

INVENTORY AND MAPPING OF PLANT COMMUNITIES IN THE
SWEETWATER CANYON WILDERNESS STUDY AREA,
FREMONT COUNTY, WYOMING.

A Report Prepared for the Bureau of Land Management
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INTRODUCTION

In July 2000, the Bureau of Land Management and the Wyoming Natural Diversity Database (WYNDD) of the University of Wyoming entered into a cooperative project to characterize the vegetation and other features of four wilderness study areas (WSAs) in Wyoming, including the Sweetwater Canyon WSA in the Lander Field Office (Figure 1). The information gathered in this project will be used by BLM biologists and managers to evaluate the degree to which the Sweetwater Canyon WSA represents vegetation types and ecosystem types present on BLM-managed lands and to help set management practices in the WSA. WYNDD biologists will use the information in their efforts to describe the composition and distribution of the state's vegetation types and the distribution and abundance of Wyoming's rare plants.

METHODS

FIELD SURVEY

Representations of the WSA boundary (Figure 2) were provided by BLM Lander Field Office staff on the South Pass USGS 1:100,000-scale map and on the Lewiston Lakes and Radium Springs 1:24,000-scale topographic quadrangles. Black-and-white aerial photographs (digital orthophotoquad quarters from the web site of the University of Wyoming's Geographic Information Sciences Center, <http://www.sdvc.uwyo.edu/doqq/>) were used to ascertain the variation in the vegetation of the area. The photographs and 1:24,000-scale topographic maps were used to select general areas of the WSA to be visited during field survey.

Field survey was conducted on foot by G. Jones on three days, July 23 - 25, 2001. Survey routes were selected to include different vegetation types on a variety of aspects and slopes. The vegetation was described at sampling points along those survey routes and notes were taken on noxious weeds and other exotic plant species, on signs of disturbance, and on other features. The sampling points generally were located where the vegetation along a survey route changed substantially, and were marked on 1:24,000-scale topographic quads. Photographs were taken at some points to illustrate the vegetation.

Vascular plants were identified to species in the field when possible, using Dorn (1992). When that proved impossible, specimens were collected for later identification. Some specimens were also collected to verify the identifications made in the field.

Before field work, G. Jones reviewed specimens in the Rocky Mountain Herbarium of species on the State of Wyoming's list of designated noxious weeds, so that populations of any of these species observed in the WSA could be recorded during field work.

REPORT PREPARATION

The cooperative agreement governing this project requires that three classification systems be used to indicate the ecosystems present in the WSA: the classification of 41 landcover-types used in a state-wide landcover map, the landtypes from the federal Ecomap project, and the vegetation types from the National Vegetation Classification System.

For the 41 landcover-types, we are using the classification of types and the coverage produced in 1996 by the Wyoming Gap Analysis Project (Merrill *et al.* 1996) and distributed by the University of Wyoming's Geographic Information Science Center (Wyoming Gap Analysis 1996). A map of these cover-types in the WSA was produced in the ArcGIS 8.2 geographic information system (ESRI, Redlands CA, USA) by using the boundary of the WSA to clip the relevant portion of the state-wide layer.

For units from the Ecomap project, we are using the landtype associations delineated for the area by Reiners *et al.* (1999). A *landtype association* is a unit of the National Hierarchical Framework

of Ecological Units (used in the Ecomap project) one level higher than the *landtype*. The landtype associations delineated by Reiners *et al.* are based primarily on slope and relief, and were digitized with a minimum mapping unit of 500 ha (1.9 square miles). A map of the landtype associations within the WSA was produced by using the boundary of the WSA to clip the relevant portion of the layer produced by Reiners *et al.* (1999).

The final indicator of ecosystem types, the National Vegetation Classification System, is a hierarchical classification of vegetation units (Grossman *et al.* 1998). Information from the field survey was used to place the vegetation of the WSA into vegetation alliances or plant associations included on the current list of those types (NatureServe 2004). Alliances are units identified by the dominant or diagnostic plant species in the uppermost or dominant stratum, and associations are units within an alliance, identified by additional dominant or diagnostic species from any stratum.

Plant species names used in this report are from the USDA Natural Resources Conservation Service (2002).

RESULTS

Observations of vegetation and other features were made at 64 sampling points in the WSA during the 2001 field survey. The locations of those points are shown on Figure 3, and information about each is given in Table 1. The vegetation descriptions made at the sampling points are in Appendix 1.

ECOSYSTEMS IN THE WSA

Landtype Associations

Six landtype associations delineated by Reiners *et al.* (1999) occur in the Sweetwater Canyon WSA (Figure 4). The predominant landtype association (LTA) in the WSA is the River Valley LTA, which includes Sweetwater Canyon and accounts for over 40% of the area (Table 2). The other five LTAs are found in the uplands next to the canyon. Most of the uplands lie on the Smooth Plains LTA (32.3% of the WSA), and the remainder lies on the Hills, Low Hills, Open Low Hills, and Irregular Plains LTAs.

Wyoming GAP Cover-types

A brief explanation of how GAP mapped landcover is needed for an understanding of the estimated area of each type in the WSA. For most polygons in the state-wide landcover layer, GAP mapped a primary and a secondary cover-type and estimated the percentage of the polygon that is each type. If it were possible to use those percentages from the GAP layer, then the actual area of a cover-type in the WSA could be estimated as:

$$\sum_{\substack{\text{polygons} \\ \text{with that} \\ \text{type}}} [(\text{area of polygon})(\% \text{ as primary type}) + (\text{area of polygon})(\% \text{ as secondary type})]$$

But the boundaries of the WSA cut across GAP polygons, so when the land area of the WSA was clipped out of the state-wide layer, some of the polygons were split. There is no reason to assume that the percentage of a given cover-type in the resulting polygons is the same as its percentage in the original polygon, so the percentages from the GAP layer were not used in calculating the areas of cover-types in the WSA. Rather, the area shown in this report for a cover-type in the WSA is the sum of the areas of the polygons in which it is mapped as the primary cover-type. This is the same method as Merrill *et al.* (1996) used for calculating the area of each cover-type in Wyoming. It may result in an

over-estimate of the amount of a cover-type in the WSA because the type actually occupies substantially less than 100% of the area of the polygons in which it is the primary type. Or it may under-estimate the amount of the cover-type because it ignores the polygons in which that cover-type is the secondary type.

The Wyoming Gap Analysis Project (Merrill *et al.* 1996) mapped six landcover-types in the WSA (Figures 5 and 6). The uplands are mapped as a mix of either the Wyoming big sagebrush type (in most of the WSA) or the Mountain big sagebrush type (in part of the western end) as the primary type, and the Mixed-grass prairie as the secondary type. All three of these cover-types are composed of a mix of grasses, forbs, and shrubs, with *Artemisia tridentata* ssp. *wyomingensis* accounting for $\geq 25\%$ of the canopy cover in the Wyoming big sagebrush type, *Artemisia tridentata* spp. *vaseyana* for $\geq 25\%$ of the cover in the Mountain big sagebrush type, and shrubs for $< 25\%$ of the cover in the Mixed-grass prairie (Merrill *et al.* 1996). Open water is mapped as the secondary cover-type in the Lewiston Lakes, which extend into a small part of the uplands in the WSA's northern side.

The canyon in the WSA is mapped by the GAP as mixtures of the Forest-dominated riparian type (the primary type) and Shrub-dominated riparian type (the secondary type) in the upstream part, and as the Shrub-dominated riparian type (the primary type) with the Mountain big sagebrush type (the secondary type) in the downstream part.

The degree to which the WSA represents the GAP cover-types mapped throughout Wyoming can be judged by looking at just the areas where those types are mapped as the primary cover-types. As Table 3 shows, the WSA represents its four primary cover-types -- Wyoming big sagebrush, Mountain big sagebrush, Shrub riparian, and Forest riparian -- in greater proportion than they occur throughout the state. The Wyoming big sagebrush type, which covers most of the uplands and accounts for nearly three-quarters of the WSA, is the primary type on 57.5% of BLM-managed lands in the state and on 33% of the state as a whole. The other primary cover-type on the uplands, Mountain big sagebrush, is the primary type on 10% of the WSA, but on only 3.8% of BLM-managed lands in Wyoming and only 3.6% of all the state's land area. Shrub-dominated riparian vegetation is mapped as the primary type on 13% of the WSA, a much higher percentage than on BLM-managed lands (0.81%) or all lands (1.12%) in Wyoming. Forest-dominated riparian vegetation is the primary type on only 5% of the WSA, but that still is greater than its representation on BLM-managed lands or all lands throughout Wyoming (0.18% and 1.14%, respectively).

National Vegetation Classification System Vegetation Alliances and Plant Associations

Seventy-six vegetation descriptions (Appendix 1) made at 64 sampling points (Table 1) are the basis for identifying the vegetation alliances and plant associations from the national vegetation classification that likely are present in the Sweetwater Canyon WSA (Table 4). Most plant associations in the national classification have been assigned a conservation rank based on the association's geographic range, its abundance within that range, and the degree to which it is thought to be threatened by weeds, habitat loss, or the alteration of the ecological processes that maintain it. Conservation ranks range from G1 to G5. A rank of G1 indicates a very rare or a seriously threatened vegetation type, and a rank of G5 indicates a common and widespread type. A GNR rank indicates that information about the association is insufficient to assign it a rank. Alliances have no conservation ranks.

The alliances and associations likely present in the Sweetwater Canyon WSA are briefly described below. Table 4 lists them and shows the vegetation descriptions from Appendix 1 that are thought to represent each. The alliances and associations are organized into general vegetation types.

Note that few of the associations from the national classification can be said with certainty to be present in the WSA, and for some of the Sweetwater Canyon vegetation types, only the applicable alliance can be identified and the association is unknown. This uncertainty results largely because many of the associations in the national classification are only poorly or moderately known, and some are undescribed. In addition, in some cases, information from the field work in the WSA was insufficiently detailed to positively assign vegetation stands to a sketchily known association.

Information on the alliances and associations in the national classification can be obtained from the web site of NatureServe (2004).

Upland Herbaceous Vegetation

The vegetation on the uplands in the WSA consists largely of sparse grass and forb vegetation with some amount of shrubs. On limited areas, primarily atop the broad divides with rocky soils, shrubs contribute little cover and the vegetation consists of grasses (*Pseudoroegneria spicata*, *Poa secunda*, and some others) and forbs (*Arenaria hookeri*, *Paronychia sessiliflora*, *Phlox hoodii*). On bedrock outcrops, forbs contribute at least as much cover as do the grasses, and clubmoss (*Selaginella densa*) is common there. This vegetation is placed into the *Pseudoroegneria spicata* - Cushion Plant Association.

The other herbaceous association, the *Pseudoroegneria spicata* - *Poa secunda* Association, includes the areas where grasses dominate. Throughout the uplands this vegetation is sparse, but stands of dense *Pseudoroegneria spicata* - dominated vegetation may be found on a few slopes in draws and the Sweetwater River Canyon. (For the latter, see description 01SwCan384.)

Both of these associations occur in the Wyoming big sagebrush cover-type and the Mixed-grass prairie cover-type of the Wyoming GAP classification (Figures 5 and 6).

Upland Shrub-Steppe

Over most of the rolling uplands, short shrubs (≤ 25 cm tall) are a conspicuous component of the vegetation, and the vegetation can be considered shrub-steppe rather than grass vegetation. Three species of sagebrush and one rabbitbrush are the common shrubs, and the plant association to which the vegetation at a point is assigned depends on which shrub contributes the most cover. *Artemisia tridentata* ssp. *wyomingensis* likely contributes most of the shrub canopy cover over most of the upland, so the most common of the plant associations in the shrub-steppe probably is the *Artemisia tridentata* ssp. *wyomingensis* / *Pseudoroegneria spicata* Shrub Herbaceous Association. *Artemisia nova* is the dominant shrub over much of the area, and there the vegetation can be placed into the *Artemisia nova* / *Pseudoroegneria spicata* Shrubland Association. (Even though shrubland associations in the national classification have, by definition, $\geq 25\%$ shrub canopy cover, the shrub-steppe vegetation of the WSA is placed in this association because the description of the association otherwise matches well the vegetation in the WSA.) *Artemisia arbuscula* ssp. *longiloba* contributes more cover than the other two short sagebrushes over some of the area, and that vegetation is placed in the *Artemisia arbuscula* ssp. *longiloba* / *Poa secunda* Shrub Herbaceous Association.

All three of the sagebrush species are present in the vegetation on much of the WSA, so assigning the vegetation at a particular spot to one of the three associations is difficult. Much of the shrub-steppe in the WSA might be considered transitional between the three associations.

A fourth low sagebrush, *Artemisia tripartita* ssp. *rupicola*, was observed in limited areas within draws on the uplands. The vegetation where this species forms the low shrub stratum is placed into the *Artemisia tripartita* ssp. *rupicola* / *Festuca idahoensis* Shrub Herbaceous Association, even though the limited information recorded during field survey suggests that *F. idahoensis* is not a significant species. That association, the only one named so far in the *A. tripartita* ssp. *rupicola* Shrub Herbaceous Alliance, is only moderately well documented. The *A. tripartita* shrub-steppe vegetation in the WSA might be better placed into the alliance until more is known about this type of vegetation.

The upland shrub-steppe is mapped by Wyoming GAP as (primarily) the Wyoming big sagebrush cover-type and (secondarily) as the Mixed-grass prairie cover-type.

Upland Shrub Vegetation

Artemisia tridentata ssp. *vaseyana*, a taller sagebrush, dominates or co-dominates the shrub layer in patches of shrub vegetation growing on slopes and in swales within the shrub-steppe matrix. In most of these stands, *A. tridentata* ssp. *vaseyana* shares dominance with *Purshia tridentata*, and the vegetation is being considered part of the *A. tridentata* ssp. *vaseyana* - *Purshia tridentata* / *Pseudoroegneria spicata* Shrub Association. Field survey suggests that *Symphoricarpos oreophilus* contributes substantial canopy cover in a few shrub stands, which can be assigned to the *A. tridentata* ssp. *vaseyana* - *Symphoricarpos oreophilus* / *Festuca idahoensis* Shrub Association. Where *A. tridentata* ssp. *vaseyana* is the only shrub with much cover in the shrub stratum, rhizomatous wheatgrass (either *Elymus lanceolatus* ssp. *lanceolatus* or *Pascopyrum smithii*) contributes much of the cover in the herbaceous stratum, and the vegetation is classified into the *Artemisia tridentata* ssp. *vaseyana* / *Pascopyrum smithii* Shrub Association. This assignment should be considered tentative until positive identification is made of the rhizomatous wheatgrass.

Wyoming GAP noted the presence of shrub stands in limited upland areas of the WSA, as shown by the designation of the Mountain big sagebrush cover-type as an "Other" type in a polygon south of the canyon and the Bitterbrush shrub steppe cover-type as an "Other" type in a polygon at the WSA's west end. Throughout most of the uplands, though, these stands are smaller than the GAP's 100-ha (248-acre) minimum mapping unit and GAP did not note them in the vegetation.

Upland Woodland and Forest

Several *Pinus flexilis* stands were noted during field survey, and the presence of *Festuca idahoensis* in the undergrowth suggests that they can be placed into the *Pinus flexilis* / *Festuca idahoensis* Woodland Association. This association is not described on the NatureServe national vegetation web site (NatureServe 2004), but the description of this woodland association in Montana (Cooper 2001) applies reasonably well to the stands in the WSA.

A single *Pinus contorta* woodland was noted along the Sweetwater River in the canyon. This small woodland is being placed into the *Pinus contorta* / *Arnica cordifolia* Forest Association. The presence of a substantial amount of *Calamagrostis canadensis* in the undergrowth suggests that this is an unusually wet stand for this upland association.

None of the upland woodland or forest patches are large enough to have been mapped by Wyoming GAP.

Riparian Herbaceous Vegetation

Mesic meadows with *Carex praegracilis*, *Muhlenbergia richardsonis*, *Juncus* spp., and many other species were noted in draws throughout the WSA. The national classification contains a *Carex praegracilis* Association into which this vegetation is being classified, although with only moderate certainty.

Meadows of *Deschampsia caespitosa*, *Carex nebrascensis*, *Agrostis stolonifera*, *Antennaria microphylla*, *Juncus* spp., and many other species, including a number shared with the *Carex praegracilis* meadows, also were observed throughout the WSA. These meadows are being considered part of the *Deschampsia caespitosa* - *Carex nebrascensis* Association from the national classification, the description of which (NatureServe 2004) applies reasonably well to the vegetation in the WSA.

One meadow was noted during field work in which *Leymus cinereus* formed a tall herbaceous stratum. The lower herbaceous stratum resembled the *Carex praegracilis* meadows. The abundance of *Leymus cinereus* justifies the placing of this stand into the *Leymus cinereus* Association of the national classification. The national classification contains several *Leymus cinereus* associations and their descriptions (NatureServe 2004) suggest that classification of these types is problematic.

Wyoming GAP apparently was unable to perceive the patches of herbaceous vegetation in the riparian zone of the canyon and mapped this vegetation either as the Shrub-dominated riparian cover-type or as the Mountain big sagebrush cover-type (the latter in the downstream part of the canyon). On the uplands, it may be part of the Mixed-grass prairie cover-type.

Riparian Shrub Vegetation

Riparian shrub stands grow along much of the Sweetwater River and the larger tributary streams in the WSA. The shrub overstory in most of this vegetation is a mixture of species, but the descriptions made during fieldwork suggest that it can be placed into four types from the national classification.

Where *Betula occidentalis* dominates or co-dominates the shrub stratum (as it does in much of the riparian zone), the vegetation is placed into the *Betula occidentalis* Association. The tall shrub layer may contain a variety of willows, and they may contribute substantial cover. Shorter shrubs usually are present (especially *Ribes oxycanthoides* var. *setosum* and *Rosa* spp.) and may form a moderately dense stratum. The herbaceous undergrowth usually is dense between the clumps of shrubs and contains many graminoids and forbs. *Phleum pratense*, *Poa pratensis*, *Agrostis stolonifera*, and *Thermopsis* sp. were noted in several stands.

Salix lutea is the willow encountered most often in the 2001 field survey of the WSA, and shrub vegetation where it dominates is being placed into the *Salix lutea* / Mesic Graminoids Association of the national classification. The herbaceous undergrowth in these shrub stands is rich in graminoids (common species of which are *Poa pratensis*, *Agrostis stolonifera*, and *Juncus balticus*) and also contains numerous forbs. A short shrub layer may be present.

Salix geyeriana is another tall willow that dominates or co-dominates the shrub overstory in parts of the WSA, and the vegetation there is considered part of the *Salix geyeriana* / Mesic Graminoids Association. The herbaceous undergrowth in these willow stands is similar to that in the *Salix lutea* stands.

Salix lucida var. *caudata* (= *S. lasiandra*) is the third willow that dominates riparian shrub vegetation in the WSA, probably in fewer areas than do the other two willows. Vegetation dominated by this willow is placed into the *Salix lucida* Temporarily Flooded Shrubland Alliance because the description of the only association in that alliance seems to not apply to the vegetation noted in the WSA.

These *Betula occidentalis* and *Salix* spp. shrub types were mapped by Wyoming GAP as the Shrub-dominated riparian cover-type.

Riparian Woodland and Forest

Scattered *Populus angustifolia* stands grow along the Sweetwater River, especially in the western part of the WSA. *Pinus flexilis* and *Juniperus scopulorum* often grow beneath the taller cottonwoods. A shrub layer may be present, or the stand may consist only of the tree canopy and subcanopy and the herbaceous undergrowth. These cottonwood stands are placed into the *Populus angustifolia* Temporarily Flooded Forest Alliance because none of the *P. angustifolia* associations seem to apply to the WSA vegetation.

A description was made of one *Populus tremuloides* stand growing in the bottom of a tributary stream. Part of the stand had *Populus angustifolia* in the canopy and a tall shrub layer of willows and *Juniperus scopulorum*, but much of it consisted just of the aspen canopy and a herbaceous undergrowth. This stand seems to fit into the *Populus tremuloides* / *Poa pratensis* Association from the national classification. A handful of additional small aspen groves were observed during field work but none were described.

The cottonwood and riparian aspen stands are mapped by Wyoming GAP as the Forest-dominated riparian cover-type.

Ecosystem Summary

The Sweetwater Canyon WSA contains two different types of ecosystems, each represented by visually distinct landscape features and vegetation features. The more striking ecosystem is the canyon itself, encompassing the river valley landtype association. Much of the vegetation therein consists of riparian herbaceous, shrub, or forest vegetation alliances and plant associations, which are included in the Wyoming GAP Shrub-dominated riparian, Forest-dominated riparian, or Mountain big sagebrush cover-types.

The second general ecosystem type is represented by the several hills and plains landtype associations and by the shrub-steppe and grassland alliances and associations on the uplands north and south of the canyon. That vegetation is mapped by Wyoming GAP as the Wyoming big sagebrush and Mixed-grass prairie cover-types. The uplands and the canyon are connected by the mesic meadows that originate in draws on the uplands and extend down tributaries into the canyon, and by the stands of upland grass and shrub-steppe vegetation that extend in places from the uplands onto the canyon walls. They also share *Artemisia tridentata* ssp. *vaseyana* - dominated shrub vegetation.

FLORISTIC FEATURES OF THE WSA

Table 5 lists the 164 plant taxa noted in the WSA during the 2001 field work. The 2001 survey did not include a thorough floristic inventory and Table 5 is far from a complete flora of the WSA.

Rare Plants

No plant species considered by the Wyoming Natural Diversity Database to be rare or of conservation concern were noted in the WSA during the 2001 field work. One species, *Antennaria arcuata* (meadow pussytoes), is known from wet meadows approximately four miles and six miles west of the WSA, but that species has not been found in the meadows of the WSA, either by the 2001 field survey for this project or by earlier surveys.

Noxious Weeds

Two plant species on Wyoming's noxious weed list (Wyoming Weed and Pest Council, 2004) were documented in the WSA by G. Jones in the 2001 field work. *Cirsium arvense*, Canada thistle, was noted at four locations along the Sweetwater River (descriptions 21, 27a, 54, and 562). Most patches of Canada thistle were small and contained few stems, but the patch at sample point 56 was estimated to contain several hundred to 1,000 stems in several dense patches. *Cirsium vulgare*, bull thistle, also was noted along the river, at three sample points (descriptions 21, 27a, and 562). This species grew in patches of less than 100 stems each.

Other Exotic Plant Species

Of the 164 taxa of vascular plants noted in the WSA during the 2001 field work (Table 5), nine are known or thought to be introduced: the two noxious weed species mentioned above (Canada thistle and bull thistle), plus *Agrostis stolonifera* (carpet bentgrass, or redtop), *Bromus tectorum* (cheatgrass), *Phleum pratense* (timothy), *Poa pratensis* (Kentucky bluegrass), *Polygonum aviculare* (prostrate knotweed), *Taraxacum laevigatum* (rock dandelion; the identity of this species was uncertain), and *Trifolium repens* (white clover). The origins of two additional taxa identified only to genus (*Agrostis* sp. and *Taraxacum* sp.) are unknown because both genera contain native and introduced species in Wyoming.

Exotic species appear to contribute little to the upland vegetation in the WSA. In the riparian zone along the Sweetwater River, though, the willow and birch shrub stands and the mesic meadows may contain considerable amounts of Kentucky bluegrass and redtop. This is a common situation in riparian vegetation at low and intermediate elevations throughout Wyoming.

ACKNOWLEDGEMENTS

Walter Fertig and Hollis Marriott identified plant specimens, and Ron Hartman and Ernie Nelson (curator and manager, respectively) made the facilities of the Rocky Mountain Herbarium available for that work. Assistance in administrative matters and in planning field work were rendered by Gary Long of the BLM's Lander Field Office and by Jeff Carroll of the BLM State Office.

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Figure 1. Location of the Sweetwater Canyon WSA in Wyoming.

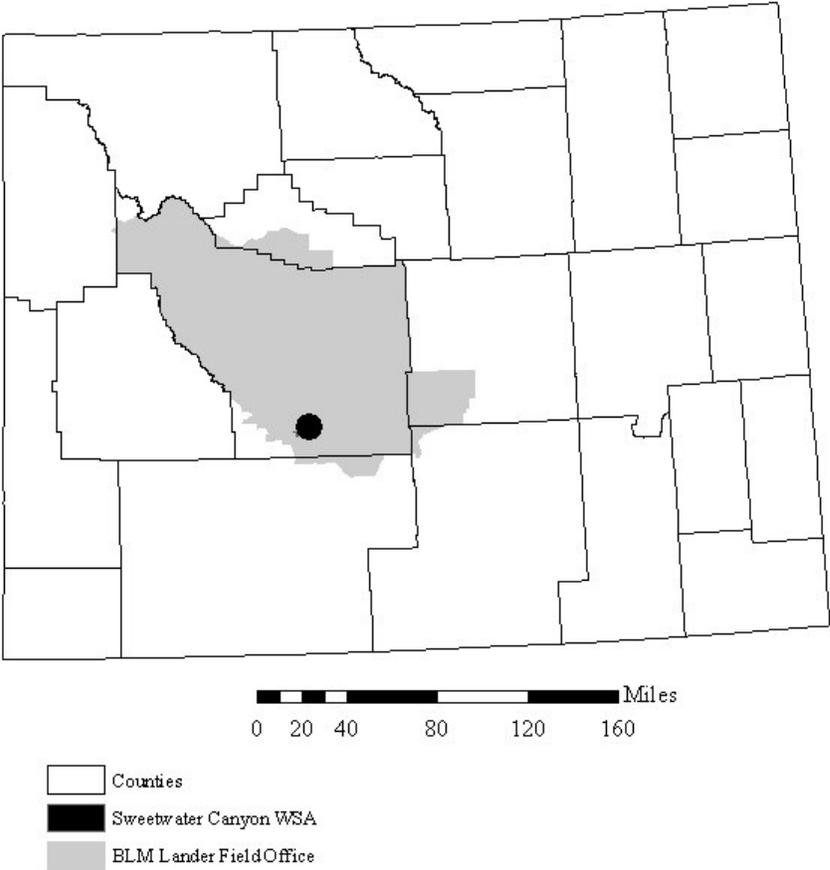


Figure 2. Location of the Sweetwater Canyon WSA on the Public Land Survey System Grid.

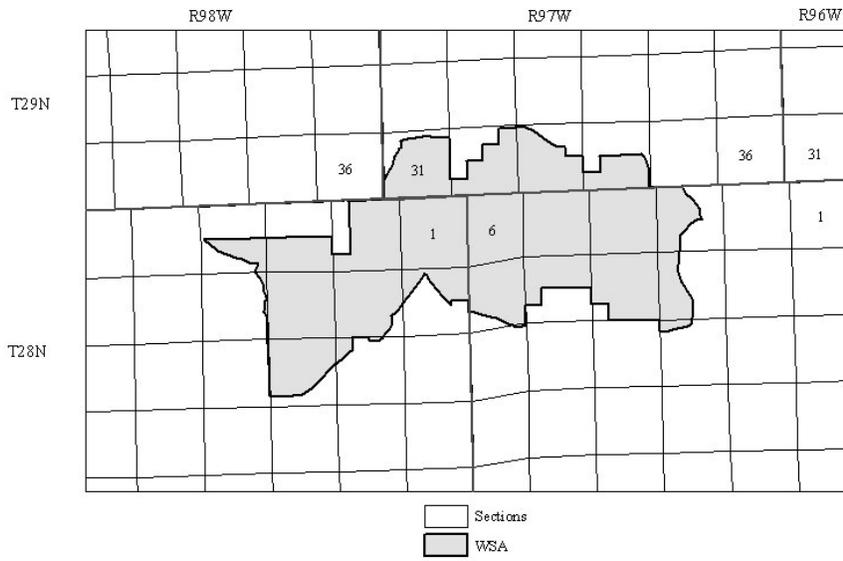
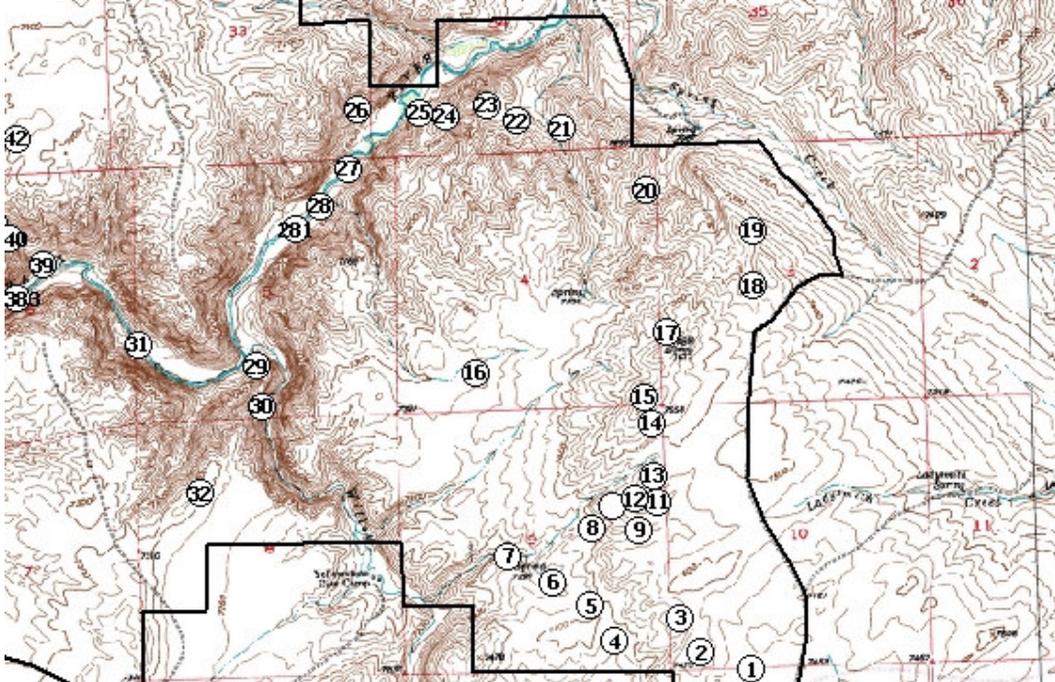


Figure 3. Locations of Vegetation Descriptions From 2001 Field Survey in the Sweetwater Canyon WSA.

Background maps are the Lewiston Lakes and Radium Springs 7.5' topographic quads. TRS and UTM coordinates for each point are shown in Table 1, and descriptions of vegetation at most points are in Appendix 1.

a. Eastern part of WSA



b. Western part of WSA

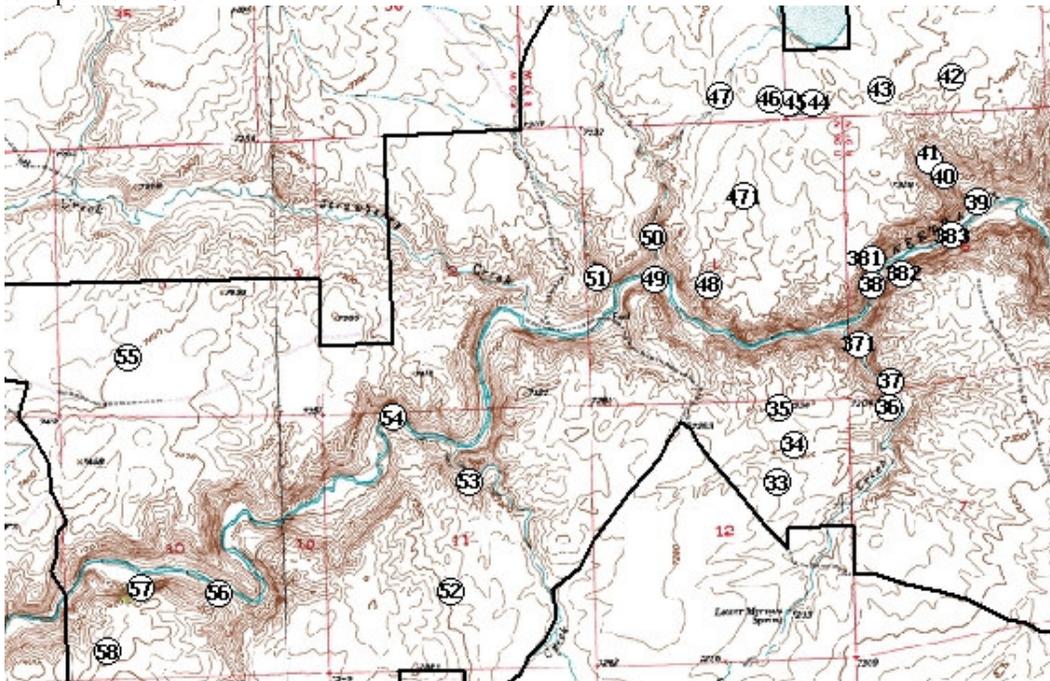
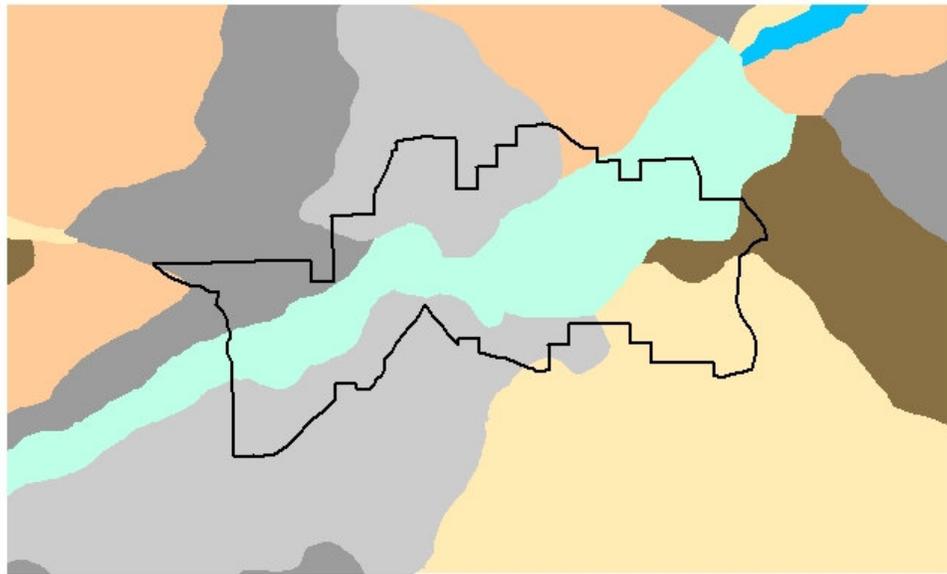


Figure 4. Landtype Associations In and Around the Sweetwater Canyon WSA
Table 2 shows the area of each landtype within the WSA.



0 1 2 4 6 8 Miles

-  WSA Boundary
- Landtype Associations**
-  Hills
-  Low Hills
-  Open Low Hills
-  Smooth Plains
-  Irregular Plains
-  River Valley
-  Alluvial Valley

Figure 5. GAP Primary Cover-types In and Around the Sweetwater Canyon WSA. Table 3 shows the area of each primary cover-type within the WSA.

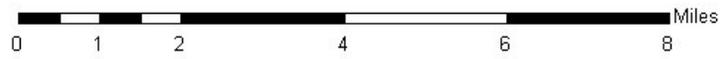
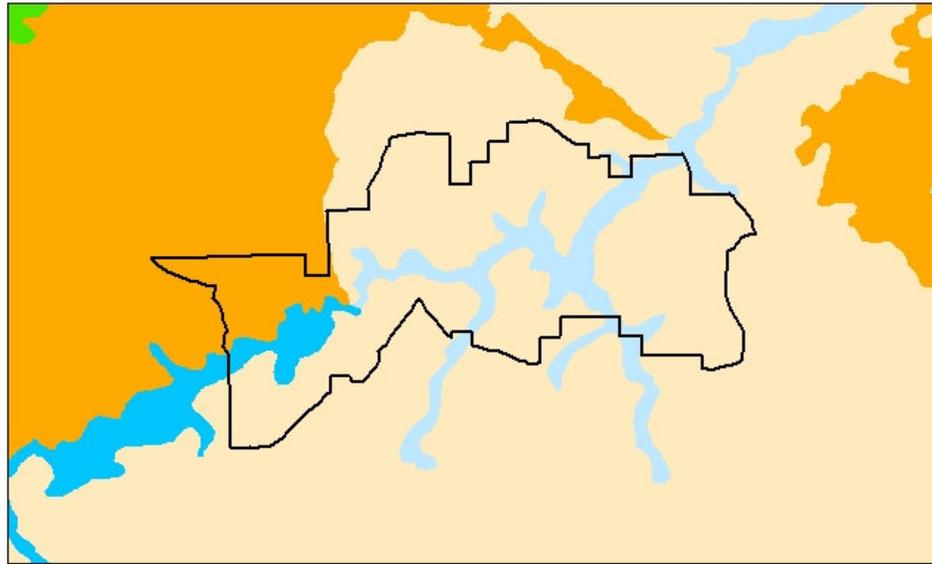
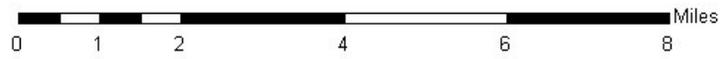
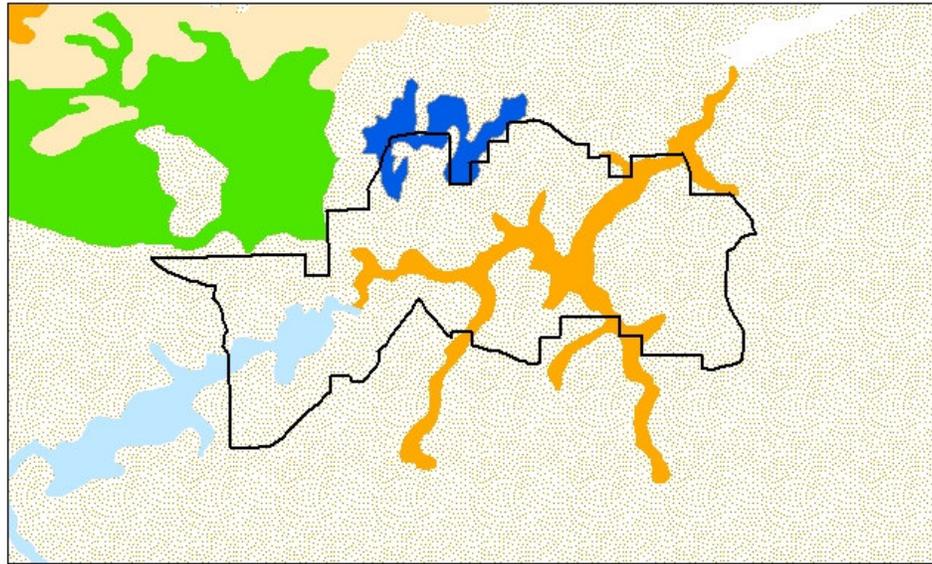


Figure 6. GAP Secondary Cover-types In and Around the Sweetwater Canyon WSA.



-  WSA Boundary
- GAP Secondary Cover**
-  Mixed-Grass Prairie
-  Wyoming Big Sagebrush
-  Mountain Big Sage
-  Aspen
-  Shrub Riparian
-  Open Water

Table 1. Locations of Vegetation Sampling Points in the Sweetwater Canyon WSA.

UTM coordinates are NAD 1983, Zone 12N. Those coordinates were calculated in ArcMap GIS, not recorded in the field. The approximate location of each point was marked in the field on the paper 7.5-minute topographic quad, and that location was digitized in ArcMap on the digital version of the map (the digital raster graphic). The UTM coordinates were then calculated for those digitized points.

Point Number	7.5' Quad Name	Township	Range	Section	UTM Easting	UTM Northing	Vegetation Descriptions
1	Lewiston Lakes	T28N	R97W	15	714192	4698561	01SwCan01 a & b
2	Lewiston Lakes	T28N	R97W	10	713891	4698664	01SwCan02
3	Lewiston Lakes	T28N	R97W	10	713760	4698870	01SwCan03 a & b
4	Lewiston Lakes	T28N	R97W	9	713366	4698729	01SwCan04 a - e
5	Lewiston Lakes	T28N	R97W	9	713216	4698945	None
6	Lewiston Lakes	T28N	R97W	9	712991	4699086	01SwCan06
7	Lewiston Lakes	T28N	R97W	9	712719	4699245	01SwCan07
8	Lewiston Lakes	T28N	R97W	9	713226	4699414	01SwCan08 a & b
9	Lewiston Lakes	T28N	R97W	9	713516	4699405	01SwCan09
10	Lewiston Lakes	T28N	R97W	9	713357	4699545	None
11	Lewiston Lakes	T28N	R97W	9	713629	4699573	None
12	Lewiston Lakes	T28N	R97W	9	713488	4699602	01SwCan12
13	Lewiston Lakes	T28N	R97W	9	713601	4699733	01SwCan13
14	Lewiston Lakes	T28N	R97W	9	713591	4700052	01SwCan14
15	Lewiston Lakes	T28N	R97W	4	713549	4700211	01SwCan15
16	Lewiston Lakes	T28N	R97W	4	712527	4700361	None
17	Lewiston Lakes	T28N	R97W	3	713680	4700605	01SwCan17 a - c
18	Lewiston Lakes	T28N	R97W	3	714206	4700886	01SwCan18
19	Lewiston Lakes	T28N	R97W	3	714206	4701224	01SwCan19 a & b
20	Lewiston Lakes	T28N	R97W	4	713559	4701468	None
21	Lewiston Lakes	T29N	R97W	34	713043	4701843	01SwCan21
22	Lewiston Lakes	T29N	R97W	34	712780	4701890	01SwCan22
23	Lewiston Lakes	T29N	R97W	34	712593	4701984	01SwCan23
24	Lewiston Lakes	T29N	R97W	34	712349	4701918	01SwCan24 a - c
25	Lewiston Lakes	T29N	R97W	34	712180	4701937	01SwCan25
26	Lewiston Lakes	T29N	R97W	33	711805	4701955	None
27	Lewiston Lakes	T28N	R97W	5	711749	4701599	01SwCan27 a & c
28	Lewiston Lakes	T28N	R97W	5	711580	4701374	01SwCan28
281	Lewiston Lakes	T28N	R97W	5	711439	4701233	01SwCan281, 282, 283
29	Lewiston Lakes	T28N	R97W	5	711195	4700399	01SwCan29
30	Lewiston Lakes	T28N	R97W	5	711233	4700155	None
31	Lewiston Lakes	T28N	R97W	5	710483	4700530	None
32	Lewiston Lakes	T28N	R97W	8	710858	4699630	None
33	Lewiston Lakes	T28N	R98W	12	708673	4699299	01SwCan331, 332, 333
34	Lewiston Lakes	T28N	R98W	12	708779	4699530	01SwCan341, 342
35	Lewiston Lakes	T28N	R98W	12	708691	4699751	01SwCan351, 352
36	Lewiston Lakes	T28N	R97W	7	709356	4699760	01SwCan36

Table 1 (continued).

Point Number	7.5' Quad Name	Township	Range	Section	UTM Easting	UTM Northing	Vegetation Descriptions
37	Lewiston Lakes	T28N	R97W	6	709365	4699920	01SwCan37
371	Lewiston Lakes	T28N	R97W	6	709170	4700142	01SwCan371
38	Lewiston Lakes	T28N	R97W	6	709250	4700506	01SwCan38
381	Lewiston Lakes	T28N	R97W	6	709250	4700665	01SwCan389
382	Lewiston Lakes	T28N	R97W	6	709436	4700577	01SwCan382
383	Lewiston Lakes	T28N	R97W	6	709738	4700807	01SwCan384
39	Lewiston Lakes	T28N	R97W	6	709906	4701012	01SwCan39
40	Lewiston Lakes	T28N	R97W	6	709693	4701171	01SwCan40
41	Lewiston Lakes	T28N	R97W	6	709605	4701269	01SwCan41, 401, 402, 403
42	Lewiston Lakes	T29N	R97W	32	709738	4701784	01SwCan42
43	Lewiston Lakes	T29N	R97W	32	709312	4701704	01SwCan43
44	Lewiston Lakes	T29N	R97W	32	708886	4701624	01SwCan44
45	Lewiston Lakes	T29N	R97W	32	708744	4701624	01SwCan45
46	Lewiston Lakes	T29N	R97W	31	708628	4701642	None
47	Lewiston Lakes	T29N	R97W	31	708318	4701659	01SwCan47
471	Lewiston Lakes	T28N	R98W	1	708469	4701047	01SwCan471
48	Lewiston Lakes	T28N	R98W	1	708256	4700506	01SwCan48
49	Lewiston Lakes	T28N	R98W	1	707918	4700541	01SwCan49
50	Lewiston Lakes	T28N	R98W	1	707910	4700799	01SwCan50
51	Lewiston Lakes	T28N	R98W	1	707572	4700550	01SwCan51
52	Lewiston Lakes	T28N	R98W	11	706670	4698633	None
53	Lewiston Lakes	T28N	R98W	11	706786	4699301	None
54	Lewiston Lakes	T28N	R98W	11	706326	4699697	01SwCan54, 541
55	Radium Springs	T28N	R98W	3	704698	4700068	01SwCan55
56	Radium Springs	T28N	R98W	10	705257	4698623	01SwCan561, 562, 563
57	Radium Springs	T28N	R98W	10	704777	4698648	01SwCan57
58	Radium Springs	T28N	R98W	10	704575	4698262	01SwCan58

Table 2. Areas of Landtype Associations in the Sweetwater Canyon WSA.
See map of landtype association in Figure 4.

Landtype Association	Ha	Acres	Percent of WSA
Hills	145	359	3.9%
Low Hills	42	105	1.1%
Open Low Hills	446	1101	12.0%
Smooth Plains	1195	2953	32.3%
Irregular Plains	293	723	7.9%
River Valley	1581	3906	42.7%
Entire WSA	3703	9145	100.0%

Table 3. Areas of GAP Landcover-types in Wyoming and in the Sweetwater Canyon WSA.

Note that the tables from Merrill *et al.* (1996) from which the values for Wyoming and for BLM-managed lands in Wyoming are taken show the areas of the *polygons* in which these are the primary cover-types, not the actual areas of these cover-types. See Merrill *et al.* (1996), Table 2.2, for an explanation. The values from the WSA also are for the polygons in which these cover-types were mapped as the primary types. See text for explanation. Figure 5 shows the primary cover-types in the WSA.

	Wyo. Big Sagebrush	Mountain Big Sagebrush	Shrub Riparian	Forest Riparian
ALL WYOMING				
Hectares ⁽¹⁾	8,385,650	906,742	283,364	288,386
Acres	20,712,556	2,239,653	699,909	712,313
% of state ⁽²⁾	33.19%	3.59%	1.12%	1.14%
BLM IN WYOMING				
Hectares ⁽¹⁾	4,129,989	275,198	58,129	13,050
Acres	10,201,073	679,739	143,579	32,234
% of BLM lands ⁽³⁾	57.51%	3.83%	0.81%	0.18%
BLM as % of state	49.25%	30.35%	20.51%	4.53%
SWEETWATER CANYON WSA				
Hectares	2689	355	490	168
Acres	6643	878	1211	414
% of WSA	73%	10%	13%	5%
WSA as % of BLM type in state	0.07%	0.13%	0.84%	1.29%

(1) Merrill *et al.* (1996), Appendix 5.1

(2) Area of Wyoming = 25,263,316 ha (62,400,391 ac); Merrill *et al.* (1996), Table 4.3

(3) Area of BLM-managed lands = 7,181,183 ha (17,737,522 ac); Merrill *et al.* (1996), Table 4.3

(4) From this report.

Table 4. Vegetation Alliances and Plant Associations of the National Vegetation Classification System Likely Present in the Sweetwater Canyon WSA.

Vegetation Alliance / Plant Association (with identifying code) ¹	Conservation Rank ²	Certainty of Identification ³	Sample Points & Vegetation Descriptions
UPLAND HERBACEOUS VEGETATION			
<i>Pseudoroegneria spicata</i> Herbaceous Alliance			
<i>Pseudoroegneria spicata</i> - Cushion Plant Herbaceous Vegetation Association (CEGL001666)	G3	Moderately Certain	01SwCan13, 01Swcan19a, 01SwCan333
<i>Pseudoroegneria spicata</i> - <i>Poa secunda</i> Herbaceous Vegetation Association (CEGL001667)	G4?	Moderately Certain	01SwCan03a, 01SwCan17a, 01SwCan384 01Swcan58
UPLAND SHRUB-STEPPE			
<i>Artemisia arbuscula</i> ssp. <i>longiloba</i> Shrub Herbaceous Alliance			
<i>Artemisia arbuscula</i> ssp. <i>longiloba</i> / <i>Poa secunda</i> Shrub Herbaceous Vegetation Association (CEGL001523)	G3Q	Uncertain	01SwCan04d, 01SwCan351, 01SwCan45
OR			
<i>Artemisia arbuscula</i> ssp. <i>longiloba</i> / <i>Pseudoroegneria spicata</i> Shrub Herbaceous Vegetation Association	GNR	Uncertain	
<i>Artemisia nova</i> Shrubland Alliance			
<i>Artemisia nova</i> / <i>Pseudoroegneria spicata</i> Shrubland Association (CEGL001424)	G4	Moderately Certain	01SwCan01a, 01SwCan02, 01SwCan04e, 01SwCan12, 01SwCan42
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> Shrub Herbaceous Alliance			
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Pseudoroegneria spicata</i> Shrub Herbaceous Vegetation Association (CEGL001535)	G4	Moderately Certain	01SwCan09, 01SwCan15, 01SwCan17b, 01SwCan23, 01SwCan283, 01SwCan29, 01SwCan321, 01SwCan352, 01SwCan43, 01SwCan55
<i>Artemisia tripartita</i> ssp. <i>rupicola</i> Shrub Herbaceous Alliance			
<i>Artemisia tripartita</i> ssp. <i>rupicola</i> / <i>Festuca idahoensis</i> Shrub Herbaceous Vegetation Association (CEGL001540)	G3	Uncertain	01SwCan341
UPLAND SHRUB VEGETATION			
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> Shrub Herbaceous Alliance			
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca idahoensis</i> Shrub Herbaceous Vegetation Association (CEGL001533)	G5	Certain	01SwCan17c, 01SwCan24c, 01SwCan25, 01SwCan342
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> Shrubland Alliance			
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> - <i>Purshia tridentata</i> / <i>Pseudoroegneria spicata</i> Shrubland Association (CEGL001032)	G5	Certain	01SwCan03b, 01SwCan04c, 01SwCan08b, 01SwCan14, 01SwCan18, 01SwCan36, 01SwCan39, 01SwCan41
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> - <i>Symphoricarpos oreophilus</i> / <i>Festuca idahoensis</i> Shrubland Association (CEGL001036)	G4	Moderately Certain	01SwCan06
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Pascopyrum smithii</i> Shrubland Association (CEGL001028)	G3?	Uncertain	01SwCan01b, 01SwCan04a, 01SwCan332, 01SwCan561

Table 4 (continued).

Vegetation Alliance / Plant Association (with identifying code) ¹	Conservation Rank ²	Certainty of Identification ³	Sample Points & Vegetation Descriptions
UPLAND WOODLAND AND FOREST			
<i>Pinus contorta</i> Forest Alliance			
<i>Pinus contorta</i> / <i>Arnica cordifolia</i> Forest Association (CEGL000135)	G4	Uncertain	01SwCan38
<i>Pinus flexilis</i> Woodland Alliance			
<i>Pinus flexilis</i> / <i>Festuca idahoensis</i> Woodland Association (CEGL000805)	G5	Moderately Certain	01SwCan382, 01SwCan403, 01SwCan57
RIPARIAN HERBACEOUS VEGETATION			
<i>Carex praegracilis</i> Seasonally Flooded Herbaceous Alliance			
<i>Carex praegracilis</i> Herbaceous Vegetation Association (CEGL002660)	G3G4	Uncertain	01SwCan04b, 01SwCan22, 01SwCan40, 01SwCan44, 01SwCan47, 01SwCan471
<i>Deschampsia caespitosa</i> Seasonally Flooded Herbaceous Alliance			
<i>Deschampsia caespitosa</i> - <i>Carex nebrascensis</i> Herbaceous Vegetation Association (CEGL001601)	G3?Q	Moderately Certain	01SwCan07, 01SwCan08a, 01SwCan27a, 01SwCan401
<i>Leymus cinereus</i> Herbaceous Alliance			
<i>Leymus cinereus</i> Herbaceous Vegetation Association (CEGL001479)	G2G3Q	Uncertain	01SwCan281
RIPARIAN SHRUB VEGETATION			
<i>Betula occidentalis</i> Seasonally Flooded Shrubland Alliance			
<i>Betula occidentalis</i> Shrubland Association (CEGL001080)	G3G4	Moderately Certain	01SwCan371, 01SwCan389, 02SwCan49, 01SwCan54, 01SwCan562
<i>Salix geyeriana</i> Temporarily Flooded Shrubland Alliance			
<i>Salix geyeriana</i> / Mesic Graminoids Shrubland Association (CEGL001210)	G3?	Moderately Certain	01SwCan37, 01SwCan51
<i>Salix lucida</i> Temporarily Flooded Shrubland Alliance			
<i>Salix lutea</i> Temporarily Flooded Shrubland Alliance			
<i>Salix lutea</i> / Mesic Graminoids Shrubland Association (CEGL002073)	GNR	Uncertain	01SwCan21, 01SwCan24a, 01SwCan27c, 01SwCan282
RIPARIAN WOODLAND AND FOREST			
<i>Populus angustifolia</i> Temporarily Flooded Forest Alliance			
<i>Populus tremuloides</i> Forest Alliance			
<i>Populus tremuloides</i> / <i>Poa pratensis</i> Forest Association (CEGL003148)	GNR	Uncertain	01SwCan50

1. An identifying code is assigned to each plant association in the national classification. Alliances have no codes.

2. Conservation rank expresses the commonness or rarity of an association and the degree to which the association throughout its range is thought to be threatened by introduction of exotics, habitat loss, or alteration of the ecological processes upon which it depends. Conservation ranks range from G1 to G5. G1 associations are very rare and (usually) face significant threats; G5 associations are common and unthreatened. See NatureServe (2004) for an explanation.

3. Degree of certainty that the vegetation in the WSA belong to this association. Certainty depends on the description of vegetation and physical environment from a sampling point (see Appendix 1) matching reasonably well the description of an association from the national classification. Some types in the national classification are undescribed.

Table 5. One-Hundred Sixty-Four Vascular Plant Species Noted During 2001 Field Work in the Sweetwater Canyon WSA.

Scientific and Common Names	NRCS Code	Origin	Life Span
<i>achillea millefolium</i> var. <i>occidentalis</i> , western yarrow	acmi2	Native	Perennial
<i>achnatherum lettermanii</i> , letterman needlegrass	acle9	Native	Perennial
<i>agoseris glauca</i> var. <i>glauca</i> , pale agoseris	aggl	Native	Perennial
<i>agrostis scabra</i> , ticklegrass	agsc5	Native	Perennial
<i>agrostis stolonifera</i> , creeping bentgrass	agst2	Introduced	Perennial
<i>agrostis</i> , bentgrass	agros2	Native and Introduced	Perennial
<i>allium</i> sp., onion	alliu	Native	Perennial
<i>alopecurus aequalis</i> , shortawn foxtail	alae	Native	Perennial
<i>amelanchier alnifolia</i> , saskatoon serviceberry	amal2	Native	Perennial
<i>antennaria microphylla</i> , littleleaf pussytoes	anmi3	Native	Perennial
<i>apocynum</i> , dogbane	apocy	Native	Perennial
<i>arabis</i> sp., rockcress	arab12	Native	Perennial
<i>arenaria congesta</i> var. <i>congesta</i> , ballhead sandwort	arcoc4	Native	Perennial
<i>arenaria hookeri</i> , hooker's sandwort	arho4	Native	Perennial
<i>argentina anserina</i> , silverweed cinquefoil	aran7	Native	Perennial
<i>arnica fulgens</i> , foothill arnica	arfu3	Native	Perennial
<i>artemisia arbuscula</i> ssp. <i>longiloba</i> , alkali sagebrush	ararl	Native	Perennial
<i>artemisia cana</i> ssp. <i>viscidula</i> , silver sagebrush	arcav2	Native	Perennial
<i>artemisia dracunculus</i> , wormwood	ardr4	Native	Perennial
<i>artemisia frigida</i> , fringed sagewort	arfr4	Native	Perennial
<i>artemisia ludoviciana</i> , louisiana sagewort	arlu	Native	Perennial
<i>artemisia nova</i> , black sagebrush	arno4	Native	Perennial
<i>artemisia tridentata</i> ssp. <i>tridentata</i> , basin big sagebrush	artrt	Native	Perennial
<i>artemisia tridentata</i> ssp. <i>vaseyana</i> , mountain big sagebrush	artrv	Native	Perennial
<i>artemisia tridentata</i> ssp. <i>wyomingensis</i> , wyoming big sagebrush	artrw8	Native	Perennial
<i>artemisia tripartita</i> ssp. <i>rupicola</i> , wyoming threetip sagebrush	artrr2	Native	Perennial
<i>astragalus bodinii</i> , bodin's milkvetch	asbo	Native	Perennial
<i>astragalus kentrophyta</i> var. <i>kentrophyta</i> , spiny milkvetch	askek	Native	Perennial
<i>balsamorhiza incana</i> , hoary balsamroot	bain	Native	Perennial
<i>betula occidentalis</i> , water birch	beoc2	Native	Perennial
<i>bromus anomalus</i> , nodding brome	bran	Native	Perennial
<i>bromus tectorum</i> , cheatgrass	orte	Introduced	Annual
<i>calamagrostis canadensis</i> , bluejoint	caca4	Native	Perennial
<i>calamagrostis stricta</i> , slimstem reedgrass	cast36	Native	Perennial
<i>campanula rotundifolia</i> , bluebell bellflower	caro2	Native	Perennial
<i>carex duriuscula</i> , needleleaf sedge	cadu6	Native	Perennial
<i>carex filifolia</i> , threadleaf sedge	cafi	Native	Perennial
<i>carex nebrascensis</i> , nebraska sedge	cane2	Native	Perennial
<i>carex pellita</i> (<i>carex lanuginosa</i>), woolly sedge	cape42	Native	Perennial
<i>carex petasata</i> , liddon sedge	cape7	Native	Perennial

Table 5 (continued)

Scientific and Common Names	NRCS Code	Origin	Life Span
<i>Carex praegracilis</i> , clustered field sedge	capr5	Native	Perennial
<i>Carex rossii</i> , ross' sedge	caro5	Native	Perennial
<i>Carex</i> sp., sedge	carex	Native	Perennial
<i>Castilleja</i> , indian paintbrush	casti2	Native	Perennial
<i>Chamerion angustifolium</i> , fireweed	chan9	Native	Perennial
<i>Crepis</i> sp., hawksbeard	crepi	Native	Perennial
<i>Chrysothamnus viscidiflorus</i> , yellow rabbitbrush	chvi8	Native	Perennial
<i>Cirsium arvense</i> , canada thistle	ciar4	Introduced	Perennial
<i>Cirsium tioganum</i> var. <i>coloradense</i> , colorado thistle	ctic	Native	Perennial
<i>Cirsium vulgare</i> , bull thistle	civu	Introduced	Biennial
<i>Collinsia parviflora</i> , smallflower blue eyed mary	copa3	Native	Annual
<i>Cordylanthus ramosus</i> , bushy bird's beak	cora5	Native	Annual
<i>Cornus sericea</i> , redosier dogwood	cose16	Native	Perennial
<i>Cryptantha flavoculata</i> , roughseed catseye	crfl6	Native	Perennial
<i>Danthonia unispicata</i> , onespoke danthonia	daun	Native	Perennial
<i>Dasiphora floribunda</i> , shrubby cinquefoil	daf13	Native	Perennial
<i>Deschampsia caespitosa</i> , tufted hairgrass	deca18	Native	Perennial
<i>Draba oligosperma</i> , fewseed whitlowgrass	drol	Native	Perennial
<i>Eleocharis palustris</i> , common spikerush	elpa3	Native	Perennial
<i>Elymus elymoides</i> ssp. <i>elymoides</i> , squirreltail	elele	Native	Perennial
<i>Elymus lanceolatus</i> (var. <i>riparius</i>), streambank wheatgrass	ella3	Native	Perennial
<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i> , thickspike wheatgrass	ellal	Native	Perennial
<i>Elymus trachycaulus</i> (var. <i>andinus</i>), slender wheatgrass	eltr7	Native	Perennial
<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i> , slender wheatgrass	eltrt	Native	Perennial
<i>Epilobium ciliatum</i> var. <i>ciliatum</i> , fringed willowherb	epcic	Native	Perennial
<i>Equisetum hyemale</i> , scouringrush horsetail	eqhy	Native	Perennial
<i>Equisetum variegatum</i> , variegated scouringrush	eqva	Native	Perennial
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> , rubber rabbitbrush	ernan3	Native	Perennial
<i>Erigeron compositus</i> (var. <i>discoideus</i>), cutleaf daisy	erco4	Native	Perennial
<i>Erigeron compositus</i> , cutleaf daisy	erco4	Native	Perennial
<i>Erigeron lonchophyllus</i> , shortray fleabane	erlo	Native	Perennial
<i>Eriogonum flavum</i> var. <i>flavum</i> , alpine golden buckwheat	erflf	Native	Perennial
<i>Eriogonum microthecum</i> var. <i>laxiflorum</i> , slender buckwheat	ermil2	Native	Perennial
<i>Eriogonum ovalifolium</i> , cushion buckwheat	erov	Native	Perennial
<i>Eriogonum</i> sp., eriogonum	eriog	Native	Perennial
<i>Eriogonum umbellatum</i> var. <i>dicrocephalum</i> , sulphur-flower buckwheat	erumd3	Native	Perennial
<i>Festuca idahoensis</i> , idaho fescue	feid	Native	Perennial
<i>Fragaria</i> , strawberry	fraga	Native	Perennial
<i>Galium boreale</i> , northern bedstraw	gabo2	Native	Perennial
<i>Gentiana affinis</i> (var. <i>affinis</i>), rocky mountain gentian	geaf	Native	Perennial

Table 5 (continued).

Scientific and Common Names	NRCS Code	Origin	Life Span
<i>glyceria striata</i> , fowl mannagrass	glst	Native	Perennial
<i>glycyrrhiza lepidota</i> , american licorice	glla3	Native	Perennial
<i>gnaphalium palustre</i> , western marsh cudweed	gnpa	Native	Annual
<i>helianthus nuttallii</i> , nuttall's sunflower	henu	Native	Perennial
<i>hesperostipa comata</i> , needle and thread	heco26	Native	Perennial
<i>heuchera parvifolia</i> , littleleaf alumroot	hepa11	Native	Perennial
<i>holodiscus dumosus</i> , rockspirea	hodu	Native	Perennial
<i>hypericum formosum</i> var. <i>formosum</i> , st. johnswort		Native	Perennial
<i>ipomopsis aggregata</i> , skyrocket gilia	ipag	Native	Biennial
<i>iris missouriensis</i> , rocky mountain iris	irmi	Native	Perennial
<i>juncus balticus</i> , baltic rush	juba	Native	Perennial
<i>juncus confusus</i> , colorado rush	juc2	Native	Perennial
<i>juncus saximontanus</i> (j. <i>ensifolius</i> var. <i>montanus</i>), rocky mountain rush	jusa	Native	Perennial
<i>juncus</i> , rush	juncu	Native	Perennial
<i>juniperus communis</i> , common juniper	juc6	Native	Perennial
<i>juniperus scopulorum</i> , rocky mountain juniper	jusc2	Native	Perennial
<i>koeleria macrantha</i> , prairie junegrass	koma	Native	Perennial
<i>leptodactylon pungens</i> , granite pricklygilia	lepu	Native	Perennial
<i>leymus cinereus</i> , basin wildrye	leci4	Native	Perennial
<i>lithospermum ruderales</i> , western gromwell	liru4	Native	Perennial
<i>lupinus argenteus</i> (var. <i>argophyllus</i>), silvery lupine	luar3	Native	Perennial
<i>machaeranthera canescens</i> ssp. <i>canescens</i> , spiny goldenweed	macac3	Native	Perennial
<i>mahonia repens</i> , oregongrape	mare11	Native	Perennial
<i>maianthemum stellatum</i> , starry false solomon's seal	mast4	Native	Perennial
<i>mentha arvensis</i> , wild mint	mear4	Native	Perennial
<i>mentzelia decapetala</i> , tenpetal blazingstar	mede2	Native	Perennial
<i>mimulus guttatus</i> , common yellow monkeyflower	migu	Native	Annual
<i>muhlenbergia richardsonis</i> , mat muhly	muri	Native	Perennial
<i>oenothera villosa</i> ssp. <i>strigosa</i> , hairy evening-primrose	oevis	Native	Biennial or Perennial
<i>orthocarpus luteus</i> , yellow owllover	orlu2	Native	Annual
<i>oxytropis deflexa</i> var. <i>sericea</i> , blue nodding locoweed	oxdes	Native	Perennial
<i>packera cana</i> , woolly groundsel	paca15	Native	Perennial
<i>parnassia palustris</i> var. <i>montanensis</i> , mountain grass of parnasis	papam2	Native	Perennial
<i>paronychia sessiliflora</i> , creeping nailwort	pase	Native	Perennial
<i>penstemon aridus</i> , stiffleaf penstemon	pear2	Native	Perennial
<i>phacelia sericea</i> spp. <i>sericea</i> , silky phacelia	phses	Native	Perennial
<i>phalaris arundinacea</i> , reed canarygrass	phar3	Native	Perennial
<i>phleum pratense</i> , timothy	phpr3	Introduced	Perennial
<i>phlox hoodii</i> , hoods phlox	phho	Native	Perennial
<i>phlox multiflora</i> , flowery phlox	phmu3	Native	Perennial

Table 5 (continued).

Scientific and Common Names	NRCS Code	Origin	Life Span
pinus contorta, lodgepole pine	pico	Native	Perennial
pinus flexilis, limber pine	pifl2	Native	Perennial
poa fendleriana, muttongrass	pofe	Native	Perennial
poa pratensis, kentucky bluegrass	popr	Introduced	Perennial
poa secunda (P. secunda var. secunda & var. elongata, P. juncifolia var. ampla) sandberg bluegrass	pose	Native	Perennial
polygonum aviculare, prostrate knotweed	poav	Introduced	Annual
populus angustifolia, narrowleaf cottonwood	poan3	Native	Perennial
populus tremuloides, quaking aspen	potr5	Native	Perennial
potentilla effusa (Potentilla hippiana var. effusa), branched cinquefoil	poef	Native	Perennial
potentilla pectinisecta (Potentilla gracilis var. elmeri), combleaf cinquefoil	pope23	Native	Perennial
potentilla plattensis, platte river cinquefoil	popl	Native	Perennial
pseudoroegneria spicata, bluebunch wheatgrass	pssp6	Native	Perennial
pteryxia hendersonii (cymopterus longilobus), henderson's wavewing	pthe	Native	Perennial
purshia tridentata, antelope bitterbrush	putr2	Native	Perennial
pyrrocoma uniflora, plantain goldenweed	pyun2	Native	Perennial
ranunculus flammula, spearwort buttercup	raf12	Native	Perennial
ribes cereum, wax currant	rice	Native	Perennial
ribes oxycanthoides ssp. setosum, redshoot gooseberry	rioxs	Native	Perennial
rosa, rose	rosa5	Native	Perennial
rubus idaeus, american red raspberry	ruid	Native	Perennial
rumex salicifolius var. denticulatus (Rumex utahensis), toothed willow dock	rusad	Native	Perennial
salix bebbiana, bebb willow	sabe2	Native	Perennial
salix boothii, booth's willow	sabo2	Native	Perennial
salix exigua, sandbar willow	saex	Native	Perennial
salix geyeriana, geyer's willow	sage2	Native	Perennial
salix lucida ssp. caudata, greenleaf willow	saluc	Native	Perennial
salix lutea, yellow willow	salu2	Native	Perennial
salix melanopsis, dusky willow	same2	Native	Perennial
scutellaria galericulata, marsh skullcap	scga	Native	Perennial
sedum lanceolatum, spearleaf stonecrop	sela	Native	Perennial
selaginella densa, lesser spikemoss	sede2	Native	Perennial
sisyrinchium idahoense var. occidentale, idaho blueeyed grass	siido	Native	Perennial
solidago missouriensis var. missouriensis, missouri goldenrod	somim	Native	Perennial
spartina gracilis, alkali cordgrass	spgr	Native	Perennial
stenotus armerioides var. armerioides, thrift mock goldenweed	stara	Native	Perennial
symphoricarpos oreophilus, whortleleaf snowberry	syor2	Native	Perennial

Table 5 (continued).

Scientific and Common Names	NRCS Code	Origin	Life Span
<i>symphyotrichum ascendens</i> , western aster	syas3	Native	Perennial
<i>taraxacum laevigatum</i> , rock dandelion (?)	tala2	Introduced	Perennial
<i>taraxacum</i> , dandelion	tarax	Introduced	Perennial
<i>tetradymia canescens</i> , spineless horsebrush	teca2	Native	Perennial
<i>trifolium andinum</i> , andes clover	tran2	Native	Perennial
<i>trifolium repens</i> , white clover	trre3	Introduced	Perennial
<i>urtica dioica</i> , stinging nettle	urdi	Native	Perennial
<i>woodsia oregana</i> var. <i>oregana</i> , oregon woodsia	wooro	Native	Perennial

APPENDIX 1. DESCRIPTIONS OF VEGETATION AT SAMPLING POINTS IN THE SWEETWATER CANYON
WSA.

VEGETATION DESCRIPTION: 01SwCan01a

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia nova*

LOCATION

T 28 N, **R** 97 W **Section** 15 , NW 1/4

Map Lewiston Lakes **Scale:** 1:23,000

ELEVATION

Elevation: 7450 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the upland vegetation within the Sweetwater Canyon

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Short (<25 cm) shrub vegetation of *Artemisia nova* (15-25% cover) with small patches and scattered individuals of *Artemisia tridentata* ssp. *wyomingensis* and *Artemisia tridentata* ssp. *vaseyana*, and a few *Chrysothamnus viscidiflorus*, and *Artemisia arbuscula* ssp. *longiloba*. Common herbaceous species are *Poa secunda*, *Stenotus armerioides* var. *armerioides*, *Pseudoroegneria spicata*, *Eriogonum* sp., *Poa fendleriana*, and *Machaeranthera canescens* var. *canescens*.

Disturbance signs:

Notes:

Point 1. This point illustrates the matrix vegetation on the uplands in the WSA. Plot 01SwCan01b nearby illustrates the taller *Artemisia tridentata* ssp. *vaseyana* shrub vegetation in areas of snow accumulation.

VEGETATION DESCRIPTION: 01SwCan01b

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 15 , NW 1/4

Map Lewiston Lakes **Scale:** 1:23,000

ELEVATION

Elevation: 7450 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate taller shrub stands on draws within the upland vegetation of the Sweetwater Canyon WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* to 50 cm tall (15-25% cover) forms a shrub layer above a herbaceous layer of *Poa secunda*, *Carex duriuscula*, *Pseudoroegneria spicata*, *Elymus lanceolatus* var. *lanceolatus* (or *Pascopyrum smithii*), *Antennaria microphylla*, *Leptodactylon pungens*, an unknown Leguminosae, *Packera cana*, and other species. The *Artemisia tridentata* ssp. *vaseyana* stands are large patches growing in areas of snow accumulation within the *Artemisia nova* matrix.

Disturbance signs:

Notes:

Point 1. This descriptive point illustrates the taller, *Artemisia tridentata* ssp. *vaseyana* - dominated shrub vegetation forming large patches in areas of snow accumulation, within the short *Artemisia nova* matrix vegetation. This stand is on an east-facing slope above a shallow draw.

VEGETATION DESCRIPTION: 01SwCan02

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Artemisia nova

LOCATION

T 28 N, **R** 97 W **Section** 10 , SW 1/4

Map Lewiston Lakes **Scale:** 1:23,000

ELEVATION

Elevation: 7500 feet **Topo position:** Interfluve

Soil Very gravelly soil over bedrock.

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the short, Artemisia nova - dominated matrix vegetation on the uplands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.3 shows the granitic outcrop on the broad ridge.

Vegetation:

The vegetation consists of a short (<25 cm tall) shrub layer of Artemisia nova with some Artemisia tridentata ssp. wyomingensis (15-25% total cover), and a herbaceous component of Selaginella densa, Poa secunda, Trifolium andinum, Pseudoroegneria spicata, Arenaria hookeri, Stenotus armerioides var. armerioides, Erigeron caespitosus, Hesperostipa comata, Ivesia gordonii, Potentilla effusa, Eriogonum flavum var. flavum, and other species.

Disturbance signs:

Notes:

Point 2. This point illustrates the short shrub vegetation matrix on the uplands in the WSA.

VEGETATION DESCRIPTION: 01SwCan03a

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Pseudoroegneria spicata*

LOCATION

T 28 N, **R** 97 W **Section** 10 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7500 feet **Topo position:** Interfluve

Soil Gravelly soil with bedrock outcrops

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the herbaceous vegetation with sparse shrubs and trees growing in bedrock outcrops on the uplands of the Sweetwater Canyon WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.3 shows granite outcrops

Vegetation:

Ribes cereum, *Symphoricarpos oreophilus*, *Artemisia tridentata* ssp. *vaseyana*, and *Artemisia nova* form a sparse, short shrub layer (< 20 cm tall) above a herbaceous stratum of *Pseudoroegneria spicata*, *Ivesia gordonii*, *Poa secunda*, *Heuchera parviflora*, *Phacelia sericea* var. *sericea*, *Draba oligosperma*, *Packera cana*, *Cryptantha flavoculata*, *Erigeron caespitosus*, *Castilleja* sp., *Leptodactylon pungens*, *Eriogonum umbellatum* var. *dicrocephalum*, and other species.

Disturbance signs:

Notes:

Point 3.

VEGETATION DESCRIPTION: 01SwCan03b

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 10 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7500 feet **Topo position:** Backslope

Soil Boulders are common

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata vaseyana* shrub vegetation growing in draws and on lee slopes in the uplands of the Sweetwater Canyon WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.4 looks SW at the *Artemisia* - *Purshia* shrub vegetation on a SE-facing slope.

Vegetation:

Artemisia tridentata ssp. *vaseyana* and *Purshia tridentata* form a shrub layer ca. 75 cm tall and with 25-35% canopy cover; *Symphoricarpos oreophilus* and *Ericameria nauseosa* are present in small amounts. The herbaceous stratum consists of *Pseudoroegneria spicata*, *Phlox multiflora*, *Antennaria microphylla*, *Eriogonum umbellatum* var. *dicrocephalum*, *Arabis* sp., *Penstemon aridus*, *Poa secunda*, *Poa fendleriana*, *Cryptantha flavoculata*, *Leptodactylon pungens*, *Mertensia* sp., and other species.

Disturbance signs:

Notes:

Point 3. This is a minor vegetation type on the sides of draws, within the matrix of short *Artemisia nova* vegetation on the uplands of the WSA.

VEGETATION DESCRIPTION: 01SwCan04a

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 9 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7400 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata vaseyana* vegetation on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.5 looks east across valley. This *Artemisia tridentata vaseyana* vegetation is to the left of the herbaceous meadow.

Vegetation:

Artemisia tridentata ssp. *vaseyana* forms a shrub stratum to 60 cm tall, with 25-35% canopy cover, that also contains some *Ericameria nauseosa* and a small amount of *Symphoricarpos oreophilus*. *Poa secunda* and *Antennaria microphylla* are common in the herbaceous stratum, and *Carex duriuscula*, *Elymus lanceolatus* var. *lanceolatus* (or *Pascopyrum smithii*), *Lupinus argenteus*, *Juncus balticus*, *Achnatherum lettermanii*, *Collinsia parviflora*, and other species are present.

Disturbance signs:

Notes:

Point 4. This shrub vegetation is common in a wide, south-facing valley.

VEGETATION DESCRIPTION: 01SwCan04b

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Carex praegracilis meadow

LOCATION

T 28 N, **R** 97 W **Section** 9 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7400 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the mesic meadow vegetation growing on uplands in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.5 looks east across valley. This meadow vegetation is in the opening in the middle of the photo.

Vegetation:

Carex praegracilis, Symphyotrichum ascendens, and Elymus lanceolatus var. riparius are the common species in the herbaceous vegetation. Scattered Ericameria nauseosa are present, and dead Artemisia tridentata ssp. vaseyana stems are present around the margin of the meadow.

Disturbance signs:

Notes:

Point 4. This herbaceous vegetation grows in openings covering up to 250 square meters within the Artemisia tridentata vaseyana shrub vegetation on the uplands of the WSA.

VEGETATION DESCRIPTION: 01SwCan04c

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 9 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7400 feet **Topo position:** Shoulder

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata vaseyana* shrub vegetation growing in patches on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.5 looks east across valley. This shrub vegetation is to the left of the meadow.

Vegetation:

Artemisia tridentata ssp. *vaseyana* (75 cm tall) and *Purshia tridentata* (40 cm tall) form a shrub stratum with 35-45% canopy cover. The herbaceous stratum consists primarily of *Carex duriuscula*, *Eriogonum umbellatum* var. *dicrocephalum*, *Achnatherum lettermanii*, and *Arenaria congesta*.

Disturbance signs:

Notes:

Point 4. This shrub vegetation grows on lee slopes within the short *Artemisia nova* matrix vegetation on the uplands in the WSA. This patch is on a SE-facing slope, and merges up-slope with a patch of *Artemisia arbuscula* spp. *longiloba* shrub-steppe (plot

VEGETATION DESCRIPTION: 01SwCan04d

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia arbuscula*

LOCATION

T 28 N, **R** 97 W **Section** 9 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7400 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia arbuscula* ssp. *longiloba* vegetation that forms part of the shrub-steppe matrix on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.5 looking east across valley. This *A. arbuscula* vegetation is in the second opening up the slope.

Vegetation:

Artemisia arbuscula ssp. *longiloba* forms a short shrub stratum (20 cm tall, 25-35% canopy cover). The herbaceous stratum consists of *Poa secunda*, *Elymus lanceolatus* var. *lanceolatus* (or *Pascopyrum smithii*), *Pseudoroegneria spicata*, *Trifolium gymnocarpon*, *Erigeron caespitosus*, *Phlox multiflora*, and other species.

Disturbance signs:

Notes:

Point 4. This patch of *Artemisia arbuscula longiloba* shrub-steppe vegetation covers < 1000 square meters and merges downslope with *Artemisia tridentata vaseyana* shrub vegetation (plot 02SwCan04c) and upslope with *Artemisia nova* matrix vegetation (plot 01SwCan04e).

VEGETATION DESCRIPTION: 01SwCan04e

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia nova*

LOCATION

T 28 N, **R** 97 W **Section** 9 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7400 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia nova* matrix vegetation on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.5 looking east across valley. This *Artemisia nova* vegetation is in the foreground.

Vegetation:

Artemisia nova dominates a short shrub stratum (< 20 cm tall) of 25-35% canopy cover that also contains *Artemisia tridentata* ssp. *wyomingensis* and a small amount of *Chrysothamnus viscidiflorus*. The herbaceous stratum consists of *Poa secunda*, *Poa fendleriana*, *Pseudoroegneria spicata*, *Phlox hoodii*, *Stenotus armerioides* var. *armerioides*, *Sedum lanceolatum*, *Crepis* sp., *Erigeron caespitosus*, *Arenaria hookeri*, *Eriogonum ovalifolium*, *Leptodactylon pungens*, and small amounts of other species.

Disturbance signs:

Notes:

Point 4. This area of *Artemisia nova* vegetation merges downslope with *Artemisia arbuscula* vegetation (plot 01SwCan04d).

VEGETATION DESCRIPTION: 01SwCan06

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 9 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7350 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata vaseyana* shrub vegetation growing in draws and on lee slopes in the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* dominates a shrub stratum > 50 cm tall and with 25-35% canopy cover. *Symphoricarpos oreophilus* and *Artemisia tridentata* ssp. *wyomingensis* (both < 50 cm tall) contribute substantial cover, and *Chrysothamnus viscidiflorus* is present.

Common herbaceous species are *Poa secunda*, *Poa fendleriana*, *Antennaria microphylla*, *Phlox multiflora*, and *Arenaria congesta*; secondary species are *Festuca idahoensis*, *Castilleja* sp., and others.

Disturbance signs:

Notes:

Point 6. This patch of *Artemisia tridentata vaseyana* shrub vegetation is growing in a broad, northwest-facing valley.

VEGETATION DESCRIPTION: 01SwCan07

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Deschampsia cespitosa* meadow

LOCATION

T 28 N, **R** 97 W **Section** 9 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7300 feet **Topo position:** Toeslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the wet meadow vegetation growing around springs and in draws on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Throughout most of the meadow, the common species are *Deschampsia cespitosa*, *Carex nebrascensis*, *Antennaria microphylla*, *Juncus balticus*, *Achillea millefolium*, *Symphotrichum ascendens*, and *Argentina anserina*, and the secondary species are *Agoseris glauca* var. *glauca*, *Juncus* sp., *Agrostis* sp., *Epilobium ciliatum* var. *ciliatum*, *Dodecatheon* sp., *Potentilla gracilis*, *Zigadenus elegans*, *Cirsium tioganum* var. *coloradense*, *Erigeron lonchophyllus*, *Lupinus argenteus*, *Parnassia palustris* var. *montanensis*, and *Fragaria* sp.. *Dasiphora floribunda* is present but contributes little cover. In the wettest areas along the active channel, the common species are *Glyceria striata*, *Mimulus guttatus*, and *Mentha arvensis*. Fewer than a dozen willows are present in a clump; the mature willows are *Salix geeyeriana* and *Salix bebbiana*, and sprouts of *Salix boothii* and *Salix lucida* ssp. *caudata* are present; *Ribes oxycanthoides* ssp. *setosum* and *Rosa* sp. are present as well.

Disturbance signs:

The herbaceous vegetation has been grazed to a height of ca. 5 cm, and the willows are noticeably mushroom-shaped.

Notes:

Point 7. This wet meadow vegetation grows from the spring in NE 1/4 of SW 1/4 of Section 9, down the draw to the confluence with a tributary draw from the east.

VEGETATION DESCRIPTION: 01SwCan08a

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Deschampsia cespitosa meadow

LOCATION

T 28 N, **R** 97 W **Section** 9 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7380 feet **Topo position:** Toeslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the wet meadow vegetation growing around springs and in draws on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Deschampsia cespitosa, Carex nebrascensis, Antennaria microphylla, Juncus balticus, Achillea millefolium, Symphyotrichum ascendens, and Argentina anserina are the common species in a fringe of herbaceous vegetation along the channel. Salix geyeriana and Salix bebbiana ca. 4 meters tall dominate a patch covering ca. 100 square meters. A small clump of half-a-dozen Populus tremuloides trees, 6 in dbh and 10 m tall, is present, and suckers are common.

Disturbance signs:

The herbaceous vegetation is grazed to a height of ca. 5 cm, and this year's cattle droppings are present. The few aspen trees have many bark wounds on their trunks, and the the aspen suckers have been browsed.

Notes:

Point 8.

VEGETATION DESCRIPTION: 01SwCan08b

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 9 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7350 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata vaseyana* shrub vegetation growing in draws and on lee slopes on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* dominates a shrub layer that also contains *Purshia tridentata*. The common herbaceous species are *Poa secunda*, *Poa fendleriana*, and *Antennaria microphylla*, and *Festuca idahoensis* and *Campanula rotundifolia* are present.

Disturbance signs:

Notes:

Point 8. This stand of shrub vegetation grows in the bottom of the draw between two wetter areas around springs (plots 01SwCan07 and 01SwCan08a).

VEGETATION DESCRIPTION: 01SwCan09

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 28 N, **R** 97 W **Section** 9 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7450 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *wyomingensis* short shrub vegetation growing on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *wyomingensis* forms a sparse, short shrub layer (5-15% canopy cover, 50 cm tall), and *Symphoricarpos oreophilus* is present. The common herbaceous species are *Poa secunda*, *Poa cusickii*, *Phlox multiflora*, *Antennaria microphylla*, *Carex duriuscula*, *Eriogonum umbellatum* var. *dicrocephalum*, *Festuca idahoensis*, and *Arenaria congesta*; minor species are *Balsamorhiza incana*, *Castilleja* sp., *Geum triflorum*, and *Juncus balticus* (and others).

Disturbance signs:

Notes:

Point 9. This stand of *Artemisia tridentata* ssp. *wyomingensis* vegetation grows on the north-facing south side of a wide draw.

VEGETATION DESCRIPTION: 01SwCan12

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia nova*

LOCATION

T 28 N, **R** 97 W **Section** 9 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7480 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the matrix vegetation over much of the uplands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.6. This *Artemisia nova* matrix vegetation is on the broad ridge in the center of

Vegetation:

Artemisia nova dominates a short shrub stratum < 20 cm tall and with 15-25% canopy cover; *Artemisia tridentata* ssp. *wyomingensis* and *A. tridentata* ssp. *vaseyana* are secondary, and a small amount of *Chrysothamnus viscidiflorus* is present. Common herbaceous species are *Poa secunda*, *Poa cusickii*, *Pseudoroegneria spicata*, *Antennaria microphylla*, *Phlox multiflora*, and *Hesperostipa comata*. *Selaginella densa* is common in the outcrop of granitic rock at the top of the slope.

Disturbance signs:

Notes:

Point 12. This area of *Artemisia nova* vegetation grows on a broad, south-facing slope. It merges upslope with herbaceous vegetation atop the ridge (plot 01SwCan13).

VEGETATION DESCRIPTION: 01SwCan13

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Pseudoroegneria spicata*

LOCATION

T 28 N, **R** 97 W **Section** 9 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7480 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the herbaceous vegetation growing on rocky ridge-tops in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.6. This herbaceous vegetation grows on the ridge-top in the center of the photo.

Vegetation:

Selaginella densa, *Paronychia sessiliflora*, *Pseudoroegneria spicata*, *Stenotus armerioides* var. *armerioides*, *Eriogonum ovalifolium*, and *Erigeron compositus* are the common species in the rocky soil; secondary species are *Erigeron caespitosus*, *Arenaria hookeri*, *Eriogonum flavum* var. *flavum*, and *Poa secunda*.

Disturbance signs:

Notes:

Point 13. This vegetation merges downslope with the short *Artemisia nova* shrub-steppe (plot 01SwCan12).

VEGETATION DESCRIPTION: 01SwCan14

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 9 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7540 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the patches of *Artemisia tridentata* ssp. *vaseyana* shrub vegetation growing on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.6 shows this patch of shrub vegetation in the right-center of photo.

Vegetation:

Artemisia tridentata ssp. *vaseyana* (75 cm tall) and *Purshia tridentata* (50 cm tall) form a shrub stratum with 25-35% canopy cover. *Chrysothamnus viscidiflorus* contributes minor cover. Common herbaceous species are *Carex duriuscula*, *Elymus lanceolatus* var. *lanceolatus* (or *Pascopyrum smithii*), *Eriogonum umbellatum* var. *dicrocephalum*, and *Poa secunda*; *Pseudoroegneria spicata* is less common.

Disturbance signs:

Notes:

Point 14. This patch of shrub vegetation grows in a southeast-facing bowl.

VEGETATION DESCRIPTION: 01SwCan15

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 28 N, **R** 97 W **Section** 4 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7600 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe growing on mafic substrate in the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *wyomingensis* dominates a short shrub stratum (20 cm tall) with 15-25% canopy cover. *Artemisia nova* is a minor species. Common herbaceous species are *Poa fendleriana*, *Poa secunda*, and *Phlox hoodii*; secondary species are *Trifolium andinum*, *Arenaria hookeri*, *Stenotus armerioides* var. *armerioides*, *Opuntia polyacantha*, *Allium* sp., *Pseudoroegneria spicata*, *Arabis* sp., and *Sedum lanceolatum*.

Disturbance signs:

A small amount of trash is present.

Notes:

Point 15. This vegetation grows on a hilltop with a mafic rock outcrop, and extends onto granitic rock nearby

VEGETATION DESCRIPTION: 01SwCan17a

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Pseudoroegneria spicata

LOCATION

T 28 N, **R** 97 W **Section** 3 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7580 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the matrix shrub-steppe vegetation on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.7 and 2.8 look WSW and W, respectively, across the rolling upland with this *Artemisia tridentata wyomingensis* vegetation.

Vegetation:

Total canopy cover in this sparse herbaceous vegetation is 15-25%. Common species are *Pseudoroegneria spicata*, *Arenaria hookeri*, *Phlox hoodii*, *Artemisia frigida*, *Poa secunda*, *Poa fendleriana*, and *Trifolium andinum*; secondary species include *Erigeron compositus*, *Erigeron caespitosus*, *Eriogonum ovalifolium*, *Sedum lanceolatum*, and *Hesperostipa comata*. *Artemisia tridentata* ssp. *wyomingensis* contributes 1-5% canopy cover and a trace of *Artemisia nova* is present.

Disturbance signs:

Notes:

Point 17. This vegetation grows on the western (windward) side of the hill. The adjoining easterly ridge-top supports denser *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe (plot 01SwCan17b).

VEGETATION DESCRIPTION: 01SwCan17b

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 28 N, **R** 97 W **Section** 3 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7580 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the matrix shrub-steppe vegetation on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *wyomingensis* forms a sparse, short shrub layer (5-15% canopy cover, 20 cm tall) that contains a trace of *Artemisia nova*. Common herbaceous species are *Poa fendleriana*, *Pseudoroegneria spicata*, *Poa secunda*, *Trifolium andinum*, *Hesperostipa comata*, *Phlox hoodii*, and *Arenaria hookeri*.

Disturbance signs:

Notes:

Point 17. This vegetation grows on a broad ridge with an easterly aspect. Sparse herbaceous vegetation (plot 01SwCan17a) grows on the adjoining west-facing slope.

VEGETATION DESCRIPTION: 01SwCan17c

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 3 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7580 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *vaseyana* shrub vegetation that grows in draws and on lee slopes within the matrix short shrub-steppe on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* (35 cm tall) dominates a shrub stratum that includes small amounts of *Chrysothamnus viscidiflorus* and *Artemisia nova*. The common herbaceous species are *Poa secunda*, *Poa fendleriana*, *Phlox multiflora*, *Festuca idahoensis*, *Antennaria microphylla*, and *Arenaria congesta*. *Carex rossii* is present.

Disturbance signs:

Notes:

Point 17. This stand of shrub vegetation grows in a northeast-facing draw. Short shrub-steppe (plot 01SwCan17b) and sparse herbaceous vegetation (plot 01SwCan17a) grow on the nearby ridge-top.

VEGETATION DESCRIPTION: 01SwCan18

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 3 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7420 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *vaseyana* shrub vegetation growing on uplands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* (1 m tall) and *Purshia tridentata* (60 cm tall) form a shrub stratum with 35-45% canopy cover. Common herbaceous species are *Festuca idahoensis*, *Poa secunda*, *Carex rossii*, *Eriogonum umbellatum* var. *dicrocephalum*, and *Arenaria congesta*; *Balsamorhiza incana* is present.

Disturbance signs:

Notes:

Point 18. This shrub stand grows on east- and northeast-facing slopes and in swales. It merges downslope with *Artemisia nova* - *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe.

VEGETATION DESCRIPTION: 01SwCan19a

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Pseudoroegneria spicata

LOCATION

T 28 N, **R** 97 W **Section** 3 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7350 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the herbaceous vegetation on rock outcrops in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.9 looks NNW along face of sandstone outcrop. This vegetation is at the top of the

Vegetation:

Selaginella densa, Trifolium andinum, Erigeron caespitosus, Poa secunda, and Pseudoroegneria spicata are the common species. Short shrubs -- Artemisia nova, Artemisia tridentata ssp. wyomingensis, and Chrysothamnus viscidiflorus -- contribute 5-15% canopy cover. This vegetation is similar to that on granitic outcrops, as described in other plots.

Disturbance signs:

Notes:

Point 19. This herbaceous vegetation is found on the shallow, rocky soils of the sandstone outcrop along the top of the ridge.

VEGETATION DESCRIPTION: 01SwCan19b

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Pinus flexilis*

LOCATION

T 28 N, **R** 97 W **Section** 3 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7350 feet **Topo position:** Footslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the limber pine woodlands on the uplands of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.9 looks NNW along face of the sandstone outcrop. This vegetation lies along the

Vegetation:

Pinus flexilis (5 m tall) forms a sparse tree stratum and *Juniperus scopulorum* (1.5 m tall) forms a sparse tall shrub stratum (total canopy cover of two strata 5-15%) above a shorter shrub stratum (5-15% canopy cover) of *Artemisia tridentata* ssp. *vaseyana*, *Purshia tridentata*, and *Artemisia tridentata* ssp. *wyomingensis* (with traces of *Ribes cereum*, *Chrysothamnus viscidiflorus*, and *Symphoricarpos oreophilus*) and a sparse herbaceous stratum of *Pseudoroegneria spicata*, *Erigeron caespitosus*, *Trifolium andinum*, and other species. The trees and shrubs grow mainly in cracks in the sandstone outcrop. The trees are of various sizes and all look healthy. Pine seedlings are present.

Disturbance signs:

Half a dozen stumps of cut limber pine are present.

Notes:

Point 19. This vegetation merges into herbaceous vegetation at the top of the slope (plot 01SwCan19a) and into *Artemisia tridentata* ssp. *vaseyana* - *Purshia tridentata* shrub vegetation downslope.

VEGETATION DESCRIPTION: 01SwCan21

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Salix

LOCATION

T 29 N, **R** 97 W **Section** 34 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7050 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Shrubs to 5 m tall grow in clumps and cover 45-55% of the riparian zone; *Salix lutea* and *Juniperus scopulorum* are the major species, and *Salix geyeriana*, *Ribes oxycanthoides* ssp. *setosum*, and *Rosa* sp. are present. Common herbaceous species are *Carex nebrascensis*, *Glyceria striata*, and *Mimulus guttatus* in the wettest part of the riparian zone; *Carex praegracilis*, *Deschampsia caespitosa*, *Phleum pratense*, *Poa pratensis*, *Juncus balticus*, and *Agrostis stolonifera* in slightly drier areas between the groups of shrubs; and *Leymus cinereus* and *Urtica dioica* beneath the shrubs.

Disturbance signs:

A handful of stumps from aspens (probably) cut long ago by beaver are present. Previous years' cattle droppings are present.

Notes:

Point 21. This riparian zone is < 20 meters wide and extends for ca. 250 meters along the stream. Two noxious weeds were noted: (1) *Cirsium vulgare*, ca. 20 rosettes and 15 flowering stems in a stretch of several hundred meters, and (2) *Cirsium arvense*, 6 stems, none flowering. The valley bottom is vegetated mainly with *Artemisia tridentata* ssp. *vaseyana* - *Purshia tridentata* shrub stands.

VEGETATION DESCRIPTION: 01SwCan22

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Carex praegracilis meadow

LOCATION

T 29 N, **R** 97 W **Section** 34 , **SE** 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7050 feet **Topo position:** Toeslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation in herbaceous openings within the Artemisia tridentata vegetation of the uplands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

The short (to 25 cm tall) herbaceous vegetation is composed mainly of Carex praegracilis, Poa pratensis, and Muhlenbergia richardsonis, with smaller amounts of Poa secunda, Elymus lanceolatus var. riparius, Juncus balticus, Lupinus argenteus, and Artemisia ludoviciana.

Disturbance signs:

Notes:

Point 22. This herbaceous meadow covers ca. 200 square meters in Artemisia tridentata ssp. vaseyana - Purshia tridentata shrub vegetation.

VEGETATION DESCRIPTION: 01SwCan23

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 29 N, **R** 97 W **Section** 34 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6950 feet **Topo position:** Toeslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe and shrub vegetation in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *wyomingensis* dominates a shrub stratum < 30 cm tall and with 15-25% canopy cover, and *Artemisia nova*, *Ericameria nauseosa*, *Purshia tridentata*, and *Chrysothamnus viscidiflorus* are present. The herbaceous stratum consists mainly of *Koeleria macrantha*, *Poa secunda*, and *Antennaria microphylla*, with smaller amounts of *Cordylanthus ramosus*, *Pseudoroegneria spicata*, *Eriogonum umbellatum* var. *dicrocephalum*, *Castilleja* sp., and *Elymus lanceolatus* var. *lanceolatus* (or *Pascopyrum smithii*).

Disturbance signs:

Notes:

Point 23.

VEGETATION DESCRIPTION: 01SwCan24a

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Salix

LOCATION

T 29 N, **R** 97 W **Section** 34 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6950 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Salix lutea and Juniperus scopulorum dominate a patchy tall shrub layer (5 m tall) that covers 35-45% of the riparian zone. Salix bebbiana is present, as are the shorter shrubs Ribes oxycanthoides ssp. setosum and Rosa sp. Common herbaceous species within the shrub patches are Urtica dioica, Agrostis stolonifera, Juncus balticus, Juncus sp., Mentha arvensis, and Maianthemum stellatum; common herbaceous species between the shrub patches are Juncus balticus, Agrostis stolonifera, Deschampsia caespitosa, Phleum pratense, and Poa pratensis; and Leymus cinereus and Achillea millefolium are present in smaller amounts.

Disturbance signs:

Notes:

Point 24. The riparian zone is only ca. 10 meters wide. The stream has water in pools. A cottonwood grove (plot 01SwCan24b) extends along 100 - 150 meters of the valley bottom.

VEGETATION DESCRIPTION: 01SwCan24b

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Populus angustifolia*

LOCATION

T 29 N, **R** 97 W **Section** 34 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6950 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the cottonwood riparian woodlands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Populus angustifolia to 15 m tall, and 10-12" dbh, form a closed tree canopy with 65-75% cover, above a sub-canopy of *Pinus flexilis* (7 m tall) and *Juniperus scopulorum* (5 m tall) with 35-45% cover. A shrub stratum composed of *Juniperus communis*, *Artemisia tridentata* ssp. *vaseyana*, *Holodiscus dumosus*, and *Ribes oxycanthoides* ssp. *setosum*, with 15-25% canopy cover, is present beneath the trees. Common herbaceous species are *Phleum pratense*, *Maianthemum stellatum*, *Achillea millefolium*, *Mentha arvensis*, *Agrostis scabra*, *Woodsia oregana* ssp. *oregana*, and *Galium boreale*. The trees are healthy.

Disturbance signs:

Notes:

Point 24. This cottonwood woodland extends 100 - 150 meters along the valley bottom. *Salix* shrub vegetation (plot 01SwCan24a) also is present.

VEGETATION DESCRIPTION: 01SwCan24c

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 29 N, **R** 97 W **Section** 34 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6950 feet **Topo position:** Footslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the nature of the *Artemisia tridentata* ssp. *vaseyana* shrub vegetation growing in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* dominates a shrub layer (75 cm tall, 15-25% canopy cover) that contains smaller amounts of *Symphoricarpos oreophilus*, *Holodiscus dumosus*, and *Juniperus communis*. The common herbaceous species are *Festuca idahoensis*, *Pseudoroegneria spicata*, *Antennaria microphylla*, and *Eriogonum umbellatum* var. *dicrocephalum*. *Woodsia oregana* ssp. *oregana* is present.

Disturbance signs:

Notes:

Point 24. This shrub stand is located on the east-facing valley wall above *Salix* shrub vegetation (plot 01SwCan24a) and a cottonwood grove (plot 01SwCan24b) in the valley bottom.

VEGETATION DESCRIPTION: 01SwCan25

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 29 N, **R** 97 W **Section** 34 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6850 feet **Topo position:** Toeslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *vaseyana* shrub vegetation growing in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* dominates an open shrub stratum 35 cm tall and with 5-25% canopy cover. *Holodiscus dumosus* is present mainly in rock outcrops, and *Symphoricarpos oreophilus*, *Purshia tridentata*, *Chrysothamnus viscidiflorus*, and *Amelanchier alnifolia* are present throughout. Common herbaceous species are *Festuca idahoensis* and *Antennaria microphylla*, and *Pseudoroegneria spicata*, *Phlox multiflora*, *Lupinus argenteus*, and *Mahonia repens* are present. Scattered *Pinus flexilis* and *Juniperus scopulorum* grow on the canyon wall.

Disturbance signs:

Notes:

Point 25. This vegetation grows on the steep, north-facing canyon wall.

VEGETATION DESCRIPTION: 01SwCan27a

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Deschampsia cespitosa meadow

LOCATION

T 29 N, **R** 97 W **Section** 33 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6775 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Abundances of species differ between the two terraces. On the lower, wetter surface, the most common species are *Agrostis stolonifera*, *Eleocharis palustris*, *Calamagrostis stricta* (?), *Arnica fulgens*, *Ranunculus flammula*, *Alopecurus* sp., and *Gnaphalium palustre*. On the higher, slightly drier surface, the common species are *Agrostis stolonifera*, *Calamagrostis stricta* (?), *Arnica fulgens*, *Deschampsia caespitosa*, *Argentina anserina*, *Trifolium repens*, *Symphytotrichum ascendens*, *Equisetum variegatum*, *Mentha arvensis*, and seedlings or suckers of *Salix lutea* and *Salix lucida* ssp. *caudata*.

Disturbance signs:

Notes:

Point 27. This herbaceous vegetation with willow suckers grows on the lower two fluvial terraces. The next higher terrace is occupied by a willow shrub stand (plot 01SwCan27c). Ca. 25 flowering stems of *Cirsium arvense* were noted growing in scattered, small patches. Several flowering stems of *Cirsium vulgare* also were noted here.

VEGETATION DESCRIPTION: 01SwCan27c

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Salix

LOCATION

T 29 N, **R** 97 W **Section** 34 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6775 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Salix lutea and Betula occidentalis dominate a tall shrub stratum, 5 - 6 m tall, that also contains Salix lucida ssp. caudata, Juniperus scopulorum, and Salix bebbiana. A shorter shrub stratum, 2 m tall, of Cornus sericea, Ribes oxycanthoides ssp. setosum, Rosa sp., Artemisia cana ssp. viscidula, and Dasiphora floribunda is present. Leymus cinereus and Glycyrrhiza lepidota form an obvious tall herbaceous component, 1.5 m tall; and a species-rich short herbaceous layer includes Achnatherum lettermanii, Solidago missouriensis var. missouriensis, Poa pratensis, Campanula rotundifolia, Bromus anomalus, Artemisia ludoviciana, Achillea millefolium, Grindellia squarrosa, Linus lewisii, Cirsium tioganum var. coloradense, Agoseris glauca var. glauca, and Artemisia frigida.

Disturbance signs:

Notes:

Point 27. This willow shrub stand grows on a terrace above riparian vegetation of herbaceous species and willow seedlings or suckers (plot 01SwCan27a).

VEGETATION DESCRIPTION: 01SwCan28

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Populus angustifolia*

LOCATION

T 28 N, **R** 97 W **Section** 5 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6780 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the cottonwood woodlands growing in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Populus angustifolia, 15 m tall and at least 12" dbh, form a tree canopy, above a sparse subcanopy of *Pinus flexilis* and *Juniperus scopulorum*. *Ribes oxycanthoides* ssp. *setosum* and *Holodiscus dumosus* form an open shrub layer, and the herbaceous undergrowth is dominated by *Phleum pratense*, *Poa pratensis*, and *Taraxacum* sp..

Disturbance signs:

Notes:

Point 28. This woodland covers ca. 500 square meters along a southern tributary of the Sweetwater River, in the canyon.

VEGETATION DESCRIPTION: 01SwCan281

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Leymus cinereus*

LOCATION

T 28 N, **R** 97 W **Section** 5 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6780 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation growing in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Leymus cinereus forms an obvious tall herbaceous stratum. Common species in the shorter herbaceous stratum (< 50 cm tall) are *Lupinus argenteus*, *Poa pratensis*, *Iris missouriensis*, *Carex praegracilis*, *Campanula rotundifolia*, *Linus lewisii*, and *Elymus trachycaulus* ssp. *trachycaulus*. A large number of additional species are present, including *Spartina gracilis*, *Grindellia squarrosa*, *Solidago missouriensis* var. *missouriensis*, *Gentiana affinis*, *Achnatherum lettermanii*, *Achillea millefolium*, *Glycyrrhiza lepidota*, *Distichlis spicata*, *Antennaria microphylla*, *Cirsium tioganum* var. *coloradense*, *Hesperostipa comata*, and *Ipomopsis aggregata*.

Disturbance signs:

Notes:

Point 28. This meadow vegetation grows in the canyon bottom. A tall shrub stand grows in a nearby abandoned channel (plot 01SwCan282). Fans at the mouths of some tributary draws support *Artemisia tridentata* ssp. *wyomingensis* shrub stands (plot 01SwCan283).

VEGETATION DESCRIPTION: 01SwCan282

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon Salix

LOCATION

T 28 N, **R** 97 W **Section** 5 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6780 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation growing in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Salix lutea and Betula occidentalis dominate a tall shrub stratum, 5-6 m tall, that also includes Salix bebbiana, Juniperus scopulorum, and Pinus flexilis. A shorter shrub stratum of Ribes oxycanthoides ssp. setosum and Dasiphora floribunda is present. The herbaceous stratum consists of Glycyrrhiza lepidota, Poa pratensis, Solidago missouriensis var. missouriensis, Equisetum variegatum, and other species.

Disturbance signs:

Notes:

Point 28. This shrub stand grows along an abandoned channel. Riparian meadow vegetation (plot 02SwCan281) also is present in the canyon bottom, and Artemisia tridentata ssp. wyomingensis shrub stands (plot 01SwCan283) grow on fans at the mouths of tributary

VEGETATION DESCRIPTION: 01SwCan283

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 28 N, **R** 97 W **Section** 5 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6780 feet **Topo position:** Basin Floor

Soil Gravels and cobbles are common in the soil and on the soil surface.

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *wyomingensis* shrub stands growing in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *wyomingensis*, *Ericameria nauseosa*, and *Chrysothamnus viscidiflorus* form a sparse shrub stratum 25 cm tall and with 5-15% canopy cover. *Symphoricarpos oreophilus* and *Tetradymia canescens* are present. Common herbaceous species are *Selaginella densa*, *Poa secunda*, *Hesperostipa comata*, *Lupinus argenteus*, *Antennaria microphylla*, *Pseudoroegneria spicata*, *Erigeron caespitosus*, and *Phlox hoodii*; less common are *Arabis* sp., *Opuntia polyacantha*, *Arenaria hookeri*, and *Sedum lanceolatum*. The vegetation is sparse, with 35-45% total canopy cover.

Disturbance signs:

Notes:

Point 28. This stand grows on a fan at the mouth of a tributary draw. Nearby riparian vegetation consists of meadows (plot 01SwCan281) and *Salix* stands (plot 01SwCan282).

VEGETATION DESCRIPTION: 01SwCan29

Sampling Date 7/23/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 28 N, **R** 97 W **Section** 5 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7000 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation on the canyon walls in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *wyomingensis* and *Chrysothamnus viscidiflorus* form a shrub layer 20 cm tall and with 5-15% canopy cover. *Symphoricarpos oreophilus*, *Amelanchier alnifolia*, and *Holodiscus dumosus* are present in rock outcrops. The common herbaceous species are *Pseudoroegneria spicata*, *Poa secunda*, *Phlox multiflora*, and *Antennaria microphylla*. Total canopy cover is 25-35%.

Disturbance signs:

Notes:

Point 29. The vegetation on much of the canyon wall, both north and south sides, looks like the vegetation described by this plot.

VEGETATION DESCRIPTION: 01SwCan331

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 28 N, **R** 98 W **Section** 12 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7200 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the matrix shrub-steppe vegetation on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.10 shows this matrix vegetation, an *A. arbuscula* patch, and *A. tridentata* vaseyana patch in draw.

Vegetation:

Artemisia tridentata ssp. *wyomingensis* forms a short shrub stratum (25 cm tall) with 15-25% canopy cover that contains traces of *Chrysothamnus viscidiflorus*, *Artemisia nova*, and *Artemisia arbuscula* ssp. *longiloba*. The herbaceous stratum is dominated by *Poa secunda*, *Phlox hoodii*, and *Arenaria hookeri*, and contains smaller amounts of *Poa fendleriana*, *Koeleria macrantha*, *Stenotus armerioides* var. *armerioides*, *Eriogonum ovalifolium*, *Antennaria microphylla*, *Pseudoroegneria spicata*, *Elymus lanceolatus* var. *lanceolatus* (or *Pascopyrum smithii*), *Erigeron caespitosus*, *Elymus elymoides*, *Leptodactylon pungens*, *Hesperostipa comata*, and other species. Total plant canopy cover is 35-45%.

Disturbance signs:

Notes:

Point 33. This *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe is the matrix vegetation in this part of the WSA. Growing within it are patches of *Artemisia arbuscula* ssp. *longiloba* shrub-steppe (with a herbaceous component similar to that described from this plot; plot 01SwCan351) and islands of taller *Artemisia tridentata* ssp. *vaseyana* shrub vegetation (plot 01SwCan332) on low mounds. Outcrops of granitic bedrock have herbaceous vegetation with little *Artemisia tridentata* ssp. *wyomingensis* (plot 01SwCan333).

VEGETATION DESCRIPTION: 01SwCan332

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 98 W **Section** 12 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *vaseyana* shrub vegetation growing on low mounds within the matrix *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.10 shows the matrix *A. tridentata* *wyoming.* vegetation, an *A. arbuscula* patch, and an *A. tridentata vaseyana* patch in draw.

Vegetation:

Artemisia tridentata ssp. *vaseyana* forms a shrub stratum 80 cm tall and with 25-35% canopy cover. The common species in the herbaceous stratum are *Poa secunda*, *Carex duriuscula*, *Elymus lanceolatus* var. *lanceolatus* (or *Pascopyrum smithii*), and *Achnatherum lettermanii*.

Disturbance signs:

Small mammal burrows (probably pocket gophers) are common in the mounds on which this vegetation grows.

Notes:

Point 33. This tall shrub vegetation grows in patches on low mounds within the *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe matrix (plot 01SwCan331). Small mammal burrows are common in the mounds, and the soil there has less gravel on the surface than on the surrounding soils.

VEGETATION DESCRIPTION: 01SwCan333

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon rock outcrop herbaceous

LOCATION

T 28 N, **R** 98 W **Section** 12 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7200 feet **Topo position:** Interfluve

Soil Gravel is abundant on the soil surface.

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the herbaceous vegetation growing on bedrock outcrops within the *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe matrix (plot 01SwCan331) on the uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.10 shows the matrix *A. tridentata* *wyoming.* vegetation, an *A. arbuscula* patch, and an *A. tridentata* *vaseyana* patch in draw.

Vegetation:

Total plant canopy cover is 25-35%. Common species are *Poa secunda*, *Phlox hoodii*, *Artemisia frigida*, *Arenaria hookeri*, *Pseudoroegneria spicata*, and *Stenotus armerioides* var. *armerioides*. Short *Artemisia tridentata* ssp. *wyomingensis* (<20 cm tall) contributes 1-5% canopy cover.

Disturbance signs:

Notes:

Point 33. This herbaceous vegetation grows on rock outcrops within the *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe matrix vegetation (plot 01SwCan331). Other vegetation patches within the matrix are *Artemisia tridentata* ssp. *vaseyana* shrub stands on low mounds (plot 01SwCan332) and in draws, and *Artemisia arbuscula* ssp. *longiloba* shrub-steppe (with a herbaceous component similar to that in the *A. tridentata* *wyomingensis* matrix; plot 01SwCan351)).

VEGETATION DESCRIPTION: 01SwCan341

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tripartita*

LOCATION

T 28 N, **R** 98 W **Section** 12 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7200 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To describe vegetation in draws on the uplands of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

This is herbaceous vegetation with scattered shrubs. *Artemisia tripartita* ssp. *tripartita* ca. 25 cm tall form a scattered shrub stratum. Common herbaceous species are *Achnatherum lettermanii*, *Muhlenbergia richardsonis*, *Symphotrichum ascendens*, *Arenaria congesta*, *Poa secunda*, and *Carex duriuscula*; patches of *Juncus balticus* are present.

Disturbance signs:

Notes:

Point 34. This vegetation grows in the bottom of a shallow draw to 2 meters wide within the *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe vegetation matrix (plot 01SwCan331). The edges of the draw are vegetation with *Artemisia tridentata* ssp. *vaseyana* shrub stands (plot 01SwCan342).

VEGETATION DESCRIPTION: 01SwCan342

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 98 W **Section** 12 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7200 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *vaseyana* shrub vegetation growing in draws and on lee slopes within the *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe matrix on uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* 60 cm tall forms a shrub stratum with 25-35% canopy cover. A trace of *Ericameria nauseosa* is present. The common herbaceous species are *Phlox multiflora*, *Antennaria microphylla*, *Achnatherum lettermanii*, *Poa secunda*, *Arenaria congesta*, and secondary species are *Carex duriuscula*, *Eriogonum umbellatum* var. *dicrocephalum*, and others. *Festuca idahoensis* is present.

Disturbance signs:

Notes:

Point 34. This shrub vegetation grows as a fringe along both sides of a shallow draw. The bottom of the draw is vegetated with sparse *Artemisia tripartita* ssp. *tripartita* vegetation (plot 01SwCan341).

VEGETATION DESCRIPTION: 01SwCan351

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia arbuscula*

LOCATION

T 28 N, **R** 98 W **Section** 12 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7180 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation of *Artemisia arbuscula* shrub-steppe growing within the *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe vegetation on broad uplands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia arbuscula ssp. *longiloba* forms a short shrub stratum (15 cm tall) with 25-35% canopy cover that also includes traces of *Artemisia tridentata* ssp. *wyomingensis* and *Chrysothamnus viscidiflorus*. The common herbaceous species are *Poa secunda*, *Phlox hoodii*, *Arenaria hookeri*, and *Eriogonum ovalifolium*, and secondary species include *Pseudoroegneria spicata*, *Hesperostipa comata*, *Koeleria macrantha*, *Erigeron caespitosus*, *Stenotus armerioides* var. *armerioides*, and others. *Leptodactylon pungens* is present.

Disturbance signs:

Notes:

Point 35. This vegetation type grows in patches on gentle slopes on uplands of the WSA. Along with *Artemisia tridentata* ssp. *wyomingensis* shrub-steppe (plot 01SwCan352), it may be considered part of the matrix vegetation on the uplands. Included within it are patches of taller *Artemisia tridentata* ssp. *vaseyana* shrub vegetation.

VEGETATION DESCRIPTION: 01SwCan352

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 28 N, **R** 98 W **Section** 12 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7180 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the matrix vegetation on broad uplands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *wyomingensis* dominates an open, short shrub stratum 25 cm tall and with 15-25% canopy cover. *Artemisia arbuscula* ssp. *longiloba* contributes 1-5% canopy cover, and traces of *Chrysothamnus viscidiflorus* and *Artemisia nova* are present. The common herbaceous species are *Poa secunda*, *Poa fendleriana*, *Phlox hoodii*, and *Pseudoroegneria spicata*, and secondary species include *Leptodactylon pungens*, *Stenotus armerioides* var. *armerioides*, *Arenaria hookeri*, *Eriogonum ovalifolium*, and others.

Disturbance signs:

Notes:

Point 35. This vegetation is the most common type on the broad uplands and probably can be considered the vegetation matrix. *Artemisia arbuscula* ssp. *longiloba* shrub-steppe (plot 01SwCan351) grows in patches and is common. Small patches of *Artemisia tridentata* ssp. *vaseyana* shrub vegetation also are present.

VEGETATION DESCRIPTION: 01SwCan36

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 48 N, **R** 97 W **Section** 7 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7150 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the tall *Artemisia tridentata* ssp. *vaseyana* shrub vegetation growing on lee slopes in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* and *Purshia tridentata* form a shrub stratum 90 cm tall and with 35-45% canopy cover. The common herbaceous species are *Festuca idahoensis*, *Eriogonum umbellatum* var. *dicrocephalum*, *Arenaria congesta*, *Poa secunda*, *Carex rossii*, and *Phlox multiflora*.

Disturbance signs:

Notes:

Point 36. This shrub vegetation grows on the east-facing side of the valley of Mormon Creek.

VEGETATION DESCRIPTION: 01SwCan37

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon Salix

LOCATION

T 28 N, **R** 97 W **Section** 6 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6950 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the willow shrub vegetation within the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Salix geeyeriana dominates a shrub layer 5-6 m tall and with 35-45% canopy cover. Traces of Betula occidentalis, Salix boothii, Salix lutea, and Salix bebbiana are present as well. A shorter shrub stratum consists of Ribes oxycanthoides ssp. setosum, Rosa sp., Artemisia cana ssp. viscidula, Dasiphora floribunda, and Rubus idaeus. The common species in the herbaceous undergrowth are Glyceria striata, Carex nebrascensis, Agrostis stolonifera, and Juncus sp. in the wettest soil along the channel, and Poa pratensis, Juncus balticus, Deschampsia caespitosa, Antennaria microphylla, Equisetum variegatum, Carex praegracilis, Achillea millefolium, and Mentha arvensis in slightly drier soil. Secondary species include Danthonia, Cirsium tioganum var. coloradense, Urtica dioica, Koeleria macrantha, Potentilla sp., Artemisia ludoviciana, Elymus trachycaulus ssp. trachycaulus, Maianthemum stellatum, and Taraxacum laevigatum (?). Leymus cinereus patches are present.

Disturbance signs:

Notes:

Point 37. This vegetation grows in the upstream portion of the valley of Mormon Creek. Downstream, the shrub vegetation is dominated by Betula occidentalis (plot 01SwCan371).

VEGETATION DESCRIPTION: 01SwCan371

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Betula occidentalis*

LOCATION

T 28 N, **R** 97 W **Section** 6 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6900 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the birch shrub vegetation within the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Betula occidentalis dominates, and *Salix lutea* and *Salix bebbiana* are sub-dominant, in a tall shrub stratum (5-6 m tall) that contains small amounts of *Salix geyeriana*, *Salix lucida* ssp. *caudata*, *Juniperus scopulorum*, *Salix exigua*, and *Pinus flexilis*. Common species in the herbaceous undergrowth are *Phalaris arundinacea*, *Mertensia ciliata* (?), *Galium boreale*, and *Parnassia palustris* var. *montanensis*.

Disturbance signs:

Notes:

Point 37. This vegetation grows in the downstream portion of the valley of Mormon Creek, for several hundred meters above the confluence with the Sweetwater River. Upstream, the shrub vegetation is dominated by *Salix geyeriana* (plot 01SwCan37).

VEGETATION DESCRIPTION: 01SwCan38

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon Pinus contorta

LOCATION

T 28 N, **R** 97 W **Section** 6 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6900 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the vegetation in Pinus contorta woodlands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.11 (looking upstream) and 2.12 (looking downstream) show Pinus contorta woodland on both sides of river.

Vegetation:

Pinus contorta trees to 15 m tall form a small patch of overstory. The undergrowth is dominated by Arnica cordifolia and Calamagrostis canadensis.

Disturbance signs:

Notes:

Point 38. This is a small patch of trees growing in boulder and cobble alluvium along the river. The major vegetation type along this stretch is Betula occidentalis shrub vegetation (plot 01SwCan389)

VEGETATION DESCRIPTION: 01SwCan382

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon Pinus flexilis

LOCATION

T 28 N, **R** 97 W **Section** 6 , SW,N 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6900 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation of Pinus flexilis woodlands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Pinus flexilis trees to 10 meters tall form a sparse tree overstory with 5-15% canopy cover. A sparse, short shrub stratum (5-15% canopy cover, to 50 cm tall) of Symphoricarpos oreophilus and Artemisia tridentata ssp. vaseyana with some Purshia tridentata, Ribes cereum, and Ribes oxyacanthoides ssp. setosum grows beneath the tree overstory. Common herbaceous species are Pseudoroegneria spicata, Poa secunda, Festuca idahoensis, Antennaria microphylla, Cymopterus longilobus, and Erigeron caespitosus. Much of the ground is covered with bedrock outcrop, boulders, and talus.

Disturbance signs:

Notes:

Point 382. This limber pine woodland grows on the south wall of the canyon.

VEGETATION DESCRIPTION: 01SwCan384

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Pseudoroegneria spicata*

LOCATION

T 28 N, **R** 97 W **Section** 6 , SW,N 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6900 feet **Topo position:** Toeslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the grass vegetation on the canyon walls in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

This is dense herbaceous vegetation (total canopy cover 65-75%) with a sparse shrub stratum (5-15% canopy cover). The common herbaceous species are *Pseudoroegneria spicata*, *Poa secunda*, *Antennaria microphylla*, *Phlox multiflora*, *Festuca idahoensis*, and *Erigeron caespitosus*. Smaller amounts of *Heuchera parviflora*, *Eriogonum umbellatum* var. *dicrocephalum*, and other species are present. *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, *Symphoricarpos oreophilus*, *Artemisia tridentata* ssp. *vaseyana*, *Artemisia tridentata* ssp. *wyomingensis*, and *Ribes cereum* are present but scattered. Cobbles and gravel cover the ground.

Disturbance signs:

Notes:

Point 383. This vegetation grows with sparse limber pine woodlands (plot 01SwCan382) on the south wall of the canyon.

VEGETATION DESCRIPTION: 01SwCan389

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Betula occidentalis*

LOCATION

T 28 N, **R** 97 W **Section** 6 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6900 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the vegetation of the riparian shrub stands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.11 (looking upstream) and 2.12 (looking downstream).

Vegetation:

Salix lucida ssp. *caudata* and *Betula occidentalis* are the most common species in a tall shrub stratum (5-6 m tall) that includes secondary amounts of *Pinus flexilis*, *Juniperus scopulorum*, and *Salix lutea*, and smaller amounts of *Pinus contorta* and *Salix boothii*. Small amounts of shorter shrubs -- *Ribes oxyacanthoides* ssp. *setosum*, *Ribes cereum*, *Rosa* sp., *Rubus idaeus*, *Amelanchier alnifolia*, *Symphoricarpos oreophilus* -- grow beneath the tall shrub canopy. The common herbaceous species are *Agrostis stolonifera*, *Calamagrostis canadensis*, *Equisetum hyemale*, *Glycyrrhiza lepidota*, *Juncus balticus*, *Achillea millefolium*, *Thermopsis* sp., *Eleocharis palustris*, and *Carex nebrascensis*. Minor amounts of other species also are present, including *Chamerion angustifolium*, *Solidago missouriensis* var. *missouriensis*, *Helianthus nuttallii*, *Bromus tectorum*, *Poa secunda* (*P. juncifolia* var. *ampla*), *Pterospora andromeda*, and *Apocynum* sp. (The *Bromus tectorum* was growing in one patch at the mouth of Mormon Creek.)

Disturbance signs:

Notes:

Point 381. This plot describes the predominant vegetation in this stretch of the river. A small stand of *Pinus contorta* also grows in the valley bottom here (plot 01SwCan38)

VEGETATION DESCRIPTION: 01SwCan39

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 6 , NE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 6900 feet **Topo position:** Toeslope

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the vegetation in *Artemisia tridentata vaseyana* shrub stands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* (80 cm tall) and *Purshia tridentata* (50 cm tall) form a shrub stratum with 25-35% canopy cover. Small amounts of *Artemisia tridentata* ssp. *tridentata* (1.5 m tall), *Ericameria nauseosa*, *Chrysothamnus viscidiflorus*, *Symphoricarpos oreophilus*, and *Ribes cereum* are present. The common herbaceous species are *Hesperostipa comata*, *Poa pratensis*, *Pseudoroegneria spicata*, and *Poa secunda*; less common are *Antennaria microphylla*, *Bromus tectorum*, *Lithospermum ruderales*, *Leymus cinereus*, *Solidago missouriensis* var. *missouriensis*, and other species.

Disturbance signs:

Notes:

Point 39. This shrub stand grows on a fan at the mouth of a tributary, at the base of the north canyon wall.

VEGETATION DESCRIPTION: 01SwCan40

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Carex praegracilis* meadow

LOCATION

T 28 N, **R** 97 W **Section** 6 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7050 feet **Topo position:** Footslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation around springs in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Juncus saximontanus, *Carex nebrascensis*, *Carex praegracilis*, and *Agrostis stolonifera* dominate the vegetation, and smaller amounts of *Hypericum formosum* var. *formosum*, *Poa pratensis*, *Symphotrichum ascendens*, and other species are present. Several willow shrubs (*Salix geyeriana* and *Salix lutea*) grow in this wet meadow.

Disturbance signs:

Notes:

Point 40. This is a small patch (200 square meters) around a spring in a tributary draw. Surrounding vegetation is limber pine woodland (plot 01SwCan413).

VEGETATION DESCRIPTION: 01SwCan401

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon Deschampsia cespitosa meadow

LOCATION

T 28 N, **R** 97 W **Section** 6 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7100 feet **Topo position:** Footslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation of wet and mesic meadows in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

The dense herbaceous vegetation is composed mostly of *Carex nebrascensis*, *Agrostis stolonifera*, *Deschampsia caespitosa*, *Juncus saximontanus*, and *Hypericum formosum* var. *formosum*. A few *Salix lutea* are present.

Disturbance signs:

Notes:

Point 40. This herbaceous vegetation with scattered willows grows in wet areas in the bottom of a draw tributary to the main canyon. Drier areas support meadows with different species (plot 01SwCan402).

VEGETATION DESCRIPTION: 01SwCan402

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon mesic meadow

LOCATION

T 28 N, **R** 97 W **Section** 6 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7050 feet **Topo position:** Footslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation of mesic meadows growing in draws in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

The dense herbaceous vegetation is composed primarily of *Juncus confusus*, *Perideridia gairdneri*, *Poa pratensis*, *Poa secunda* (?), *Taraxacum laevigatum* (?), *Lupinus argenteus*, *Elymus trachycaulus* ssp. *trachycaulus*, and *Danthonia unispicata*.

Disturbance signs:

Notes:

Point 40. This herbaceous vegetation grows in mesic areas in the bottom of a draw tributary to the main canyon. *Deschampsia caespitosa* meadows grow in wetter areas (plot 01SwCan401).

VEGETATION DESCRIPTION: 01SwCan403

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon Pinus flexilis

LOCATION

T 28 N, **R** 97 W **Section** 6 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7100 feet **Topo position:** Backslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation of limber pine woodlands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Pinus flexilis 10-15 m tall dominate a tree canopy with 25-35% cover; Populus tremuloides is present but contributes less cover. Scattered Juniperus scopulorum grow beneath the tree overstory, and Artemisia tridentata ssp. vaseyana forms a sparse shorter shrub layer (5-15% canopy cover, 75 cm tall). The common herbaceous species are Elymus trachycaulus ssp. trachycaulus, Festuca idahoensis, Poa pratensis, Poa secunda, Geranium viscosissimum, Ipomopsis aggregata, Arnica cordifolia, Taraxacum sp., Achnatherum lettermanii, and Lupinus argenteus. Fallen aspen trunks are common and aspen suckers are present but have been browsed to a height of 50 cm or less.

Disturbance signs:

Aspen suckers have been browsed to a height of 50 cm or less.

Notes:

Point 40. This woodland grows in a draw tributary to the main canyon from the north, being confined to the bottom of the lower part of the draw and spreading out to cover the bowl at the upper end of the draw.

VEGETATION DESCRIPTION: 01SwCan41

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 97 W **Section** 6 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7100 feet **Topo position:** Foothslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation of sagebrush shrub stands growing in draws tributary to the main canyon in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana*, *Artemisia tridentata* ssp. *wyomingensis*, and *Purshia tridentata* form a shrub layer 50 cm tall and with 25-35% canopy cover. Small amounts of *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, and *Artemisia nova* are present. The shrub stratum is somewhat patchy, with the shrubs densest in small draws and concavities and sparser on convexities in the slope. The common herbaceous species are *Pseudoroegneria spicata*, *Carex rossii*, *Poa secunda*, *Poa fendleriana*, and *Antennaria microphylla*. *Bromus tectorum* grows in patches but contributes little cover. Scattered *Pinus flexilis* are present.

Disturbance signs:

Notes:

Point 41. This vegetation grows on the northeast and southwest sides of a draw flowing into the main canyon from the north.

VEGETATION DESCRIPTION: 01SwCan42

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia nova*

LOCATION

T 29 N, **R** 98 W **Section** 32 , **SE** 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7320 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the short shrub-steppe vegetation matrix on the rolling uplands of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.13 and 2.14 from granite outcrop, looking SW and SE (respectively) at rolling uplands, with this type as matrix

Vegetation:

Artemisia nova, 15 cm tall, dominates a shrub stratum that contains traces of *Artemisia tridentata* ssp. *wyomingensis* and *Ericameria nauseosa*. Total shrub canopy cover is 5-15%. The common herbaceous species are *Poa secunda*, *Poa cusickii*, and *Phlox hoodii*, and secondary species include *Pseudoroegneria spicata*, *Arenaria hookeri*, *Elymus elymoides*, *Antennaria microphylla*, and others.

Disturbance signs:

Notes:

Point 42. This short shrub-steppe forms the matrix vegetation on the rolling uplands, within which the amounts of *Artemisia nova*, *A. tridentata* ssp. *wyomingensis*, and *A. arbuscula* ssp. *longiloba* vary from place to place. (Plot 01SwCan43 describes shrub-steppe dominated by *A. tridentata* ssp. *wyomingensis*, and 01SwCan45 describes vegetation with more *A. arbuscula*.) *Artemisia tridentata* ssp. *vaseyana* shrub stands and *Carex praegracilis* meadows (plot 01SwCan44) grow in draws. Cover of shrubs, graminoids, and forbs is sparse on bedrock outcrops, and *Selaginella densa* cover is substantial.

VEGETATION DESCRIPTION: 01SwCan43

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 29 N, **R** 98 W **Section** 32 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7280 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the short shrub-steppe vegetation matrix on the rolling uplands of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.13 and 2.14 from granite outcrop, looking SW and SE (respectively) at rolling uplands, with this type as matrix

Vegetation:

Artemisia tridentata ssp. *wyomingensis* (15 cm tall) and *Artemisia arbuscula* ssp. *longiloba* (10 cm tall) form a short shrub stratum with 15-25% canopy cover. A trace of *Artemisia nova* is present. The common herbaceous species are *Poa secunda*, *Poa fendleriana*, *Phlox hoodii*, *Stenotus armerioides* var. *armerioides*, *Antennaria microphylla*, *Pseudoroegneria spicata*, and *Arenaria hookeri*.

Disturbance signs:

Notes:

Point 43. This short shrub-steppe forms the matrix vegetation on the rolling uplands, within which the amounts of *Artemisia nova*, *A. tridentata* ssp. *wyomingensis*, and *A. arbuscula* ssp. *longiloba* vary from place to place. Plot 01SwCan42 describes shrub-steppe dominated by *A. nova*, and 01SwCan45 describes vegetation with more *A. arbuscula*. *Artemisia tridentata* ssp. *vaseyana* shrub stands and *Carex praegracilis* meadows (plot 01SwCan44) grow in draws. Cover of shrubs, graminoids, and forbs is sparse on bedrock outcrops, and *Selaginella densa* cover is substantial.

VEGETATION DESCRIPTION: 01SwCan44

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Carex praegracilis* meadow

LOCATION

T 29 N, **R** 98 W **Section** 32 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7280 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation in draws and swales within the shrub-steppe matrix on the uplands of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.13 and 2.14 from granite outcrop, looking SW and SE (respectively) at rolling

Vegetation:

Carex praegracilis, *Muhlenbergia richardsonis*, *Juncus balticus*, *Poa secunda*, and *Antennaria microphylla* dominate in most of the draw. Scattered individuals of *Artemisia arbuscula* ssp. *longiloba*, and scattered patches of *A. tridentata* ssp. *vaseyana* (50 cm tall) are present in the meadows.

Disturbance signs:

Notes:

Point 44. This mesic meadow type grows in broad draws within the matrix of *Artemisia nova*, *A. tridentata* ssp. *wyomingensis*, and *A. arbuscula* ssp. *longiloba* shrub-steppe matrix. These meadows may contain patches of *Artemisia tridentata* ssp. *vaseyana* shrub vegetation.

VEGETATION DESCRIPTION: 01SwCan45

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Artemisia arbuscula*

LOCATION

T 29 N, **R** 98 W **Section** 32 , SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7280 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the shrub-steppe vegetation matrix on the uplands of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.13 and 2.14 from granite outcrop, looking SW and SE (respectively) at rolling uplands and shows this matrix vegetation.

Vegetation:

Artemisia arbuscula ssp. *longiloba* (10 cm tall) and *Artemisia nova* (15 cm tall) form a short shrub layer with 15-25% canopy cover. *A. arbuscula* contributes slightly more cover than *A. nova*. *Artemisia tridentata* ssp. *wyomingensis* and *A. tridentata* ssp. *vaseyana* contribute traces of cover. The common species in the herbaceous stratum are *Poa secunda*, *Poa fendleriana*, *Phlox hoodii*, *Leptodactylon pungens*, *Arenaria congesta*, *Pseudoroegneria spicata*, *Eriogonum ovalifolium*, and *Antennaria microphylla*. *Balsamorhiza incana* is present.

Disturbance signs:

Notes:

Point 45. This plot illustrates one aspect of the short shrub-steppe vegetation matrix on the rolling uplands in this area. Within that matrix, the amounts of *Artemisia nova*, *A. tridentata* ssp. *wyomingensis*, and *A. arbuscula* ssp. *longiloba* vary from place to place. This plot is in vegetation co-dominated by *A. arbuscula* and *A. nova*. Plot 01SwCan42 shows vegetation dominated by *A. nova*, and plot 01SwCan43 shows vegetation co-dominated by *A. arbuscula* and *A. tridentata* ssp. *wyomingensis*. Cover of shrubs, graminoids, and forbs is sparse on bedrock outcrops, and *Selaginella densa* cover is substantial.

VEGETATION DESCRIPTION: 01SwCan47

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Carex praeegracilis* meadow

LOCATION

T 29 N, **R** 98 W **Section** 31 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7180 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the meadow vegetation in swales on the rolling uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Carex praeegracilis, *Muhlenbergia richardsonis*, and *Poa secunda* are the most common species, and secondary species include *Juncus confusus*, *Juncus balticus*, *Pyrocoma uniflora*, *Agoseris glauca* var. *glauca*, *Iris missouriensis*, *Erigeron lonchophyllus*, *Achillea millefolium*, *Distichlis spicata*, *Antennaria microphylla*, *Gentiana affinis*, *Sisyrinchium idahoense* var. *occidentale*, *Cirsium tioganum* var. *coloradense*, *Symphyotrichum ascendens*, and *Orthocarpus luteus*. Scattered *Artemisia cana* ssp. *viscidula* are present.

Disturbance signs:

Notes:

Point 47. This herbaceous vegetation forms meadows in broad, shallow draws within the matrix of short shrub-steppe. Plot 01SwCan471 describes a nearby meadow with slightly different species composition.

VEGETATION DESCRIPTION: 01SwCan471

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Carex praegracilis* meadow

LOCATION

T 28 N, **R** 98 W **Section** 1, NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7050 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the meadow vegetation in swales on the rolling uplands of the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

The common species are *Carex praegracilis*, *Muhlenbergia richardsonis*, and *Poa secunda*, and secondary species include *Deschampsia caespitosa*, *Zigadenus elegans*, *Koeleria macrantha*, *Potentilla pectinisecta*, *Juncus confusus*, *Juncus balticus*, *Pyrocoma uniflora*, *Agoseris glauca* var. *glauca*, *Iris missouriensis*, *Erigeron lonchophyllus*, *Achillea millefolium*, *Distichlis spicata*, *Antennaria microphylla*, *Gentiana affinis*, *Sisyrinchium idahoense* var. *occidentale*, *Cirsium tioganum* var. *coloradense*, *Symphotrichum ascendens*, and *Orthocarpus luteus*. Scattered *Dasiphora floribunda* are present.

Disturbance signs:

Notes:

Point 47. This herbaceous vegetation forms meadows in broad, shallow draws within the matrix of short shrub-steppe. Plot 01SwCan47 describes a nearby meadow with slightly different species composition.

VEGETATION DESCRIPTION: 01SwCan48

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Pinus flexilis*

LOCATION

T 28 N, **R** 98 W **Section** 1, SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7000 feet **Topo position:** Toeslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation of *Pinus flexilis* woodlands in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Pinus flexilis forms a tree canopy over a shrub stratum of *Artemisia tridentata* ssp. *vaseyana* and *Symphoricarpos oreophilus*, and a herbaceous stratum dominated by *Leymus cinereus* and *Agrostis stolonifera*.

Disturbance signs:

Notes:

Point 48. This woodland grows in the bottom of a draw tributary to the main canyon.

VEGETATION DESCRIPTION: 01SwCan49

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon *Betula occidentalis*

LOCATION

T 28 N, **R** 98 W **Section** 1, SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7020 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian shrub vegetation in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Betula occidentalis dominates a tall shrub stratum that includes *Salix lutea*, *Salix bebbiana*, *Juniperus scopulorum*, and *Cornus sericea*. *Salix lucida* ssp. *caudata* contributes substantial cover immediately long the channel. *Dasiphora floribunda* and *Juniperus communis* form a patchy shorter shrub stratum. The common herbaceous species are *Poa pratensis*, *Agrostis stolonifera*, *Carex praegracilis*, and *Glycyrrhiza lepidota*. Other herbaceous species include *Phleum pratense*, *Maianthemum stellatum*, *Solidago missouriensis* var. *missouriensis*, *Thalictrum* sp., *Thermopsis* sp., *Achnatherum lettermanii*, *Trifolium repens*, *Carex pellita* (*C. lanuginosa*), *Calamagrostis stricta* (?), *Mentha arvensis*, *Eleocharis palustris*, and *Juncus saximontanus*.

Disturbance signs:

Notes:

Point 49. This shrub vegetation grows along the river banks and on the lower terraces.

VEGETATION DESCRIPTION: 01SwCan50

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon Populus tremuloides

LOCATION

T 28 N, **R** 98 W **Section** 1, NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7040 feet **Topo position:** Toeslope

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the vegetation in aspen woodlands in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Populus tremuloides dominates the tree canopy, and Populus angustifolia is present in about half the stand. A patchy tall shrub stratum of Salix lucida ssp. caudata, Salix lutea, Juniperus scopulorum, and Populus tremuloides suckers is present, but much of the woodland consists of just the tree canopy and the herbaceous undergrowth. The common herbaceous species are Poa pratensis, Carex pellita (C. lanuginosa), and Agrostis stolonifera. The trees are healthy.

Disturbance signs:

Two very old beaver-cut stumps were noted.

Notes:

Point 50. This woodland grows in the bottom of a draw tributary to the main canyon from the north.

VEGETATION DESCRIPTION: 01SwCan51

Sampling Date 7/24/2001

Cover Type: Sweetwater Canyon Salix

LOCATION

T 28 N, **R** 98 W **Section** 1, SW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7140 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the vegetation in willow shrub stands in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Salix lutea and Salix geyeriana co-dominate a tall shrub stratum to 4 m tall that includes traces of Salix boothii, Salix exigua, and Betula occidentalis. The herbaceous undergrowth is dominated by Agrostis stolonifera, Carex nebrascensis, Deschampsia caespitosa, Poa pratensis, and Carex pellita (C. lanuginosa).

Disturbance signs:

Notes:

Point 51. This shrub stand grows in the bottom of a draw tributary to the main canyon from the north.

VEGETATION DESCRIPTION: 01SwCan54

Sampling Date 7/25/2001

Cover Type: Sweetwater Canyon *Betula occidentalis*

LOCATION

T 28 N, **R** 99 W **Section** 11 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7080 feet **Topo position:** Terrace

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian shrub vegetation in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.15 looking across river at this tall shrub stand, 2.16 farther upstream looking at similar vegetation

Vegetation:

The vegetation consists of a tall shrub stratum (4-5 m tall), a shorter shrub stratum (1.5 m tall), and a herbaceous undergrowth. The composition of the tall shrub stratum differs from point to point, but *Betula occidentalis* dominates over most of the stand, *Salix lutea* and *Juniperus scopulorum* are secondary, and small amounts of *Salix melanopsis*, *Salix exigua*, *Salix geyeriana*, and *Cornus sericea* are present. *Salix lucida* ssp. *caudata* is common as shorter shrubs (1.5 m tall) along the lowest terrace. The shorter shrubs *Dasiphora floribunda*, *Ribes oxycanthoides* ssp. *setosum*, and *Rosa* sp. are present throughout. The common species in the herbaceous undergrowth are *Phleum pratense*, *Achnatherum lettermanii*, *Glycyrrhiza lepidota*, *Poa pratensis*, *Maianthemum stellatum*, *Achillea millefolium*, *Taraxacum laevigatum* (?), *Juncus balticus*, *Cirsium tioganum* var. *coloradense*, *Elymus trachycaulus* ssp. *trachycaulus*, *Bromus anomalus*, and *Galium boreale*.

Agrostis stolonifera and *Carex pellita* (*C. lanuginosa*) are common in the lowest, wettest part of the stand. *Cirsium arvense* is present, in a patch of several hundred stems.

Disturbance signs:

An active beaver dam and sediment-filled old beaver ponds are present in this stretch of the river.

Notes:

Point 54. This tall shrub stand grows on the terraces along the river. Several hundred flowering stems of *Cirsium arvense* were noted in one patch on the second terrace.

VEGETATION DESCRIPTION: 01SwCan541

Sampling Date 7/25/2001

Cover Type: Sweetwater Canyon Salix

LOCATION

T 28 N, **R** 99 W **Section** 11 , NW 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7080 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation in the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Salix lucida ssp. caudata 1.5 m tall and Dasiphora floribunda grow in a wet meadow dominated by Agrostis stolonifera and Phleum pratense.

Disturbance signs:

Notes:

Point 54. This vegetation grows in a sediment filled beaver pond. The nearby riparian vegetation along the river is tall shrub vegetation dominated by Betula occidentalis and Salix lutea (plot 01SwCan54).

VEGETATION DESCRIPTION: 01SwCan55

Sampling Date 7/25/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata* wyo.

LOCATION

T 28 N, **R** 99 W **Section** 3 , SE 1/4

Map Lewiston Lakes **Scale:** 1:24,000

ELEVATION

Elevation: 7350 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the short shrub-steppe vegetation matrix on the uplands in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

01GJ2.17 looking east across the rolling uplands and upper canyon walls

Vegetation:

Artemisia tridentata ssp. *wyomingensis* ca. 20 cm tall forms a short shrub stratum with 15-25% canopy cover. Common species are *Poa secunda*, *Poa fendleriana*, *Phlox hoodii*, *Pseudoroegneria spicata*, and *Arenaria hookeri*; *Carex filifolia* is common on rocky outcrops.

Disturbance signs:

Notes:

Point 55. This plot describes one aspect of the matrix shrub-steppe vegetation. In other areas, *Artemisia arbuscula* ssp. *longiloba* contributes more cover.

VEGETATION DESCRIPTION: 01SwCan561

Sampling Date 7/25/2001

Cover Type: Sweetwater Canyon *Artemisia tridentata vaseyana*

LOCATION

T 28 N, **R** 99 W **Section** 10 , SE 1/4

Map Radium Springs **Scale:** 1:24,000

ELEVATION

Elevation: 7000 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the *Artemisia tridentata* ssp. *vaseyana* shrub vegetation in riparian zones of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Artemisia tridentata ssp. *vaseyana* forms a shrub layer above a herbaceous undergrowth of *Poa pratensis*, *Achnatherum lettermanii*, *Juncus balticus*, *Lupinus argenteus*, *Iris missouriensis*, *Bromus anomalus*, and other species. In some areas, *Dasiphora floribunda* contributes substantial cover to the shrub layer, and it is absent from other areas. *Betula occidentalis*, *Juniperus scopulorum*, and *Pinus flexilis* may be scattered through the stand but contribute little cover.

Disturbance signs:

Notes:

Point 56. Stands of this shrub type grow on relatively dry sites on the insides of river meanders.

VEGETATION DESCRIPTION: 01SwCan562

Sampling Date 7/25/2001

Cover Type: Sweetwater Canyon *Betula occidentalis*

LOCATION

T 28 N, **R** 98 W **Section** 10 , SE 1/4

Map Radium Springs **Scale:** 1:24,000

ELEVATION

Elevation: 7100 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Betula occidentalis and *Salix lutea* dominate a patchy tall shrub layer ca. 5 m tall. A shorter shrub layer of *Ribes oxycanthoides* ssp. *setosum*, *Rosa* sp., and *Cornus sericea* is present in places. Common species in the herbaceous undergrowth are *Phleum pratense*, *Thermopsis* sp., and *Poa pratensis*.

Disturbance signs:

Notes:

Point 56. This tall shrub vegetation type is present in patches along the river in this upstream part of the canyon, and is more common downstream. Higher, drier terraces support *Artemisia tridentata* ssp. *vaseyana* shrub vegetation (plot 01SwCan561), and the vegetation closer to the channel in many places is dominated by short *Salix lucida* var. *caudata* (= *S. lasiandra*). *Cirsium arvense* and *C. vulgare* are present, the former in several patches with up to 1000 stems and the latter as 10 - 20 flowering stems and several rosettes.

VEGETATION DESCRIPTION: 01SwCan563

Sampling Date 7/25/2001

Cover Type: Sweetwater Canyon Salix

LOCATION

T 28 N, **R** 98 W **Section** 10 , SE 1/4

Map Radium Springs **Scale:** 1:24,000

ELEVATION

Elevation: 7100 feet **Topo position:** Basin Floor

Soil

Surface deposit: Alluvial

DESCRIPTION

Reason for plot: To illustrate the riparian vegetation in the WSA.

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Salix lucida ssp. *caudata* forms a shrub stratum ca. 2 m tall. *Dasiphora floribunda* often is present beneath the taller shrubs. Common species in the herbaceous undergrowth are *Agrostis stolonifera* and *Carex* spp.

Disturbance signs:

Notes:

Point 56. This vegetation grows near the channel. Taller shrub stands of *Betula occidentalis* and *Salix lucida* var. *caudata* (= *S. luteas*) (plot 01SwCan562) often are present, usually farther from the channel.

VEGETATION DESCRIPTION: 01SwCan57

Sampling Date 7/25/2001

Cover Type: Sweetwater Canyon Pinus flexilis

LOCATION

T 28 N, **R** 98 W **Section** 10 , SW 1/4

Map Radium Springs **Scale:** 1:24,000

ELEVATION

Elevation: 7200 feet **Topo position:** Footslope

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the vegetation in limber pine woodlands of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Pinus flexilis forms a patchy and open tree canopy to 7 m tall, with 15-25% canopy cover. Populus tremuloides is present but contributes less cover than does the pine. A patchy shrub layer of Juniperus communis with Symphoricarpos oreophilus, Artemisia tridentata ssp. vaseyana, and Purshia tridentata grows in the openings in the tree canopy. Common herbaceous species are Carex petasata, Carex rossii, Pseudoroegneria spicata, Festuca idahoensis, Antennaria microphylla, Geum triflorum, and Selaginella densa.

Disturbance signs:

Notes:

Point 57. This woodland covers a hectare (2.47 acres) or less on the south wall of the canyon.

VEGETATION DESCRIPTION: 01SwCan58

Sampling Date 7/25/2001

Cover Type: Sweetwater Canyon *Pseudoroegneria spicata*

LOCATION

T 28 N, **R** 98 W **Section** 10 , SW 1/4

Map Radium Springs **Scale:** 1:24,000

ELEVATION

Elevation: 7420 feet **Topo position:** Interfluve

Soil

Surface deposit: Residual

DESCRIPTION

Reason for plot: To illustrate the herbaceous vegetation on rock outcrops on the uplands of the WSA

Completeness of Species List:

Only the common species were listed and canopy cover of individual species was not recorded.

Photos:

Vegetation:

Common species are *Pseudoroegneria spicata*, *Carex filifolia*, *Selaginella densa*, *Poa secunda*, *Antennaria microphylla*, *Phlox hoodii*, and *Arenaria congesta*. *Hesperostipa comata* is present but contributes relatively little cover. *Artemisia tridentata* ssp. *wyomingensis*, 15 cm tall, contributes 1-5% canopy cover. The ground surface not covered by *Selaginella densa* is paved with gravel and cobbles.

Disturbance signs:

Notes:

Point 58. This patch of vegetation grows on an outcrop of mafic rock in the short shrub-steppe vegetation matrix of the uplands.

APPENDIX 2. PHOTOGRAPHS FROM THE 2001 FIELD SURVEY IN THE SWEETWATER CANYON WSA.

Appendix 2 (pp. 105 - 120) is in a separate digital file, "SweetCan_WSA_01_Appendix_2_Photos.doc."