTR)					
		Slender wheatgrass-redtop				
			ELTR-AGGI-JUAR			
		Slender wheatgrass-sedge				
			ELTR-CARX-IRMI	ELTR-CARX-JUAR	ELTR-CARX-LECI	
		Slender wheatgrass-Rocky Mountain iris				
			ELTR-IRMI-JUAR			
		Slender wheatgrass-alkali ivesia				
			ELTR-IVKI-JUAR			
		Slender wheatgrass-Baltic rush				
			ELTR-JUAR-CARX	JUAR-ELTR-CAPR	JUAR-ELTR-HENU	
			ELTR-JUAR-DISP	JUAR-ELTR-CARX		
		Slender wheatgrass-alfalfa				
			ELTR-MESA-SCPR			
	Meadow barley (HOBR)					
		Meadow barley-alkaligrass				
			HOBR-PUCC-CARX			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
	Basin wildrye (LECI)					
		Basin wildrye-tall wheatgrass				
			LECI-THPO-BRIN			
		Basin wildrye-sumpweed				
			LECI-IVAX-ERNA	LECI-IVAX-JUAR		
		Basin wildrye-Louisiana sagewort				
			LECI-ARLU-ERNA			
	Creeping wildrye (LETR)					
		Creeping wildrye-redtop				
			LETR-AGGI-PHPR			
		Creeping wildrye-alkali muhly				
			LETR-MUAS-JUAR	MUAS-LETR-ARAN		
		Creeping wildrye-alkaligrass				
			LETR-PUCC-SPGR	PUCC-LETR-JUAR		
		Creeping wildrye-silver cinquefoil				
			ARAN-LETR-AGGI	ARAN-LETR-ELTR	ARAN-LETR-JUAR	LETR-ARAN-JUAR
			ARAN-LETR-CAPR	ARAN-LETR-EQAR	ARAN-LETR-MUAS	LETR-ARAN-MUAS
		Creeping wildrye-Nebraska sedge				
			LETR-CANE-MURI			
		Creeping wildrye-fieldclustered sedge				
			CAPR-LETR-CANE	CAPR-LETR-JUAR	CAPR-LETR-TRRE	LETR-CAPR-PHPR
			CAPR-LETR-DISP	CAPR-LETR-MESA	LETR-CAPR-ARAN	LETR-CAPR-SPAI
			CAPR-LETR-ELPA	CAPR-LETR-MURI	LETR-CAPR-DISP	LETR-CAPR-SPGR
			CAPR-LETR-ERNA	CAPR-LETR-SPAI	LETR-CAPR-ELPA	
		Creeping wildrye-sedge				
			CARX-LETR-JUAR	CARX-LETR-JUSC	LETR-CARX-JUAR	
		Creeping wildrye-horsetail				
			EQAR-LETR-THRH	LETR-EQAR-SPAI		
		Creeping wildrye-sumpweed				
			IVAX-LETR-CAPR	IVAX-LETR-CARX	IVAX-LETR-ERNA	LETR-IVAX-HOJU
		Creeping wildrye-Baltic rush				
			JUAR-LETR-ARAN	JUAR-LETR-ERNA	JUAR-LETR-ROWO	LETR-JUAR-DISP
			JUAR-LETR-CANE	JUAR-LETR-IVAX	LETR-JUAR-ARAN	LETR-JUAR-MURI
			JUAR-LETR-CARX	JUAR-LETR-MURI	LETR-JUAR-CAPR	LETR-JUAR-PULE
			JUAR-LETR-DECE	JUAR-LETR-POPR	LETR-JUAR-CARX	LETR-JUAR-SPAI
			JUAR-LETR-DISP	JUAR-LETR-PUCC	LETR-JUAR-DECE	
		Creeping wildrye-glasswort				
			LETR-SALI-CARX			
		Creeping wildrye-thermopsis				
			LETR-THRH-CAPR	THRH-LETR-MEOF	THRH-LETR-MURI	THRH-LETR-NIOC
		Creeping wildrye-pepperweed				
			LETR-CADR-JUAR			
	Alkali muhly (MUAS)					
		Alkali muhly-fieldclustered sedge				
			CAPR-MUAS-JUAR	MUAS-CAPR-JUAR		
	Mat muhly (MURI)					
		Mat muhly-tufted hairgrass				
			MURI-DECE-JUAR			
		Mat muhly-creeping wildrye				
			MURI-LETR-IVAX			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Mat muhly-alkali muhly				
			MURI-MUAS-JUNE			
		Mat muhly-Sandberg bluegrass				
			MURI-POSE-CARX	MURI-POSE-CRYP	POSE-MURI-CARX	
		Mat muhly-sacaton				
			MURI-SPAI	MURI-SPAI-JUAR	SPAI-MURI-ELTR	
			MURI-SPAI-CAPR	MURI-SPAI-LETR	SPAI-MURI-IRMI	
			MURI-SPAI-ELTR	MURI-SPAI-VEBR	SPAI-MURI-JUAR	
		Mat muhly-silver cinquefoil				
			ARAN-MURI-CANE	ARAN-MURI-LETR	MURI-ARAN-JUAR	
		Mat muhly-Nebraska sedge				
			MURI-CANE-JUAR			
		Mat muhly-fieldclustered sedge				
			CAPR-MURI-JUAR	MURI-CAPR-ARAN	MURI-CAPR-IVAX	MURI-CAPR-TRRE
			CAPR-MURI-SAEX	MURI-CAPR-CANE	MURI-CAPR-JUAR	
			CAPR-MURI-SPAI	MURI-CAPR-DISP	MURI-CAPR-LETR	
		Mat muhly-sedge				
			CARX-MURI-ERNA	CARX-MURI-POSE	MURI-CARX-DISP	MURI-CARX-LETR
			CARX-MURI-JUAR	CARX-MURI-SPAI	MURI-CARX-JUAR	MURI-CARX-SPAI
		Mat muhly-Rocky Mountain iris				
			IRMI-MURI-JUAR	MURI-IRMI-DISP		
		Mat muhly-Baltic rush				
			JUAR-MURI	JUAR-MURI-ERNA	MURI-JUAR-ARAN	MURI-JUAR-LETR
			JUAR-MURI-AGGI	JUAR-MURI-HOJU	MURI-JUAR-CANE	MURI-JUAR-POSE
			JUAR-MURI-ARAN	JUAR-MURI-LETR	MURI-JUAR-CAPR	MURI-JUAR-ROWO
			JUAR-MURI-CANE	JUAR-MURI-MUAS	MURI-JUAR-CARX	MURI-JUAR-SPAI
			JUAR-MURI-CAPR	JUAR-MURI-POSE	MURI-JUAR-CRYP	MURI-JUAR-SPGR
			JUAR-MURI-CARX	JUAR-MURI-PULE	MURI-JUAR-DISP	MURI-JUAR-TRIF
			JUAR-MURI-DISP	JUAR-MURI-SPAI	MURI-JUAR-ERNA	MURI-JUAR-TRRE
			JUAR-MURI-ELPA	MURI-JUAR-AGGI	MURI-JUAR-IVAX	MURI-JUAR-VEAN
		Mat muhly-white clover				
			MURI-TRRE-PHPR			
		Mat muhly-cheatgrass				
			MURI-BRTE-HOJU			
		Mat muhly-foxtail barley				
			MURI-HOJU-CIRS			
		Mat muhly-alfalfa				
			MURI-MESA-CARX			
		Mat muhly-prostrate verbena				
			MURI-VEBR-SPAI			
	Reed canarygrass (PHAR)					
		Reed canarygrass-meadow barley				
			PHAR-HOBR-AGGI			
		Reed canarygrass-meadow fescue				
			PHAR-SCPR-CARX			
		Reed canarygrass-creeping spikerush				
			PHAR-ELPA-SCPR			
		Reed canarygrass-tule bulrush				
			PHAR-SCAC-CANE			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
	Carrizo (PHAU)					
		Carrizo-carrizo				
			PHAU			
		Carrizo-sedge				
			PHAU-CARX-SEHY			
		Carrizo-Baltic rush				
			JUAR-PHAU-CARX			
		Carrizo-tule bulrush				
			PHAU-SCAC-CAPR	PHAU-SCAC-CARX	SCAC-PHAU-CANE	
		Carrizo-cattail				
			TYLA-PHAU-CARX			
	Timothy (PHPR)					
		Timothy-slender wheatgrass				
			PHPR-ELTR-JUAR			
		Timothy-meadow fescue				
			PHPR-SCPR-AGGI	SCPR-PHPR-POPR		
		Timothy-sedge				
			CARX-PHPR-AGGI	PHPR-CARX-JUAR		
		Timothy-Baltic rush				
			JUAR-PHPR-CANE			
	Bluegrass (POA)					
		Bluegrass-sedge				
			POA-CARX-ERNA			
	Kentucky bluegrass (POPR)					
		Kentucky bluegrass-redtop				
			POPR-AGGI-SCPR			
		Kentucky bluegrass-creeping spikerush				
			POPR-ELPA-JUAR			
	Sandberg bluegrass (POSE)					
		Sandberg bluegrass-bastard toadflax				
			POSE-COUM-JUAR			
		Sandberg bluegrass-slender wheatgrass				
			ELTR-POSE-SPAI	POSE-ELTR	POSE-ELTR-DISP	POSE-ELTR-PHPU
				POSE-ELTR-ARAN	POSE-ELTR-IVKI	POSE-ELTR-SPAI
				POSE-ELTR-CIRS	POSE-ELTR-JUAR	
		Sandberg bluegrass-creeping wildrye				
			LETR-POSE-SPAI	POSE-LETR-DECE	POSE-LETR-IVKI	POSE-LETR-SPAI
				POSE-LETR-DISP	POSE-LETR-JUAR	
		Sandberg bluegrass-Lemmon's alkaligrass				
			POSE-PULE-JUAR	POSE-PULE-SPGR	PULE-POSE-SPGR	
		Sandberg bluegrass-meadow fescue				
			POSE-SCPR-ELTR			
		Sandberg bluegrass-alkali cordgrass				
			POSE-SPGR-EQAR	POSE-SPGR-JUSC	SPGR-POSE-JUAR	
			POSE-SPGR-IVKI	POSE-SPGR-PUCC	SPGR-POSE-JUSC	
			POSE-SPGR-JUAR	POSE-SPGR-RAAR	SPGR-POSE-SPAI	
		Sandberg bluegrass-fieldclustered sedge				
			POSE-CAPR-LETR			
		Sandberg bluegrass-shooting star				
			POSE-DODE-ELTR			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Sandberg bluegrass-horsetail				
			POSE-EQAR-SPGR			
		Sandberg bluegrass-Rocky Mountain iris				
			POSE-IRMI-JUAR			
		Sandberg bluegrass-alkali ivesia				
			IVKI-POSE-CARX	POSE-IVKI-ELTR	POSE-IVKI-LETR	POSE-IVKI-SPAI
			IVKI-POSE-DISP	POSE-IVKI-JUAR	POSE-IVKI-PUCC	POSE-IVKI-SPGR
		Sandberg bluegrass-Baltic rush				
			JUAR-POSE-AGGI	JUAR-POSE-IVKI	POSE-JUAR-CISC	POSE-JUAR-IVAX
			JUAR-POSE-CAPR	JUAR-POSE-SPAI	POSE-JUAR-DECE	POSE-JUAR-IVKI
			JUAR-POSE-CARX	POSE-JUAR-ARAN	POSE-JUAR-DISP	POSE-JUAR-LETR
			JUAR-POSE-DISP	POSE-JUAR-CAPR	POSE-JUAR-ELPA	POSE-JUAR-POSE
			JUAR-POSE-ELTR	POSE-JUAR-CARX	POSE-JUAR-ELTR	POSE-JUAR-SPAI
			JUAR-POSE-HYLE	POSE-JUAR-CIRS	POSE-JUAR-HOJU	POSE-JUAR-SPGR
		Sandberg bluegrass-tufted phlox				
			POSE-PHPU-IRMI	POSE-PHPU-JUAR	POSE-PHPU-PYLA	
		Sandberg bluegrass-baby goldenrod				
			POSE-SONA-JUAR			
		Sandberg bluegrass-foxtail barley				
			POSE-HOJU-ARAN			
		Sandberg bluegrass-popcorn flower				
			PLSC-POSE-JUAR	POSE-PLSC-JUAR	POSE-PLSC-SAVE	
	Alkaligrass (PUCC)					
		Alkaligrass-saltgrass				
			DISP-PUCC-ERNA	PUCC-DISP-JUAR	PUCC-DISP-SPAI	PUCC-DISP-THPO
		Alkaligrass-Sandberg bluegrass				
			PUCC-POSE-SPAI	PUCC-POSE-SPGR		
		Alkaligrass-alkali cordgrass				
			PUCC-SPGR-CHVI	PUCC-SPGR-IVKI	PUCC-SPGR-LETR	SPGR-PUCC-CHVI
			PUCC-SPGR-DISP	PUCC-SPGR-JUAR	PUCC-SPGR-PHPU	
			PUCC-SPGR-ERNA	PUCC-SPGR-JUSC		
		Alkaligrass-horsetail				
			PUCC-EQAR-JUAR			
		Alkaligrass-alkali ivesia				
			IVKI-PUCC-EQAR			
		Alkaligrass-Baltic rush				
			JUAR-PUCC-CANE	PUCC-JUAR-CARX	PUCC-JUAR-ERNA	PUCC-JUAR-SPGR
			JUAR-PUCC-CARX	PUCC-JUAR-DISP	PUCC-JUAR-IVKI	
				PUCC-JUAR-EQAR	PUCC-JUAR-SPAI	
		Alkaligrass-tufted phlox				
			PUCC-PHPU-DECE	PUCC-PHPU-JUAR		
	Weeping alkaligrass (PUDI)					
		Weeping alkaligrass-western centaur				
			HEPU-PUDI-DISP			
		Weeping alkaligrass-alkali ivesia				
			PUDI-IVKI-JUAR			
	Torrey alkaligrass (PUFA)					
		Torrey alkaligrass-creeping wildrye				
			PUFA-LETR-JUAR			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Torrey alkaligrass-Sandberg bluegrass				
			PUFA-POSE-SPGR			
	Lemmon's alkaligrass (PULE)					
		Lemmon's alkaligrass-smooth brome				
			PULE-BRIN-EQAR			
		Lemmon's alkaligrass-creeping wildrye				
			PULE-LETR-DISP	PULE-LETR-JUAR	PULE-LETR-NIOC	
		Lemmon's alkaligrass-alkali cordgrass				
			PULE-SPGR-CARX	PULE-SPGR-IVKI	PULE-SPGR-SPAI	SPGR-PULE-PYLA
			PULE-SPGR-DISP	PULE-SPGR-JUAR	SPGR-PULE-CAPR	SPGR-PULE-SPAI
			PULE-SPGR-ELTR	PULE-SPGR-JUSC	SPGR-PULE-IRMI	
			PULE-SPGR-EQAR	PULE-SPGR-LETR	SPGR-PULE-IVKI	
			PULE-SPGR-ERNA	PULE-SPGR-ROWO	SPGR-PULE-JUAR	
		Lemmon's alkaligrass-Parry's sedge				
			PULE-CAPA-JUSC			
		Lemmon's alkaligrass-sedge				
			CARX-PULE-CHAL	CARX-PULE-SPGR	PULE-CARX-ERNA	PULE-CARX-JUSC
			CARX-PULE-IVKI		PULE-CARX-IRMI	PULE-CARX-POSE
		Lemmon's alkaligrass-sea milkwort				
			PULE-GLMA-PHPU			
		Lemmon's alkaligrass-Rocky Mountain iris				
			PULE-IRMI-ELTR	PULE-IRMI-SPGR		
		Lemmon's alkaligrass-alkali ivesia				
			PULE-IVKI-CISC	PULE-IVKI-JUAR	PULE-IVKI-PHPU	
		Lemmon's alkaligrass-Baltic rush				
			JUAR-PULE-CANE	JUAR-PULE-DISP	PULE-JUAR-CAPR	PULE-JUAR-IVKI
			JUAR-PULE-CAPR	JUAR-PULE-LETR	PULE-JUAR-CARX	PULE-JUAR-LETR
			JUAR-PULE-CARX	JUAR-PULE-SPGR	PULE-JUAR-DISP	PULE-JUAR-SPAI
			JUAR-PULE-DECE	PULE-JUAR-CANE	PULE-JUAR-ERNA	PULE-JUAR-SPGR
		Lemmon's alkaligrass-tufted phlox				
			PHPU-PULE-JUAR	PULE-PHPU-ERNA	PULE-PHPU-IVKI	PULE-PHPU-SPGR
		Lemmon's alkaligrass-New Mexico sida				
			SINE-PULE-LETR			
		Lemmon's alkaligrass-thermopsis				
			PULE-THRH-CAPR	THRH-PULE-IRMI		
		Lemmon's alkaligrass-clover				
			PULE-TRIF-CARX			
		Lemmon's alkaligrass-red clover				
			PULE-TRPR-DISP			
	Meadow fescue (SCPR)					
		Meadow fescue-redtop				
			AGGI-SCPR-CANE	AGGI-SCPR-JUAR	SCPR-AGGI-CANE	SCPR-AGGI-JUAR
		Meadow fescue-smooth brome				
			SCPR-BRIN-MESA			
		Meadow fescue-orchardgrass				
			SCPR-DAGL-POPR			
		Meadow fescue-meadow barley				
			SCPR-HOBR-AGGI			
		Meadow fescue-creeping wildrye				
			SCPR-LETR-CAPR			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Meadow fescue-Kentucky bluegrass				
			POPR-SCPR-JUAR	SCPR-POPR-AGGI	SCPR-POPR-PHPR	SCPR-POPR-THPO
				SCPR-POPR-MESA	SCPR-POPR-POPR	
		Meadow fescue-milkweed				
			SCPR-ASSP-SAEX			
		Meadow fescue-Nebraska sedge				
			CANE-SCPR-DECE	SCPR-CANE-CARX	SCPR-CANE-PHPR	
			CANE-SCPR-JUAR	SCPR-CANE-JUAR		
		Meadow fescue-fieldclustered sedge				
			SCPR-CAPR-MEOF			
		Meadow fescue-sedge				
			CARX-SCPR-AGGI	CARX-SCPR-POPR	SCPR-CARX-ELTR	SCPR-CARX-POPR
			CARX-SCPR-HOBR	SCPR-CARX-AGGI	SCPR-CARX-JUAR	SCPR-CARX-TRIF
			CARX-SCPR-JUAR	SCPR-CARX-BICE	SCPR-CARX-MESA	
		Meadow fescue-creeping spikerush				
			SCPR-ELPA-TRIF			
		Meadow fescue-Rocky Mountain iris				
			SCPR-IRMI-JUAR	SCPR-IRMI-LETR		
		Meadow fescue-Baltic rush				
			JUAR-SCPR-CANE	JUAR-SCPR-TRRE	SCPR-JUAR-IRMI	SCPR-JUAR-TRPR
			JUAR-SCPR-CAPR	SCPR-JUAR-AGGI	SCPR-JUAR-PHPR	SCPR-JUAR-VEAN
			JUAR-SCPR-CARX	SCPR-JUAR-CARX	SCPR-JUAR-SAEX	
			JUAR-SCPR-TRPR	SCPR-JUAR-ELTR	SCPR-JUAR-TRIF	
		Meadow fescue-knotweed				
			SCPR-POLY-CANE			
		Meadow fescue-thermopsis				
			SCPR-THRH-JUAR			
		Meadow fescue-clover				
			SCPR-TRIF-AGGI			
		Meadow fescue-red clover				
			SCPR-TRPR-IRMI	SCPR-TRPR-THRH	TRPR-SCPR-CARX	
		Meadow fescue-white clover				
			SCPR-TRRE-CARX			
		Meadow fescue-water parsnip				
			SCPR-BEER-AGGI			
		Meadow fescue-water speedwell				
			SCPR-VEAN-CANE	VEAN-SCPR-AGGI		
		Meadow fescue-sweetclover				
			SCPR-MEOF-VEAN			
		Meadow fescue-alfalfa				
			MESA-SCPR-DAGL	SCPR-MESA-JUAR	SCPR-MESA-POPR	
	Sacaton (SPAI)					
		Sacaton-wheatgrass				
			SPAI-AGRO-MURI			
		Sacaton-slender wheatgrass				
			SPAI-ELTR-BRIN	SPAI-ELTR-CARX		
		Sacaton-creeping wildrye				
			SPAI-LETR-DISP	SPAI-LETR-EQAR		

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Sacaton-Sandberg bluegrass				
			POSE-SPAI-DISP	POSE-SPAI-JUAR	SPAI-POSE-CARX	SPAI-POSE-ERNA
			POSE-SPAI-ERNA	POSE-SPAI-JUSC	SPAI-POSE-CISC	SPAI-POSE-JUAR
			POSE-SPAI-IVKI	POSE-SPAI-LETR	SPAI-POSE-DISP	SPAI-POSE-JUSC
					SPAI-POSE-ELTR	
		Sacaton-alkaligrass				
			PUCC-SPAI-ERNA	SPAI-PUCC	SPAI-PUCC-SPGR	
			PUCC-SPAI-JUAR	SPAI-PUCC-JUAR		
		Sacaton-Lemmon's alkaligrass				
			PULE-SPAI-ERNA	SPAI-PULE-ERNA	SPAI-PULE-SPGR	
			PULE-SPAI-IVKI	SPAI-PULE-JUAR		
		Sacaton-sacaton				
			SPAI			
		Sacaton-alkali cordgrass				
			SPAI-SPGR-DISP	SPAI-SPGR-JUAR	SPAI-SPGR-PUCC	SPGR-SPAI-GLMA
			SPAI-SPGR-ERNA	SPAI-SPGR-PHPU	SPGR-SPAI-DISP	SPGR-SPAI-IVKI
			SPAI-SPGR-IVKI	SPAI-SPGR-POSE	SPGR-SPAI-ERNA	
		Sacaton-silver cinquefoil				
			ARAN-SPAI-JUAR	SPAI-ARAN-JUAR		
		Sacaton-fieldclustered sedge				
			CAPR-SPAI-IVAX	SPAI-CAPR-IVAX	SPAI-CAPR-LETR	
			CAPR-SPAI-JUAR	SPAI-CAPR-JUAR		
		Sacaton-sedge				
			CARX-SPAI-DISP	SPAI-CARX-DISP	SPAI-CARX-IVAX	SPAI-CARX-LECI
			CARX-SPAI-JUAR	SPAI-CARX-ERNA	SPAI-CARX-JUAR	SPAI-CARX-SAVE
		Sacaton-horsetail				
			SPAI-EQAR-IVAX			
		Sacaton-sumpweed				
			IVAX-SPAI-CARX	IVAX-SPAI-LETR	SPAI-IVAX-ERNA	SPAI-IVAX-SPCR
			IVAX-SPAI-DISP		SPAI-IVAX-SAVE	
		Sacaton-alkali ivesia				
			SPAI-IVKI-JUAR	SPAI-IVKI-MURI		
		Sacaton-Baltic rush				
			JUAR-SPAI-ARAN	JUAR-SPAI-MURI	SPAI-JUAR-COUM	SPAI-JUAR-PHPU
			JUAR-SPAI-CARX	JUAR-SPAI-PHPU	SPAI-JUAR-DISP	SPAI-JUAR-POSE
			JUAR-SPAI-DISP	SPAI-JUAR-ARAN	SPAI-JUAR-ERNA	SPAI-JUAR-PUCC
			JUAR-SPAI-ERNA	SPAI-JUAR-CAPR	SPAI-JUAR-JUSC	SPAI-JUAR-PULE
			JUAR-SPAI-HOJU	SPAI-JUAR-CARX	SPAI-JUAR-LETR	SPAI-JUAR-SAVE
			JUAR-SPAI-IVAX	SPAI-JUAR-CISC	SPAI-JUAR-MURI	
		Sacaton-rush				
			SPAI-JUNC-ARAN			
		Sacaton-tufted phlox				
			SPAI-PHPU-POSE			
	Alkali cordgrass (SPGR)					
		Alkali cordgrass-bastard toadflax				
			SPGR-COUM-JUAR			
		Alkali cordgrass-tufted hairgrass				
			DECE-SPGR-POSE	SPGR-DECE-IVKI		
		Alkali cordgrass-slender wheatgrass				
			SPGR-ELTR-DISP			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Alkali cordgrass-creeping wildrye				
			LETR-SPGR-DISP	SPGR-LETR-ARAN	SPGR-LETR-JUAR	
			LETR-SPGR-JUSC	SPGR-LETR-IRMI	SPGR-LETR-PULE	
		Alkali cordgrass-mat muhly				
			MURI-SPGR-ARAN	MURI-SPGR-JUSC	SPGR-MURI-IRMI	SPGR-MURI-JUSC
		Alkali cordgrass-Parry's sedge				
			CAPA-SPGR-DISP	SPGR-CAPA-DISP	SPGR-CAPA-JUAR	
		Alkali cordgrass-sumpweed				
			SPGR-IVAX-CAPR			
		Alkali cordgrass-alkali ivesia				
			IVKI-SPGR-POSE	SPGR-IVKI-POSE	SPGR-IVKI-PUCC	SPGR-IVKI-PYLA
		Alkali cordgrass-Baltic rush				
			JUAR-SPGR-CARX	JUAR-SPGR-MURI	SPGR-JUAR-ARAN	SPGR-JUAR-LETR
			JUAR-SPGR-DECE	JUAR-SPGR-PUCC	SPGR-JUAR-CARX	SPGR-JUAR-PUCC
			JUAR-SPGR-ELTR	JUAR-SPGR-PULE	SPGR-JUAR-DISP	SPGR-JUAR-PULE
			JUAR-SPGR-HYLE		SPGR-JUAR-ELTR	SPGR-JUAR-SPAI
			JUAR-SPGR-LETR		SPGR-JUAR-IVKI	
		Alkali cordgrass-alkali pink				
			NIOC-SPGR-ERNA	SPGR-NIOC-CISC		
		Alkali cordgrass-thermopsis				
			SPGR-THRH-IRMI			
	Tall wheatgrass (THPO)					
		Tall wheatgrass-redtop				
			THPO-AGGI-SCPR			
		Tall wheatgrass-saltgrass				
			DISP-THPO-CARX	DISP-THPO-LETR	THPO-DISP-CARX	THPO-DISP-LETR
					THPO-DISP-ERNA	THPO-DISP-SCPR
		Tall wheatgrass-meadow fescue				
			SCPR-THPO-ELTR	THPO-SCPR-CARX	THPO-SCPR-TRIF	
		Tall wheatgrass-Baltic rush				
			THPO-JUAR-IRMI			
Wetland Biome						
	Yarrow (ACMI)					
		Yarrow-Lemmon's alkaligrass				
			ACMI-PULE-JUAR			
	Silver cinquefoil (ARAN)					
		Silver cinquefoil-meadow barley				
			ARAN-HOBR-JUAR			
		Silver cinquefoil-alkali muhly				
			ARAN-MUAS-CAPR	ARAN-MUAS-EQAR	ARAN-MUAS-JUAR	ARAN-MUAS-MURI
		Silver cinquefoil-Kentucky bluegrass				
			ARAN-POPR	ARAN-POPR-STFI	POPR-ARAN-ELPA	
		Silver cinquefoil-Sandberg bluegrass				
			ARAN-POSE-CARX	ARAN-POSE-JUAR	POSE-ARAN-HOJU	
			ARAN-POSE-HOJU		POSE-ARAN-SIHA	
		Silver cinquefoil-alkali cordgrass				
			ARAN-SPGR-JUAR			
		Silver cinquefoil-silver cinquefoil				
			UNID-ARAN			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Silver cinquefoil-fieldclustered sedge				
			ARAN-CAPR-CANE	ARAN-CAPR-JUNE	ARAN-CAPR-MURI	CAPR-ARAN-LETR
			ARAN-CAPR-IVAX	ARAN-CAPR-LETR	CAPR-ARAN-DISP	CAPR-ARAN-MURI
			ARAN-CAPR-JUAR	ARAN-CAPR-MUAS	CAPR-ARAN-JUAR	CAPR-ARAN-MUAS
		Silver cinquefoil-sedge				
			ARAN-CARX-CANE	ARAN-CARX-JUAR	CARX-ARAN-CIRS	CARX-ARAN-THRH
			ARAN-CARX-DISP	ARAN-CARX-LETR	CARX-ARAN-JUAR	
		Silver cinquefoil-spikerush				
			ARAN-ELEO-HOJU	ELEO-ARAN-JUAR	ELEO-ARAN-UNID	
			ARAN-ELEO-JUAR	ELEO-ARAN-SCAM		
		Silver cinquefoil-creeping spikerush				
			ARAN-ELPA-CARX	ELPA-ARAN-AGGI	ELPA-ARAN-DECE	ELPA-ARAN-POAM
			ARAN-ELPA-ELEL	ELPA-ARAN-CANE	ELPA-ARAN-IVAX	
			ARAN-ELPA-JUAR	ELPA-ARAN-CAPR	ELPA-ARAN-JUAR	
			ARAN-ELPA-PLSC	ELPA-ARAN-CISC	ELPA-ARAN-MUAS	
		Silver cinquefoil-horsetail				
			ARAN-EQAR-AGGI	ARAN-EQAR-DISP	ARAN-EQAR-MURI	EQAR-ARAN-MUAS
			ARAN-EQAR-CAPR	ARAN-EQAR-MUAS		
		Silver cinquefoil-sumpweed				
			ARAN-IVAX-CAPR	ARAN-IVAX-ELRO	IVAX-ARAN-HOBR	
			ARAN-IVAX-DISP		IVAX-ARAN-JUAR	
		Silver cinquefoil-biennial sagewort				
			ARAN-ARBI-HOJU	ARBI-ARAN-JUAR		
		Silver cinquefoil-foxtail barley				
			ARAN-HOJU	ARAN-HOJU-JUAR	HOJU-ARAN-JUAR	
			ARAN-HOJU-CARX		HOJU-ARAN-ROWO	
		Silver cinquefoil-popcorn flower				
			ARAN-PLSC-DISP	PLSC-ARAN-DISP	PLSC-ARAN-IVAX	PLSC-ARAN-JUAR
		Silver cinquefoil-biennial cinquefoil				
			ARAN-POBI-HOJU			
	Nebraska sedge (CANE)					
		Nebraska sedge-shortawn foxtail				
			ALAE-CANE-ELPA	CANE-ALAE-JUAR	CANE-ALAE-JUNE	
		Nebraska sedge-tufted hairgrass				
			CANE-DECE-ELEO	CANE-DECE-HOJU	DECE-CANE-CAPR	DECE-CANE-JUAR
			CANE-DECE-ELPA	CANE-DECE-JUAR	DECE-CANE-ELPA	
		Nebraska sedge-meadow barley				
			CANE-HOBR-SCPR			
		Nebraska sedge-reed canarygrass				
			CANE-PHAR-CARX			
		Nebraska sedge-carrizo				
			CANE-PHAU-JUAR	CANE-PHAU-SCAC	CANE-PHAU-TYLA	
		Nebraska sedge-timothy				
			CANE-PHPR-AGGI	CANE-PHPR-CASI	CANE-PHPR-JUAR	CANE-PHPR-LETR
		Nebraska sedge-Kentucky bluegrass				
			CANE-POPR-DISP	CANE-POPR-JUAR	CANE-POPR-ROWO	POPR-CANE-SCPR
		Nebraska sedge-Sandberg bluegrass				
			CANE-POSE-ELPA			
		Nebraska sedge-sacaton				
			CANE-SPAI-CARX			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Nebraska sedge-silver cinquefoil				
			ARAN-CANE-HOBR	CANE-ARAN	CANE-ARAN-ELPA	
			ARAN-CANE-JUAR	CANE-ARAN-AGGI	CANE-ARAN-JUAR	
			ARAN-CANE-MUAS	CANE-ARAN-CAPR	CANE-ARAN-JUNE	
		Nebraska sedge-Nebraska sedge				
			CANE	UNID-CANE-UNID		
		Nebraska sedge-fieldclustered sedge				
			CANE-CAPR	CANE-CAPR-IVAX	CANE-CAPR-TRRE	CAPR-CANE-HIVU
			CANE-CAPR-AGGI	CANE-CAPR-JUAR	CAPR-CANE	CAPR-CANE-JUAR
			CANE-CAPR-DECE	CANE-CAPR-MURI	CAPR-CANE-AGGI	CAPR-CANE-MIGU
			CANE-CAPR-ELPA	CANE-CAPR-POAM	CAPR-CANE-ELPA	
			CANE-CAPR-ELRO	CANE-CAPR-TRPR	CAPR-CANE-EQAR	
		Nebraska sedge-sedge				
			CANE-CARX-AGGI	CANE-CARX-POSE	CARX-CANE-DECE	CARX-CANE-POPR
			CANE-CARX-BICE	CANE-CARX-SCPU	CARX-CANE-ELEO	CARX-CANE-SAEX
			CANE-CARX-DECE	CANE-CARX-SPAR	CARX-CANE-ELPA	CARX-CANE-SCAC
			CANE-CARX-ELEO	CANE-CARX-TRPR	CARX-CANE-ELRO	CARX-CANE-SPAR
			CANE-CARX-ELPA	CANE-CARX-TRRE	CARX-CANE-HOJU	CARX-CANE-TRIF
			CANE-CARX-JUAR	CANE-CARX-VEAN	CARX-CANE-JUAR	CARX-CANE-TYLA
			CANE-CARX-JUSC	CARX-CANE-AGGI	CARX-CANE-JUSA	CARX-CANE-VEAN
			CANE-CARX-PHPR	CARX-CANE-ARAN	CARX-CANE-MURI	
		Nebraska sedge-analogue sedge				
			CANE-CASI-ARAN	CANE-CASI-MEAR	CANE-CASI-VEAN	CASI-CANE-JUNE
			CANE-CASI-ELRO	CANE-CASI-POAM	CASI-CANE-DECE	CASI-CANE-TYLA
			CANE-CASI-JUAR	CANE-CASI-SPEU	CASI-CANE-ELEO	CASI-CANE-VINE
			CANE-CASI-JUNE	CANE-CASI-TRRE	CASI-CANE-JUAR	
		Nebraska sedge-needle spikerush				
			CANE-ELAC-CAPR			
		Nebraska sedge-spikerush				
			CANE-ELEO-AGGI	CANE-ELEO-JUAR	CANE-ELEO-VEAN	ELEO-CANE
			CANE-ELEO-CARX	CANE-ELEO-SCPR		ELEO-CANE-JUAR
		Nebraska sedge-creeping spikerush				
			CANE-ELPA	CANE-ELPA-JUAR	CANE-ELPA-TRRE	ELPA-CANE-JUAT
			CANE-ELPA-AGGI	CANE-ELPA-JUNE	CANE-ELPA-VEAN	ELPA-CANE-JUNE
			CANE-ELPA-ALAE	CANE-ELPA-MIGU	ELPA-CANE	ELPA-CANE-MESA
			CANE-ELPA-BEER	CANE-ELPA-MURI	ELPA-CANE-AGGI	ELPA-CANE-POSE
			CANE-ELPA-BICE	CANE-ELPA-POSE	ELPA-CANE-ALAE	ELPA-CANE-SACU
			CANE-ELPA-CAPR	CANE-ELPA-RACY	ELPA-CANE-ALGR	ELPA-CANE-SCAC
			CANE-ELPA-CARX	CANE-ELPA-SACU	ELPA-CANE-BEER	ELPA-CANE-SCAM
			CANE-ELPA-CASI	CANE-ELPA-SCAC	ELPA-CANE-CAPR	ELPA-CANE-SPAR
			CANE-ELPA-DECE	CANE-ELPA-SCPR	ELPA-CANE-CARX	ELPA-CANE-SPGR
			CANE-ELPA-EPIL	CANE-ELPA-TRIF	ELPA-CANE-DECE	
			CANE-ELPA-HOJU	CANE-ELPA-TRPR	ELPA-CANE-JUAR	
		Nebraska sedge-willow weed				
			CANE-EPIL-AGGI	EPIL-CANE-NAOF		
		Nebraska sedge-fern				
			CANE-FERN-SCAM			
		Nebraska sedge-marestail				
			CANE-HIVU	CANE-HIVU-RACY	CANE-HIVU-SCAM	HIVU-CANE
			CANE-HIVU-RAAQ	CANE-HIVU-SCAC		

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Nebraska sedge-Rocky Mountain iris				
			CANE-IRMI-ELEO	IRMI-CANE-CARX	IRMI-CANE-JUAR	
		Nebraska sedge-sumpweed				
			IVAX-CANE-CARX			
		Nebraska sedge-Baltic rush				
			CANE-JUAR	CANE-JUAR-HOBR	CANE-JUAR-TRMA	JUAR-CANE-ELPA
			CANE-JUAR-AGGI	CANE-JUAR-HOJU	CANE-JUAR-TRPR	JUAR-CANE-ELRO
			CANE-JUAR-ALGA	CANE-JUAR-IVAX	CANE-JUAR-TRRE	JUAR-CANE-HOBR
			CANE-JUAR-ARAN	CANE-JUAR-JUNE	CANE-JUAR-TYLA	JUAR-CANE-HOJU
			CANE-JUAR-ARTR	CANE-JUAR-LEMI	CANE-JUAR-UNID	JUAR-CANE-LETR
			CANE-JUAR-BEER	CANE-JUAR-LETR	CANE-JUAR-VEAN	JUAR-CANE-MOSS
			CANE-JUAR-CAPR	CANE-JUAR-MIGU	CANE-UNID-JUAR	JUAR-CANE-MURI
			CANE-JUAR-CARX	CANE-JUAR-MURI	JUAR-CANE	JUAR-CANE-PHPR
			CANE-JUAR-CASI	CANE-JUAR-NAOF	JUAR-CANE-ACMI	JUAR-CANE-POSE
			CANE-JUAR-DECE	CANE-JUAR-PHPR	JUAR-CANE-AGGI	JUAR-CANE-RASC
			CANE-JUAR-DISP	CANE-JUAR-POSE	JUAR-CANE-ARAN	JUAR-CANE-SCAC
			CANE-JUAR-ELAN	CANE-JUAR-SAEX	JUAR-CANE-BEER	JUAR-CANE-SCAM
			CANE-JUAR-ELEO	CANE-JUAR-SCAC	JUAR-CANE-CAPR	JUAR-CANE-SCPR
			CANE-JUAR-ELPA	CANE-JUAR-SCAM	JUAR-CANE-CARX	JUAR-CANE-SCPU
			CANE-JUAR-ERNA	CANE-JUAR-SCPR	JUAR-CANE-CASI	JUAR-CANE-TRRE
			CANE-JUAR-HIVU	CANE-JUAR-TRIF	JUAR-CANE-DECE	
		Nebraska sedge-rush				
			CANE-JUNC-JUAR			
			JUNC-CANE-ELPA			
		Nebraska sedge-Nevada rush				
			CANE-JUNE-AGGI	CANE-JUNE-CASI	CANE-JUNE-JUAR	JUNE-CANE-SACU
			CANE-JUNE-ALAE	CANE-JUNE-DECE	CANE-JUNE-MIGU	JUNE-CANE-SPEU
			CANE-JUNE-CAPR	CANE-JUNE-ELPA	JUNE-CANE-HENU	JUNE-CANE-VEAN
		Nebraska sedge-common monkeyflower				
			CANE-MIGU-BEER	CANE-MIGU-MEAR		
		Nebraska sedge-moss				
			CANE-MOSS-BEER	CANE-MOSS-DISP	MOSS-CANE-JUAR	
			CANE-MOSS-CAAQ	CANE-MOSS-JUAR		
		Nebraska sedge-American bulrush				
			CANE-SCAM	CANE-SCAM-JUAR	SCAM-CANE	
			CANE-SCAM-BEER	CANE-SCAM-TYLA	SCAM-CANE-NAOF	
		Nebraska sedge-bulrush				
			CANE-SCIR-JUAR			
		Nebraska sedge-bur-reed				
			SPAR-CANE			
		Nebraska sedge-giant bur-reed				
			CANE-SPEU-SCAC	SPEU-CANE-CASI		
		Nebraska sedge-thermopsis				
			CANE-THRH-JUAR	CANE-THRH-SAEX	THRH-CANE-CIVU	THRH-CANE-JUAR
		Nebraska sedge-clover				
			TRIF-CANE-AGGI			
		Nebraska sedge-seaside arrowgrass				
			CANE-TRMA-JUAR			
		Nebraska sedge-red clover				
			CANE-TRPR-CAPR	CANE-TRPR-JUEN		

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Nebraska sedge-white clover				
			CANE-TRRE-JUAR	CANE-TRRE-POPR	TRRE-CANE-JUAR	
			CANE-TRRE-PHPR		TRRE-CANE-JUNE	
		Nebraska sedge-water plantain				
			CANE-ALPL-ELPA	CANE-ALPL-NAOF		
		Nebraska sedge-sloughgrass				
			CANE-BESY-AGGI	CANE-BESY-JUAR		
		Nebraska sedge-duckweed				
			CANE-LEMI-JUAR			
		Nebraska sedge-white water crowfoot				
			CANE-RAAQ-BEER			
		Nebraska sedge-burdock				
			ARCT-CANE-JUAR			
		Nebraska sedge-bull thistle				
			CANE-CIVU			
		Nebraska sedge-popcorn flower				
			CANE-PLSC-HOBR	PLSC-CANE-JUAR		
		Nebraska sedge-prostrate knotweed				
			CANE-POAV-JUAR			
		Nebraska sedge-curly dock				
			CANE-RUCR-ELPA			
	Fieldclustered sedge (CAPR)					
		Fieldclustered sedge-tufted hairgrass				
			CAPR-DECE-JUAR			
		Fieldclustered sedge-Lemmon's alkaligrass				
			CAPR-PULE-JUAR	PULE-CAPR-ARAN	PULE-CAPR-JUAR	
			CAPR-PULE-LETR	PULE-CAPR-CANE		
		Fieldclustered sedge-horsetail				
			CAPR-EQAR-JUAR	CAPR-EQAR-MUAS		
		Fieldclustered sedge-marestail				
			CAPR-HIVU			
		Fieldclustered sedge-sumpweed				
			CAPR-IVAX-ARLU	CAPR-IVAX-SPAI	IVAX-CAPR-CANE	IVAX-CAPR-LETR
			CAPR-IVAX-JUAR	CAPR-IVAX-TRRE	IVAX-CAPR-DISP	IVAX-CAPR-PULE
					IVAX-CAPR-JUAR	IVAX-CAPR-SPGR
		Fieldclustered sedge-swordleaf rush				
			CAPR-JUEN-ELPA			
		Fieldclustered sedge-Nevada rush				
			CAPR-JUNE-CANE	CAPR-JUNE-MURI	JUNE-CAPR-CANE	
		Fieldclustered sedge-common monkeyflower				
			CAPR-MIGU-BEER			
		Fieldclustered sedge-clover				
			TRIF-CAPR-JUAR			
		Fieldclustered sedge-white clover				
			CAPR-TRRE-AGGI	TRRE-CAPR-AGGI	TRRE-CAPR-LETR	
			CAPR-TRRE-LETR	TRRE-CAPR-JUAR		
		Fieldclustered sedge-cattail				
			CAPR-TYLA	CAPR-TYLA-CARO		
		Fieldclustered sedge-foxtail barley				
			CAPR-HOJU-IVAX	HOJU-CAPR-JUAR		

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Fieldclustered sedge-sweetclover				
			CAPR-MEOF-JUAR			
	Beaked sedge (CARO)					
		Beaked sedge-Nebraska sedge				
			CARO-CANE-SCAM			
		Beaked sedge-creeping spikerush				
			CARO-ELPA-CANE	CARO-ELPA-JUAR	CARO-ELPA-TYLA	ELPA-CARO-SCAC
		Beaked sedge-Baltic rush				
			CARO-JUAR-CANE			
		Beaked sedge-tule bulrush				
			CARO-SCAC-ELPA			
		Beaked sedge-thermopsis				
			CARO-THRH-AGGI			
		Beaked sedge-cattail				
			TYLA-CARO-SCAC			
	Sedge (CARX)					
		Sedge-Lemmon's bitterweed				
			CARX-HYLE-JUSC			
		Sedge-smooth brome				
			CARX-BRIN-JUAR	CARX-BRIN-MESA	CARX-BRIN-SCPR	
		Sedge-basin wildrye				
			CARX-LECI-HOJU	CARX-LECI-JUAR	LECI-CARX-ELAN	
		Sedge-reed canarygrass				
			CARX-PHAR-BEER	CARX-PHAR-PHPR		
		Sedge-Kentucky bluegrass				
			CARX-POPR-CANE	CARX-POPR-SCPR		
		Sedge-Sandberg bluegrass				
			CARX-POSE-HOJU	CARX-POSE-JUSC	POSE-CARX-JUAR	POSE-CARX-SPGR
			CARX-POSE-JUAR	CARX-POSE-SPGR	POSE-CARX-LETR	
		Sedge-alkaligrass				
			CARX-PUCC-DISP	CARX-PUCC-IRMI	CARX-PUCC-JUSC	PUCC-CARX-ERNA
			CARX-PUCC-ERNA	CARX-PUCC-JUAR		PUCC-CARX-SPGR
		Sedge-Torrey alkaligrass				
			CARX-PUFA-ERNA			
		Sedge-alkali cordgrass				
			CARX-SPGR-DISP	CARX-SPGR-JUSC	CARX-SPGR-PYLA	SPGR-CARX-JUAR
			CARX-SPGR-JUAR	CARX-SPGR-PUCC	SPGR-CARX-IRMI	SPGR-CARX-SCPR
		Sedge-tall wheatgrass				
			CARX-THPO-JUAR	CARX-THPO-PUCC		
		Sedge-milkweed				
			CARX-ASSP			
		Sedge-sedge				
			CARX			
		Sedge-shooting star				
			CARX-DODE-CIRS			
		Sedge-spikerush				
			CARX-ELEO-CANE	CARX-ELEO-HENU	CARX-ELEO-SCPR	ELEO-CARX-AGGI
			CARX-ELEO-DECE	CARX-ELEO-JUAR		ELEO-CARX-RUCR

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Sedge-creeping spikerush				
			CARX-ELPA-BEER	CARX-ELPA-DECE	CARX-ELPA-JUSA	ELPA-CARX-CANE
			CARX-ELPA-CANE	CARX-ELPA-JUAR	CARX-ELPA-TYLA	ELPA-CARX-DECE
		Sedge-beaked spikerush				
			CARX-ELRO-CANE	CARX-ELRO-ELTR	ELRO-CARX-AGGI	
			CARX-ELRO-DECE	CARX-ELRO-TYLA		
		Sedge-Rocky Mountain iris				
			CARX-IRMI-JUAR	IRMI-CARX-ARAN	IRMI-CARX-ROWO	
			CARX-IRMI-SPGR	IRMI-CARX-JUAR		
		Sedge-sumpweed				
			CARX-IVAX-GRSQ	CARX-IVAX-JUAR	CARX-IVAX-POSE	IVAX-CARX-HOJU
		Sedge-alkali ivesia				
			CARX-IVKI-SPGR			
		Sedge-Rocky Mountain rush				
			CARX-JUSA-ELPA			
		Sedge-common threesquare				
			CARX-SCPU-ELPA			
		Sedge-baby goldenrod				
			CARX-SONA-DISP			
		Sedge-thermopsis				
			CARX-THRH-IRMI	THRH-CARX-ARAN	THRH-CARX-HOJU	
			CARX-THRH-JUAR	THRH-CARX-CANE		
		Sedge-clover				
			CARX-TRIF-JUAR			
		Sedge-red clover				
			CARX-TRPR-TRRE			
		Sedge-cattail				
			CARX-TYLA-CANE	CARX-TYLA-ELPA	CARX-TYLA-SCAC	TYLA-CARX-BICE TYLA-CARX-CANE
		Sedge-water speedwell				
			CARX-VEAN-BICE	CARX-VEAN-MURI		
		Sedge-bindweed				
			CARX-COAR-IVAX	CARX-COAR-LECI		
		Sedge-foxtail barley				
			CARX-HOJU-JUAR	HOJU-CARX-DISP	HOJU-CARX-JUAR	
	Analogue sedge (CASI)					
		Analogue sedge-redtop				
			AGGI-CASI-TRRE	CASI-AGGI-SCAM		
		Analogue sedge-tufted hairgrass				
			CASI-DECE-ARAN			
		Analogue sedge-mat muhly				
			CASI-MURI-AGGI			
		Analogue sedge-beaked sedge				
			CARO-CASI-JUAR	CASI-CARO-CANE		
		Analogue sedge-creeping spikerush				
			CASI-ELPA-CANE			
		Analogue sedge-beaked spikerush				
			CASI-ELRO-CANE	CASI-ELRO-JUNE		
		Analogue sedge-Nevada rush				
			CASI-JUNE-BEER	CASI-JUNE-CANE	JUNE-CASI-CANE	

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Analogue sedge-seaside arrowgrass				
			TRMA-CASI-JUAR			
		Analogue sedge-water speedwell				
			CASI-VEAN-LEMI			
	Elk thistle (CISC)					
		Elk thistle-Lemmon's alkaligrass				
			CISC-PULE-PLSC			
		Elk thistle-fieldclustered sedge				
			CISC-CAPR-AGGI			
	Spikerush (ELEO)					
		Spikerush-tufted hairgrass				
			DECE-ELEO-AGGI	ELEO-DECE-CARX	ELEO-DECE-JUSC	
		Spikerush-spikerush				
			ELEO			
		Spikerush-Baltic rush				
			ELEO-JUAR-AGGI	ELEO-JUAR-DECE	ELEO-JUAR-SCIR	JUAR-ELEO-CARX
			ELEO-JUAR-CANE	ELEO-JUAR-DISP		JUAR-ELEO-EQAR
			ELEO-JUAR-CARX	ELEO-JUAR-SCAM		JUAR-ELEO-SCAM
		Spikerush-curly dock				
			ELEO-RUCR-HOJU			
	Creeping spikerush (ELPA)					
		Creeping spikerush-redtop				
			ELPA-AGGI-CANE	ELPA-AGGI-CARX	ELPA-AGGI-JUAR	
		Creeping spikerush-shortawn foxtail				
			ALAE-ELPA-SACU	ELPA-ALAE-CANE	ELPA-ALAE-JUAR	ELPA-ALAE-VEAN
		Creeping spikerush-tufted hairgrass				
			DECE-ELPA-DISP	ELPA-DECE-CANE	ELPA-DECE-CARX	ELPA-DECE-JUAR
		Creeping spikerush-creeping wildrye				
			ELPA-LETR-CANE			
		Creeping spikerush-mat muhly				
			ELPA-MURI-CANE	ELPA-MURI-JUAR		
		Creeping spikerush-Nebraska sedge				
			ELPA-CANE-HIVU	ELPA-CANE-MIGU	ELPA-CANE-NAOF	ELPA-CANE-RAAQ
		Creeping spikerush-fieldclustered sedge				
			CAPR-ELPA-CANE	ELPA-CAPR	ELPA-CAPR-CANE	ELPA-CAPR-JUAR
		Creeping spikerush-downingia				
			ELPA-DOLA-JUAR			
		Creeping spikerush-creeping spikerush				
			ELPA			
		Creeping spikerush-marestail				
			ELPA-HIVU-CANE			
		Creeping spikerush-Rocky Mountain iris				
			ELPA-IRMI-ELTR			
		Creeping spikerush-Baltic rush				
			ELPA-JUAR	ELPA-JUAR-DISP	ELPA-JUAR-THRH	JUAR-ELPA-JUSA
			ELPA-JUAR-AGGI	ELPA-JUAR-EQAR	JUAR-ELPA-AGGI	JUAR-ELPA-MURI
			ELPA-JUAR-ARAN	ELPA-JUAR-IVAX	JUAR-ELPA-ARAN	JUAR-ELPA-POPR
			ELPA-JUAR-CANE	ELPA-JUAR-MEOF	JUAR-ELPA-CANE	JUAR-ELPA-POSE
			ELPA-JUAR-CAPR	ELPA-JUAR-MURI	JUAR-ELPA-CAPR	JUAR-ELPA-TRRE
			ELPA-JUAR-CARX	ELPA-JUAR-SCAC	JUAR-ELPA-CARX	

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
			ELPA-JUAR-DECE	ELPA-JUAR-SCAM	JUAR-ELPA-JUNC	
		Creeping spikerush-fine rush				
			ELPA-JUAT-SACU			
		Creeping spikerush-Nevada rush				
			ELPA-JUNE-CANE	JUNE-ELPA-BEER	JUNE-ELPA-SACU	
		Creeping spikerush-common monkeyflower				
			MIGU-ELPA-CARX	MIGU-ELPA-JUAR		
		Creeping spikerush-shore buttercup				
			ELPA-RACY-TRMA			
		Creeping spikerush-duck potato				
			ELPA-SACU-CANE	SACU-ELPA-ELAC		
		Creeping spikerush-American bulrush				
			ELPA-SCAM-CANE			
		Creeping spikerush-bur-reed				
			ELPA-SPAR-CANE			
		Creeping spikerush-giant bur-reed				
			ELPA-SPEU-CANE	SPEU-ELPA-SACU		
		Creeping spikerush-white clover				
			ELPA-TRRE-JUAR			
		Creeping spikerush-cattail				
			ELPA-TYLA-SCAC	TYLA-ELPA-JUAR		
		Creeping spikerush-water plantain				
			ELPA-ALPL-CANE			
		Creeping spikerush-water parsnip				
			BEER-ELPA-JUAR	ELPA-BEER-JUEN		
		Creeping spikerush-water knotweed				
			ELPA-POAM-CANE	ELPA-POAM-JUAR	POAM-ELPA-SCAC	
		Creeping spikerush-fineleaf pondweed				
			ELPA-STFI-BEER			
		Creeping spikerush-foxtail barley				
			ELPA-HOJU-ARAN			
		Creeping spikerush-popcorn flower				
			ELPA-PLSC-POSE	PLSC-ELPA-JUAR	PLSC-ELPA-SCAC	
	Beaked spikerush (ELRO)					
		Beaked spikerush-tufted hairgrass				
			DECE-ELRO-DAFR	ELRO-DECE-CAPR	ELRO-DECE-JUAR	
			DECE-ELRO-JUAR	ELRO-DECE-CARX	ELRO-DECE-JUNE	
			DECE-ELRO-JUSC	ELRO-DECE-ELTR	ELRO-DECE-MURI	
		Beaked spikerush-Nebraska sedge				
			CANE-ELRO-ARAN	CANE-ELRO-JUAR	ELRO-CANE-CARX	ELRO-CANE-MIGU
			CANE-ELRO-BEER	CANE-ELRO-JUNE	ELRO-CANE-CASI	ELRO-CANE-MURI
			CANE-ELRO-CARX	CANE-ELRO-TRRE	ELRO-CANE-JUAR	
		Beaked spikerush-Nevada rush				
			ELRO-JUNE-CANE	ELRO-JUNE-SPEU		
		Beaked spikerush-white clover				
			ELRO-TRRE-AGGI	ELRO-TRRE-CAPR		
		Beaked spikerush-water parsnip				
			ELRO-BEER-CANE	ELRO-BEER-DECE		
		Beaked spikerush-watercress				
			ELRO-NAOF-CANE			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY		
	Horsetail (EQAR)				
		Horsetail-mat muhly			
			EQAR-MURI-LETR		
	Marestail (HIVU)				
		Marestail-analogue sedge			
			HIVU-CASI		
		Marestail-spikerush			
			HIVU-ELEO-HOBR		
		Marestail-marestail			
			HIVU		
		Marestail-tule bulrush			
			HIVU-SCAC-TYLA		
		Marestail-American bulrush			
			HIVU-SCAM-LEMI	SCAM-HIVU	
		Marestail-common threesquare			
			HIVU-SCPU-STFI		
		Marestail-bur-reed			
			HIVU-SPAR-CANE		
		Marestail-coon's tail			
			CEDE-HIVU-ELPA		
		Marestail-watercress			
			HIVU-NAOF		
	Rocky Mountain iris (IRMI)				
		Rocky Mountain iris-redtop			
			IRMI-AGGI-CAPR		
		Rocky Mountain iris-alkali cordgrass			
			IRMI-SPGR-MEOF		
		Rocky Mountain iris-silver cinquefoil			
			ARAN-IRMI-CAPR	IRMI-ARAN-MURI	
		Rocky Mountain iris-fieldclustered sedge			
			CAPR-IRMI-JUAR	CAPR-IRMI-LETR	IRMI-CAPR-DECE
			IRMI-CAPR-JUAR		
		Rocky Mountain iris-Baltic rush			
			IRMI-JUAR-AGGI	IRMI-JUAR-DISP	IRMI-JUAR-PLSC
			JUAR-IRMI-CISC		
			IRMI-JUAR-ARAN	IRMI-JUAR-ELTR	IRMI-JUAR-THRH
			JUAR-IRMI-ELTR		
			IRMI-JUAR-CAPR	IRMI-JUAR-HEPU	JUAR-IRMI
			JUAR-IRMI-EQAR		
			IRMI-JUAR-CARX	IRMI-JUAR-LETR	JUAR-IRMI-ARAN
			JUAR-IRMI-ROWO		
			IRMI-JUAR-CISC	IRMI-JUAR-MURI	JUAR-IRMI-CARX
			JUAR-IRMI-THRH		
		Rocky Mountain iris-solomon plume			
			MARA-IRMI-LETR		
		Rocky Mountain iris-tufted phlox			
			IRMI-PHPU-PUCC		
		Rocky Mountain iris-thermopsis			
			IRMI-THRH-CAPR	IRMI-THRH-PULE	THRH-IRMI-AGRO
			THRH-IRMI-PULE		
			IRMI-THRH-DISP		THRH-IRMI-CARX
	Sumpweed (IVAX)				
		Sumpweed-mat muhly			
			IVAX-MURI-CAPR	IVAX-MURI-JUAR	IVAX-MURI-SPAI
			MURI-IVAX-ARAN		
		Sumpweed-bluegrass			
			IVAX-POA-CAPR	IVAX-POA-HOBR	

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		Sumpweed-Sandberg bluegrass				
			IVAX-POSE-SAVE			
		Sumpweed-creeping spikerush				
			IVAX-ELPA-CAPR			
		Sumpweed-foxtail barley				
			HOJU-IVAX-CARX	HOJU-IVAX-DISP	HOJU-IVAX-SAVE	IVAX-HOJU-JUAR
		Sumpweed-popcorn flower				
			IVAX-PLSC-ARAN	PLSC-IVAX-DISP	PLSC-IVAX-HOJU	PLSC-IVAX-POMO
		Sumpweed-prostrate knotweed				
			IVAX-POAV-JUAR			
	Alkali ivesia (IVKI)					
		Alkali ivesia-shooting star				
			IVKI-DODE-PULE			
	Baltic rush (JUAR)					
		Baltic rush-bermudagrass				
			JUAR-CYDA-CAPR			
		Baltic rush-tufted hairgrass				
			DECE-JUAR-CARX	DECE-JUAR-PULE	JUAR-DECE-ARAN	JUAR-DECE-ELPA
			DECE-JUAR-ELPA	DECE-JUAR-SPGR	JUAR-DECE-CANE	JUAR-DECE-GLMA
			DECE-JUAR-ELTR		JUAR-DECE-CARX	JUAR-DECE-IRMI
			DECE-JUAR-MURI		JUAR-DECE-DAFR	JUAR-DECE-SPGR
		Baltic rush-alkali muhly				
			JUAR-MUAS-DISP	JUAR-MUAS-MURI	MUAS-JUAR-AGGI	
			JUAR-MUAS-EQAR		MUAS-JUAR-ARAN	
		Baltic rush-bluegrass				
			JUAR-POA-ELPA			
		Baltic rush-Kentucky bluegrass				
			JUAR-POPR	JUAR-POPR-CANE	POPR-JUAR	
			JUAR-POPR-ARAN		POPR-JUAR-THRH	
		Baltic rush-Torrey alkaligrass				
			JUAR-PUFA-BRTE			
		Baltic rush-silver cinquefoil				
			ARAN-JUAR	ARAN-JUAR-MUAS	JUAR-ARAN-CANE	JUAR-ARAN-IRMI
			ARAN-JUAR-ARBI	ARAN-JUAR-MURI	JUAR-ARAN-CAPR	JUAR-ARAN-LETR
			ARAN-JUAR-CANE	ARAN-JUAR-PLSC	JUAR-ARAN-CARX	JUAR-ARAN-MUAS
			ARAN-JUAR-CAPR	ARAN-JUAR-PULE	JUAR-ARAN-CIAR	JUAR-ARAN-PLSC
			ARAN-JUAR-CARX	ARAN-JUAR-SCAC	JUAR-ARAN-DECE	JUAR-ARAN-POMO
			ARAN-JUAR-DISP	ARAN-JUAR-SCIR	JUAR-ARAN-DISP	JUAR-ARAN-POSE
			ARAN-JUAR-ELEO	ARAN-JUAR-SCNE	JUAR-ARAN-DODE	JUAR-ARAN-SAEX
			ARAN-JUAR-ELPA	ARAN-JUAR-SPAI	JUAR-ARAN-ELEL	JUAR-ARAN-SCIR
			ARAN-JUAR-HOJU	ARAN-JUAR-SPGR	JUAR-ARAN-ELEO	JUAR-ARAN-SPAI
			ARAN-JUAR-IRMI	JUAR-ARAN	JUAR-ARAN-ELPA	JUAR-ARAN-THRH
			ARAN-JUAR-LETR	JUAR-ARAN-AGGI	JUAR-ARAN-HOJU	JUAR-ARAN-TRHY
		Baltic rush-Nebraska sedge				
			JUAR-UNID-CANE			
		Baltic rush-Parry's sedge				
			CAPA-JUAR-CARX			
		Baltic rush-fieldclustered sedge				
			CAPR-JUAR-ACMI	CAPR-JUAR-LETR	CAPR-JUAR-SPGR	JUAR-CAPR-IRMI
			CAPR-JUAR-AGGI	CAPR-JUAR-MESA	CAPR-JUAR-TRRE	JUAR-CAPR-IVAX

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			CAPR-JUAR-ARAN	CAPR-JUAR-MUAS	JUAR-CAPR	JUAR-CAPR-LETR
			CAPR-JUAR-CANE	CAPR-JUAR-MURI	JUAR-CAPR-AGGI	JUAR-CAPR-MUAS
			CAPR-JUAR-DAGL	CAPR-JUAR-PLSC	JUAR-CAPR-ARAN	JUAR-CAPR-MURI
			CAPR-JUAR-DECE	CAPR-JUAR-POGR	JUAR-CAPR-ARTR	JUAR-CAPR-PLSC
			CAPR-JUAR-DISP	CAPR-JUAR-POPR	JUAR-CAPR-BRIN	JUAR-CAPR-POSE
			CAPR-JUAR-ELPA	CAPR-JUAR-PULE	JUAR-CAPR-CANE	JUAR-CAPR-PULE
			CAPR-JUAR-ERNA	CAPR-JUAR-ROWO	JUAR-CAPR-DECE	JUAR-CAPR-SCAC
			CAPR-JUAR-HEPU	CAPR-JUAR-SAEX	JUAR-CAPR-DISP	JUAR-CAPR-SPAI
			CAPR-JUAR-IRMI	CAPR-JUAR-SCAM	JUAR-CAPR-ELPA	JUAR-CAPR-SPGR
			CAPR-JUAR-IVAX	CAPR-JUAR-SCPR	JUAR-CAPR-ELRO	JUAR-CAPR-THRH
		Baltic rush-chamisso sedge				
			JUAR-CAPY			
		Baltic rush-sedge				
			CARX-JUAR	CARX-JUAR-IVAX	CARX-JUAR-TRIF	JUAR-CARX-IVAX
			CARX-JUAR-ACMI	CARX-JUAR-IVKI	CARX-JUAR-TRPR	JUAR-CARX-JUSC
			CARX-JUAR-AGGI	CARX-JUAR-JUSC	CARX-JUAR-UNID	JUAR-CARX-LETR
			CARX-JUAR-ARAN	CARX-JUAR-LETR	CARX-JUAR-VEAN	JUAR-CARX-MUAS
			CARX-JUAR-CANE	CARX-JUAR-MESA	JUAR-CARX	JUAR-CARX-MURI
			CARX-JUAR-CISC	CARX-JUAR-MURI	JUAR-CARX-ACMI	JUAR-CARX-POA
			CARX-JUAR-DAFR	CARX-JUAR-PHPU	JUAR-CARX-AGGI	JUAR-CARX-POMO
			CARX-JUAR-DECE	CARX-JUAR-POPR	JUAR-CARX-ARAN	JUAR-CARX-POPR
			CARX-JUAR-DISP	CARX-JUAR-POSE	JUAR-CARX-ARTR	JUAR-CARX-POSE
			CARX-JUAR-ELEO	CARX-JUAR-PUCC	JUAR-CARX-CANE	JUAR-CARX-PUCC
			CARX-JUAR-ELPA	CARX-JUAR-PUNU	JUAR-CARX-DECE	JUAR-CARX-PULE
			CARX-JUAR-ELRO	CARX-JUAR-SCAM	JUAR-CARX-DISP	JUAR-CARX-SAVE
			CARX-JUAR-ELTR	CARX-JUAR-SCIR	JUAR-CARX-ELTR	JUAR-CARX-SCAC
			CARX-JUAR-ERNA	CARX-JUAR-SCPR	JUAR-CARX-ERNA	JUAR-CARX-SCPR
			CARX-JUAR-HENU	CARX-JUAR-SPAI	JUAR-CARX-HOJU	JUAR-CARX-SPAI
			CARX-JUAR-HOBR	CARX-JUAR-SPGR	JUAR-CARX-HYLE	JUAR-CARX-SPGR
			CARX-JUAR-IRMI	CARX-JUAR-THRH	JUAR-CARX-IRMI	JUAR-CARX-TRPR
		Baltic rush-analogue sedge				
			CASI-JUAR-ERNA	JUAR-CASI-CANE	JUAR-CASI-ELPA	
		Baltic rush-elk thistle				
			JUAR-CISC-ELPA	JUAR-CISC-POPR		
		Baltic rush-hawksbeard				
			JUAR-CRRU-LETR			
		Baltic rush-cryptantha				
			JUAR-CRYP-ARAN			
		Baltic rush-shooting star				
			JUAR-DODE-PULE			
		Baltic rush-creeping spikerush				
			JUAR-ELPA			
		Baltic rush-beaked spikerush				
			ELRO-JUAR-CANE	JUAR-ELRO-CAPR	JUAR-ELRO-ELPA	JUAR-ELRO-MURI
		Baltic rush-horsetail				
			EQAR-JUAR-MURI	JUAR-EQAR-MUAS		
		Baltic rush-sea milkwort				
			JUAR-GLMA-ARAN	JUAR-GLMA-CASI	JUAR-GLMA-DISP	

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		Baltic rush-western centaur				
			HEPU-JUAR-IRMI	JUAR-HEPU-CAPR	JUAR-HEPU-DISP	
				JUAR-HEPU-CISC	JUAR-HEPU-RACY	
		Baltic rush-marestail				
			JUAR-HIVU-RACY			
		Baltic rush-sumpweed				
			IVAX-JUAR-CAPR	IVAX-JUAR-MURI	JUAR-IVAX-ATTR	JUAR-IVAX-LETR
			IVAX-JUAR-CARX	IVAX-JUAR-POSE	JUAR-IVAX-CAPR	JUAR-IVAX-MURI
			IVAX-JUAR-DISP	IVAX-JUAR-ROWO	JUAR-IVAX-CARX	JUAR-IVAX-SPGR
			IVAX-JUAR-ERNA	IVAX-JUAR-SPAI	JUAR-IVAX-HOJU	
		Baltic rush-alkali ivesia				
			IVKI-JUAR-PUCC	IVKI-JUAR-THRH	JUAR-IVKI-MURI	JUAR-IVKI-SPGR
			IVKI-JUAR-PULE		JUAR-IVKI-PULE	
		Baltic rush-Baltic rush				
			JUAR	UNID-UNID-JUAR		
		Baltic rush-alkali mallow				
			MALE-JUAR-ARBI			
		Baltic rush-moss				
			JUAR-MOSS-NAOF			
		Baltic rush-tule bulrush				
			JUAR-SCAC	JUAR-SCAC-ELPA	SCAC-JUAR	
			JUAR-SCAC-CANE		SCAC-JUAR-CANE	
		Baltic rush-thermopsis				
			JUAR-THRH	JUAR-THRH-MURI	THRH-JUAR-CANE	THRH-JUAR-DISP
			JUAR-THRH-ARAN	THRH-JUAR	THRH-JUAR-CAPR	THRH-JUAR-IRMI
			JUAR-THRH-CANE	THRH-JUAR-AGGI	THRH-JUAR-CARX	THRH-JUAR-POPR
			JUAR-THRH-DISP	THRH-JUAR-ARAN	THRH-JUAR-CIVU	
		Baltic rush-clover				
			JUAR-TRIF-HOJU	TRIF-JUAR-CANE		
		Baltic rush-stinging nettle				
			JUAR-URDI-CYOF			
		Baltic rush-algae				
			JUAR-ALGA-CANE			
		Baltic rush-white water crowfoot				
			JUAR-RAAQ-CANE			
		Baltic rush-Canada thistle				
			CIAR-JUAR-CANE	JUAR-CIAR-CAPR		
		Baltic rush-thistle				
			CIRS-JUAR	JUAR-CIRS-POSE	JUAR-CIRS-THRH	
		Baltic rush-bull thistle				
			JUAR-CIVU-CANE	JUAR-CIVU-CISC		
		Baltic rush-foxtail barley				
			HOJU-JUAR-ARAN	HOJU-JUAR-CARX	JUAR-HOJU-ARAN	JUAR-HOJU-CARX
			HOJU-JUAR-CANE	HOJU-UNID-JUAR	JUAR-HOJU-CANE	
		Baltic rush-popcorn flower				
			JUAR-PLSC-ARAN	JUAR-PLSC-POSE	PLSC-JUAR	PLSC-JUAR-DISP
			JUAR-PLSC-CANE		PLSC-JUAR-ARAN	PLSC-JUAR-IVAX
			JUAR-PLSC-CAPR		PLSC-JUAR-CAPR	

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	Swordleaf rush (JUEN)		
		Swordleaf rush-Baltic rush	
			JUEN-JUAR-BEER
		Swordleaf rush-water parsnip	
			JUEN-BEER
	Rush (JUNC)		
		Rush-analogue sedge	
			JUNC-CASI-CANE
		Rush-algae	
			JUNC-ALGA
	Nevada rush (JUNE)		
		Nevada rush-duck potato	
			JUNE-SACU-SPGR
		Nevada rush-giant bur-reed	
			JUNE-SPEU-ELPA
		Nevada rush-water parsnip	
			JUNE-BEER-CANE
	Common monkeyflower (MIGU)		
		Common monkeyflower-willow weed	
			MIGU-EPIL-LEMI
		Common monkeyflower-common monkeyflower	
			MIGU
		Common monkeyflower-watercress	
			MIGU-NAOF-CANE MIGU-NAOF-LEMI NAOF-MIGU
	Moss (MOSS)		
		Moss-moss	
			MOSS
		Moss-water parsnip	
			MOSS-BEER
	Alkali pink (NIOC)		
		Alkali pink-creeping wildrye	
			NIOC-LETR-DISP
		Alkali pink-sacaton	
			NIOC-SPAI-DISP NIOC-SPAI-LETR
	Tufted phlox (PHPU)		
		Tufted phlox-alkali cordgrass	
			PHPU-SPGR-JUAR
		Tufted phlox-alkali ivesia	
			PHPU-IVKI-POSE
		Tufted phlox-baby goldenrod	
			SONA-PHPU-JUAR
	Northwest cinquefoil (POGR)		
		Northwest cinquefoil-fieldclustered sedge	
			POGR-CAPR-JUAR
	Glasswort (SALI)		
		Glasswort-saltgrass	
			SALI-DISP-SAVE
		Glasswort-sacaton	
			SALI-SPAI-CHVI

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		Glasswort-alkali cordgrass				
			SALI-SPGR-DISP			
		Glasswort-borage				
			BORA-SALI-POA			
	Tule bulrush (SCAC)					
		Tule bulrush-silver cinquefoil				
			ARAN-SCAC-ELPA	SCAC-ARAN-ELPA	SCAC-ARAN-PHAU	SCAC-ARAN-TYLA
		Tule bulrush-Nebraska sedge				
			CANE-SCAC	CANE-SCAC-JUAR	SCAC-CANE-AGGI	SCAC-CANE-ELAC
			CANE-SCAC-AGGI	CANE-SCAC-RACY	SCAC-CANE-BEER	SCAC-CANE-ELPA
			CANE-SCAC-BEER	CANE-SCAC-SPAR	SCAC-CANE-CAPR	SCAC-CANE-JUAR
			CANE-SCAC-CAPR	CANE-SCAC-TYLA	SCAC-CANE-CARX	SCAC-CANE-SPAR
		Tule bulrush-fieldclustered sedge				
			SCAC-CAPR-CANE	SCAC-CAPR-ELPA	SCAC-CAPR-JUAR	
		Tule bulrush-sedge				
			CARX-SCAC-CANE	CARX-SCAC-JUSA	CARX-SCAC-TYLA	SCAC-CARX-ELPA
			CARX-SCAC-JUAR	CARX-SCAC-PHAU	SCAC-CARX	SCAC-CARX-TYLA
		Tule bulrush-downingia				
			SCAC-DOLA-ELPA			
		Tule bulrush-creeping spikerush				
			ELPA-SCAC-ARAN	ELPA-SCAC-RACY	SCAC-ELPA	SCAC-ELPA-JUAR
			ELPA-SCAC-CANE		SCAC-ELPA-CANE	SCAC-ELPA-SAEX
			ELPA-SCAC-PLSC		SCAC-ELPA-CIDO	
		Tule bulrush-Tule bulrush				
			SCAC	UNID-SCAC		
		Tule bulrush-American bulrush				
			SCAC-SCAM-CAPR	SCAC-SCAM-ELPA		
		Tule bulrush-giant bur-reed				
			SCAC-SPEU-MIGU			
		Tule bulrush-thermopsis				
			SCAC-THRH-TYLA			
		Tule bulrush-cattail				
			SCAC-TYLA	SCAC-TYLA-NAOF	TYLA-SCAC-CANE	TYLA-SCAC-ELPA
			SCAC-TYLA-ARAN	SCAC-TYLA-SCPR	TYLA-SCAC-CARX	TYLA-SCAC-SPAR
			SCAC-TYLA-CANE		TYLA-SCAC-CIAR	
		Tule bulrush-water parsnip				
			BEER-SCAC	SCAC-BEER	SCAC-BEER-JUAR	SCAC-BEER-NAOF
			BEER-SCAC-JUAR	SCAC-BEER-CANE	SCAC-BEER-LEMI	UNID-SCAC-BEER
		Tule bulrush-watercress				
			SCAC-NAOF-BEER			
		Tule bulrush-water speedwell				
			VEAN-SCAC-BICE			
	American bulrush (SCAM)					
		American bulrush-silver cinquefoil				
			SCAM-ARAN-HOJU			
		American bulrush-fieldclustered sedge				
			CAPR-SCAM	CAPR-SCAM-ELPA	SCAM-CAPR	SCAM-CAPR-ELPA
		American bulrush-sedge				
			SCAM-CARX-CANE	SCAM-CARX-TYLA		

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		American bulrush-needle spikerush				
			SCAM-ELAC-ELPA			
		American bulrush-spikerush				
			ELEO-SCAM-JUAR	SCAM-ELEO-JUAR	SCAM-ELEO-POMO	
		American bulrush-Baltic rush				
			JUAR-SCAM	JUAR-SCAM-CARX	SCAM-JUAR	SCAM-JUAR-CARX
			JUAR-SCAM-CANE	JUAR-SCAM-NAOF	SCAM-JUAR-CANE	
		American bulrush-American bulrush				
			SCAM			
		American bulrush-cattail				
			SCAM-TYLA	SCAM-TYLA-CANE	TYLA-SCAM	
		American bulrush-watercress				
			NAOF-SCAM	NAOF-SCAM-BEER	SCAM-NAOF	
	Bulrush (SCIR)					
		Bulrush-sacaton				
			SCIR-SPAI-JUAR			
		Bulrush-needle spikerush				
			SCIR-ELAC-CANE			
		Bulrush-spikerush				
			SCIR-ELEO	SCIR-ELEO-CIVU		
	Goldenrod (SOLI)					
		Goldenrod-Baltic rush				
			SOLI-JUAR-IRMI			
	Bur-reed (SPAR)					
		Bur-reed-common monkeyflower				
			SPAR-MIGU-LEMI			
		Bur-reed-bur-reed				
			SPAR			
		Bur-reed-water parsnip				
			SPAR-BEER	SPAR-BEER-MIGU		
		Bur-reed-beggars ticks				
			SPAR-BICE-CARX			
	Thermopsis (THRH)					
		Thermopsis-yarrow				
			THRH-ACMI-AGGI			
		Thermopsis-fieldclustered sedge				
			THRH-CAPR-ELTR	THRH-CAPR-JUAR		
		Thermopsis-elk thistle				
			CISC-THRH-LETR	THRH-CISC-HOBR		
		Thermopsis-Canada thistle				
			CIAR-THRH-ACMI	CIAR-THRH-HOJU	THRH-CIAR-AGGI	THRH-CIAR-CIVU
		Thermopsis-bull thistle				
			THRH-CIVU			
	Strawberry clover (TRFR)					
		Strawberry clover-redtop				
			TRFR-AGGI-CAPR			
		Strawberry clover-Baltic rush				
			TRFR-JUAR-POPR			

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	Red clover (TRPR)					
		Red clover-Nebraska sedge				
			TRPR-CANE-CARX			
	White clover (TRRE)					
		White clover-shortawn foxtail				
			TRRE-ALAE-CANE			
		White clover-horsetail				
			TRRE-EQAR-IRMI			
		White clover-Baltic rush				
			JUAR-TRRE-ALAE	TRRE-JUAR-AGGI	TRRE-JUAR-CAPR	TRRE-JUAR-MUAS
				TRRE-JUAR-CANE	TRRE-JUAR-GLMA	
	Cattail (TYLA)					
		Cattail-Nebraska sedge				
			CANE-TYLA-AGGI	TYLA-CANE-BEER	TYLA-CANE-CIDO	
			CANE-TYLA-CARX	TYLA-CANE-CAPR	TYLA-CANE-ELEO	
			CANE-TYLA-LETR	TYLA-CANE-CARX	TYLA-CANE-ELPA	
			CANE-TYLA-SCAM	TYLA-CANE-CASI	TYLA-CANE-SCAM	
		Cattail-analogue sedge				
			CASI-TYLA-CANE	TYLA-CASI-CARO		
		Cattail-spikerush				
			TYLA-ELEO-JUAR			
		Cattail-marestail				
			TYLA-HIVU			
		Cattail-Baltic rush				
			TYLA-JUAR	TYLA-JUAR-BEER	TYLA-JUAR-CANE	TYLA-JUAR-HIVU
		Cattail-cattail				
			TYLA			
		Cattail-water parsnip				
			TYLA-BEER-HIVU	TYLA-BEER-JUAR		
		Cattail-beggars ticks				
			TYLA-BICE-ELEO			
Aquatic Biome						
	Algae (ALGA)					
		Algae-marestail				
			ALGA-HIVU	HIVU-ALGA		
		Algae-algae				
			ALGA			
	Water plantain (ALPL)					
		Water plantain-duck potato				
			ALPL-SACU-SPEU			
	Water parsnip (BEER)					
		Water parsnip-redtop				
			BEER-AGGI	BEER-AGGI-CANE		
		Water parsnip-shortawn foxtail				
			ALAE-BEER-CANE	BEER-ALAE-ELPA		
		Water parsnip-Nebraska sedge				
			BEER-CANE	BEER-CANE-JUSA	CANE-BEER	CANE-BEER-JUNE
			BEER-CANE-AGGI	BEER-CANE-MIGU	CANE-BEER-ELPA	CANE-BEER-MIGU
			BEER-CANE-CEDE	BEER-CANE-PHPR	CANE-BEER-HIVU	CANE-BEER-NAOF

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			BEER-CANE-HIVU	BEER-CANE-TYLA	CANE-BEER-JUAR	CANE-BEER-RAAQ
			BEER-CANE-JUAR		CANE-BEER-JUEN	CANE-BEER-ROWO
		Water parsnip-fieldclustered sedge				
			BEER-CAPR-MIGU			
		Water parsnip-sedge				
			BEER-CARX-JUAR	CARX-BEER-JUSA		
		Water parsnip-willow weed				
			BEER-EPIL-CANE			
		Water parsnip-Baltic rush				
			BEER-JUAR	JUAR-BEER	JUAR-BEER-ELPA	
			BEER-JUAR-AGGI	JUAR-BEER-CAAQ	JUAR-BEER-NAOF	
			BEER-JUAR-CARX	JUAR-BEER-CANE	JUAR-BEER-SCAM	
		Water parsnip-common monkeyflower				
			BEER-MIGU-CANE	BEER-MIGU-ELRO		
		Water parsnip-American bulrush				
			BEER-SCAM	SCAM-BEER	SCAM-BEER-MIGU	
			BEER-SCAM-CANE	SCAM-BEER-ELPA		
		Water parsnip-common threesquare				
			BEER-SCPU-CARX			
		Water parsnip-water parsnip				
			BEER			
		Water parsnip-coon's tail				
			BEER-CEDE-JUAR			
		Water parsnip-duckweed				
			BEER-LEMI-CANE			
		Water parsnip-water knotweed				
			BEER-POAM-CANE			
		Water parsnip-white water crowfoot				
			BEER-RAAQ	BEER-RAAQ-NAOF	RAAQ-BEER-EPIL	
			BEER-RAAQ-ELPA		RAAQ-BEER-TYLA	
		Water parsnip-water speedwell				
			BEER-VEAN-CANE	BEER-VEAN-MIGU	VEAN-BEER-CANE	
	Water whorlgrass (CAAQ)					
		Water whorlgrass-shore buttercup				
			CAAQ-RACY			
	Water hemlock (CIDO)					
		Water hemlock-Nebraska sedge				
			CIDO-CANE-BEER			
	Duckweed (LEMI)					
		Duckweed-duckweed				
			LEMI			
	Watercress (NAOF)					
		Watercress-shortawn foxtail				
			NAOF-ALAE-BEER	NAOF-ALAE-LEMI		
		Watercress-Nebraska sedge				
			CANE-NAOF	CANE-NAOF-ELPA	NAOF-CANE	NAOF-CANE-JUAR
			CANE-NAOF-ELAC	CANE-NAOF-SCAM	NAOF-CANE-ELPA	NAOF-CANE-MIGU
		Watercress-creeping spikerush				
			NAOF-ELPA-AGGI	NAOF-ELPA-JUAR		

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY			
		Watercress-willow weed				
			EPIL-NAOF			
		Watercress-Baltic rush				
			JUAR-NAOF	NAOF-JUAR-BEER	NAOF-JUAR-CASI	
			JUAR-NAOF-CAAQ	NAOF-JUAR-CANE		
		Watercress-swordleaf rush				
			NAOF-JUEN-CAPR			
		Watercress-Nevada rush				
			NAOF-JUNE-CANE			
		Watercress-moss				
			NAOF-MOSS			
		Watercress-water parsnip				
			BEER-NAOF	NAOF-BEER-ALGA	NAOF-BEER-MIGU	
				NAOF-BEER-CANE	NAOF-BEER-SCAM	
		Watercress-water whorlgrass				
			NAOF-CAAQ			
		Watercress-duckweed				
			LEMI-NAOF-JUNE	NAOF-LEMI	NAOF-LEMI-BEER	NAOF-LEMI-JUAR
		Watercress-watercress				
			NAOF			
		Watercress-water speedwell				
			NAOF-VEAN-JUAR			
	Water knotweed (POAM)					
		Water knotweed-timothy				
			POAM-PHPR-ECMU			
	Pondweed (POTA)					
		Pondweed-shortawn foxtail				
			ALAE-POTA-VEAN	POTA-ALAE-ELPA		
		Pondweed-Baltic rush				
			POTA-JUAR-ELPA			
		Pondweed-algae				
			POTA-ALGA			
		Pondweed-duckweed				
			POTA-LEMI-ELPA			
	White water crowfoot (RAAQ)					
		White water crowfoot-cattail				
			RAAQ-TYLA-CANE			
		White water crowfoot-white water crowfoot				
			RAAQ			
	Fineleaf pondweed (STFI)					
		Fineleaf pondweed-fineleaf pondweed				
			STFI			
	Water speedwell (VEAN)					
		Water speedwell-Nebraska sedge				
			CANE-VEAN-ALAE	CANE-VEAN-DECE	VEAN-CANE-ELPA	VEAN-CANE-LEMI
			CANE-VEAN-CARX	CANE-VEAN-ELPA	VEAN-CANE-JUAR	VEAN-CANE-MIGU
			CANE-VEAN-CASI	CANE-VEAN-SACU	VEAN-CANE-JUNE	
		Water speedwell-Baltic rush				
			VEAN-JUAR-AGGI			

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY	
		Water speedwell-Nevada rush		
			VEAN-JUNE-BEER	
		Water speedwell-beggars ticks		
			VEAN-BICE-AGGI	VEAN-BICE-CANE
	Open water (WATR)			
	Horned pondweed (ZAPA)			
		Horned pondweed-horned pondweed		
			ZAPA	
Early-Seral				
	Louisiana sagewort (ARLU)			
		Louisiana sagewort-creeping wildrye		
			ARLU-LETR-IVAX	
		Louisiana sagewort-sumpweed		
			ARLU-IVAX-SPAI	
	Canada thistle (CIAR)			
		Canada thistle-redtop		
			CIAR-AGGI	
		Canada thistle-Douglas' sedge		
			CIAR-CADO-HOBR	
	Thistle (CIRS)			
		Thistle-Sandberg bluegrass		
			CIRS-POSE-ELTR	
		Thistle-thistle		
			CIRS	
	Bull thistle (CIVU)			
		Bull thistle-Nebraska sedge		
			CIVU-CANE-HOJU	
	Halogeton (HAGL)			
		Halogeton-foxtail barley		
			HAGL-HOJU-JUAR	
	Salt heliotrope (HECU)			
		Salt heliotrope-sedge		
			HECU-CARX-JUAR	
		Salt heliotrope-sumpweed		
			HECU-IVAX-JUAR	
		Salt heliotrope-Baltic rush		
			HECU-JUAR-DISP	HECU-JUAR-IRMI
	Foxtail barley (HOJU)			
		Foxtail barley-Nebraska sedge		
			HOJU-CANE-TRIF	
		Foxtail barley-spikerush		
			HOJU-ELEO-POMO	
		Foxtail barley-knotweed		
			HOJU-POLY-ARAN	
		Foxtail barley-clover		
			HOJU-TRIF-CANE	
		Foxtail barley-Canada thistle		
			HOJU-CIAR-LETR	

BIOME	ALLIANCE	ASSOCIATION	COMMUNITY		
		Foxtail barley-mullein			
			HOJU-VETH-RUCR		
	Sweetclover (MEOF)				
		Sweetclover-tufted hairgrass			
			MEOF-DECE-CAPR		
		Sweetclover-creeping wildrye			
			MEOF-LETR-CAPR		
		Sweetclover-sedge			
			MEOF-CARX-JUAR		
	Alfalfa (MESA)				
		Alfalfa-brome			
			MESA-BROM-AGCR		
		Alfalfa-creeping wildrye			
			MESA-LETR-THPO		
		Alfalfa-bluegrass			
			MESA-POA-CAPR	MESA-POA-LETR	MESA-POA-PHPR
		Alfalfa-fieldclustered sedge			
			MESA-CAPR-LETR		
		Alfalfa-Baltic rush			
			MESA-JUAR-CANE		
		Alfalfa-curlycup gumweed			
			MESA-GRSQ-COAR		
	Popcorn flower (PLSC)				
		Popcorn flower-meadow barley			
			PLSC-HOBR-ARAN		
		Popcorn flower-creeping wildrye			
			PLSC-LETR-JUAR		
		Popcorn flower-downingia			
			PLSC-DOLA-JUAR		
		Popcorn flower-foxtail barley			
			PLSC-HOJU		
	Knotweed (POLY)				
		Knotweed-silver cinquefoil			
			POLY-ARAN-UNID		
		Knotweed-knotweed			
			UNID-POLY		
	Rabbitsfoot grass (POMO)				
		Rabbitsfoot grass-Baltic rush			
			POMO-JUAR	POMO-JUAR-SCAM	
	Prostrate verbena (VEBR)				
		Prostrate verbena-foxtail barley			
			VEBR-UNID-HOJU		
	Bare ground (BARE)				
	Unidentified plant (UNID)				
		Unidentified plant-unidentified plant			
			UNID-UNID-UNID		

APPENDIX B

SCIENTIFIC NAMES, COMMON NAMES, AND CODES OF SPECIES INCLUDED IN MAPPED UNITS

All species used to define plant communities mapped in Spring Valley, Nevada during the 2008–2009 seasons are presented here in Appendix B, Table B-1. For each species, the four-letter code used within the SNWA Vegetation Mapping Report is provided, along with the scientific name, common name, and accepted USDA code (USDA, NRCS 2010). For seven of the four-letter codes, there are two species listed with details presented in Appendix B, Table B-2.

Table B-1. Species list containing all species described in vegetation communities during the 2008–2009 mapping effort in Spring Valley, Nevada.

Species Code	Scientific Name	Common Name	Family	USDA Code
ACHY	Achnatherum hymenoides	Indian ricegrass	Poaceae	ACHY
ACMI	Achillea millefolium	Yarrow	Asteraceae	ACMI2
AGCR	Agropyron cristatum	Crested wheatgrass	Poaceae	AGCR
AGGI	Agrostis gigantea	Redtop	Poaceae	AGGI2
AGRO	Agropyron	Wheatgrass	Poaceae	AGROP2
ALAE	Alopecurus aequalis	Shortawn foxtail	Poaceae	ALAE
ALGA		Algae		
ALGR	Alisma gramineum	Narrowleaf water plantain	Alismataceae	ALGR
ALOC	Allenrolfea occidentalis	Iodinebush	Chenopodiaceae	ALOC2
ALPL	Alisma plantago-aquatica	Water plantain	Alismataceae	ALPL
ARAN	Argentina anserina	Silver cinquefoil	Rosaceae	ARAN7
ARBI	Artemisia biennis	Biennial sagewort	Asteraceae	ARBI2
ARCA	Artemisia campestris	Field sagewort	Asteraceae	ARCA12
ARCT	Arctium	Burdock	Asteraceae	ARCTI
ARLU	Artemisia ludoviciana	Louisiana sagewort	Asteraceae	ARLU
ARTR	Artemisia tridentata	Big sagebrush	Asteraceae	ARTR2
ASSP	Asclepias speciosa	Milkweed	Asclepiadaceae	ASSP
ATCO	Atriplex confertifolia	Shadscale	Chenopodiaceae	ATCO
ATTR	Atriplex truncata	Wedgescale saltbush	Chenopodiaceae	ATTR
BASC	Bassia scoparia	Kochia	Chenopodiaceae	BASC5
BEER	Berula erecta	Water parsnip	Apiaceae	BEER
BESY	Beckmannia syzigachne	Sloughgrass	Poaceae	BESY
BICE	Bidens cernua	Beggars ticks	Asteraceae	BICE
BORA	Borago	Borage	Boraginaceae	BORAG
BRIN	Bromus inermis	Smooth brome	Poaceae	BRIN2
BROM	Bromus	Brome	Poaceae	BROMU
BRTE	Bromus tectorum	Cheatgrass	Poaceae	BRTE
CAAQ	Catabrosa aquatica	Water whorlgrass	Poaceae	CAAQ3
CADO	Carex douglasii	Douglas' sedge	Cyperaceae	CADO2
CADR	Cardaria draba	Pepperweed	Brassicaceae	CADR
CANE	Carex nebrascensis	Nebraska sedge	Cyperaceae	CANE2
CAPA	Carex parryana	Parry's sedge	Cyperaceae	CAPA18
CAPR	Carex praegracilis	Fieldclustered sedge	Cyperaceae	CAPR5
CAPY	Carex pachystachya	Chamisso sedge	Cyperaceae	CAPA14
CARO	Carex rostrata	Beaked sedge	Cyperaceae	CARO6
CARX	Carex	Sedge	Cyperaceae	CAREX
CASI	Carex simulata	Analogue sedge	Cyperaceae	CASI2
CEDE	Ceratophyllum demersum	Coon's tail	Ceratophyllaceae	CEDE4
CHAL	Chrysothamnus albidus	Alkali rabbitbrush	Asteraceae	CHAL9
CHVI	Chrysothamnus viscidiflorus	Douglas rabbitbrush	Asteraceae	CHVI8

Species Code	Scientific Name	Common Name	Family	USDA Code
CIAR	Cirsium arvense	Canada thistle	Asteraceae	CIAR4
CIDO	Cicuta douglasii	Water hemlock	Apiaceae	CIDO
CIRS	Cirsium	Thistle	Asteraceae	CIRSI
CISC	Cirsium scariosum	Elk thistle	Asteraceae	CISC2
CIVU	Cirsium vulgare	Bull thistle	Asteraceae	CIVU
COAR	Convolvulus arvensis	Bindweed	Convolvulaceae	COAR4
COUM	Comandra umbellata	Bastard toadflax	Santalaceae	COUM
CRRU	Crepis runcinata	Hawksbeard	Asteraceae	CRRUG
CRYP	Cryptantha	Cryptantha	Boraginaceae	CRYPT
CYDA	Cynodon dactylon	Bermudagrass	Poaceae	CYDA
CYOF	Cynoglossum officinale	Gypsyflower	Boraginaceae	CYOF
DAFR	Dasiphora fruticosa	Shrubby potentilla	Rosaceae	DAFRF
DAGL	Dactylis glomerata	Orchardgrass	Poaceae	DAGL
DECE	Deschampsia cespitosa	Tufted hairgrass	Poaceae	DECE
DISP	Distichlis spicata	Saltgrass	Poaceae	DISP
DODE	Dodecatheon	Shooting star	Primulaceae	DODEC
DODE	Dodecatheon jeffreyi	Shootingstar	Primulaceae	DOJE
DOLA	Downingia laeta	Downingia	Campanulaceae	DOLA2
ECMU	Echinochloa muricata	Rough barnyardgrass	Poaceae	ECMU2
ELAC	Eleocharis acicularis	Needle spikerush	Cyperaceae	ELAC
ELAN	Elaeagnus angustifolia	Russian olive	Elaeagnaceae	ELAN
ELEL	Elymus elymoides	Squirreltail	Poaceae	ELEL5
ELEO	Eleocharis	Spikerush	Cyperaceae	ELEOC
ELPA	Eleocharis palustris	Creeping spikerush	Cyperaceae	ELPA3
ELRO	Eleocharis rostellata	Beaked spikerush	Cyperaceae	ELRO2
ELTR	Elymus trachycaulus	Slender wheatgrass	Poaceae	ELTR7
EPIL	Epilobium	Willow weed	Onagraceae	EPILO
EPIL	Epilobium ciliatum	Willow weed	Onagraceae	EPCI
EQAR	Equisetum arvense	Horsetail	Equisetaceae	EQAR
ERNA	Ericameria nauseosa	Rabbitbrush	Asteraceae	ERNA10
FERN		Fern		
GLMA	Glaux maritima	Sea milkwort	Primulaceae	GLMA
GRSQ	Grindelia squarrosa	Curlycup gumweed	Asteraceae	GRSQ
GUSA	Gutierrezia sarothrae	Broom snakeweed	Asteraceae	GUSA2
HAGL	Halogeton glomeratus	Halogeton	Chenopodiaceae	HAGL
HECU	Heliotropium curassavicum	Salt heliotrope	Boraginaceae	HECU3
HENU	Helianthus nuttallii	Nuttall's sunflower	Asteraceae	HENU
HEPU	Hesperochiron pumilus	Western centaur	Hydrophyllaceae	HEPU6
HEVI	Heterotheca villosa	Hairy false goldenaster	Asteraceae	HEVI4
HIVU	Hippuris vulgaris	Marestail	Hippuridaceae	HIVU2
HOBR	Hordeum brachyantherum	Meadow barley	Poaceae	HOBR2
HOJU	Hordeum jubatum	Foxtail barley	Poaceae	HOJU
HOLA	Holcus lanatus	Velvetgrass	Poaceae	HOLA
HYLE	Hymenoxys lemmonii	Lemmon's bitterweed	Asteraceae	HYLE
IRMI	Iris missouriensis	Rocky Mountain iris	Iridaceae	IRMI
IVAX	Iva axillaris	Sumpweed	Asteraceae	IVAX
IVKI	Ivesia kingii	Alkali ivesia	Rosaceae	IVKI
JUAR	Juncus arcticus	Baltic rush	Juncaceae	JUARL
JUAT	Juncus articulatus	Fine rush	Juncaceae	JUAR4

Species Code	Scientific Name	Common Name	Family	USDA Code
JUEN	Juncus ensifolius	Swordleaf rush	Juncaceae	JUEN
JUNC	Juncus	Rush	Juncaceae	JUNCU
JUNE	Juncus nevadensis	Nevada rush	Juncaceae	JUNE
JUSA	Juncus saximontanus	Rocky Mountain rush	Juncaceae	JUSA
JUSC	Juniperus scopulorum	Rocky Mountain juniper	Cupressaceae	JUSC2
LECI	Leymus cinereus	Basin wildrye	Poaceae	LECI4
LEMI	Lemna minor	Duckweed	Lemnaceae	LEMI3
LEMI	Lemna minuta	Duckweed	Lemnaceae	LEMI6
LETR	Leymus triticoides	Creeping wildrye	Poaceae	LETR5
MALE	Malvella leprosa	Alkali mallow	Malvaceae	MALE3
MARA	Maianthemum racemosum	Solomon plume	Liliaceae	MARA7
MEAR	Mentha arvensis	Wild mint	Lamiaceae	MEAR4
MEOF	Melilotus officinalis	Sweetclover	Fabaceae	MEOF
MESA	Medicago sativa	Alfalfa	Fabaceae	MESA
MIGU	Mimulus guttatus	Common monkeyflower	Scrophulariaceae	MIGU
MOSS		Moss		MOSS
MUAS	Muhlenbergia asperifolia	Alkali muhly	Poaceae	MUAS
MURI	Muhlenbergia richardsonis	Mat muhly	Poaceae	MURI
NAOF	Nasturtium officinale	Watercress	Brassicaceae	NAOF
NIOC	Nitrophila occidentalis	Alkali pink	Chenopodiaceae	NIOC2
PHAR	Phalaris arundinacea	Reed canarygrass	Poaceae	PHAR3
PHAU	Phragmites australis	Carrizo	Poaceae	PHAU7
PHPR	Phleum pratense	Timothy	Poaceae	PHPR3
PHPU	Phlox pulvinata	Tufted phlox	Polemoniaceae	PHPU5
PLSC	Plagiobothrys scouleri	Popcorn flower	Boraginaceae	PLSC2
POA	Poa	Bluegrass	Poaceae	POA
POAL	Populus alba	White poplar	Salicaceae	POAL7
POAM	Polygonum amphibium	Water knotweed	Polygonaceae	POAM8
POAN	Populus angustifolia	Narrowleaf poplar	Salicaceae	POAN3
POAV	Polygonum aviculare	Prostrate knotweed	Polygonaceae	POAV
POBI	Potentilla biennis	Biennial cinquefoil	Rosaceae	POBI7
PODE	Populus deltoides	Eastern cottonwood	Salicaceae	PODE3
POGR	Potentilla gracilis	Northwest cinquefoil	Rosaceae	POGR9
POLY	Polygonum	Knotweed	Polygonaceae	POLYG4
POMO	Polypogon monspeliensis	Rabbitsfoot grass	Poaceae	POMO5
POPR	Poa pratensis	Kentucky bluegrass	Poaceae	POPR
POSE	Poa secunda	Sandberg bluegrass	Poaceae	POSE
POTA	Potamogeton	Pondweed	Potamogetonaceae	POTAM
PUCC	Puccinellia	Alkaligrass	Poaceae	PUCCI
PUDI	Puccinellia distans	Weeping alkaligrass	Poaceae	PUDI
PUFA	Puccinellia fasciculata	Torrey alkaligrass	Poaceae	PUFA
PULE	Puccinellia lemmonii	Lemmon's alkaligrass	Poaceae	PULE
PUNU	Puccinellia nuttalliana	Nuttall's alkaligrass	Poaceae	PUNU2
PYLA	Pyrrocoma lanceolata	Goldenweed	Asteraceae	PYLA
RAAQ	Ranunculus aquatilis	White water crowfoot	Ranunculaceae	RAAQ
RAAR	Raillardella argentea	Silky raillardella	Asteraceae	RAAR
RACY	Ranunculus cymbalaria	Shore buttercup	Ranunculaceae	RACY
RASC	Ranunculus sceleratus	Cursed buttercup	Ranunculaceae	RASC3
RHTR	Rhus trilobata	Skunkbush	Anacardiaceae	RHTR

Species Code	Scientific Name	Common Name	Family	USDA Code
RIBE	Ribes	Currant	Grossulariaceae	RIBES
ROWO	Rosa woodsii	Woods' rose	Rosaceae	ROWO
RUCR	Rumex crispus	Curly dock	Polygonaceae	RUCR
SACU	Sagittaria cuneata	Duck potato	Alismataceae	SACU
SAEX	Salix exigua	Coyote willow	Salicaceae	SAEX
SALI	Salicornia	Glasswort	Chenopodiaceae	SALIC
SALX	Salix	Willow	Salicaceae	SALIX
SAVE	Sarcobatus vermiculatus	Greasewood	Chenopodiaceae	SAVE4
SCAC	Schoenoplectus acutus	Tule bulrush	Cyperaceae	SCAC3
SCAC	Schoenoplectus acutus	Tule bulrush	Cyperaceae	SCACA
SCAM	Schoenoplectus americanus	American bulrush	Cyperaceae	SCAM6
SCIR	Scirpus	Bulrush	Cyperaceae	SCIRP
SCNE	Scirpus nevadensis	Nevada bulrush	Cyperaceae	SCNE
SCPR	Schedonorus pratensis	Meadow fescue	Poaceae	SCPR4
SCPU	Schoenoplectus pungens	Common threesquare	Cyperaceae	SCPU10
SCPU	Schoenoplectus pungens var. longispicatus	Common threesquare	Cyperaceae	SCPUL4
SEHY	Senecio hydrophilus	Water ragwort	Asteraceae	SEHY2
SIHA	Sisyrinchium halophilum	Nevada blue-eyed grass	Iridaceae	SIHA2
SINE	Sida neomexicana	New Mexico sida	Malvaceae	SINE
SOLI	Solidago	Goldenrod	Asteraceae	SOLID
SONA	Solidago nana	Baby goldenrod	Asteraceae	SONA
SPAI	Sporobolus airoides	Sacaton	Poaceae	SPAI
SPAR	Sparganium	Bur-reed	Sparganiaceae	SPARG
SPAR	Sparganium angustifolium	Bur-reed	Sparganiaceae	SPAN2
SPCR	Sporobolus cryptandrus	Sand dropseed	Poaceae	SPCR
SPEU	Sparganium eurycarpum	Giant bur-reed	Sparganiaceae	SPEU
SPGR	Spartina gracilis	Alkali cordgrass	Poaceae	SPGR
STFI	Stuckenia filiformis	Fineleaf pondweed	Potamogetonaceae	STFI6
TACH	Tamarix chinensis	Five-stamen tamarisk	Tamaricaceae	TACH2
THME	Thelesperma megapotamicum	Hopi tea greenthread	Asteraceae	THME
THPO	Thinopyrum ponticum	Tall wheatgrass	Poaceae	THPO7
THRH	Thermopsis	Thermopsis	Fabaceae	THERM
THRH	Thermopsis rhombifolia	Thermopsis	Fabaceae	THRH
TRFR	Trifolium fragiferum	Strawberry clover	Fabaceae	TRFR2
TRHY	Trifolium hybridum	Alsike clover	Fabaceae	TRHY
TRIF	Trifolium	Clover	Fabaceae	TRIFO
TRMA	Triglochin maritima	Seaside arrowgrass	Juncaginaceae	TRMA20
TRPR	Trifolium pratense	Red clover	Fabaceae	TRPR2
TRRE	Trifolium repens	White clover	Fabaceae	TRRE3
TYLA	Typha latifolia	Cattail	Typhaceae	TYLA
TYLA	Typha	Cattail	Typhaceae	TYPHA
UNID		Unidentified plant		
URDI	Urtica dioica	Stinging nettle	Urticaceae	URDI
VEAN	Veronica anagallis-aquatica	Water speedwell	Scrophulariaceae	VEAN2
VEBR	Verbena bracteata	Prostrate verbena	Verbenaceae	VEBR
VETH	Verbascum thapsus	Mullein	Scrophulariaceae	VETH
VINE	Viola nephrophylla	Northern bog violet	Violaceae	VINE
ZAPA	Zannichellia palustris	Horned pondweed	Zannichelliaceae	ZAPA

Table B-2. For seven species within the vegetation mapping report, KS2 and Biowest identified similar, but not identical species, or described species at different classification levels (e.g., genus level vs. species level). For the purposes of this vegetation mapping report, each pair of species was collapsed into a single category represented by a four-letter code (Appendix B, Table B-2).

Code	Scientific Name	Common Name	Family	Species 1 USDA Code	Species 2 USDA Code
DODE	Dodecatheon	Shooting star	Primulaceae	DODEC	DOJE
EPIL	Epilobium	Willow weed	Onagraceae	EPILO	EPCI
LEMI	Lemna minuta	Duckweed	Lemnaceae	LEMI6	LEMI3
SCAC	Schoenoplectus acutus	Tule bulrush	Cyperaceae	SCACA	SCAC3
SCPU	Schoenoplectus pungens	Common threesquare	Cyperaceae	SCPU10	SCPUL4
SPAR	Sparganium	Bur-reed	Sparganiaceae	SPARG	SPAN2
THRH	Thermopsis rhombifolia	Thermopsis	Fabaceae	THRH	THERM

APPENDIX C

MAPPED VEGETATION IN SPRING VALLEY (2008-2009)

Plate 1 (22x34 overview map)

Plate 2 (30x36 5-page atlas)