

**A VEGETATION MAP FOR BROWNLEE WILDLIFE MANAGEMENT AREA,
WASHINGTON COUNTY, IDAHO**

by

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Summary

A vegetation map has been prepared for the Brownlee Wildlife Management Area (WMA) based on field inventories conducted between May 30 and July 7, 1995. The vegetation map is depicted in two formats. One is a color and numerically coded GIS-generated 1:24,000 scale map, and the other uses numerically coded polygons transferred to the four U.S.G.S. 1:24,000 scale topographic quadrangles covering the WMA area. This report is the support document for the Brownlee WMA vegetation map.

The study area is comprised of approximately 22,838 acres and includes Idaho Department of Fish and Game (IDFG), Idaho Department of Lands (IDL), and small amounts of Bureau of Land Management (BLM) and Payette National Forest lands. Large portions of the WMA are characterized by highly dissected, steep canyon slopes dominated by grassland vegetation. Upper elevations along the southern and eastern ends of the WMA have more moderate topography and support a vegetation mosaic where mountain big sagebrush communities are common.

Twenty-seven cover types form the basis of the vegetation map classification, describing grassland, bitterbrush, mountain big sagebrush, scabland, deciduous shrub, riparian and conifer woodland habitats. Cover type circumscription and names are based on published vegetation classifications as much as possible. We used floristic and structural criteria to develop the cover type classification. We also considered wildlife habitat values when developing the classification scheme. The vegetation map is comprised of 440 polygons (map units) ranging in size from less than 1 to 419 acres. Polygon delineation was based primarily on vegetation pattern homogeneity. Topographic and ecological condition factors were also taken into account. Topographic and associated vegetation variability in the study area resulted in many polygons consisting of more than one cover type. Percentages of each were estimated for polygons containing multiple cover types. The ecological condition of most grassland, bitterbrush and mountain big sagebrush communities was assessed during field work. In addition, habitat types were determined where possible.

Grassland cover types encompass approximately 59% of the vegetation, followed by mountain big sagebrush (21.6%), bitterbrush (6.6%), deciduous shrub (6.4%), riparian (2.7%), scabland (2.2%), and conifer (1.6%) types. Bluebunch wheatgrass/Sandberg's bluegrass, Idaho fescue/bluebunch wheatgrass, annual grassland, and mountain big sagebrush/Idaho fescue are the only four cover types covering more than 10% of the area. Eighteen cover type classes cover less than 3% of the study area each. Because deciduous shrub communities often occur as small inclusions impractical to map separately, their coverage is the most underestimated class using our mapping system.

Approximately 50% of grassland, 65% of bitterbrush, and 55% of mountain big sagebrush communities are in very early or early seral ecological condition. Many polygons are characterized by a mosaic of variable ecological conditions. Because of their pervasiveness and threats to wildlife habitat values, the control of weeds will be one of the primary management challenges at the WMA. Disturbance is the main conduit for weed establishment and spread in all habitats within the WMA. Grassland, bitterbrush and certain sagebrush communities are especially susceptible to disturbance and weed invasion. For many years, livestock grazing and related activities have been the primary and the most widespread disturbance factors. This report contains recommendation for both weed control and livestock management.

We conducted a general floristic inventory and compiled a vascular plant species list for the WMA as part of the vegetation map project. The list contains a total of 363 species. One-hundred and thirty-two plant

species were collected and labelled, and will be given to the WMA to serve as a beginning reference collection for managers and researchers. Rare plant surveys were incorporated into our vegetation map field work as well. Snake Canyon milkvetch (*Astragalus vallis*) and Sheldon's sedge (*Carex sheldonii*) are two rare plant species known to occur within the WMA. In order to help assess plant community conservation values of the WMA from a statewide perspective, most polygons were evaluated using the classification of the Vegetation Map of Idaho. Brownlee WMA is already recognized for its many wildlife values. Completion of the Brownlee vegetation map project helps to show that IDFG management at Brownlee WMA is also an important plant community conservation opportunity.

Acknowledgements

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Table of contents

Summary i
Acknowledgements ii
Table of contents iii
List of figures iv
List of tables iv
List of appendices iv
BROWNLEE WILDLIFE MANAGEMENT AREA
Location 1
Land ownership 1
Physical setting 1
Geology 1
Soils 5
Climate 5
Vegetation 5
VEGETATION MAP FOR BROWNLEE WILDLIFE MANAGEMENT AREA
Objective 8
Methods 8
Vegetation map cover type descriptions 11
Vegetation map analysis 26
Organization of the vegetation map 26
Cover types 26
Ecological condition assessment 29
Vegetation map notes 31
Polygon descriptions 31
Rare plants at Brownlee WMA 59
Flora of Brownlee WMA 62
Recommendations 62
References 66

List of figures

Figure 1	Location map of Brownlee WMA in Idaho	2
Figure 2	Brownlee WMA ownership map	3
Figure 3	Brownlee WMA vegetation map study area	4
Figure 4	Brownlee WMA vegetation map	10
Figure 5	Location map for spotted knapweed population	64

List of tables

Table 1	List of plant communities occurring within Brownlee WMA	7
Table 2	Summary of cover type data for Brownlee WMA vegetation map	27
Table 3	Summary of ecological condition assessments for grassland, bitterbrush and mountain big sagebrush communities	30

List of appendices

Appendix 1	Summary of vegetation map polygon data.
Appendix 2	Vascular plant species list for Brownlee WMA.
Appendix 3	Idaho rare plant observation form.
Appendix 4	Map locations for Snake Canyon milkvetch and Sheldon's sedge at Brownlee WMA.
Appendix 5	Element Occurrence Records for Snake Canyon milkvetch at Brownlee WMA.

BROWNLEE WILDLIFE MANAGEMENT AREA

Location

The Brownlee Wildlife Management Area (WMA) is located in Washington County, Idaho, approximately 15-20 miles northwest of Cambridge (Figure 1). The northern boundary of the WMA is located south of the Adams-Washington county line near lower Dukes Creek. Along the northern face of the Hitt Mountains, the Payette National Forest boundary marks the southern extent of the WMA. National Forest land along the west face of Cuddy Mountain marks the eastern boundary, while Brownlee Reservoir, along the Snake River forms much of the WMA's western boundary. State Highway 71 bisects the WMA and secondary roads from the highway provide access into the WMA.

Land ownership

Brownlee WMA is approximately 23,078 acres in size. It is comprised of 10,087 acres of Idaho Department of Fish and Game (IDFG) land, 12,821 acres leased from the State Department of Lands (IDL), 285 acres of U.S. Forest Service, and 170 acres of Bureau of Land Management land (BLM) (Figure 2). In addition, there are approximately 23,151 acres of U.S. Forest Service (USFS) allotments associated with the Brownlee WMA being considered for administration under a Coordinated Resource Management Plan. These Forest lands are not part of the study area. The size of the study area is estimated to be 22,838 acres (Figure 3).

Physical setting: The WMA is drained by steep gradient forks and tributaries of Brownlee Creek and by several other creeks flowing west out of the Cuddy Mountains and north from the Hitt Mountains. Below approximately the 4000 foot contour, most of the WMA is characterized by highly dissected, steep canyon slopes and associated ridges dominated by grassland vegetation. The topography moderates above 4000 feet elevation and consists of a series of broad, undulating ridges along southern portions of the WMA, and a more gentle continuation of the adjacent steep slopes and ridges along its eastern edge. A mosaic of mountain big sagebrush, deciduous shrubfield and grassland habitats characterizes much of this upland area. Elevations in the study area range from about 2100 feet near Brownlee Reservoir to 5400 feet in the Cuddy Mountain foothills.

Ross and Savage (1967) place the Brownlee WMA area within the Wallowa-Seven Devils Section of the Columbia Intermontane Province. It is considered part of the Blue Mountain Ecoregion of the Pacific Northwest by Omernik and Gallant (1986) and part of the Middle Rocky Mountain-Steppe-Coniferous Forest-Alpine Meadow Province mapped Bailey (1995).

Geology

Eruption of fluid Miocene lavas, approximately 17-14 million years ago consisted of sheets of Imnaha Basalt followed by Grande Ronde Basalt and comprise the dominant surface rock at Brownlee WMA. Imnaha Basalt is much more widespread than Grande Ronde within the WMA (Fitzgerald 1982). These formations are part of the Columbia River Basalt Group, a series of basalt flows that covered much of eastern Washington, northern Oregon and adjacent parts of Idaho (Bush and Seward 1992). Brownlee WMA lies within a geologic area known as the Weiser embayment, the southeasternmost extension of the Columbia Plateau. Following vulcanism, pronounced structural activity occurred throughout this area. Northeast-trending, high angle fault patterns characterize the extensive Snake River

fault system encompassing the Brownlee WMA area (Fitzgerald 1982).

Figure 1

Figure 2

Figure 3

Besides basalt, other rock types also are present within the WMA. Extensive limestone outcrops are found in the Grade Creek drainage and local granitic outcrops also occur.

Soils

Soils in the study area are derived mainly from basalt. Most soils have developed from a mixture of residual and colluvial material. The canyon grassland slopes of Brownlee WMA are dominated by Bakeoven-Reywat-Rock outcrop complex, Gross-Bakeoven complex, Gem-Reywat complex, Gross, and Gem soil units. These soils are all well drained and vary from very shallow to moderately deep. Loams are the dominant textural class and vary from very stony to silty, often with a clay subsoil component. The more gentle upper elevations of the WMA are dominated by Meland-Riggins complex, Gem-Bakeoven complex and DeMasters soil units. These soils are well drained, vary from very shallow to deep, and have loam to clay loam profiles. Small to large inclusions of several additional soil units are scattered throughout the WMA (Natural Resources Conservation Service 1995).

Climate

From late fall to early spring the climate of west-central Idaho is typically influenced by cool and moist Pacific maritime air. Periodically this westerly flow is interrupted by outbreaks of cold, dry, continental air from the north normally blocked by mountain ranges to the east. During the summer months, a Pacific high pressure system dominates weather patterns, resulting in minimal precipitation and more continental climatic conditions overall (Ross and Savage 1967). Weather data from Brownlee Dam (Johnson 1981) indicate nearly 45% of the average annual 16 inches (406 mm) of precipitation falls during the November through January winter months. This is strongly contrasted by the July through September summer months when only about 9% of the yearly average is recorded. Average annual temperature is 51.8⁰ F (26.5⁰ C), with July the hottest and January the coldest months. Temperatures are lower and precipitation greater at higher elevations in the WMA.

Vegetation

Most of Brownlee WMA is characterized by highly dissected, steep canyon slopes and associated ridges. Perennial bunchgrass communities or degraded versions characterized by invasive annual grasses dominate the canyon faces. The canyon grassland communities are representative of the bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*) habitat type series (Tisdale 1986). Mountain big sagebrush communities are common in areas of gentle canyon topography south of Brownlee Creek. A mosaic of bitterbrush, mountain big sagebrush, scabland and deciduous shrubfield communities also occur within the canyon landscape. Narrow bands of woody riparian vegetation, often dominated by black cottonwood, follow all the perennial streams within the WMA, adding further diversity to the canyon ecosystem.

The canyon grasslands are susceptible to disturbance and subsequent weed invasion, and to varying degrees, extensive areas within the canyon ecosystem are now dominated by weedy species. These changes have adversely affected the WMA's wildlife values. The primary anthropogenic disturbances at Brownlee WMA have been livestock grazing and related activities such as stockpond construction, road construction, prescribed burning and agricultural conversion attempts. Powerline construction and associated roadways are another set of major disturbances. Annual brome grasses, medusahead rye, bulbous bluegrass, and a number of introduced forbs, especially hoary whitetop, rank as the most

widespread and intractable weeds within the WMA. Cyclical fire is a natural part of the Snake Canyon and upland ecosystems.

At approximately the 4000 foot contour, the topography of the WMA moderates. Mountain big sagebrush communities dominate extensive areas along the series of broad, undulating ridges dissecting southern portions of the WMA. Fire (prescribed burns?) within the past decade has reduced the sagebrush cover over large sections of these uplands. In general, sagebrush habitats west of West Brownlee Creek are in considerably poorer ecological condition than to the east, around Cherry Creek. It is unclear if this is due to past or present livestock grazing patterns, season of burn, or other factors. Much of the WMA's upper elevations, including nearly all areas along the WMA's eastern edge, can be characterized as transitional between forest and non-forest habitats. This transitional-type vegetation is comprised of a complex mosaic of mesic grassland, mountain big sagebrush, deciduous shrubfield, aspen, and conifer patch habitats. Throughout the WMA, aspect and microtopography are pivotal factors in controlling the distribution of these various plant communities. Extensive conifer stands do not occur within the WMA, but are common on adjacent Payette National Forest land. Timber harvest has begun in some of these nearby forest stands.

Based on the descriptions of various published classifications, 21 plant communities have been identified for Brownlee WMA. Canyon grassland, bitterbrush, mountain big sagebrush, deciduous shrub, riparian and conifer forest plant communities are listed below (Table 1). There is considerable overlap between this list of plant communities and cover type names used for the vegetation map classification.

Seven of the 21 plant communities in Table 1 are rare within the WMA. Several are not discussed elsewhere in the report so are mentioned here. Sand dropseed plant communities are extremely limited in extent and all that we observed are in poor ecological condition (very early seral or early seral stage). The spiny greenbush/bluebunch wheatgrass plant community within the WMA is also very limited. Mountain big sagebrush/elk sedge is found only in a couple small locations near the southern boundary of the WMA (polygon 410). No attempt was made to include these three communities in the vegetation map. Netleaf hackberry/bluebunch wheatgrass plant communities are restricted to a few enclaves within the WMA. None were large enough to be included in the vegetation map except as a rare inclusion. All of the small netleaf hackberry stands we observed contained depleted understories dominated by annual grasses. Bitterbrush/needle-and-thread grass, bitterbrush/Idaho fescue, and white alder/syringa plant communities, are each represented by only a single polygon for the vegetation map.

At least nine additional plant communities occur at Brownlee WMA, but are not represented in the above list. There are two reasons for this, 1) the plant communities are not described in the regional literature; or 2) we lack sufficient quantitative floristic and structural information to assess their relationship with published descriptions.

Plant communities that occur at the WMA, but are not linked to published classification names include the following - mixed deciduous shrub, black cottonwood/mixed deciduous shrub, aspen/mixed deciduous shrub, water birch, black hawthorne, low forb scabland, *Lomatium* spp./*Eriogonum* spp. scabland, northern buckwheat scabland, stiff sagebrush/Idaho fescue, mountain mahogany/rock outcrop. All of these will require further study before a more rigorous classification is possible.

Table 1. Plant communities occurring within the Brownlee WMA.

Name	¹ Ref.
Grassland	
1. Bluebunch wheatgrass-Sandberg's bluegrass/arrowleaf balsamroot (<i>Agropyron spicatum</i> - <i>Poa sandbergii</i> / <i>Balsamorhiza sagittata</i>)	1
2. Idaho fescue/bluebunch wheatgrass (<i>Festuca idahoensis</i> / <i>Agropyron spicatum</i>)	1
3. Idaho fescue/prairie Junegrass (<i>Festuca idahoensis</i> / <i>Koeleria cristata</i>)	1
4. Sand dropseed (<i>Sporobolus cryptandrus</i>)	1
5. Spiny greenbush/bluebunch wheatgrass (<i>Glossopetalon nevadense</i> / <i>Agropyron spicatum</i>)	2
Bitterbrush	
6. Bitterbrush/bluebunch wheatgrass <i>Purshia tridentata</i> / <i>Agropyron spicatum</i>	2
7. Bitterbrush/needle-and-thread grass <i>Purshia tridentata</i> / <i>Stipa comata</i>	3
8. Bitterbrush/Idaho fescue-bluebunch wheatgrass <i>Purshia tridentata</i> / <i>Festuca idahoensis</i> - <i>Agropyron spicatum</i>	2
Mountain big sagebrush	
9. Mountain big sagebrush/Idaho fescue <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Festuca idahoensis</i>	2
10. Mountain big sagebrush/bluebunch wheatgrass <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Agropyron spicatum</i>	4
11. Mountain big sagebrush-bitterbrush/Idaho fescue <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> - <i>Purshia tridentata</i> / <i>Festuca idahoensis</i>	2
12. Mountain big sagebrush/Geyer's sedge <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> / <i>Carex geyeri</i>	4
Scabland	
13. Stiff sagebrush/Sandberg's bluegrass <i>Artemisia rigida</i> / <i>Poa sandbergii</i>	1
Deciduous shrub	
14. Ninebark <i>Physocarpus malvaceus</i>	2
15. Common snowberry <i>Symphoricarpos albus</i>	1
16. Wood's rose <i>Rosa woodsii</i>	2
17. Talus-shrub garland	2
18. Netleaf hackberry/bluebunch wheatgrass <i>Celtis reticulata</i> / <i>Agropyron spicatum</i>	1

Table 1. (cont.) Plant communities occurring within the Brownlee WMA.

Name	Ref.
Riparian	
19. White alder/syringa <i>Alnus rhombifolia/Philadelphus lewisii</i>	5
Conifer woodland	
20. Douglas-fir ninebark <i>Pseudotsuga menziesii/Physocarpus malvaceus</i>	6
21. Douglas-fir/common snowberry <i>Pseudotsuga menziesii/Symphoricarpos albus</i>	6

¹References (Ref.) used to classify the vegetation at Brownlee WMA are: 1 = Tisdale 1986; 2 = Johnson and Simon 1987; 3 = Daubenmire 1970; 4 = Hironaka *et al.* 1983; 5 = Miller 1976; 6 = Steele *et al.* 1981

The Brownlee area represents the northern boundary of low elevation big sagebrush (*Artemisia tridentata* complex) communities in Idaho. The area encompassed by Brownlee WMA is transitional between big sagebrush vegetation to the south and the canyon grasslands characterizing Hells Canyon to the north. Extensive low elevation big sagebrush communities are extensive further south, but north of Brownlee Creek become very sparse and soon disappear.

VEGETATION MAP FOR BROWNLEE WMA

Objective

Our primary goal was to delineate and describe the plant communities at Brownlee WMA at sufficient scale and detail to help Idaho Department of Fish and Game land managers set, meet and assess wildlife and wildlife habitat management objectives. A related objective was to assess the status of the vegetation's ecological condition. In conjunction with field reconnaissance for the vegetation map, we also conducted a general floristic inventory and compiled a vascular plant species list for the WMA. Additionally, we surveyed for several rare plant species known from the canyon grasslands around Brownlee Reservoir. These surveys were incorporated into the vegetation map field work.

Methods

Vegetation map

The vegetation map classification is based on cover types. Cover types are based on a sites existing vegetation and reflect plant communities readily differentiated within the area's canyon and lower mountain slope habitats. We used floristic and structural criteria to devise the cover type classification. Wildlife habitat concerns were also considered when developing the cover type classification. Cover type circumscription and names are based on published classifications as much as possible. Each polygon (vegetation mapping unit) on the vegetation map has been assigned a cover type. Polygon boundaries were

delineated primarily on the basis of vegetation pattern homogeneity. Topographic and ecological condition attributes were also taken into account. The vegetation map portrays the extent, distribution and juxtaposition of the grassland, bitterbrush, mountain big sagebrush, scabland, deciduous shrub, riparian and conifer woodland habitats comprising the WMA. The topographic heterogeneity characterizing Brownlee WMA makes large areas of homogeneous vegetation uncommon. As a result, many polygons are comprised of more than one cover type. A typical pattern is for a polygon to be dominated by one cover type, and containing one or more other cover type inclusions. Percentages of each cover type were estimated for most polygons containing multiple cover types. The Brownlee WMA vegetation map is depicted in two formats. One is a color and numerically coded GIS-generated 1:24,000 scale map, and the other uses numerically coded polygons transferred to the four U.S.G.S. 1:24,000 scale topographic quadrangles covering the WMA area.

Habitat types, which represent the potential natural climax vegetation at a given site, were determined in the field for most polygons. In many cases, the cover type equals the habitat type. The ecological condition of most grassland, bitterbrush and mountain big sagebrush communities was also assessed during field work. This assessment reveals the variability of habitat conditions within the WMA and which areas are presently still in good ecological condition. This information should be helpful when designing management plans, especially related to livestock grazing.

Cover types are described solely from field reconnaissance methods, no vegetation sampling was conducted. This lack of quantifiable data limits direct comparison concerning the vegetation of other areas or studies, or the ability to confidently calculate vegetation-based parameters such as livestock carrying capacity. Cover type descriptions contain varying levels of composition and structural information that should, however, allow limited evaluation and comparisons for wildlife habitat models and other management tools. This is helped by the fortunate fact that many plant communities at Brownlee WMA have received more intensive study elsewhere (e.g., Tisdale 1986; Johnson and Simon 1987) . Our field investigations indicate a general floristic and ecologic agreement between most cover types described for the WMA and similar plant communities described in more detail elsewhere. These community counterparts are noted in the section describing each of the cover types.

The vegetation map for Brownlee WMA is based on the field inventory method. The WMA's relatively small size and well developed road network allowed most of the area to be visited and field verified during the three weeks of field study. Field work was conducted between May 30 and July 7, 1995. The WMA was divided into a series of inventory areas based on various access routes and were systematically surveyed. The boundaries of a particular vegetation unit were delineated in the field onto a clear acetate overlay taped to the appropriate color 1:15,840 scale aerial photograph. The aerial photographs used for this project were taken July 24, 1987, under identification number USDA-F 16 614120. Portions of roll 987 (987 30-33, 64-68, 87-94, 113-125) and roll 1087 (67-78) provide full stereoscopic coverage of the study area. Vegetation and other notes necessary for classification were recorded for each polygon into a field notebook. These notebooks are on file at the Conservation Data Center office in Boise.

Upon completion of field work, the polygons delineated on aerial photos were transferred to 1:24,000 orthophoto maps. These were then traced onto 1:24,000 U.S.G.S. topographic quadrangles and provide the template for GIS digitization. Figure 4 is a reduced rendition of the Brownlee WMA vegetation map. Polygons were numbered consecutively from 1 to 440. Polygons are referenced using their unique number. General cover types descriptions are outlined in the following section. Cover type, acreage, and where

appropriate habitat type, ecological condition, and Idaho vegetation map

Figure 4

class are summarized for each polygon (Appendix 1). Photographs (slide transparencies) of a number of polygons were taken and are on file at the Idaho Department of Fish and Game.

Floristic inventory

A general floristic inventory was conducted during vegetation map field reconnaissance and a vascular plant species list for the WMA compiled (Appendix 2). We were able to field identify the majority of plant species encountered. Plants we could not field identify were collected using standard plant collecting techniques and identified at a later date. These specimens will be deposited at the University of Idaho Herbarium in Moscow, Idaho. In addition, collections of 132 common and not so common species were made. These labelled plant collections will be deposited at Brownlee WMA to serve as reference material for staff and other interested people. To insure proper storage and therefore longevity of the plant collections, we recommend the WMA purchase a herbarium cabinet. The collections should also be mounted if possible.

Rare plant surveys

Prior to starting field work we used the CDC data base to compile a list of rare plants and their habitats known from the Brownlee area. Time constraints did not allow intensive or separate rare plant surveys to be conducted. Instead, rare plants surveys were incorporated with field work for the vegetation map. A CDC rare plant observation form was completed and locations noted on a topographic map for each rare plant population encountered. The observation forms includes fields for location, habitat, population, threats and other information. A sample form is included (Appendix 3).

Vegetation map cover type descriptions

The Brownlee WMA vegetation map consist of 27 cover types grouped into seven habitat classes - grassland, bitterbrush, mountain big sagebrush, scabland, deciduous shrub, riparian and conifer woodland. Aquatic habitats such as creeks and stock ponds are not considered in this classification.

Grasslands

Bluebunch wheatgrass-Sandberg's bluegrass (*Agropyron spicatum-Poa sandbergii*, AGRSPI-POASAN) - Bluebunch wheatgrass-dominated communities cover much of the canyon grassland ecosystem, and encompass more acreage than any other type within the WMA. This type occupies most southerly exposures from reservoir to canyon rim. At the lowest elevations it dominates all canyon aspects except north. As elevation increases, bluebunch wheatgrass communities gradually give way to Idaho fescue communities on east- and west-facing canyon slopes, so that at upper canyon positions the bluebunch wheatgrass cover type is restricted to southeast to southwest aspects. In some places, generally where shallow, rocky soils prevail, AGRSPI-POASAN is found on northerly aspects even at upper canyon elevations.

Where disturbance has not strongly altered things, the vegetation is characterized by well-spaced clumps of bluebunch wheatgrass, relatively low forb diversity and abundance, and conspicuous rock/gravel and bare ground coverage. Sandberg's bluegrass is the only other native bunchgrass commonly occurring with bluebunch wheatgrass, and for this reason is recognized in the name of this cover type. AGRSPI-POASAN portrays several other distinguishable features, including 1) the common occurrence of a limited suite of perennial forbs such as arrowleaf balsamroot, hawksbeard, spurred lupine, one to several

species of desert-parsley (e.g. Gray's lomatium, swale desert-parsley, fern-leaved desert-parsley), one to several species of milkvetch (e.g. hermit milkvetch, hairy milkvetch, Cusick's milkvetch), and narrow-leave skullcap; 2) the occurrence of several native annual forb species, such as large-flowered collomia, threadleaf-phacelia, blepharipappus, and cryptantha species; 3) The virtual absence of Idaho fescue and prairie Junegrass; 4) the widespread presence of exotic grasses, especially annual bromes; and 5) shrubs are rare or absent [discounting inclusions in draws or other microsites, or occasional widely scattered gray rabbitbrush (*Chrysothamnus nauseosus*) or bitterbrush shrubs].

Using the classification of Tisdale (1986), a majority of the bluebunch wheatgrass communities at Brownlee WMA are the *Agropyron spicatum*-*Poa sandbergii*/*Balsamorhiza sagittata* habitat type. However, some areas supporting bluebunch wheatgrass communities are not adequately described by this habitat type. These are mostly harsh sites, characterized by reduced foliage, litter, and cryptobiotic soil crust cover, reduced forb diversity and abundance, an apparent reduced resistance to weed invasion, and an increase in rock/gravel and bare ground coverage. This combination of features gives these sites a noticeably sparser overall appearance. Except for the fact that prickly-pear cactus (*Opuntia polyacantha*) does not occur within the WMA, these sites largely match Tisdale's (1986) *Agropyron spicatum*/*Opuntia polyacantha* habitat type. The *Agropyron spicatum*-*Poa sandbergii*/*Scutellaria angustifolia* habitat type described by Johnson and Simon (1987) may be more applicable for many of these steep, very rocky, open sites.

Bluebunch wheatgrass communities in climax or late seral condition are uncommon at Brownlee WMA. Most examples are found in steep areas with limited water and access. These factors limit disturbance by livestock. Late seral communities contain intact native species composition and proportions, and minimal exotic species. They also possess an intact cryptobiotic soil crust and litter layer, and barring disturbance, should remain resistant to weed invasion.

Mid-seral communities have at least a partially intact bunchgrass and native forb structure. Forbs that tend to increase with disturbance such as hawksbeard, yarrow (*Achillea millefolium*) and fiddleneck (*Amsinckia* spp.) often have an increased abundance. Invasive grasses are typically well established, at least in portions of the community, and exotic forbs may also be present.

Large areas that formerly supported bluebunch wheatgrass communities are now dominated by introduced, annual grass species, and are rated as early or very early seral. Widespread annual grasses include cheatgrass (*Bromus tectorum*), soft brome (*Bromus mollis*), Japanese brome (*Bromus japonicus*), rattlesnake brome (*Bromus briaeziformis*), and medusahead rye (*Elymus caput-medusae*). In addition, bulbous bluegrass (*Poa bulbosa*) is an invasive perennial grass abundant in many places. Hoary whitetop (*Cardaria draba*) is presently the most pervasive noxious forb throughout the WMA and is common in early and very early seral bluebunch wheatgrass communities. Other invasive native or exotic forbs such as tumbling mustard (*Sisymbrium altissimum*) also are found under disturbed conditions. For purposes of the vegetation map, grassland communities estimated to support 75% or greater early and/or very early seral vegetation, are considered to be the annual grassland cover type. Many canyon slopes are a mosaic of bluebunch wheatgrass and annual grass-dominated communities. It was common to delineate polygons where the grassland vegetation was comprised of two or three seral stages. In polygons containing this mosaic, the ratio of each seral stage was estimated whenever possible. The bluebunch wheatgrass cover type is the matrix throughout which inclusions of several other vegetation map classes are superimposed, especially bitterbrush and deciduous shrub habitats.

Bluebunch wheatgrass communities at Brownlee WMA are similar to habitat types described for several other parts of the region. Daubenmire (1970) describes a related *Agropyron spicatum-Poa sandbergii* habitat type in his treatment of the eastern Washington steppe. At least one other bluebunch wheatgrass type described by Johnson and Simon (1987), the *Agropyron spicatum-Poa sandbergii* (basalt) plant association was observed at Brownlee WMA. Minus the prickly-pear cactus, their *Agropyron spicatum-Poa sandbergii/Opuntia polyacantha* association is similar to communities on harsh canyon sites at Brownlee WMA. Johnson and Clausnitzer (1992) describe an *Agropyron spicatum-Poa sandbergii* plant association for the Blue and Ochoco Mountains. Mueggler and Stewart's (1980) *Agropyron spicatum-Poa sandbergii* habitat type for Montana does not closely match patterns at the WMA.

Idaho fescue-bluebunch wheatgrass (*Festuca idahoensis-Agropyron spicatum*, FESIDA-AGRSPI) -

This cover type is distinguished by the presence of Idaho fescue and the co-dominance of bluebunch wheatgrass. Bluebunch wheatgrass may be rhizomatous and its coverage usually equals or exceeds, sometimes greatly, that of Idaho fescue. Except for Sandberg's bluegrass, other perennial grasses are rare. Species diversity, foliage cover and litter are greater, while rock/gravel and bare ground cover are less than for bluebunch wheatgrass sites. Native forbs are more abundant and invasive annuals, including the bromes, less abundant compared to bluebunch wheatgrass communities. Associated forbs for the FESIDA-AGRSPI cover type include arrowleaf balsamroot, yarrow, western hawksbeard, spurred lupine, Snake River phlox (*Phlox colubrina*), twin arnica (*Arnica sororia*), goose-grass cleavers (*Galium aparine*) and Douglas' brodiaea (*Brodiaea douglasii*). Other regional studies (Tisdale 1986; Johnson and Simon 1987) found rattlesnake brome to be an abundant invader on disturbed Idaho fescue sites, but at Brownlee WMA soft brome and cheatgrass appear to be the primary invaders.

Late seral examples are nearly weed-free. Mid-seral communities are characterized by decreased Idaho fescue cover and increased bluebunch wheatgrass abundance, mostly as a result of livestock grazing. This is especially true at lower canyon elevations, probably near the species' ecological limit, where it is common to find Idaho fescue habitat type sites supporting lush bluebunch wheatgrass and mesic forbs, but with Idaho fescue reduced to a few remnant individuals. Invasive grasses are usually established in mid-seral conditions, although they are not as common as in mid-seral AGRSPI-POASAN communities. Compared to AGRSPI-POASAN sites, Idaho fescue communities are more resistant and resilient regarding weed invasion. Native forb composition shows a marked abundance of spurred lupine, arrowleaf balsamroot and others species capable of increasing under the disturbance patterns these grasslands are subject. Some mid-seral and most early seral communities typically lack Idaho fescue in any appreciable amount and are mapped as either AGRSPI-POASAN or ANNUAL GRASSLAND cover types.

The FESIDA-AGRSPI cover type corresponds to the *Festuca idahoensis-Agropyron spicatum* habitat type described by Tisdale (1986) for the canyon grasslands of west-central Idaho and adjacent areas. It is the prevalent Idaho fescue grassland type at Brownlee WMA and occurs at all elevations within the canyon complex. Below approximately 2800 feet elevation it is restricted to north-northwest, to north-northeast aspects. Higher in elevation it begins to occupy all but southerly exposures. Along some of the upper canyon slopes FESIDA-AGRSPI is replaced by Idaho fescue-prairie Junegrass on northerly aspects. Because the canyon slopes above Brownlee Reservoir are so dissected, FESIDA-AGRSPI inclusions are common within the main AGRSPI-POASAN grassland matrix, and generally are not mapped separately. In draw positions, the FESIDA-AGRSPI cover type is commonly part of the shrubfield/grassland mosaic occurring above the band of deciduous shrubs in the draw bottom.

Beside Tisdale (1986), there are several other regional classifications for FESIDA-AGRSPI communities,

including Campbell (1962), Daubenmire (1970), Hall (1973), Mueggler and Stewart (1980), Johnson and Simon (1987) and Johnson and Clausnitzer (1992). Of these, Johnson and Simon's (1987) *Festuca idahoensis-Agropyron spicatum/Balsamorhiza sagittata*, *Festuca idahoensis-Agropyron spicatum/Phlox colubrina*, and *Festuca idahoensis-Agropyron spicatum/Lupinus sericeus* plant associations are the most applicable to Brownlee WMA.

Idaho fescue-prairie Junegrass (*Festuca idahoensis-Koeleria cristata*, FESIDA-KOECRI) - The most mesic canyon grasslands support the FESIDA-KOECRI cover type. It is characterized by a clear dominance of Idaho fescue, the strong tendency for bluebunch wheatgrass to be rhizomatous, a very conspicuous and diverse forb component and minimal bare ground or rock cover. Prairie Junegrass is nearly always present, although usually in only trace amounts. At Brownlee WMA, sites that support greater amounts of prairie Junegrass also support mountain big sagebrush and are mapped accordingly. The FESIDA-KOECRI cover type occurs at upper canyon elevations, in areas of relatively gentle topography or stable steeper slopes.

A distinctive suite of perennial forbs, including western hawkweed (*Hieracium albertinum*), Rocky Mountain helianthella (*Helianthella uniflora*), slender cinquefoil (*Potentilla gracilis*) and prairie smoke (*Geum triflorum*) occur with this cover type. Additionally, a number of forbs such as harsh paintbrush (*Castilleja hispida*), sticky penstemon (*Penstemon glandulosus*), big pod mariposa (*Calochortus eurycarpus*) and twin arnica, are more common in the FESIDA-KOECRI than FESIDA-AGRSPI cover type. FESIDA-KOECRI is the most resistant of the canyon grassland cover types to invasive annuals. Disturbed sites tend to have a skewed abundance of "increaser" native forbs and the presence of Kentucky bluegrass (*Poa pratensis*). However, highly disturbed sites such as around stockponds and service roads can be exclusively weedy exotics, including hoary white top.

The FESIDA-KOECRI cover type is the least common of the canyon grassland types at Brownlee WMA. It is restricted to northerly aspects above about 3500 feet elevation, and is commonly an inclusion within one of the other grassland types. It matches the *Festuca idahoensis-Koeleria cristata* habitat type found in Tisdale's (1986) classification. Hall (1973) and Johnson and Simon (1987) also describe similar vegetation.

Annual grasslands - Throughout Brownlee WMA there are disturbed areas dominated by the invasive grasses cheatgrass, soft brome, Japanese brome, rattlesnake brome, medusahead rye and bulbous bluegrass. Exotic forbs such as hoary whitetop are also often common in these disturbed sites. All of these sites are either in early or very early seral condition.

Within the canyon grassland complex, areas of relatively gentle topography and slopes near water sources, have been subject to extensive livestock disturbance and now support annual grassland vegetation. Areas near roads, corrals and other disturbances are also dominated by annual grasslands. Fire has undoubtedly been an important contributing factor in the conversion of bunchgrass to annual grassland vegetation, especially in areas already depleted from years of livestock disturbance. Pasture grass seedings have been attempted on several of the gentle benchlands above Brownlee Reservoir. For the most part these seedings have failed and the sites are now strongly dominated by annual grasses and weedy forbs. Xeric, southerly aspects are the most prone to annual grassland conversion. These slopes formerly supported canyon grassland or bitterbrush habitats. Benches and gentle slopes above Brownlee Reservoir that support mountain big sagebrush typically have an early or very early seral understory dominated by annual grasses. These are mapped as a distinct sagebrush cover type (ARTTRV/BROMUS). Many grassland

communities are comprised of a mosaic of different ecological conditions. Polygons estimated to be 75% or more early and/or very early seral condition are mapped as an annual grassland cover type.

Pastureland - There are scattered pasturelands within the WMA that occupy former meadows, mountain big sagebrush or bunchgrass benchlands and terraces, and other areas of very gentle topography. The main pasture grasses are intermediate wheat (*Agropyron intermedium*), pubescent wheat (*Agropyron trichophorum*) and smooth brome (*Bromus inermis*). Other pasture grasses observed include timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*) and Kentucky bluegrass. Sites where pasture grasses are persisting as a major part of the vegetation are mapped as pastureland. Failed seedings that are currently dominated by annual grasses are mapped as annual grassland cover type. Pastureland sites are all considered to be in very early seral condition.

Bitterbrush cover types

Bitterbrush/annual bromes (*Purshia tridentata*/Bromus spp., PURTRI/BROMUS) - The canyon ecosystem comprising most of the Brownlee WMA supports scattered stands of bitterbrush, especially at low to middle elevations. Grassland communities separate these bitterbrush stands. Bitterbrush communities are most commonly found on dry, steep, southerly exposures. This kind of habitat is also prone to annual grass invasion when disturbed, such as by livestock grazing. As a result, many bitterbrush communities contain an understory dominated by annual bromes, especially cheatgrass. The *Bromus*-dominated understory is considered an early or very early seral stage. Mid-seral or better communities are mapped as bitterbrush/bluebunch wheatgrass cover type. Large communities that contain a mosaic of seral stages are mapped as bitterbrush/annual bromes cover type if 75% or more of the understory is in early and/or very early seral condition. Estimated proportions for each seral stage is often provided. Areas mapped as a PURTRI/BROMUS cover type belong to the bitterbrush/bluebunch wheatgrass habitat type.

The PURTRI/BROMUS cover type is characterized by scattered individual or small clusters of bitterbrush, with varying in-stand density and an overall cover value usually less than 10% cover, often in the 3% range. Because of its patchy distribution pattern, most polygons contain sections with little or no bitterbrush. The understory is strongly dominated by annual bromes with only remnant bluebunch wheatgrass plants remaining, if any. Sandberg's bluegrass may also be all but gone. Forb diversity and abundance is low and comprised of the same species as nearby bluebunch wheatgrass grassland habitats. Weedy forbs, including hoary whitetop may also be present. Gray rabbitbrush is the most commonly associated shrub, although other shrubs such as syringa (*Philadelphus lewisii*), smooth sumac (*Rhus glabra*) and serviceberry (*Amelanchier alnifolia*), or netleaf hackberry (*Celtis reticulata*) a low growing tree, occasionally occur within the bitterbrush matrix.

Bitterbrush/bluebunch wheatgrass (*Purshia tridentata*/*Agropyron spicatum*, PURTRI/AGRSPI) - This cover type is characterized by an open bitterbrush canopy, often less than 10%, with a bluebunch wheatgrass-dominated understory. Sandberg's bluegrass is also present. Cheatgrass or other bromes are usually common. Forb diversity and abundance are low. Some common associated forbs are arrowleaf balsamroot, yarrow, one or more species of desert-parsley, hermit milkvetch, hairy milkvetch, hot rock penstemon (*Penstemon deustus*), strict buckwheat (*Eriogonum strictum*) and northern buckwheat (*E. compositum*). It was rare to find PURTRI/AGRSPI communities in better than mid-seral condition. PURTRI/AGRSPI communities with an early or very early seral stage understory are mapped as PURTRI/BROMUS cover type. cursory observations indicate very low recruitment, and dead plants are common in some bitterbrush stands. It is also common to find heavily browsed bitterbrush shrubs.

From Dukes Creek south to Brownlee Creek, scattered patches of bitterbrush are closely associated with the numerous spur ridges dissecting the lower slopes, most commonly on dry, rocky, south and west aspects. West of Brownlee Creek, most bitterbrush communities are found on dry, steep, rocky, southerly slope faces, often with a depauperate understory. In contrast to the dry, rocky, steep canyon slopes where PURTRI/AGRSPI mostly occurs, bitterbrush is also found with mountain big sagebrush above about 3000 feet elevation, on more mesic sites with gentle, undulating terrain.

PURTRI-AGRSPI at Brownlee WMA resembles the *Purshia tridentata/Agropyron spicatum* plant association described by Johnson and Simon (1987) for the Wallowa-Snake Province. Their description seems to better fit PURTRI/AGRSPI communities occurring on more moderate sites within the WMA. Daubenmire (1970), Hironaka et al. (1983), and Mueggler and Stewart (1980) describe PURTRI/AGRSPI habitat types that are similar to varying degrees. Hall (1973) describes a *Purshia tridentata/Agropyron spicatum-Festuca idahoensis* habitat type that allows Idaho fescue to be absent.

Bitterbrush/needle-and-thread grass (*Purshia tridentata/Stipa comata*, PURTRI/STICOM) - We observed this cover type at only one location within the WMA, near Heath (polygon #354). At this location, bitterbrush density varies, but averages approximately 20% cover. Big sagebrush is interspersed along the margins of the polygon. Annual grasses are abundant, but needle-and-thread grass dominates what remains of the bunchgrass understory. Bluebunch wheatgrass, Sandberg's bluegrass and several forbs such as arrowleaf balsamroot, hermit milkvetch and desert-parsley species are also components of this community.

A *Purshia tridentata/Stipa comata* habitat type is described by Daubenmire (1970) for the eastern Washington steppe. He comments there is little doubt that PURTRI/STICOM communities are seral to big sagebrush/needle-and-thread grass in places. It is unclear if this is the situation near Heath as well. Hironaka et. al. (1983) note the existence of a *Purshia tridentata/Stipa comata* habitat type, but provide no descriptive information.

Bitterbrush/Idaho fescue (*Purshia tridentata/Festuca idahoensis*, PURTRI/FESIDA) - This cover type is based on a single location above Middle Fork Brownlee Creek near the southern boundary of the WMA. It occurs on a westerly-facing slope between 4200 and 4600 feet elevation (polygon #403). The bitterbrush forms an open, savanna-like layer. Mountain big sagebrush is present but rare. Idaho fescue is subordinate to bluebunch wheatgrass. Perennial forbs include arrowleaf balsamroot, spurred lupine, hawksbeard, hairy milkvetch and desert yellow daisy (*Erigeron linearis*). As for all the bitterbrush cover types, bare ground and rock coverage is high.

Several regional authors have described similar vegetation. Daubenmire (1970) and Mueggler and Stewart (1980) recognize a *Purshia tridentata/Festuca idahoensis* habitat type, while Hall (1973) and Johnson and Simon (1987) use the trinomial *Purshia tridentata/Festuca idahoensis/Agropyron spicatum*. Although there are some differences, the latter seems to best match the pattern observed at Brownlee WMA.

Mountain big sagebrush cover types

Mountain big sagebrush/Idaho fescue (*Artemisia tridentata* ssp. *vaseyana/Festuca idahoensis*, ARTTRV/FESIDA) - The presence of mountain big sagebrush with Idaho fescue in the understory distinguishes this cover type. Sagebrush distribution is often variable within a given polygon, from dense clusters approaching 50% cover, to a more open, savanna-like appearance, to portions with very sparse

coverage. A polygon must average greater than 5% sagebrush canopy cover to be considered a sagebrush cover type. Sites that support only very widely scattered individual sagebrush plants are considered bunchgrass cover types, unless part of a burn mosaic.

The amount of Idaho fescue also varies greatly depending on site characteristics and seral stage. It is the dominant bunchgrass in some communities, but bluebunch wheatgrass is often co-dominant or significantly more abundant. Sandberg's bluegrass is always present and can be common in disturbed stands. Prairie junegrass is usually present and can be locally common. Many ARTTRV/FESIDA communities would key to FESIDA-KOECRI if there was no sagebrush. Other native grasses such as mountain brome (*Bromus carinatus*) are also usually present. Invasive grasses are abundant in disturbed areas.

A rich forb component is part of most communities. Some common associates include arrowleaf balsamroot, yarrow, hawksbeard, twin arnica, nodding microseris (*Microseris nutans*), spurred lupine, harsh paintbrush, Wyeth's buckwheat (*Eriogonum heracleoides*) and tapertip onion (*Allium acuminatum*). Gray rabbitbrush and green rabbitbrush (*Chrysothamnus viscidiflorus*) are two commonly associated shrubs. Scattered rosaceous shrubs and common snowberry occasionally occur as well.

Mid-seral communities are characterized by an increase in certain forbs such as yarrow, hawksbeard, curly-gumweed (*Grindelia squarrosa*), spurred lupine and tapertip onion. Exotic forbs are present, but not abundant. For the grasses, it seems that Idaho fescue decreases and Sandberg's bluegrass increases in cover. Kentucky bluegrass may also be present. Annual bromes and bulbous bluegrass can be common. Early seral conditions are distinguished by the clear dominance of invasive grasses and weedy forbs, including hoary whitetop. In very early seral vegetation, no or only remnant native species remain in the understory. Sagebrush communities with a 75% or more early and/or very early seral understory are mapped as the Mountain big sagebrush/annual bromes cover type (ARTTRV/BROMUS).

Mountain big sagebrush most commonly occurs on upland sites with gentle undulating topography. On steeper slopes it is often confined to concavities and can appear as a band following the course of these mini-draws. At lower elevation it grades into canyon grassland vegetation, while at upper elevations within the WMA mountain big sagebrush abuts conifer forest, often forming a mosaic vegetation with deciduous shrubfields and scattered conifers near this interface. Scabland or deciduous shrub inclusions are common within ARTTRV/FESIDA cover type.

Extensive areas of mountain big sagebrush appear to have been prescribed burned in upper Cave Creek, Cherry Creek, and upper Pine Creek north of USFS Road 085. Some areas like most of Cherry Creek and upper Pine Creek, now support a patchwork of burned, partially burned and unburned vegetation and possibly represent natural fire regime patterns. Other areas, including most of upper Cave Creek support only a few sagebrush that escaped the burns. Sagebrush regeneration is occurring, but appears to be quite variable. In general, sagebrush stands west of West Brownlee Creek are in considerably poorer ecological condition than to the east. It is unclear if this is due to past livestock grazing patterns post- or pre-fire, season of burn, or other factors.

The relationship of bitterbrush with mountain big sagebrush and fire will require additional field work to decipher. The response of bitterbrush to fire is variable (Driver 1982). Bitterbrush was not observed in any of the prescribed burn areas, including sections that did not burn. This seems like good evidence these sites are ecologically different from the ARTTRV-PURTRI cover type described below, at least in the Cherry Creek and upper Cave Creek areas. However, in upper Pine Creek, a prescribed fire burned north

of USFS road 085, but not south. Bitterbrush occurs south, but was not observed north of the road. The areas north of the road mapped as ARTTRV/FESIDA likely supported bitterbrush in the past. In upper Pine Creek, near the southern boundary of the WMA, elk sedge replaces Idaho fescue in the sagebrush understory. It is not known if these sites represent examples of the *Artemisia vaseyana* "spiciformis"/*Carex geyer* habitat type outlined by Hironaka *et al.* (1983).

Schlatterer (1972), Mueggler and Stewart (1980), Hironaka *et al.* (1983), Nelson and Jensen (1987), Johnson and Simon (1987) and Johnson and Clausnitzer (1992) have all classified regional *Artemisia tridentata* ssp. *vaseyana*/*Festuca idahoensis* types. The description of Johnson and Simon's (1987) seems to be the most applicable to Brownlee WMA. That of Johnson and Clausnitzer (1992) does not have to contain Idaho fescue, its presence indicating the more mesic phase of the type.

Mountain big sagebrush-bluebunch wheatgrass (*Artemisia tridentata* ssp. *vaseyana*/Agropyron spicatum, ARTTRV/AGRSPI) - This cover type shares many of the same associated species as ARTTRV/FESIDA. Differences include the absence or only rare occurrence of Idaho fescue and prairie Junegrass, a lower abundance of forbs, and higher coverage of bare ground. Mesic-site forbs such as twin arnica are absent or rare while dry site indicators like desert-parsley species are more abundant and diverse. There is noticeably less overall bunchgrass cover compared to ARTTRV/FESIDA. Bluebunch wheatgrass dominates the sagebrush understory which also include Sandberg's bluegrass and squirreltail (*Sitanion hystrix*). As with ARTTRV/FESIDA, sagebrush density can be variable in this type, with most stands probably averaging near 20% cover. Field observations suggests the ARTTRV/AGRSPI cover type is more prone to weed invasion than ARTTRV/FESIDA, which has implications regarding certain management activities, such as prescribed burning. Invasive grasses become abundant on disturbed sites, with soft brome usually the most common. Annual forbs such as Indian-wheat (*Plantago patagonica*) also increase in disturbed habitats. Areas that contain 75% or more early and/or very early seral understories are referenced as ARTTRV/BROMUS for the vegetation map.

The habitat type outlined by Hironaka *et al.* (1983) seems to be the fairly applicable to Brownlee WMA. Note that Hironaka *et al.* (1983) used the binomial *Artemisia vaseyana* in their description.

Mountain big sagebrush-bitterbrush (*Artemisia tridentata* ssp. *vaseyana*-*Purshia tridentata*/*Festuca idahoensis*, ARTTRV-PURTRI) - This cover type is found in the southern part of the WMA, above approximately 4200 feet elevation. This area is transitional between the nearby conifer forest and canyon grassland habitats. ARTTRV-PURTRI is characterized by the presence of both mountain big sagebrush and bitterbrush. Sagebrush is more common than bitterbrush, an estimated 20:1 ratio in some areas, but less in others. Field observations found portions of the bitterbrush mosaic in upper Pine Creek to consist almost entirely of large, decadent plants, while in other places various size classes are represented. Additionally, Idaho fescue is the dominant bunchgrass, with bluebunch wheatgrass also common. Graminoid diversity also includes prairie Junegrass, mountain brome, Wheeler's bluegrass (*Poa nervosa*), mutton-grass (*Poa fendleriana*), and Geyer's sedge (*Carex geyeri*). Forb diversity is marked by mesic site indicators such as western hawkweed, Rocky Mountain helianthella, slender cinquefoil, sticky geranium (*Geranium viscosissimum*) and Scouler's catchfly (*Silene scouleri*), as well as others found in most grassland sites, including spurred lupine, hawksbeard and yarrow. Scattered deciduous shrub patches of bittercherry, serviceberry and common snowberry are common. Southerly slopes and rocky inclusions tend to be dominated by bitterbrush and bluebunch wheatgrass. An occasional Douglas-fir (*Pseudotsuga menziesii*) or ponderosa pine (*Pinus ponderosa*) may dot the community. Bulbous bluegrass, Kentucky bluegrass and cheatgrass occur in disturbed places.

Johnson and Simon (1987) recognize a *Artemisia tridentata* ssp. *vaseyana*-*Purshia tridentata*/*Festuca idahoensis* community type for the Wallowa-Snake Province, noting that it is a transitional shrubland type between cold desert sagebrush-dominated vegetation and conifer forest.

Mountain big sagebrush/annual bromes (*Artemisia tridentata* ssp. *vaseyana*/*Bromus* spp., ARTTRV/BROMUS) - Mountain big sagebrush stands with a 75% or more early and/or very early seral condition understory are classified as this type. The cover type is dominated by annual, invasive grasses in the understory. Except for Sandberg's bluegrass and/or squirreltail which may be locally common, native bunchgrasses are reduced to remnant status. Weedy forbs, including hoary whitetop are often very common. Native perennial forbs are uncommon. Native annual forbs can be locally common, however.

Extensive sagebrush stands between lower Spring and Cave creeks, middle Cave Creek and north of Flat Creek have been mapped as ARTTRV/BROMUS. These areas are all gentle benchlands and have been subject to many years of intensive livestock grazing. It is also possible some of the sagebrush in these areas is xeric sagebrush (*Artemisia tridentata* ssp. *xericensis*). Additional fieldwork is required for verification.

Scabland cover types

Rocky, sparsely vegetated openings occur throughout the WMA. These scablands form distinctive inclusions within the surrounding grassland or sagebrush vegetation. Beside the sparse vegetation and conspicuous rock/gravel and bare ground cover, the occurrence of Sandberg's bluegrass as the dominant bunchgrass, and a suite of low growing forbs, many of them not occurring elsewhere at Brownlee WMA, distinguish scabland sites. Soils are shallow, with the basalt bedrock at or near the surface.

There are at least four scabland vegetation found at Brownlee WMA. Stiff sagebrush (*Artemisia rigida*) communities are the only scablands included as a distinct cover type for the vegetation map. The other scabland communities have been lumped into a generic scabland cover type. All require further study before separate classification attempts are made.

Stiff sagebrush (*Artemisia rigida*, ARTRIG) - This cover type is widespread at Brownlee WMA, but only a few larger sites are mapped separately. Smaller sites are noted as inclusions within grassland or mountain big sagebrush habitats. Sites are relatively sparsely vegetated and characterized by well spaced stiff sagebrush plants, low growing forbs and Sandberg's bluegrass as the usual dominant bunchgrass. Rock/gravel and bare ground are conspicuous, as are lichens and moss in some places. Soils are shallow and stony, with the basalt bedrock near or at the surface. Density of stiff sagebrush is variable, but is rarely if ever more than 20% cover. Shrubs other than stiff sagebrush are usually absent. Forb diversity can be high and a partial list of associates includes one or more desert-parsley species (e.g., *Lomatium ambiguum*, *L. grayi*, *L. macrocarpum*, *L. nudicaule*, *L. triternatum*), Hooker's balsamroot (and sometimes putative *Balsamorhiza hookeri* x *Balsamorhiza sagittata* hybrids), onion species (*Allium* spp.), capitate sandwort (*Arenaria capitata*), Gairdner's penstemon (*Penstemon gairdneri*), desert yellow daisy, bitterroot (*Lewisia rediviva*) and blepharipappus. Of special note is the occurrence of the regional endemic Pale Wallowa paintbrush (*Castilleja oresbia*) in stiff sagebrush communities in the Board Point area. Brownlee WMA represents a southern extension of the species known range in Idaho, the first populations documented for Washington County (Mancuso and Moseley 1990). Exotic weedy forbs are rare in the ARTRIG cover type. Annual bromes are usually present, but uncommon. Bulbous bluegrass can be locally common. Although Sandberg's bluegrass is usually the most common bunchgrass, there are

communities where squirreltail or Idaho fescue dominate. It is unclear if sites with Idaho fescue reflect retrogression from an Idaho fescue-bluebunch wheatgrass community or represent an undescribed type.

Stiff sagebrush scablands occur along open, flat to gently undulating ridgecrests, on exposed basalt outcrops on canyon slopes and spur ridges, and on the rolling plateau-like uplands characterizing the southern portion of the WMA.

Stiff sagebrush communities at Brownlee WMA can be quite different between sites and in some places do not readily fit existing classifications. The regional classifications of Daubenmire (1970), Hall (1973), Tisdale (1986) and Johnson and Simon (1987) all contain stiff sagebrush types. The *Artemisia rigida/Poa sandbergii* type of Tisdale is the most applicable for many sites at Brownlee WMA.

Scabland - This cover type pertains to scabland communities lacking stiff sagebrush and includes the following three complexes.

1) There are grass/forb scabland communities without stiff sagebrush that are otherwise very similar to the stiff sagebrush cover type. Sandberg's bluegrass and Hooker's balsamroot (*Balsamorhiza hookeri*) are common. Desert-parsley species, tapertip onion, sticky phlox (*Phlox viscida*) and big head clover (*Trifolium macrocephalum*) are other commonly associated forbs. Possible explanations for the absence of stiff sagebrush may be related to excessive moisture in the depressions and resulting poor aeration during the spring (Tisdale 1986), and/or the absence of fractures in the basalt (Hall 1973). Examples of this type usually are found near stiff sagebrush sites.

In his treatment of the regional canyon grasslands, Tisdale (1986) recognized a similar vegetation related to his *Artemisia rigida/Poa sandbergii* (high elevation) community type. Hall (1973) describes a bluegrass scabland, and Johnson and Simon (1987) a *Poa sandbergii-Danthonia unispicata* plant association that are similar in some regards.

2) Sites with very high rock/gravel and bare ground cover, and with widely spaced northern buckwheat (*Eriogonum compositum*) and Sandberg's bluegrass plants were observed in a few places. Associated forbs and cheatgrass coverage are sparse. These scabland sites are often on steep slopes adjacent to open bitterbrush stands. The soils often have a peculiar, more reddish color.

Daubenmire (1970) briefly mentions *Eriogonum compositum/Poa sandbergii* as one of his shallow soil habitat types.

3) Widespread across the canyon slopes are scabland inclusions with the vegetation characterized by a sparse coverage of one or more desert-parsley species (e.g. *Lomatium grayi*, *Lomatium ambiguum*) and usually one or more species of buckwheat (e.g. *Eriogonum strictum*, *E. compositum*). Sandberg's bluegrass is the main bunchgrass. Annual bromes are sometimes common. Individual inclusions tend to be small, but can be common in places, especially within the canyon grasslands between Dukes and Brownlee creeks. Portions of a few of the shallow soil habitat types briefly outlined by Daubenmire (1970) show similar characteristics.

Deciduous shrubfield cover types

Ninebark (*Physocarpus malvaceus*, PHYMAL) - Shrubfields clearly dominated by ninebark are the

defining characteristic for this cover type. There is usually only a minimal forb or grass layer. Wood's rose and especially common snowberry are usual associates. Scattered bittercherry, chokecherry, serviceberry and elderberry shrubs are also common. Shrubfields dominated by ninebark, but part of a larger mixed species matrix are mapped as a mixed shrubfield cover type. For the vegetation map, ninebark inclusions are a common component of shrubfield/grassland and mosaics. Ecological condition rating is not very applicable to ninebark communities at Brownlee WMA and was not assessed.

Spanning all elevations, the ninebark cover type becomes more common at middle and upper elevations at Brownlee WMA. It is generally restricted to northerly aspects, often occurring irregularly along slope bottoms between riparian and grassland vegetation, as a narrow band following the course of draws dissecting grassland slopes, extending out or alongside conifer stands, or within other topographic concavities.

Hall (1973) describes a ninebark plant community, and Johnson and Simon (1987) and Johnson and Clausnitzer (1992) a ninebark-snowberry plant community for areas north of Brownlee WMA.

Common snowberry (*Symphoricarpos albus*, SYMALB) - Shrubfields dominated by common snowberry, sometimes with small amounts of other shrub species, and a relatively sparse herbaceous layer characterize one form of this cover type. In what appear to be less mesic situations, it also occasionally occurs as the dominant or co-dominant with Idaho fescue and bluebunch wheatgrass. The common snowberry cover type is found at all elevations within the WMA, but most stands are small and occur as inclusions within the canyon grassland mosaic. It can occur on all but southerly aspects, and often in areas of steep topography. Common snowberry itself is more common as part of the understory shrub layer in mixed shrubfield, bittercherry, ninebark, Wood's rose, or riparian cover types. Patches of common snowberry are often round in outline due to its propensity for vegetative reproduction. As for all the deciduous shrub cover types, ecological condition assessments are not included for the vegetation map.

Common snowberry communities are described by Hall (1973), Tisdale (1986) and Johnson and Clausnitzer (1992). Common snowberry-rose plant associations are described in Johnson and Simon (1987). The classifications of Tisdale (1986) and Johnson and Simon (1987) are the most similar to patterns at Brownlee WMA.

Wood's rose (*Rosa woodsii*, ROSWOO) - Wood's rose is the clear dominant in this cover type. Common snowberry is a common associate and taller shrub species occasionally protrude above the dense, few-foot high Wood's rose. Density of the herbaceous layer is variable. Patches of Wood's rose occur on northerly aspects, mostly on the lower half of steep canyon slopes and surrounded by Idaho fescue-dominated grassland. It is more often an inclusion within polygons labelled as shrub/grass mosaic, than delineated as a separate polygon.

Wood's rose is widespread at Brownlee WMA. It is a common associate of other cover types, including mixed deciduous shrubfield, bittercherry, ninebark, common snowberry or riparian cover types. Wood's rose is apparently replaced by Nootka rose (*Rosa nutkana*) in some of the wetter riparian vegetation. As for all the deciduous shrub cover types, ecological condition was not assessed.

The classification of Johnson and Simon (1987) include a common snowberry-Wood's rose plant association that is similar to the Wood's rose cover type in most regards.

Bittercherry (*Prunus emarginata*, PRUEMA) - Thickets strongly dominated by bittercherry are common

at elevations above approximately 4000 foot elevation. Other shrubs such as serviceberry, Rocky Mountain maple (*Acer glabrum*), common snowberry or others are present in varying amounts. Scattered aspen (*Populus tremuloides*) or Douglas-fir trees are also occasionally present. Because the canopy is more open compared to the other deciduous shrub types, the herbaceous layer is typically well developed and includes mesic forbs and grasses such as mountain sweet-cicely (*Osmorhiza chilensis*), goose-grass cleavers, star-flowered solomon plume (*Smilacina stellata*), violet (*Viola* spp.), blue stickseed (*Hackelia micrantha*) and blue wildrye (*Elymus glaucus*), to name a few. Less mesic sites may have an understory dominated by weedy grasses. Dead or decadent shrubs are common in some bittercherry stands and in a few places outnumber living individuals.

Bittercherry sites typically possess a more favorable moisture regime than surrounding grassland or mountain big sagebrush vegetation, such as snow deposition pockets or concavities on northerly slopes. This is similar to one of the site types Roberts (1971) found during his study of bittercherry on the Boise National Forest. Most bittercherry stands were judged to be permanent, although in the southern part of the WMA some sites may be seral to Douglas-fir, which occurs nearby or was observed encroaching along the margins of bittercherry stands. Steele and Geier-Hayes (1989) recognize bittercherry-dominated vegetation as one of the possible successional shrub layers for the Douglas-fir/ninebark habitat type.

Bittercherry communities are not described in any of the regional classifications. Roberts (1971) investigated bittercherry on the Boise National Forest, but does not include any kind of classification scheme.

Mixed deciduous shrub - This cover type is characterized by a diverse assemblage of deciduous shrubs that includes chokecherry (*Prunus virginiana*), bittercherry, serviceberry, black hawthorne, ninebark, Wood's rose, white spirea, syringa, Rocky Mountain maple, common snowberry, elderberry, and less often, willow species (*Salix exigua* or *S. rigida*). Occasionally, scattered black cottonwood, aspen or water birch may occur. The ratio of any of these shrubs can vary considerably from one site to the next, or even within a given polygon. Typically, no one species is clearly dominant. The herbaceous understory is mostly well developed, but often dominated by weedy taxa. Some common understory forbs include chervil (*Anthriscus scandicina*), miner's lettuce (*Montia perfoliata*), goose-grass cleavers and Kentucky bluegrass.

This cover type predominately occurs as long, narrow ribbons following ephemeral watercourses and in draws. Occasionally it is found along permanent creek segments that do not support black cottonwood or aspen communities. The mixed deciduous shrub cover type is also common on northerly-facing lower slopes as a band between riparian and grassland vegetation. Mixed deciduous shrub habitats are often surrounded by grassland or sagebrush vegetation and provides important structural diversity to the landscape.

Huschle (1975) describes a "heterogenous shrub mixture" vegetation type containing many of the same shrub species, and Mancuso and Moseley (1994) describe a very similar cover type for Craig Mountain. The mixed shrub canyon bottoms association described by Kovalchik (1987) for central Oregon has limited similarities.

Talus-shrub garland - Some canyon grassland slopes contain inclusions of talus stripes ringed by shrubs. These shrub garlands are positioned downslope from eroding cliffs or rock outcrops and usually occur on steep, upper to middle slope positions. The most common shrubs are syringa, elderberry, serviceberry,

smooth sumac (*Rhus glabra*) and squaw currant (*Ribes cereum*). A minor cover type, these shrub garlands are not as common within the WMA as further north in Hells Canyon. In most cases, talus-shrub garlands are noted as inclusions within the canyon grassland vegetation. Johnson and Simon (1987) describe a very similar talus shrub garland community.

Riparian cover types

The riparian vegetation at Brownlee WMA received only cursory investigation during our field work for preparing the vegetation map. Riparian vegetation occurs as a narrow band along the major drainages in the WMA. These drainages typically support perennial water flows. Riparian vegetation is usually structurally and compositionally diverse. The following cover type descriptions are simplifications of the more complex and variable conditions that are usually present. Further investigation is necessary to refine these descriptions.

Black cottonwood/mixed deciduous shrub (*Populus trichocarpa*/mixed deciduous shrub, POPTRI)

This is the common cover type along most of the major drainages in the WMA, including East, Middle and West Brownlee creeks, Dukes Creek, Grade Creek and Camp Creek. The cover type is characterized by black cottonwood dominating the upper canopy and abundant shrubs in the understory. Canopy closure is variable even along a single stretch, but tends to be more open than closed. Thinleaf alder (*Alnus incana*), white alder (*Alnus rhombifolia*), water birch (*Betula occidentalis*) or aspen may be upper or sub-canopy associates, in some places replacing black cottonwood as the community dominant. At upper elevations in the WMA, conifers may be present in minor amounts. Common shrubs include red-osier dogwood (*Cornus stolonifera*), syringa, Wood's rose, chokecherry, bittercherry, serviceberry, black hawthorne, elderberry, Rocky Mountain maple and willow species. This closely resembles the diverse shrub assemblage characterizing the mixed deciduous shrub cover type. One difference is that species such as bittercherry and chokecherry may exhibit a tree instead of shrub growth form in riparian habitats. Poison ivy (*Rhus radicans*) is sometimes abundant alongside, and in places extending into the riparian vegetation. Herbaceous composition tends to be weedy, in some places markedly so, including with hoary whitetop. Riparian vegetation is bordered by deciduous shrub or other upland habitats.

Tuhy and Jensen (1982), Kauffman *et al.* (1985) and Kovalchik (1987) report black cottonwood communities that are partially similar to Brownlee WMA.

Aspen/mixed deciduous shrub (*Populus tremuloides*/mixed deciduous shrub, POPTRE) - This cover type is characterized by aspen dominating the upper canopy and lush shrub and herb layers. Various size classes of aspen are usually present. Black cottonwood may be scattered within the aspen. Near forested areas, a few conifers may be also be intermixed. The diverse shrub component is usually comprised of a tall and short layer. Where the understory is not excessively disturbed, the herb layer is dominated by mesic site indicators similar to the bittercherry cover type.

Patches of aspen are distributed widely throughout the WMA. Spring areas and segments of seasonal drainages often support aspen communities. On steep northerly slopes, small patches may be part of a larger shrubfield mosaic, where the aspen is often confined to areas of talus substrate. Along the eastern and southern edges of the WMA, aspen islands are part of the mosaic vegetation transitional between non-forest and forest vegetation. Aspen/mix deciduous shrub vegetation also occurs locally as a riparian strip along the major drainages.

Johnson and Simon (1987) include an aspen plant community in their classification of the Wallowa-Snake Province that seems similar. Daubenmire (1970) and Hall (1973) have aspen types that are less applicable to Brownlee WMA. Further outside the study area, other classifications such as Schlatterer (1972), Kovalchik (1987), Mueggler (1988) and Hansen *et. al.* (1990) also describe aspen communities. The *Populus tremuloides/Amelanchier alnifolia*/tall forb community type and the *Populus tremuloides/Amelanchier alnifolia-Symphoricarpos oreophilus*/tall forb community type described for the Intermountain region (Mueggler 1988) have approximate counterparts in upland areas at Brownlee WMA.

White alder (*Alnus rhombifolia*, ALNRHO) - A closed to partially open tree canopy of white alder and a multi-layered shrub understory characterize this cover type. Occasional black cottonwood trees may protrude above the white alder. Lower Cave Creek is the only place we observed this cover type. Additional examples may be present in segments of other drainages not visited during field work. White alder is more commonly part of the black cottonwood cover type along lower stream reaches at Brownlee WMA. Along lower Cave Creek, syringa, red-osier dogwood and blackberry (*Rubus* sp) are the primary shrubs accompanying the white alder. There is also a diverse herbaceous layer comprised of both native and exotic species. The white alder community along lower Cave Creek is similar to the *Alnus rhombifolia/Philadelphus lewisii* community type described by Miller (1976).

White alder communities dominate many tributaries of the lower Salmon, lower Clearwater and Snake river canyons. The most comprehensive regional treatment of white alder is by Miller (1976). Huschle (1975) and Daubenmire (1970) also describe white alder types.

Water birch (*Betula occidentalis*, BETOCC) - Riparian vegetation dominated by a dense to occasionally more open overstory of water birch and lush shrubs distinguish this cover type. The water birch cover type is usually local in extent as an inclusion along streams dominated by black cottonwood. These inclusions are not separated on the vegetation map. Water birch is an important member of black cottonwood communities in portions of most drainages.

Padgett *et al.* (1989) describe a *Betula occidentalis/Cornus stolonifera* community type occurring in Utah and southeastern Idaho that resembles the vegetation at Brownlee WMA. Confirmation will require additional study.

Black hawthorne (*Crataegus douglasii*, CRADOU) - Black hawthorne strongly dominates the tall shrub layer in this cover type, often forming very dense thickets. Other shrubs such as serviceberry, chokecherry, Wood's rose, elderberry, Rocky Mountain maple and willow are inconsistently present. This is a minor cover type and was observed in Upper Cherry Creek and upper Long Gulch. Patches of black hawthorne also occur intermixed with the small mesic meadows and along the forest edge in the southeastern portion of the WMA. Black hawthorne is a common member of other deciduous shrub or riparian cover types.

Kovalchik (1987) describes a *Crataegus douglasii* riparian association for central Oregon that shares some similarity with Brownlee WMA. The two *Crataegus douglasii* habitat types described by Daubenmire (1970) pertain to grassland mosaics of the Palouse area.

Conifer woodlands

Douglas-fir/deciduous shrub (*Pseudotsuga menziesii*/deciduous shrub, PSEMEN) - Large blocks of

conifer forest approach, but do not occur within the Brownlee WMA. Contiguous forest stands on Payette National Forest land are present along portions of the WMA's eastern and southern boundary. These contiguous stands barely extend into the WMA along upper Board Gulch, Grade Creek and East Brownlee Creek on steep, north-facing slopes. Additionally, a few small outlying conifer patches occur near the eastern and southeastern perimeters of the WMA.

The Douglas-fir cover type is quite variable within the WMA. When part of much larger forest stands along Grade and East Brownlee creeks, the cover type is characterized by a mostly closed canopy dominated by Douglas-fir, with a small contribution from ponderosa pine. Ninebark and to a lesser extent other shrubs form a nearly complete shrub layer. The herbaceous layer is most diverse in forest openings. These large forest stands belong to the Douglas-fir/ninebark habitat type described by Steele *et al.* (1981). When the cover type occurs as an outlying stand, it is characterized by well spaced and/or small, denser clumps of Douglas-fir and usually a few ponderosa pine. Trees are rarely more than 12 m tall. The shrub layer may or may not be well developed. If it is, common snowberry, ninebark, or a diverse mix of deciduous shrubs may dominate. Stands, or portions of stands with a depauperate shrub layer can have an understory dominated by either Idaho fescue or pinegrass (*Calamagrostis rubescens*). Several stands have a disturbed understory characterized by lots of bare ground and annual forbs such as miners lettuce and goose-grass cleavers. Most of these conifer patches are part of the vegetation mosaic characterizing the transition from non-forest to forest habitats. Habitat typing these small stands, some less than acre in size is tenuous.

Based on the classification of Steele *et al.* (1981), the Douglas-fir/common snowberry, Douglas-fir/ninebark and Douglas-fir/pinegrass habitat types are represented within the WMA. Beside Steele *et al.* (1981), other regional classifications that describe forest habitats similar to those occurring at Brownlee WMA include Daubenmire and Daubenmire (1968), Hall (1973) Cooper *et al.* (1987), Johnson and Simon (1987) and Johnson and Clausnitzer (1992).

Vegetation map analysis

Analysis of the vegetation map is possible using GIS. The project study area totaled approximately 22,838 acres. The sum acreage of the various polygons equals only 21,340, or 93% of the study area acreage, however. This discrepancy is primarily due to two factors.

1) The acreage covered by inclusions are not tallied in the mapping process. If a particular cover type covered the entire polygon it was ranked as 100% area for the polygon. If a particular polygon consists of multiple cover types, each encompassing more than 10% of the polygons, their areas were ranked accordingly (e.g. 65%, 20%, 15%). In cases where a polygon contained inclusions of one or more cover types, each covering less than 10% of the polygon's area, the entire polygon was given a 95% ranking for the dominant cover type. This last category occurs 85 times in the vegetation map, and resulted in the cumulative "loss" of area (acreage). The occurrence of inclusions are noted in the polygon descriptions, but omitted from further analysis. Because deciduous shrub cover types are clearly the most common inclusions (and therefore not tallied), their coverage is underestimated in our preliminary analysis (Table 2).

2) The large amount of cliff, rock outcrop, scree fields, or other rocky habitats in some areas, for which there is no cover type, also accounts for "lost" acreage. These rock habitats are noted in the polygon description as a percentage of the polygon, but omitted from further analysis.

Little effort was made to separately map the various riparian vegetation occurring in a drainage. We usually mapped the entire drainage as black cottonwood/mixed deciduous shrub if most of the drainage supported some version of this cover type. One result of this is that the black cottonwood/mixed deciduous shrub cover type is likely overestimated and the amount of the other riparian types, especially water birch, underestimated. Mean polygon size for the vegetation map is 49.9 acres, while the average polygon size is 48.5 acres.

Organization of the vegetation map

The Brownlee WMA Vegetation Map consists of 440 polygons, numbered 1 to 440. Polygons 1 to 190 cover polygons east of Highway 71, and numbers 191 to 440 occur west of the highway. The numbering sequence begins in the northern part of the WMA, in the Dukes Creek drainage, and scrolls south, ending in the southeastern corner of the WMA. Because some polygons were omitted and others added after the initial polygon numbering exercise, there are a several polygons that are out of sequential number order, including a few exceptions north and south of Highway 71.

Cover types

Classification of the vegetation at Brownlee WMA is based on 27 cover types. A cover type or group of cover types has been assigned to each polygon. In addition, information on ecological condition, inclusions, and other pertinent comments are included in many of the descriptions. The vegetation of Table 2. Summary of cover type data for Brownlee WMA vegetation map.

Cover type group	¹ Cover type	Acres	² % coverage within cover type group	³ % coverage within the WMA	⁴ Frequency (%)
Grassland	G1	4412	35	20.7	9.1
	G2	3965	31.6	18.6	16.9
	G3	360	2.9	1.7	1.8
	G4	3414	27.2	16.0	9.5
	G5	398	3.2	1.9	2.1
		12550	-	53.6	39.4
Bitterbrush	B1	596	42	2.8	3.4
	B2	761	54	3.6	4.0
	B3	42	3	0.2	0.1
	B4	14	1	<0.1	0.1
		1413	-	6.6	7.6
Sagebrush	S1	2914	63.3	13.7	11.4
	S2	135	2.9	0.6	0.7
	S3	740	16.1	3.5	1.2

	S4	815	17.7	3.8	2.5
		4603	-	21.6	15.8
Scabland	A1	206	45	1.0	2.0
	A2	255	55	1.2	1.2
		461	-	2.2	3.2
Decid. shrub	D1	401	29.3	1.9	7.4
	D2	57	4.2	0.3	1.0
	D3	42	3.0	0.2	1.5
	D4	238	17.4	1.1	3.9
	D5	611	44.6	2.9	8.4
	D6	31	2.3	0.1	0.8
		1369	-	6.4	23.0
Cover type group	Cover type	Acres	% coverage within cover type group	% coverage within the WMA	Frequency (%)
Riparian	R1	332	58.3	1.6	2.0
	R2	201	35.3	0.9	3.4
	R3	23	3.9	0.2	0.1
	R4	15	2.6	0.1	0.1
	R5	19	3.4	0.1	0.3
		592	-	2.7	6.0
Conifer	C1	351	100	1.6	4.9
		351	-	1.6	4.9

¹G1=AGRSPI-POASAN; G2=FESIDA-AGRSPI;G3=FESIDA-KOECRI; G4=Annual grassland; G5=Pastureland; B1=PURTRI/BROMUS; B2=PURTRI-AGRSPI;B3=PURTRI-STICOM; B4=PURTRI-FESIDA; S1=ARTTRV/FESIDA; S2=ARTTRV/AGRSPI; S3=ARTTRV-PURTRI; S4=ARTTRV/BROMUS; A!=ARTRIG; A2=Scabland; D1=PHYMAL; D2=SYMALB; D3=ROSWOO; D4=PRUEMA; D5=Mixed deciduous shrub; D6=Talus-shrub garland; R1=POPTRI; R2=POPTRE; R3=ALNRHO; R4=BETOCC ; R5=CRADOU; C1=PSEMEN.

²A percentage of the number of acres covered by a given cover type divided by the number of acres the entire cover type class encompasses.

³A percentage of the number of acres covered by a given cover type divided by 21340 acres.

⁴Frequency refers to the number of polygons (or portions of polygons) a given cover type is assigned in the vegetation map. It is expressed as a percentage of the 597 (not 440 because many polygons consist of

more than one cover type) cover types assigned for the map.

any area within the WMA can be determined by referencing the appropriate polygon description. It is necessary to have a copy of the vegetation map to determine which polygon describes a particular area.

A list of the 27 cover types and their associated acronyms used for the 440 polygon descriptions are provided below. Acronyms are derived from the scientific name of the dominant species characterizing the cover type.

Grassland Cover Types

Bluebunch wheatgrass-Sandberg's bluegrass	AGRSPI-POASAN
Idaho fescue-bluebunch wheatgrass	FESIDA-AGRSPI
Idaho fescue-prairie Junegrass	FESIDA-KOECRI
Annual grassland	ANNUAL GRASSLAND
Pastureland	PASTURELAND

Bitterbrush Cover Types

Bitterbrush/annual bromes	PURTRI/BROMUS
Bitterbrush/bluebunch wheatgrass	PURTRI/AGRSPI
Bitterbrush/Idaho fescue	PURTRI/FESIDA
Bitterbrush/needle-and-thread grass	PURTRI/STICOM

Mountain Big Sagebrush Cover Types

Mountain big sagebrush/Idaho fescue	ARTTRV/FESIDA
Mountain big sagebrush/bluebunch wheatgrass	ARTTRV/AGRSPI
Mountain big sagebrush-bitterbrush	ARTTRV/PURTRI
Mountain big sagebrush/annual bromes	ARTTRV/BROMUS

Scabland Cover Types

Stiff sagebrush	ARTRIG
Scabland	SCABLAND

Deciduous Shrub Cover Types

Ninebark	PHYMAL
Wood's rose	ROSWOO
Common snowberry	SYMALB
Bittercherry	PRUEMA
Mixed deciduous shrub	MIXED DECIDUOUS SHRUB
Talus-shrub garland	TALUS-SHRUB GARLAND

Riparian Cover Types

Black cottonwood/mixed deciduous shrub	POPTRI
Aspen/mixed deciduous shrub	POPTRE
White alder	ALNRHO
Water birch	BETOCC
Black hawthorne	CRADOU

Conifer woodland

Douglas-fir/deciduous shrub	PSEMEN
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Ecological condition assessment

One of our objectives in producing this vegetation map was to provide an ecological assessment of areas we mapped. Our approach was to assign ecological ranks on an individual polygon basis. The assignments were made during field mapping. All assignments represent our best judgement based on ocular methods, no quantitative sampling was done. Interpretation of the ecological status percentages should keep this limitation in mind.

Not all of the cover types are conducive to ready ecological assessment, especially in light of time constraints. We therefore limited our assessments to habitats believed to be the most meaningful. Towards this end, the ecological status of most map units (polygons) supporting grassland, bitterbrush and mountain big sagebrush were completed. A summary of our ecological condition assessment for these groups is presented in Table 3. Polygons were assigned an ecological rank, or several ranks were proportioned if, as was often the case, a composite of conditions characterized the vegetation. The ecological ranks are based on sequential stages of retrogression from the sites natural potential vegetation (climax). The natural potential vegetation equates to the habitat type for a given site, which was also assessed during field work when possible. The ecological ranks are slightly modified from Johnson and Simon (1987) and are defined as follows:

Climax - The stable state when species composition and density do not change over time and dominant species are reproducing.

Table 3. Summary of ecological condition assessment for grassland, bitterbrush and sagebrush communities.

¹ Cover Type	² Acres	³ Acres % Class.	⁴ Ecological Condition Acres / %				
			Very Early	Early	Mid	Late	Climax
G1	4266	97	432 / 10	1154 / 27	2195 / 51	466 / 11	19 / 0.4
G2	3299	86	149 / 5	484 / 15	1887 / 57	692 / 21	88 / 2
G3	310	97	1 / 0.3	37 / 12	189 / 61	83 / 27	0 / 0
G4	3369	99	1784 / 53	1383 / 41	202 / 6	0 / 0	0 / 0
G5	398	100	322 / 81	75 / 19	0 / 0	0 / 0	0 / 0
G1 - G5	11642	93	2688 / 23	3133 / 27	4473 / 38	1241 / 11	107 / 1
B1	311	52	11 / 4	300 / 96	0 / 0	0 / 0	0 / 0
B2	609	80	0 / 0	173 / 28	367 / 60	70 / 12	0 / 0
B3	42	100	21 / 50	21 / 50	0 / 0	0 / 0	0 / 0
B4	14	100	0 / 0	0 / 0	14 / 100	0 / 0	0 / 0
B1 - B4	976	69	30 / 3	494 / 51	382 / 39	70 / 7	0 / 0
S1	1722	61	213 / 12	418 / 24	834 / 48	251 / 15	16 / 1
S2	121	90	3 / 2	6 / 5	66 / 54	35 / 30	11 / 9

S3	NA						
S4	655	80	238 / 36	417 / 64	0 / 0	0 / 0	0 / 0
S1 - S4	2498	54	454 / 18	841 / 34	890 / 36	286 / 11	27 / 1

¹G1=AGRSPI-POASAN; G2=FESIDA-AGRSPI;G3=FESIDA-KOECRI; G4=Annual grassland; G5=Pastureland; B1=PURTRI/BROMUS; B2=PURTRI-AGRSPI;B3=PURTRI-STICOM; B4=PURTRI-FESIDA; S1=ARTTRV/FESIDA; S2=ARTTRV/AGRSPI; S3=ARTTRV-PURTRI; S4=ARTTRV/BROMUS.

²Total acreage of the cover type within the study area used for the analysis. Note the total acreage for many of the cover types is different than in Table 2. This is because polygons containing multiple cover types are not used in the analysis for Table 3. Also, many, but not all polygons were ranked.

³The acreage of each cover type that received an ecological condition assessment, divided by the total acreage of the cover type, expressed as a percentage. Nearly all remaining acres for B1 - B4 and a majority of acres for S1 - S4, that are not included in the analysis, rank as either very early seral or early seral condition. Therefore, the percentage of very early and early seral vegetation for bitterbrush and mountain big sagebrush would be greater than the table indicates.

⁴Ecological condition classes are expressed in both acres / and percentage relative to the cover type.

Late seral stage - Climax species are present, but not at climax density and composition levels. Exotic species are present in only trace amounts.

Mid seral stage - The major climax species are present, but at reduced density and composition. Associated species sensitive to disturbance have a reduced abundance or may be missing, while species tending to increase with disturbance often occur in skewed abundance. Invading species are usually common.

Early seral state - Major climax species are present, but in peril of being lost from the community. Native species that tend to increase with disturbance may be common. Invading species are abundant and usually dominate the vegetation. A disclimax will likely result if degradation continues.

Very early seral - Climax species are absent or so few to make natural recolonization highly unlikely. Invading species strongly dominate the vegetation. A disclimax exists and only manipulative change can reintroduce native dominants.

Vegetation map notes

1. Inclusions comprise less than 10% of the polygon unless noted otherwise; in most cases less than 5%.
2. Patches of netleaf hackberry and serviceberry occur within the WMA, but never large enough to map separately. Therefore, they are listed as inclusions even though there are no cover type descriptions. Rock inclusions can be cliffs, outcrops, talus or scree slopes. All support little if any vegetation.
3. Percentage of each cover type for polygons contains multiple cover types (mosaic vegetation) is based on field estimates and aerial photograph interpretation.
4. Polygons numbered out of sequential order are highlighted in bold in the following descriptions.

Polygon descriptions

Polygon #	Polygon Description
1	Dukes Creek - POPTRI cover type; several sections support BETOCC cover type; water birch is common with black cottonwood in many places; white alder seems to drop out approximately 1.5 miles upstream from the mouth of Dukes Creek, at which point conifer trees begin to appear in the riparian zone.
2	AGRSPI-POASAN cover type, mix of early and mid-seral; annual bromes are common; with widely scattered shrubs including antelope bitterbrush, bittercherry, syringa and netleaf hackberry.
3	PURTRI/AGRSPI cover type; bitterbrush density is variable and averages about 10%; lower 2/3 slope early seral understory of mostly cheatgrass, upper 1/3 is mid-seral; mixed deciduous shrub patch and netleaf hackberry patch inclusions.
4	PASTURELAND cover type; pubescent wheatgrass seeding; formerly a sand dropseed community type.
5	POPTRI cover type in draw position.
6	AGRSPI-POASAN cover type; with scattered antelope bitterbrush, bittercherry and poison ivy; lower slopes very early and early seral, upper 1/2 of slope mostly mid-seral.
7	ANNUAL GRASSLAND cover type; benches above riparian zone are very early seral; lower 1/2 of slopes are early seral grading to mid-seral AGRSPI/POASAN in upper slope position; inclusion of netleaf hackberry.
8	PASTURELAND cover type, very early seral; with seeded pasture grasses and weedy forbs.
9	AGRSPI-POASAN cover type; upper 2/3 slope mid-seral, lower 1/3 early seral; 20% rock outcrop inclusion; POPTRI cover type inclusion in draw.
10	60% ANNUAL GRASSLAND cover type; 40% PURTRI/BROMUS cover type.
11	AGRSPI-POASAN cover type, 20% early and very early seral in areas of gentle topography, and 80% mid-seral; 25% rock outcrop inclusions.
12	PURTRI/AGRSPI cover type, mid-seral; with inclusions of bittercherry and smooth sumac.
13	ANNUAL GRASSLAND cover type.
14	80% PHYMAL cover type; with abundant Wood's rose, and other shrubs such as bittercherry, serviceberry, common snowberry also present; 20% early seral AGRSPI-POASAN cover type.
15	Shrub/grass mosaic - 65% PHYMAL, ROSWOO and SYMALB cover types; 35% mid-seral AGRSPI-POASAN cover type (Idaho fescue very uncommon), with many (ca. 15% coverage)

- large serviceberry shrubs; scree and rock outcrop inclusions.
- 16 PASTURELAND cover type; with Kentucky bluegrass and smooth brome apparently the most abundant grasses; hoary whitetop well established.
 - 17 ANNUAL GRASSLAND cover type, early seral; with a few small deciduous shrub patch inclusions.
 - 18 PASTURELAND cover type; with Kentucky bluegrass and smooth brome apparently the most abundant grasses; hoary whitetop well established.
 - 19 85% PHYMAL, ROSWOO, and SYMALB cover types; 15% MIXED DECIDUOUS SHRUB cover type.
 - 20 POPTRE cover type in lower draw position; bittercherry is common.
 - 21 Shrub/grass mosaic - 35% PHYMAL cover type; 30% ROSWOO and SYMALB cover types; 35% FESIDA-AGRSPI cover type; with serviceberry common throughout mosaic.
 - 22 Mix of ANNUAL GRASSLAND and PASTURELAND cover types; with Kentucky bluegrass and smooth brome common pasture grasses.
 - 23 Annual grassland cover type; with 15% ROSWOO inclusions.
 - 24 ANNUAL GRASSLAND cover type, 35% very early seral and 65% early seral; 15% SCABLAND cover type (*Lomatium* spp./Sandberg's bluegrass community) inclusions.
 - 25 AGRSPI-POASAN cover type, 50% early seral and 50% mid-seral; with a few scattered serviceberry shrubs.
 - 26 Shrub/grass mosaic - 60% AGRSPI-POASAN cover type, early seral and mid-seral ; 40% PHYMAL and ROSWOO cover types, with chokecherry patches and with scattered bittercherry and serviceberry throughout mosaic.
 - 27 50% FESIDA-AGRSPI cover type, with Idaho fescue common only on north-facing and upper slope positions, 20% late seral, 50% mid-seral, 20% early seral and 10% very early seral; 20% PHYMAL, 10% PRUEMA and 10% ROSWOO cover types; with common snowberry common in understories; serviceberry shrubs are scattered across the slope; MIXED DECIDUOUS SHRUB cover type and TALUS-SHRUB GARLAND cover type inclusions.
 - 28 Pastureland cover type; Kentucky bluegrass has invaded (probably not seeded) and now dominates site.
 - 29 Pastureland cover type.
 - 30 Shrub/grass mosaic - 30% ROSWOO and 10% PHYMAL cover types; 40% ANNUAL GRASSLAND cover type; with 10% rock outcrop and 10% dirt road inclusions. This polygon

- constructed from aerial photo only.
- 31 ANNUAL GRASSLAND cover type, 90% early seral and 10% mid-seral.
 - 32 Grass/shrub/mosaic - 70% FESIDA-AGRSPI cover type (Idaho fescue very uncommon), that is 35% early seral and 65% mid-seral; 20% ROSWOO cover type; 10% PHYMAL cover type; with widely scattered other shrubs such as syringa, elderberry and serviceberry.
 - 33 FESIDA-AGRSPI cover type, mid-seral; with scattered antelope bitterbrush, syringa and chokecherry shrubs; rock outcrop inclusion.
 - 34 PURTRI/BROMUS cover type, early and very early seral understory.
 - 35 Board Gulch - POPTRI cover type; with water birch and white alder common in places. Large sections of this drainage were not visited.
 - 36 FESIDA-AGRSPI cover type, with 70% mid-seral and 30% early seral; inclusions of PHYMAL and ROSWOO cover types in draw and other mesic microsites; a few scattered, small inclusions of PURTRI/BROMUS on southerly aspects.
 - 37 AGRSPI-POASAN cover type, with 30% mid-seral, 50% early seral and 20% very early seral; with a few widely scattered bitterbrush shrubs.
 - 38 ANNUAL GRASSLAND cover type, with 20% mid-seral and 80% early and very early seral; 10% inclusions on slopes and in draws of PHYMAL and ROSWOO cover types, and also with scattered serviceberry and elderberry shrubs.
 - 39 ROSWOO cover type, with common snowberry; scattered black hawthorne, chokecherry and serviceberry shrubs.
 - 40 ANNUAL GRASSLAND cover type, with 20% mid-seral and 80% early and very early seral.
 - 41 Mosaic of 40% AGRSPI-POASAN cover type, with 70% mid-seral, 20 early seral and 10% very early seral; 35% SCABLAND (*Lomatium* spp./Sandberg's bluegrass community); 15% PURTRI/BROMUS; 10% rock outcrop inclusion; draws with small inclusions of shrubs, mostly syringa and serviceberry.
 - 42 90% ANNUAL GRASSLAND cover type, with 95% early seral and 5% mid-seral; 10% shrub inclusions of PHYMAL and ROSWOO cover types.
 - 43 PHYMAL cover type.
 - 44 ANNUAL GRASSLAND cover type, 90% early seral and 10% mid-seral.
 - 45 MIXED DECIDUOUS SHRUB cover type; with scattered small clumps or individuals of aspen or black cottonwood mixed in at upper end of polygon.

- 46 90% FESIDA-AGRSPI cover type, mid-seral; 10% PHYMAL cover type, with small inclusions of ROSWOO cover type or other deciduous shrubs.
- 47 75% FESIDA-AGRSPI cover type; 15% PHYMAL cover type; 10% ROSWOO cover type; with shrub patches mostly confined to northerly-facing draws.
- 48 Aspen/shrub/grass mosaic - 30% POPTRE cover type; 30% PHYMAL cover type; 30% FESIDA-AGRSPI cover type; 10% other shrub species inclusions. This polygon viewed only from a distance, ground-truthing is recommended.
- 49 Grass/shrub/mosaic - 60% FESIDA-AGRSPI cover type; 20% PHYMAL cover type; 20% mix of ROSWOO and SYMALB cover types, and other shrub species;. This polygon only viewed from a distance.
- 50 Grass/shrub mosaic - 15% PHYMAL cover type; 20% other shrubs such as SYMALB cover type and serviceberry; 65% FESIDA-AGRSPI cover type, mid-seral. Most of polygon viewed only from a distance.
- 51 FESIDA-AGRSPI cover type, 80% mid-seral; 20% ARTTRV/FESIDA, with sagebrush cover averaging near 50%.
- 52 PRUEMA cover type; shrubs average about 3 meters tall and with a few aspen mixed in.
- 53 FESIDA-KOECRI cover type; with Kentucky bluegrass strongly dominating the meadow.
- 54 Sagebrush/grass mosaic - 40% ARTTRV/FESIDA cover type; sagebrush density is variable, with patches ranging from >50% to <10% coverage (average is 40% where sagebrush is well established); 60% FESIDA-AGRSPI cover type; polygon is 10% late seral, 80% mid-seral and 10% early seral; rock outcrop inclusions.
- 55 AGRSPI-POASAN cover type, 80% late seral and 20% mid-seral.
- 56 Shrub/grass mosaic - 50% PHYMAL cover type; 10% other shrubs such as serviceberry; 40% FESIDA-AGRSPI cover type.
- 57 Shrub/grass mosaic - 30% PHYMAL cover type; 25% other shrubs, mostly SYMALB and PRUEMA cover types; 10% POPTRE cover type; 35% FESIDA-AGRSPI cover type.
- 58 Grass/shrub mosaic - 80% FESIDA-AGRSPI cover type, mid-seral; 10% PHYMAL cover type; 10% SYMALB cover type.
- 59 AGRSPI-POASAN cover type, with 60% early seral along lower slopes and flatter sites and 40% mid-seral along steeper upper slopes.
- 60 AGRSPI-POASAN cover type, with 70% mid-seral and 30% early seral; with small deciduous shrub inclusion in draw.

- 61 Grass/shrub mosaic - 80% AGRSPI-POASAN cover type, with 75% early seral and 25% mid-seral; 10% ROSWOO cover type; 10% PHYMAL cover type, plus scattered other shrubs.
- 62 MIXED DECIDUOUS SHRUB cover type, with a few small aspen patches.
- 63 ANNUAL GRASSLAND cover type; apparently a failed pasture seeding; hoary whitetop is abundant.
- 64 Shrub/grass mosaic - 40% PHYMAL cover type; 10% ROSWOO cover type; 50% FESIDA-AGRSPI cover type; some scattered serviceberry shrubs.
- 65 FESIDA-AGRSPI cover type, mid-seral; with rocky, sparsely vegetated ridgecrest inclusions.
- 66 ANNUAL GRASSLAND cover type, 80% very early seral, 20% early seral; with 10% open PURTRI/BROMUS inclusions.
- 67 PURTRI/BROMUS cover type, with bitterbrush coverage average of roughly 20%; with 10% netleaf hackberry inclusion.
- 68 POPTRI cover type.
- 69 Grass/shrub mosaic - 70% FESIDA-AGRSPI cover type, 80% mid-seral, 20% early seral; 10% PHYMAL cover type; 10% ROSWOO cover type; 10% serviceberry inclusions.
- 70 ARTTRV/BROMUS cover type; with average 30% sagebrush canopy cover; early seral understory with no Idaho fescue remaining.
- 71 10% ARTRIG cover type; 70% SCABLAND cover type (rocky, shallow soil, sparsely vegetated sites similar to ARTRIG, but without the stiff sagebrush); 10% rock outcrop and TALUS-SHRUB GARLAND cover type inclusions.
- 72 AGRSPI-POASAN cover type, 70% mid-seral, 20% early-seral and 10% very early seral.
- 73 ANNUAL GRASSLAND cover type, 90% very early seral, 10% early seral; with 10% PURTRI/BROMUS cover type inclusion; several small shrub inclusions in draw positions.
- 74 ARTRIG cover type.
- 75 ANNUAL GRASSLAND cover type; a failed pasture grass seeding.
- 76 ANNUAL GRASSLAND cover type, 15% very early seral, 70% early seral and 15% mid-seral; inclusions of open PURTRI/BROMUS cover type.
- 77 SCABLAND cover type; several buckwheat species present; bluebunch wheatgrass is rare within this sparsely vegetated (except for annual bromes in many places), rocky, shallow soil site.
- 78 PURTRI/BROMUS cover type; with bitterbrush at low overall density (<10% canopy) and often in

- widely spaced clumps.
- 79 MIXED DECIDUOUS SHRUB cover type; with scattered black cottonwood.
- 80 PASTURELAND cover type; with pasture and weedy grasses; hoary whitetop and other weedy forbs also common.
- 81 FESIDA-AGRSPI cover type, mix of mid-seral and late seral.
- 82 FESIDA-AGRSPI cover type, mix of mid-seral and late seral; ARTTRV/FESIDA, ROSWOO, and SYMALB cover type inclusions.
- 83 POPTRE shrub cover type; decadent aspen with Wood's rose the most common shrub.
- 84 ANNUAL GRASSLAND cover type, very early and early seral.
- 85 ARTRIG cover type.
- 86 POPTRE cover type.
- 87 PSEMEN cover type; predominately a Douglas-fir/common snowberry community in portion of polygon visited.
- 88 FESIDA-KOECRI cover type, mix of mid and late seral; with 10% ARTTRV/FESIDA cover type; ARTRIG inclusions along ridgecrest.
- 89 Grass/sagebrush mosaic - 70% FESIDA-KOECRI cover type; 20% ARTTRV/FESIDA cover type; 10% ARTRIG cover type along ridgecrests.
- 90 PRUEMA cover type.
- 91 PRUEMA cover type; other tall and low deciduous shrub common.
- 92 ARTTRV/FESIDA cover type; mostly a mid-seral understory.
- 93 PRUEMA cover type; aspen and abundant common snowberry add structural diversity to stand.
- 94 POPTRE cover type.
- 95 POPTRE cover type.
- 96 Grass/shrub mosaic - 35% PRUEMA cover type, and other deciduous shrubs; 65% FESIDA-KOECRI cover type.
- 97 FESIDA-KOECRI cover type, mostly mid-seral; with 10% deciduous shrub inclusions.
- 98 AGRSPI-POASAN cover type, 80% late seral and 20% mid-seral.

- 99 FESIDA-KOECRI cover type, mostly mid seral; with deciduous shrub inclusions.
- 100 POPTRE cover type.
- 101 PURTRI/BROMUS cover type; with bitterbrush at low overall density (<10% canopy) and often in widely spaced clumps.
- 102 ANNUAL GRASSLAND cover type, 90% very early and early seral and 10% mid-seral.
- 103** PURTRI/AGRSPI cover type, early, mid and late seral; open (<10%) bitterbrush coverage.
- 104** POPTRE cover type.
- 105** Grass/sagebrush mosaic - 65% FESIDA-AGRSPI cover type, with 80% mid-seral and 20% late seral; 25% ARTTRV/FESIDA cover type, with average of 10% sagebrush canopy; sagebrush occurs along upper slopes and extending downslope in small draw positions, and with bitterbrush near the ridgecrest; 10% ARTRIG; along Board Point ridgecrest, climax condition and containing pale Wallowa paintbrush.
- 106 PURTRI/AGRSPI cover type; low density bitterbrush with <10% canopy cover, mostly scattered clumps/clusters of bitterbrush separated by areas of no or rare bitterbrush; mostly mid-seral understory.
- 107 Lower Flat Creek - MIXED DECIDUOUS SHRUB cover type.
- 108 Upper Flat Creek - POPTRE cover type; the aspen dropping out in spots.
- 109 Shrub/grass mosaic - 25% PHYMAL cover type; 25% other shrubfields dominated by PRUEMA cover type, a lot of the bittercherry is dead or decadent; 50% FESIDA-AGRSPI cover type, with 50% mid-seral, and 50% early seral, especially near road.
- 110 ANNUAL GRASSLAND cover type, 50% very early seral, 35% early seral, 15% mid- seral; limestone substrate.
- 111 AGRSPI-POASAN cover type, 75% mid-seral, 25% early seral; limestone substrate.
- 112 FESIDA-AGRSPI cover type, 10% early seral, 85% mid-seral and 5% late seral; with 10% serviceberry inclusions in concavities and small draws; AGRSPI-POASAN inclusions on southerly aspects; limestone substrate.
- 113 75% AGRSPI-POASAN cover type, with 15% early seral, 80% mid-seral, 5% late seral; 20% talus, and rock outcrop inclusions, with local mountain mahogany (*Cercocarpus ledifolius*) shrubs associated with many of the outcrops; inclusions of scattered, individual ponderosa pine trees on steep southerly slopes; FESIDA-AGRSPI cover type inclusions on east and west aspects; limestone substrate.

- 114 85% AGRSPI-POASAN cover type, with 65% mid-seral, 25% early seral and 10% very early seral; early seral portions concentrated beneath powerline and gentle upper slope positions; 15% rock outcrop inclusions; scattered bitterbrush shrubs along rocky lower slope positions.
- 115** PURTRI/AGRSPI cover type, mid and late seral.
- 116 ANNUAL GRASSLAND cover type; 65% very early seral (partly a failed seeding attempt?) along gentle lower slopes; 15% early seral; 20% mid-seral along steeper upper slopes.
- 117 ANNUAL GRASSLAND cover type; 80% early and very early seral, 20% mid-seral.
- 118 Annual grassland cover type; mix of very early and early seral conditions; small inclusions of PURTRI/BROMUS, and rocky, shallow sites supporting northern buckwheat scablands.
- 119 Annual grassland cover type; apparently seeded with various *Agropyron* species, but now heavily invaded with medusahead rye, annual bromes and hoary whitetop.
- 120 80% MIXED DECIDUOUS SHRUB cover type; 20% POPTRI cover type.
- 121 ANNUAL GRASSLAND cover type, with 10% very early seral, 80% early and 10% mid-seral; rock outcrop and scabland inclusions; shrub inclusions associated with draw positions.
- 122 AGRSPI-POASAN cover type, with 10% very early, 80% early and 10% mid-seral; 15% rock outcrop inclusion; and 10% shrub inclusion in band along toe slope.
- 123 AGRSPI-POASAN cover type; nearly all early seral with Idaho fescue rare or absent; abundant terracing.
- 124 MIXED DECIDUOUS SHRUB cover type; bittercherry, serviceberry and Wood's rose main contributors.
- 125 ANNUAL GRASSLAND cover type.
- 126 80% PURTRI/AGRSPI cover type, mix of early and mid seral; 20% talus inclusions.
- 127 AGRSPI-POASAN cover type; with high bare ground cover; 75% mid-seral and 25% early seral.
- 128 ANNUAL GRASSLAND cover type, very early seral; appears to be a failed seeding attempt as some intermediate wheatgrass is present.
- 129 ANNUAL GRASSLAND cover type; rock outcrop inclusions; scattered shrub inclusions, including mountain big sagebrush. This polygon viewed only from a distance; there may be some relatively intact FESIDA-AGRSPI remnants present.
- 130 AGRSPI-POASAN cover type, with 15% very early, 25% early and 60% mid- seral; lower slopes near Grade Creek are in the worst condition; rocky, sparsely vegetated inclusions, especially along ridgecrest.

- 131 Grade Creek - POPTRI cover type along most of length; water birch is common in places; white alder seems to be very uncommon.
- 132 AGRSPI-POASAN cover type, with 10% very early seral (nearest Grade Creek), 20% early seral and 70% mid-seral.
- 133 ANNUAL GRASSLAND cover type, 40% very early seral and 60% early seral; 10% shrub inclusions in draw and north slope positions.
- 134 ANNUAL GRASSLAND cover type; early seral bluebunch wheatgrass site with pasture grasses invading from above and below.
- 135 MIXED DECIDUOUS SHRUB cover type; with small aspen patch.
- 136 AGRSPI-POASAN cover type, 10% early, 75% mid and 15% late seral.
- 137 ANNUAL GRASSLAND cover type, mix of very early and early seral bluebunch wheatgrass type.
- 138 Grass/sagebrush mosaic - 60% FESIDA-AGRSPI cover type, with 50% early seral (on flat knolls and gentle slopes), 40% mid-seral and 10% late seral; 30% ARTTRV/FESIDA, with mid-seral understory; 10% shrub inclusions including PHYMAL and PRUEMA cover types; roadways are major weed conduit and hoary whitetop is common; mountain big sagebrush is widespread and scattered individuals occur throughout polygon.
- 139 Grass/shrub mosaic - 60% FESIDA-AGRSPI cover type, with a mix of mid and early seral; 40% shrub patches of SYMALB, PHYMAL and ROSWOO cover types; serviceberry and black cottonwood also present.
- 140 POPTRE cover type.
- 141 ANNUAL GRASSLAND cover type; 80% very early seral and 20% early seral.
- 142 Shrub/grass mosaic - 65% shrub patches of SYMALB, PHYMAL and ROSWOO cover types; serviceberry and black cottonwood also present; 35% FESIDA-AGRSPI cover type, with a mix of mid and early seral.
- 143 PSEMEN cover type; with deciduous shrubs and small amount of ponderosa pine.
- 144 ANNUAL GRASSLAND cover type; 80% very early seral and 20% early seral.
- 145 Shrub/grass/conifer mosaic - 65% SYMALB and ROSWOO cover types, with serviceberry also common, and smaller amounts of PHYMAL cover type; 15% PSEMEN cover type, with mostly common snowberry understory; the conifers mostly < 40 feet tall; 20% FESIDA-AGRSPI cover type, mid-seral.
- 146 PSEMEN cover type; Douglas-fir/ninebark forest that is located mostly upslope and outside

- WMA boundaries.
- 147** 60% PHYMAL cover type; 30% PRUEMA cover type; 10% other shrubs.
- 148 FESIDA-AGRSPI cover type, mid-seral; with PSEMEN cover type inclusions.
- 149 PSEMEN cover type; scattered clusters of Douglas-fir (ponderosa pine is rare) with ninebark and/or common snowberry, or Idaho fescue-dominated understories; larger Douglas-fir clumps have a disturbed understory.
- 150 PRUEMA cover type; with a few black cottonwoods.
- 151 ARTTRV/FESIDA cover type, mid-seral.
- 152 POPTRE cover type.
- 153 PSEMEN cover type; scattered clusters of Douglas-fir (ponderosa pine is rare) with ninebark, common snowberry, or Idaho fescue-dominated understories.
- 154 FESIDA-AGRSPI cover type, 80% mid and 20% early seral; few widely scattered mountain big sagebrush shrubs; AGRSPI-POASAN cover type inclusions on southerly portions of undulating topography.
- 155 ARTTRV/FESIDA cover type, mid-seral; sagebrush averages 30% cover.
- 156 AGRSPI-POASAN cover type, 80% mid and 20% early seral.
- 157 PASTURELAND cover type.
- 158** AGRSPI-POASAN cover type, mostly mid-seral, less early and very early seral conditions near base of slope; site has burned (prescribed burn?) with scattered mountain big sagebrush shrubs remaining; ARTRIG cover type inclusion.
- 159 AGRSPI-POASAN cover type, 75% mid, 20% early and 5% very early seral; along road and flatter areas are the weediest.
- 160 POPTRE cover type.
- 161 ARTTRV/FESIDA cover type, mid-seral; variable sagebrush density averages about 30%.
- 162 Grass/shrub mosaic - 65% FESIDA-AGRSPI cover type, mostly mid-seral; 25% MIXED DECIDUOUS SHRUB inclusions; 10% POPTRE inclusion.
- 163 Shrub/grass mosaic - 20% PHYMAL cover type; 10% PRUEMA cover type; 20% ARTTRV/FESIDA cover type; 20% AGRSPI-POASAN cover type; 20% FESIDA-AGRSPI cover type (on steep northerly and westerly slopes), early and mid-seral; 10% rock outcrop inclusions.

- 164 AGRSPI-POASAN cover type, 65% mid, 25% early and 10% very early seral.
- 165 PRUEMA cover type; most of bittercherry killed by fire, and with a weedy understory.
- 166 PASTURELAND cover type. This polygon only viewed from a distance.
- 167 AGRSPI-POASAN cover type, with 10% very early seral, 30% early seral and 60% mid-seral; 10% rock outcrop inclusions; 15% POPTRE cover type and deciduous shrub inclusions, with primary shrubs being Wood's rose and serviceberry; worst weeds associated with roadcut and ecological conditions improving approximately 30 m above roadcut.
- 168 ANNUAL GRASSLAND cover type; mostly very early seral, some early seral; hoary whitetop abundant; alfalfa persisting in a few places; rock outcrop inclusions.
- 169 Grass/shrub mosaic - 15% PURTRI/BROMUS cover type; 15% ARTTRV/BROMUS cover type, early seral understory; 60% ANNUAL GRASSLAND cover type; inclusions of netleaf hackberry and a mixed deciduous shrub and tree patches.
- 170 ANNUAL GRASSLAND cover type; weedy wheat field.
- 171 ANNUAL GRASSLAND cover type, with 25% very early, 65% early, and 10% mid- seral; rock outcrop inclusions.
- 172 PURTRI/BROMUS cover type; scattered clusters of low density (<10% cover) bitterbrush.
- 173 PURTRI/BROMUS cover type.
- 174 East Brownlee Creek - POPTRI cover type; various size black cottonwood trees form an inconsistent upper canopy, with mountain alder often filling in the gaps.
- 175 Lower Camp Creek - POPTRI cover type; often with a few aspen trees; BETOCC cover type in places.
- 176 Grass/shrub mosaic - 75% FESIDA-AGRSPI cover type; 10% shrub patch inclusions (bittercherry, Wood's rose and serviceberry); 15% ARTTRV/FESIDA cover type.
- 177 PASTURELAND cover type; very early seral meadow, appears as if smooth brome was seeded, and now with lots of hoary whitetop and other weeds; inclusion of narrow riparian shrub zone with rose and black hawthorne.
- 178 Shrub/conifer/grass mosaic - 55% MIXED DECIDUOUS SHRUB cover type; 20% PSEMEN cover type (stringers of Douglas-fir/ninebark); 15% ARTTRV/FESIDA cover type; 10% FESIDA-AGRSPI cover type; the latter two type mostly in mid- seral condition.
- 179 ARTTRV/FESIDA cover type; sagebrush with variable density, from over 50% cover in northwestern part of polygon, to 10% or less elsewhere; 20% SCABLAND cover type inclusions without stiff sagebrush.

- 180 AGRSPI-POASAN cover type; mix of very early, early and mid-seral; shrub patch inclusions.
- 181 ARTTRV/FESIDA cover type; mix of late and mid-seral; sagebrush cover is high.
- 182 ANNUAL GRASSLAND cover type; with mix of pasture grasses and weedy forbs including hoary whitetop.
- 183 ARTTRV/FESIDA cover type; sagebrush with variable density and averaging about 35% cover, except in some areas where only about 10% cover and grading into adjacent grassland slopes; 10% early, 70% mid and 20% late seral condition; southerly aspects may actually be ARTTRV/AGRSPI cover type; SCABLAND cover type inclusions without stiff sagebrush.
- 184 AGRSPI-POASAN cover type, with 10% very early, 25% early, 50% mid, and 15% late seral; PRUEMA cover type inclusion (with serviceberry); ARTTRV/FESIDA inclusions creeping down from above.
- 185 Long Gulch - upper segment with CRADOU cover type; grading into BETOCC cover type at lower end approaching mouth of drainage.
- 186 ARTTRV/FESIDA cover type; mix of late and mid-seral condition; sagebrush cover averages roughly 30%; bluebunch wheatgrass is more abundant than Idaho fescue except on north aspects.
- 187 ANNUAL GRASSLAND cover type; 80% very early and 20% early seral; hoary whitetop is abundant; inclusions of occasional bitterbrush and also bittercherry and other shrubs along lower slopes near road.
- 188 Shrub/grass mosaic - 40% ARTTRV/FESIDA cover type, 15% PHYMAL cover type; 15% MIXED DECIDUOUS SHRUB cover type (consisting of bittercherry, ninebark, Wood's rose, chokecherry and common snowberry), 25% FESIDA-AGRSPI cover type; inclusion of PSEMEN cover type.
- 189 ARTTRV/FESIDA cover type; ranging from open (10%) to fairly dense (40%) cover; 25% late seral, 50% mid-seral, and 25% early seral, especially as sagebrush grades into adjacent bluebunch wheatgrass community at west end of polygon.
- 190 AGRSPI-POASAN cover type; with 10% very early, 60% early and 30% mid- seral; inclusions of small shrub patches.

West of Brownlee Creek

- 191 ANNUAL GRASSLAND cover type, early seral 80% and 20% mid-seral; upper slopes with a northeastern aspect are in the best ecological condition; 10% rock outcrop inclusion; small, scattered inclusions of ARTRIG cover type occur along the ridgeline in northern part of polygon.
- 192 70% AGRSPI-POASAN cover type, with 70% mix of very early and early seral, 25% mid-seral and 5% late seral; 30% FESIDA-AGRSPI cover type, with 10% early seral, 20% mid-seral and

70% mix of late seral and climax. In general, from the reservoir extending upslope for approximately 70 meters above roadcut, the grasslands are in poor ecological shape. Where the slope considerably steepens, mid-seral conditions begin to dominate. The vegetation becomes more intact proceeding further upslope and the upper one-half or so is in mid-seral or better condition except for a few small weedy patches. The FESIDA-AGRSPI cover type occupies northerly aspects within this dissected grassland matrix.

- 193 ARTRIG cover type.
- 194 MIXED DECIDUOUS SHRUB cover type; stringer in draw bottom.
- 195 Shrub/grass mosaic - 60% FESIDA-AGRSPI cover type; 40% MIXED DECIDUOUS SHRUB cover type.
- 196 ANNUAL GRASSLAND cover type, mix of very early and early seral.
- 197 PURTRI/BROMUS cover type; bitterbrush averaging less than 10% cover.
- 198 Shrub/grass mosaic - 75% FESIDA-AGRSPI cover type; 25% MIXED DECIDUOUS SHRUB cover type.
- 199 ARTTRV/BROMUS cover type; sagebrush cover averages about 25%.
- 200 PURTRI/BROMUS cover type; bitterbrush cover averages approximately 20%.
- 201 PURTRI/BROMUS cover type; bitterbrush cover averages approximately 20%.
- 202 MIXED DECIDUOUS SHRUB cover type.
- 203 FESIDA-AGRSPI cover type; with 20% early seral and 80% mix of mid- and late seral; patchy inclusions of SYMALB and PHYMAL cover types; inclusion of ARTRIG cover type along ridge spine.
- 204 MIXED DECIDUOUS SHRUB cover type; dense, structurally diverse stringer in draw bottom.
- 205 65% FESIDA-AGRSPI cover type; 35% AGRSPI-POASAN cover type; mid-seral to climax; with rock outcrop and shrub patch inclusions.
- 206 Grass/shrub mosaic - 80% FESIDA-AGRSPI cover type, 15% early seral and 85% mix of mid and late seral; 20% shrub patch inclusions including PHYMAL, SYMALB, ROSWOO and PRUEMA cover types.
- 207 AGRSPI-POASAN cover type; with 75% very early and early seral, and 25% mid-seral.
- 208 MIXED DECIDUOUS SHRUB cover type.
- 209 Grass/shrub mosaic - 80% FESIDA-AGRSPI cover type; 20% deciduous shrub patches or

- stringers.
- 210 ANNUAL GRASSLAND cover type.
- 211 MIXED DECIDUOUS SHRUB cover type.
- 212 ARTTRV/BROMUS cover type.
- 213 PURTRI/BROMUS cover type, early seral understory; bitterbrush coverage averaging 10% or less, except for a few denser patches.
- 214 Grass/shrub mosaic; with 65% FESIDA-AGRSPI cover type; 15% MIXED DECIDUOUS SHRUB cover type; 20% netleaf hackberry inclusion.
- 215 ANNUAL GRASSLAND cover type; with 80% mix of very early and early seral, and 20% mid-seral.
- 216 AGRSPI-POASAN cover type; with 20% early seral and 80% mid-seral.
- 217 MIXED DECIDUOUS SHRUB cover type.
- 218 AGRSPI-POASAN cover type, 25% mix of very early and early seral, 65% mid-seral and 10% late seral; 15% talus and rock outcrop inclusions; deciduous shrub patch inclusions; FESIDA-AGRSPI cover type inclusions on northerly exposures; upper slopes support the best condition grasslands.
- 219 FESIDA-AGRSPI cover type, with 20% very early and early seral, 50% mid-seral and 30% late seral; best condition grasslands at upper slopes; 25% rock outcrop and talus inclusion; MIXED DECIDUOUS SHRUB cover type inclusions; TALUS-SHRUB GARLAND inclusions.
- 220 AGRSPI-POASAN cover type, with 30% very early seral, 45% early seral and 25% mid-seral; areas near road in the worst ecological condition; rock and talus inclusion; shrub patch and stringer inclusions.
- 221 PURTRI/BROMUS cover type, early and very early seral understory; bitterbrush occurs at low density.
- 222 65% FESIDA-AGRSPI cover type; 35% AGRSPI-POASAN cover type (occurring on southeastern aspects); 10% early seral, 80% mid-seral and 10% late seral; rock outcrop inclusion; small shrub patch inclusions.
- 223 PURTRI/BROMUS cover type, early seral understory; bitterbrush occurring at low density.
- 224 ANNUAL GRASSLAND cover type; very early seral.
- 225 ANNUAL GRASSLAND cover type; with 85% mix of very early and early seral and 15% mid-seral; widely scattered bitterbrush and mountain big sagebrush shrubs occur within

- polygon.
- 226 MIXED DECIDUOUS SHRUB cover type; with occasional black cottonwood and water birch.
 - 227 PURTRI/BROMUS cover type, early seral understory; bitterbrush occurs at low density; deciduous shrub patch inclusion.
 - 228 Grass/shrub mosaic - 65% FESIDA-AGRSPI cover type, mix of early and mid-seral; 35% deciduous shrub patches, mainly SYMALB cover type, with lesser amounts of PHYMAL cover type and other shrubs.
 - 229 AGRSPI-POASAN cover type, mid-seral.
 - 230 FESIDA-AGRSPI cover type, 20% early, 70% mid and 10% late seral; 10% PHYMAL and SYMALB inclusions; scattered serviceberry shrubs; rock outcrop inclusions.
 - 231 MIXED DECIDUOUS SHRUB cover type.
 - 232 FESIDA-AGRSPI cover type, 80% mid-seral and 20% mix of early and very early seral (mostly near stock pond and two-track road); most of the mountain big sagebrush in this polygon killed by fire (prescribed burn?) except for a strip near ridgecrest.
 - 233 Mosaic of burned ARTTRV/FESIDA cover type, with most of the sagebrush killed and little regeneration, mid-seral, but very weedy in places; and unburned ARTRIG cover type (Sandberg's bluegrass the main associated grass).
 - 234 FESIDA-AGRSPI cover type; with deciduous shrub patch inclusions.
 - 235 AGRSPI-POASAN cover type, mid seral.
 - 236 FESIDA-AGRSPI cover type.
 - 237 AGRSPI-POASAN cover type, 75% late seral and climax, 25% mid-seral.
 - 238 ARTTRV/FESIDA cover type; the sagebrush thinning as slope steepens; sagebrush burned in places and with early seral understory, otherwise mid- seral.
 - 239 FESIDA-AGRSPI cover type, 25% mix of early and mid-seral, and 75% late seral; 25% TALUS-SHRUB GARLAND cover type inclusions.
 - 240 PURTRI/BROMUS cover type, early seral; bitterbrush most common on southerly portions of slope and occurring in clusters separated by grassland; ARTTRV/BROMUS inclusions along toe slope.
 - 241 ANNUAL GRASSLAND cover type, with 20% very early seral, 75% early seral and 5% mid-seral.

- 242 PASTURELAND cover type; seeded to mostly intermediate wheat.
- 243 PURTRI/AGRSPI cover type, mid-seral.
- 244 AGRSPI-POASAN cover type, 80% mid-seral and 20% early seral; FESIDA-AGRSPI cover type inclusions on northerly aspects; MIX DECIDUOUS SHRUB cover type inclusion; SYMALB cover type inclusions; rock outcrop and talus inclusions; ARTTRV/BROMUS inclusion along toe slopes.
- 245 TALUS-SHRUB GARLAND cover type; dominated by smooth sumac.
- 246 PURTRI/AGRSPI cover type; with bitterbrush cover 10% to less and mixing with mountain big sagebrush at base of slope; 40% mix of very early and early seral (especially near creek and road), and 60% mid-seral; rock outcrop inclusions; 15% SCABLAND cover type inclusions (*Lomatium* spp).
- 247 AGRSPI-POASAN cover type, with 50% mid-seral, 35% early seral, and 15% very early seral, especially near road and lower slope areas.
- 248 ANNUAL GRASSLAND cover type.
- 249 ANNUAL GRASSLAND cover type; very early seral, with roadside and saddle area extremely weedy including hoary whitetop; with widely scattered remnant mountain big sagebrush.
- 250 MIXED DECIDUOUS SHRUB cover type; dominated by chokecherry, with some ninebark and syringa, Idaho fescue and mesic forbs.
- 251 FESIDA-AGRSPI cover type, mid-seral; with PHYMAL cover type and other shrub patch inclusions.
- 252 FESIDA-AGRSPI cover type, 75% mid-seral, 25% mix of very early and early seral; mountain big sagebrush is very spotty within polygon, consisting of scattered individuals or small clusters, and overall cover of less than 5%.
- 253 PURTRI/AGRSPI cover type, mid seral.
- 254 ARTTRV/BROMUS cover type; burned in past, but sagebrush still plentiful and averaging 30% canopy cover in most places; weedy understory, but with some remnant forbs and Sandberg's bluegrass common.
- 255 ARTTRV/AGRSPI cover type, mid-seral; with the sagebrush dropping out at bottom slope positions; Snake Canyon milkvetch (*Astragalus vallis*) occurs in polygon.
- 256 MIXED DECIDUOUS SHRUB cover type.
- 257 PURTRI/AGRSPI cover type, mid seral; with scattered mountain big sagebrush.

- 258 AGRSPI-POASAN cover type, 80% mid-seral and 20% early seral, with weedy patches scattered throughout; rock outcrop and talus inclusions; deciduous shrub patch inclusions.
- 259 FESIDA-AGRSPI cover type, 85% late seral and climax, 15% mid-seral; much less Idaho fescue compared to bluebunch wheatgrass.
- 260 ARTTRV/FESIDA cover type; with sagebrush commonly sparse and less than 5% canopy cover.
- 261** West Brownlee Creek - POPTRI cover type; the black cottonwood often spotty and water birch a more consistent canopy dominant, and in several stretches BETOCC cover type replaces the black cottonwood type; ALNRHO cover type occurs downstream from the third road crossing; some segments upstream from fourth road crossing with very sparse riparian vegetation and banks in poor condition.
- 262 PURTRI/AGRSPI cover type, mix of early and mid-seral; bitterbrush occurs as scattered, low density clusters; high rock cover and overall sparse vegetation.
- 263 ARTTRV/FESIDA cover type; along toe and lower slope positions; polygon observed only from a distance.
- 264 PURTRI/AGRSPI cover type, 15% late, 65% mid and 20% early seral; bitterbrush occurs at low density.
- 265 Mosaic with 75% FESIDA-AGRSPI cover type, varying from early to late seral condition; 10% PHYMAL cover type; 15% bands of MIXED DECIDUOUS SHRUB cover type in draws; POPTRI inclusion; ARTTRV/BROMUS inclusion near base of polygon.
- 266 PURTRI/AGRSPI cover type; bitterbrush with an overall 10% or less canopy cover, except for scattered dense clusters; 25% mosaic of FESIDA-AGRSPI cover type and deciduous shrubs.
- 267 PURTRI/AGRSPI cover type, 80% mid-seral and 20% early seral; with mountain big sagebrush shrubs along bottom of slope.
- 268 FESIDA-AGRSPI cover type, 10% very early seral, 10% early seral, 80% mix of mid and late seral; very rocky and open in places.
- 269 Grass/shrub mosaic - 65% FESIDA-AGRSPI cover type, early to late seral portions; 25% ARTTRV/FESIDA cover type; 10% PHYMAL, SYMALB and MIXED DECIDUOUS SHRUB cover types.
- 270 ARTTRV/FESIDA cover type.
- 271 ARTTRV/BROMUS cover type, very early and early seral understory; mosaic of sagebrush density patterns, but mostly open (15% or less canopy cover); corral area inclusion is very early seral and very bad with weeds, including hoary whitetop.
- 272 AGRSPI-POASAN cover type, 50% mix of early and very early seral, 50% mid-seral; deciduous

- shrub patch inclusion.
- 273 ARTTRV/BROMUS cover type; sagebrush averages 30% canopy cover.
- 274 ARTTRV/BROMUS cover type; large slump area with low density of sagebrush; 20% talus-shrub garland inclusion; rock outcrop inclusion; deciduous shrub patch inclusion.
- 275 ARTTRV/BROMUS cover type, very early and early seral understory; mosaic of sagebrush density patterns, but mostly 15% or less canopy cover.
- 276 MIXED DECIDUOUS SHRUB cover type; with POPTRE cover type portions in upper reaches of draw.
- 277 PURTRI/AGRSPI cover type, mix of early and mid-seral; bitterbrush with less than 10% canopy cover except for several more dense inclusions.
- 278 ARTTRV/BROMUS cover type, mostly early seral understory; average of approximately 30% sagebrush canopy cover.
- 279 Mix of 75% AGRSPI/POASAN cover type and 25% FESIDA-AGRSPI cover type on northerly aspects, 30% early seral and 70% combined mid- and late seral; deciduous shrub inclusion.
- 280 Lower Cave Creek - ALNRHO cover type.
- 281** FESIDA-AGRSPI cover type; with PHYMAL and MIXED DECIDUOUS SHRUB cover types in draws; ARTTRV/FESIDA cover type inclusions; rock outcrop inclusion. This polygon defined via air photograph interpretation only.
- 282** ARTTRV/BROMUS cover type; narrow band of sagebrush along toe slope and bottomland positions.
- 283 Grass/shrub mosaic - FESIDA/AGRSPI cover type, mostly mid-seral; and MIXED DECIDUOUS SHRUB cover types in a series of north-facing draws.
- 284 FESIDA-AGRSPI cover type; with 15% ARTTRV/FESIDA cover type inclusions. Polygon was not visited.
- 285 ARTTRV/BROMUS cover type; sagebrush canopy cover is low, but with denser clusters.
- 286 FESIDA-AGRSPI cover type; with deciduous shrub patch inclusions in draws.
- 287 FESIDA-AGRSPI cover type, early and mid-seral; polygon not visited.
- 288 ARTTRV/FESIDA cover type; mostly unburned, some areas with sparse sagebrush, but averaging about 20% canopy cover; ARTRIG cover type inclusions.
- 289 ARTRIG cover type; very sparsely vegetated with >50% bare ground; site supports example of

- patterned ground topography.
- 290 ARTTRV/FESIDA cover type; a composite of unburned and patchy burned sagebrush where mortality is spotty, ranging to 100% in some places; fires where probably prescribed burns; mix of early and mid-seral, except near roads, salt blocks and stockponds, which are very early seral, including hoary whitetop; 10% SCABLAND cover type inclusions.
- 291 FESIDA/AGRSPI cover type; polygon originally supported ARTTRV/FESIDA cover type, but high fire mortality (probably prescribed burn) has resulted in little sagebrush remaining except in scattered patches, mostly within dissections of the otherwise flat to gently undulating topography; mostly a mix of early and mid-seral grass communities except near roads, salt blocks and stock ponds which tend to be in very early seral condition; 10% ARTRIG cover type inclusions. Note, that as a general rule, the ecological condition of mountain big sagebrush upland communities west of West Brownlee Creek is worse than east of this drainage.
- 292 FESIDA-KOECRI cover type, mix of early and mid-seral; the mountain big sagebrush that formerly occupied site has nearly all been killed by fire (probably prescribed burn), but with scattered survivors especially toward western edge of polygon; it appears as if pubescent wheat has been seeded onto the site.
- 293 FESIDA-AGRSPI cover type, mid-seral, although weeds, especially *Bromus* well established; fire (probably prescribed burn) has killed most of the mountain big sagebrush shrubs that formerly occurred within polygon, but good regeneration was observed; 25% ARTRIG cover type inclusions.
- 294 ARTTRV/FESIDA cover type; with patchy sagebrush distribution.
- 295 ARTTRV/FESIDA cover type, 20% early seral (mainly near trails and stock ponds) and 80% mid-seral; 20% ARTRIG cover type inclusion.
- 296 ANNUAL GRASSLAND cover type.
- 297 AGRSPI-POASAN cover type, mix of early and mid-seral; 20% TALUS-SHRUB GARLAND inclusion; 10% rock outcrop inclusions; smooth sumac patch inclusion.
- 298 AGRSPI-POASAN cover type, 80% mid and late seral, 20% early seral; south aspects are the most weedy; FESIDA-AGRSPI cover type inclusions on north aspects; talus inclusions.
- 299 PURTRI/AGRSPI cover type, mostly mid-seral; extensive southerly slope with widely spaced individual or small clumps of bitterbrush; portions at eastern end and upper slopes of polygon have burned; bitterbrush is most common on upper half of slope; mostly mid-seral with local late seral conditions; ARTTRV/BROMUS cover type inclusion in band along lower toe slope.
- 300 MIXED DECIDUOUS SHRUB cover type; except for lower end of Box Gulch with ARTTRV/BROMUS cover type.
- 301 Shrub/grass mosaic - with 30% ARTTRV/FESIDA cover type; 20% combination of MIXED

- DECIDUOUS SHRUB and PHYMAL cover types; 50% FESIDA-AGRSPI cover type, with 10% early seral, 90% mix of mid and late seral; inclusion of open PSEMEN cover type, with some ponderosa pine trees.
- 302 ARTTRV/BROMUS cover type; narrow strip in toe slope position.
- 303 PURTRI/AGRSPI cover type; bitterbrush coverage averages 10% or less; ARTTRV/FESIDA cover type inclusions creeping over from adjacent polygons.
- 304 POPTRI cover type.
- 305 Grass/shrub mosaic - 65% FESIDA-AGRSPI cover type, mix of early and mid-seral; 35% combination of MIXED DECIDUOUS SHRUB, SYMALB and PHYMAL cover types, primarily in a strip along lower slope positions above the riparian zone.
- 306 FESIDA/AGRSPI cover type; inclusion of ARTTRV/FESIDA cover type.
- 307 ARTTRV/FESIDA cover type, late and mid-seral; sagebrush cover varies from very open and less than 10% to more than 30%, with an average of approximately 15%; ARTTRV/AGRSPI cover type inclusions on south aspects; ARTRIG cover type and other and scabland vegetation inclusions; MIXED DECIDUOUS SHRUB cover type inclusion.
- 308 ARTTRV/FESIDA cover type; much of the sagebrush has been killed by fire (prescribed burn?), resulting in a mosaic of variable sagebrush canopy cover averaging less than 10%; ARTRIG cover type and other scabland vegetation inclusions.
- 309 ARTTRV/FESIDA cover type; mosaic of burned (prescribed fire?) and unburned sagebrush with clusters of intact sagebrush stands interspersed throughout areas of burned, widely spaced remnant sagebrush shrubs and areas naturally supporting very low sagebrush density; scabland vegetation inclusions.
- 310 FESIDA-AGRSPI cover type, mostly mid-seral with some late seral; with widely scattered individual or small clumps of mountain big sagebrush (<1% canopy cover).
- 311 ARTTRV/FESIDA cover type; intermittent sagebrush band along toe and lower slope positions; with FESIDA-AGRSPI and PHYMAL cover type inclusions.
- 312 FESIDA-AGRSPI cover type on northerly and west aspects; with AGRSPI-POASAN cover type on southwesterly exposures within undulating topography; rock outcrop inclusion; PRUEMA cover type and other shrub inclusions.
- 313 Grass/shrub mosaic - 85% FESIDA-AGRSPI cover type, late and mid-seral; 15% PHYMAL cover type and MIXED DECIDUOUS SHRUB cover type in north-facing draws along dissected slope; inclusions of AGRSPI-POASAN cover type on portions of contrasting southerly aspects; ARTTRV/FESIDA cover type inclusion.
- 314 MIXED DECIDUOUS SHRUB cover type.

- 315 CRADOU cover type; hoary whitetop establishing in places along bottomlands; also bur buttercup (*Ranunculus testiculatus*) establishing along old road.
- 316 MIXED DECIDUOUS SHRUB cover type; with syringa, willow (*Salix rigida*), ninebark, Nootka rose and *Prunus* spp.
- 317 ARTTRV/FESIDA cover type, mix of late and mid-seral; sagebrush canopy cover is variable and averages about 20%.
- 318 ARTTRV/FESIDA cover type, largely mid-seral with pockets of early as well as late seral vegetation; sagebrush canopy cover is variable and averages about 20%; ARTTRV/AGRSPI cover type on south aspects; deciduous shrub patch inclusions; stockpond and service road areas support inclusions of very early seral vegetation.
- 319 PRUEMA cover type.
- 320 Conifer/shrub/grass mosaic - 35% PSEMEN cover type, consisting of a mix of Douglas-fir (mostly saplings) and ponderosa pine (mostly larger trees); 25% ARTTRV/FESIDA cover type; 25% combination of MIXED DECIDUOUS SHRUB, PHYMAL and PRUEMA cover types; 15% FESIDA-KOECRI cover type.
- 321 Mosaic of ARTTRV/FESIDA cover type, and MIXED DECIDUOUS SHRUB cover type; a few Douglas-fir trees occur within polygon; stockpond and service road areas surrounded by very early seral vegetation including lots of hoary whitetop and bulbous bluegrass.
- 322 ARTRIG cover type.
- 323 FESIDA-KOECRI cover type; series of stockponds and associated wet meadow habitat dominated by mesic forbs and graminoids; hoary whitetop is abundant on dams, roads and other disturbed sites in the area.
- 324 PURTRI/AGRSPI cover type, mix of early and mid-seral; with 1-3% average bitterbrush cover scattered along upper and mid slope positions; 15% ARTTRV/FESIDA cover type inclusions restricted to very upper and lower slopes (perhaps too much soil movement on other sections of steep slope); TALUS-SHRUB GARLAND cover type inclusion, and scattered other shrubs; widely scattered individual ponderosa pine trees (<1% canopy cover) across slope except where substrate is unstable.
- 325 TALUS-SHRUB GARLAND cover type; syringa is most common shrub.
- 326 80% AGRSPI-POASAN cover type; 20% FESIDA-AGRSPI cover type on northwest aspects and upper slopes near ridgetop; inclusions of widely scattered, individual ponderosa pine trees; SYMALB cover type inclusions.
- 327 ARTTRV/PURTRI cover type, mid-seral.
- 328 AGRSPI-POASAN cover type, with 75% mid, 20% early and 5% very early seral; deciduous

- shrub patch inclusions; scree inclusions.
- 329 ARTTRV/BROMUS cover type; sagebrush cover variable, but exceeding 35% in places; deciduous shrub patch inclusions.
- 330 MIXED DECIDUOUS SHRUB cover type; ARTTRV/FESIDA cover type inclusion; a few Douglas-fir trees also occur.
- 331 ARTTRV/BROMUS cover type; sagebrush cover variable, but exceeding 35% in places; 15% MIXED DECIDUOUS SHRUB inclusions (dominated by rosaceous shrubs).
- 332 FESIDA-AGRSPI cover type, with 75% late seral and 25% mix of early and very early seral, especially in vicinity of service road.
- 333 ARTTRV/FESIDA cover type; with sagebrush density varying from less than 10% to 35% or more.
- 334 AGRSPI-POASAN cover type; FESIDA-AGRSPI inclusions on northwest aspects.
- 335 MIXED DECIDUOUS SHRUB cover type.
- 336 FESIDA-AGRSPI cover type, mostly mid and late seral.
- 337 PURTRI/AGRSPI cover type.
- 338 ARTTRV/FESIDA cover type, early and mid-seral; local black cottonwood/water birch inclusion; PURTRI/AGRSPI inclusion; a few scattered deciduous shrubs also occur.
- 339 Shrub/grass mosaic - 75% MIXED DECIDUOUS SHRUB cover type (dominated by ninebark); 25% FESIDA-AGRSPI cover type.
- 340 FESIDA-AGRSPI cover type, late and mid-seral.
- 341 Shrub/grass mosaic in draw - 70% MIXED DECIDUOUS SHRUB cover type; 30% FESIDA-AGRSPI cover type.
- 342 PURTRI/AGRSPI cover type.
- 343 MIXED DECIDUOUS SHRUB cover type.
- 344 PURTRI/AGRSPI cover type.
- 345 Mosaic of AGRSPI/POASAN cover type (much more bluebunch wheatgrass cover than Idaho fescue), lower slopes often early seral, otherwise mostly mid-seral, with late seral vegetation in some upper slope locations; MIXED DECIDUOUS SHRUB and SYMALB cover types inclusions as stringers in north-facing concavities within the dissected slope; rock outcrop inclusion; ARTTRV/FESIDA cover type inclusions along toe slope; there are also occasional scattered

- bitterbrush shrubs.
- 346 AGRSPI-POASAN cover type, with 25% very early, 50% early and 25% mid-seral; lower slope and many south-facing slopes are the earliest seral condition; FESIDA-AGRSPI cover type on northerly inclusions; MIXED DECIDUOUS SHRUB cover type inclusions in draws; rock outcrop inclusions; occasional bitterbrush shrubs dot the slope.
- 347 PURTRI/AGRSPI cover type.
- 348 Grass/shrub mosaic - 60% FESIDA-AGRSPI cover type, late and mid-seral; 20% PURTRI/AGRSPI cover type; 20% MIXED DECIDUOUS SHRUB cover type in draws (dominated by ninebark and common snowberry); rock outcrop inclusions.
- 349 AGRSPI-POASAN cover type, mid-seral and late seral; TALUS-SHRUB GARLAND cover type inclusions; talus and rock outcrop inclusions.
- 350 FESIDA-AGRSPI cover type, mid and late seral, and climax vegetation; 15% MIXED DECIDUOUS SHRUB cover type; rock outcrop inclusion; small ARTRIG cover type inclusions on rocky ledges.
- 351 FESIDA-AGRSPI cover type, 40% mix of early and very early seral, and 60% mid-seral; as the aspect becomes more east than north ecological condition declines, with the weediest vegetation occurring along the lower slopes and extending to mid-slope in places.
- 352 FESIDA-AGRSPI cover type, with 50% very and early seral and 50% mid-seral; bluebunch wheatgrass much more common than Idaho fescue; lower slopes are the weediest.
- 353 85% FESIDA-AGRSPI cover type, mid-seral; 15% PHYMAL and MIXED DECIDUOUS SHRUB cover types.
- 354 PURTRI/STICOM cover type, mix of early and very early seral understory; bitterbrush canopy is variable and averages approximately 20%; some mountain big sagebrush interspersed along margins of polygon; juvenile sagebrush shrubs observed, but there is little bitterbrush recruitment.
- 355 ANNUAL GRASSLAND cover type; seeded pasture grasses also common; hoary whitetop is common; MIXED DECIDUOUS SHRUB cover type inclusion (the patch of shrubs dominated by black hawthorne); inclusion of outbuildings.
- 356 ARTTRV/FESIDA cover type, mid-seral and some early seral vegetation; the sagebrush patchy and averaging about 10% canopy cover; AGRSPI-POASAN cover type inclusion; MIXED DECIDUOUS SHRUB cover type inclusion; scattered patches of PRUEMA cover type with serviceberry.
- 357 80% ARTTRV/FESIDA cover type, with 10% early seral and 90% a mix of mid and late seral; the sagebrush is fairly evenly distributed, but sparse in places and averaging roughly 15% canopy cover; 15% SYMALB and PHYMAL and to lesser degree ROSWOO cover types; MIXED DECIDUOUS SHRUB cover type inclusion in draw.

- 358 PURTRI/BROMUS cover type, with 90% early seral and 10% mid-seral; SCABLAND cover type inclusions characterized by well spaced northern buckwheat plants.
- 359 ANNUAL GRASSLAND cover type, very early seral; a very few sagebrush shrubs remain.
- 360 AGRSPI-POASAN cover type, with 35% early and very early seral, and 65% mid seral; rock outcrop inclusions; small deciduous shrub patch inclusions along toe slope. Of note is that bitterbrush is missing from slope complex, whereas in nearby West Brownlee Creek, bitterbrush is present on these same slope positions.
- 361 PASTURELAND cover land; smooth brome, pubescent wheatgrass, and weedy forbs are common.
- 362 MIXED DECIDUOUS SHRUB cover type; with occasional black cottonwood trees.
- 363 Grass/shrub mosaic - 75% FESIDA-AGRSPI cover type; 25% MIXED DECIDUOUS SHRUB cover type, dominated by ninebark and common snowberry.
- 364 PRUEMA cover type.
- 365 Grass/shrub mosaic - 75% FESIDA-AGRSPI cover type; 25% MIXED DECIDUOUS SHRUB cover type, dominated by ninebark and common snowberry.
- 366 ANNUAL GRASSLAND cover type, very early seral; hoary whitetop is abundant.
- 367 80% FESIDA-AGRSPI cover type; 20% inclusions of MIXED DECIDUOUS SHRUB cover type, dominated by rosaceous shrubs on steep lower slope positions.
- 368 ARTTRV/FESIDA cover type; with sparse to no sagebrush in places; ARTTRV/AGRSPI cover type inclusions.
- 369 80% AGRSPI-POASAN cover type, early and mid-seral; 20% mosaic of FESIDA-AGRSPI and MIXED DECIDUOUS SHRUB (mainly ninebark and common snowberry) cover types in topographic concavities or draws; rock outcrop inclusion.
- 370 AGRSPI-POASAN cover type, mid-seral with some weedy, early seral patches; talus and rock outcrop inclusions.
- 371 AGRSPI-POASAN cover type, late seral and climax; with widely spaced (ca 1% canopy cover) mountain big sagebrush.
- 372 ANNUAL GRASSLAND cover type, with 90% very early and early seral, and 10% mid-seral; a few scattered sagebrush persist; deciduous shrub patch inclusion; bottomlands are very early seral understory with intact deciduous shrub component.
- 373 ANNUAL GRASSLAND cover type, very early seral.

- 374 Grass/shrub mosaic - 75% FESIDA-AGRSPI cover type, mid-seral; 25% mix of PHYMAL, SYMALB and ROSWOO cover types; common snowberry also common within grassland vegetation; a few scattered mountain big sagebrush shrubs are present.
- 375 Mosaic of 65% PHYMAL cover type, with common snowberry and bittercherry common in spots; 20% ARTTRV/FESIDA cover type; 10% PSEMEN cover type, with ninebark-dominated understory in draws; SYMALB and PRUEMA cover type inclusions.
- 376 Mosaic of 55% ARTTRV/FESIDA cover type; 35% PRUEMA cover type; 10% PHYMAL cover type.
- 377 FESIDA-KOECRI cover type, 15% early seral, 85% mix of late and mid-seral; mountain big sagebrush occurs throughout polygon, but averages less than 3% canopy cover, except for some scattered dense clumps; original sagebrush cover reduced by fire (prescribed burn?); PRUEMA and PHYMAL cover type inclusions.
- 378 MIXED DECIDUOUS SHRUB cover type; dominated by bittercherry; area burned, but shrub regeneration is occurring.
- 379 FESIDA\AGRSPI cover type, with 80% mid-seral and 20% early seral; with very sparse mountain big sagebrush averaging no more than 1% cover; some burned (prescribed burn?)sagebrush stumps present, but these are uncommon; ARTTRV/AGRSPI cover type inclusion.
- 380 Scabland mosaic - dominated by ARTRIG cover type (Sandberg's bluegrass and to lesser extent bulbous bluegrass are common, with bluebunch wheatgrass uncommon and Idaho fescue absent); intermixed are more open, rocky sites without stiff sagebrush; the scabland vegetation of this polygon grades into the mountain big sagebrush communities on adjacent upper slopes, some of which has burned with most sagebrush killed.
- 381 ARTTRV/FESIDA cover type, with 10% early 90% mid-seral; more bluebunch wheatgrass than Idaho fescue; sagebrush coverage averages 10% or less, except for local denser patches; 25% numerous, but small (mostly less than 0.1 acre) SCABLAND cover type inclusions, both with stiff sagebrush and without (then with forbs such as *Lomatium* spp., Hooker's balsamroot, sticky phlox, tapertip onion and Sandberg's bluegrass).
- 382 ARTTRV/FESIDA cover type, mid-seral; with sagebrush cover averaging roughly 30%; PHYMAL cover type inclusion.
- 383 Shrub/grass mosaic - 40% ARTTRV/FESIDA cover type, early and mid- seral; 10% MIXED DECIDUOUS SHRUB cover type, dominated by ninebark; 50% FESIDA-AGRSPI cover type, 35% very early and early seral and 65% mid-seral.
- 384 ARTRIG cover type, climax condition; approximately 10% stiff sagebrush cover, with blocks of lichenized basalt throughout polygon.
- 385 ARTTRV/FESIDA cover type; overall low sagebrush density and with cover reduced due to fire (prescribed burn?); ARTTRV/AGRSPI inclusions on southerly aspects..

- 386 Shrub/grass/conifer mosaic - 40% ARTTRV/FESIDA cover type, with approximately 40% sagebrush canopy cover; 30% PHYMAL and PRUEMA cover types; 20% FESIDA-AGRSPI cover type; 10% PSEMEN cover type.
- 387 ARTTRV/FESIDA cover type; sagebrush averaging about 50% cover in most places; inclusions of scabland vegetation supporting little or no mountain big sagebrush.
- 388 PRUEMA cover type; with sapling and seeding Douglas-fir trees along ridge lip.
- 389 ARTTRV/FESIDA cover type; sagebrush averaging about 50% cover in most places; inclusions of scabland vegetation supporting little or no mountain big sagebrush.
- 390 Mosaic of 75% ARTTRV/FESIDA cover type, with roughly 50% average sagebrush canopy cover; 25% PRUEMA and MIXED DECIDUOUS SHRUB cover types; scattered Douglas-fir trees also present.
- 391 ARTTRV/FESIDA cover type; with variable sagebrush cover ranging between 10% to 25%; PRUEMA cover type and other scattered deciduous shrub inclusions.
- 392 FESIDA-AGRSPI cover type, early seral, to mostly mid-and late seral.
- 393 Mosaic of 70% ARTTRV/FESIDA cover type; 20% PRUEMA and PHYMAL cover types; 10% PSEMEN cover type, consisting of scattered individual or small clumps of Douglas-fir.
- 394 ARTTRV/PURTRI cover type; with shrub coverage averaging about 30%; sagebrush outnumbers bitterbrush by a 10-20:1 ratio; PRUEMA and PHYMAL cover type inclusions.
- 395 PRUEMA cover type.
- 396 POPTRE cover type, with shrub layer dominated by bittercherry.
- 397 ARTTRV/FESIDA cover type, with 20% mid-seral and 80% mix of late seral and climax; sagebrush cover is approximately 20%.
- 398 PSEMEN cover type; consisting of pole and sapling conifers all less than 10 meters tall; ninebark dominates understory.
- 399 POPTRE cover type; bittercherry, ninebark and mountain big sagebrush are all common.
- 400 PSEMEN cover type; with ninebark, bittercherry and mountain big sagebrush common in understory.
- 401 75% PRUEMA cover type; with seedling and sapling Douglas-fir trees encroaching from adjacent stand; 25% ARTTRV/FESIDA cover type.
- 402 75% PRUEMA cover type, with scattered Douglas-fir trees; 25% PSEMEN cover type inclusion, with roughly 30% canopy cover, ninebark, common snowberry, white spiraea and pinegrass are all

- common in the understory and ponderosa pine shares the overstory.
- 403 PURTRI/FESIDA cover type, mostly mid-seral, but some late seral; mountain big sagebrush is rare, minimal bitterbrush regeneration seen; PRUEMA cover type inclusion.
- 404 ARTTRV/AGRSPI cover type, with 15% very early and early seral (around lower, gentle slopes and stock ponds), 50% mid-seral and 35% late seral and climax; sagebrush coverage is 10% or less cover except for local, dense clusters; inclusions of AGRSPI-POASAN cover type on south aspects; large FESIDA-AGRSPI cover type inclusion on southwest-facing slope.
- 405 PSEMEN cover type, with approximately 50% canopy cover; largest conifers are approximately 18 inch dbh; thick deciduous shrub layer in most places, and where canopy more open the forb-graminoid layer also well represented; aspen patches scattered throughout stand, but many dying as the conifer canopy closes.
- 406 Mosaic of 60% ARTTRV/FESIDA cover type; 30% deciduous shrubfields dominated by PRUEMA and PHYMAL cover types; 10% PSEMEN, comprised of scattered conifers.
- 407 PSEMEN cover type, with deciduous shrub understory.
- 408 PSEMEN cover type, with deciduous shrub understory.
- 409 Mosaic of ARTTRV/FESIDA and FESIDA-AGRSPI cover types on northwest and west aspects; AGRSPI-POASAN on southwest-facing slopes. Polygon not visited.
- 410 Shrub/grass mosaic - 40% ARTTRV/FESIDA cover type; 15% PRUEMA cover type, with serviceberry and ninebark common in places; 35% mix of FESIDA-KOECRI cover type and FESIDA-AGRSPI cover type; 10% PSEMEN cover type, with open canopy.
- 411 PRUEMA cover type, with scattered Douglas-fir trees; 15% ARTTRV/FESIDA cover type inclusion, with 50% very early and early seral (near stockpond) and 50% mid-seral.
- 412 PSEMEN cover type, with ninebark and bittercherry common in understory.
- 413 Mosaic of 50% ARTTRV/FESIDA cover type, early and mid-seral; 35% MIXED DECIDUOUS SHRUB cover type; 15% PSEMEN cover type.
- 414 Mosaic of 60% ARTTRV/PURTRI cover type, with only occasional bitterbrush; 40% ARTTRV/AGRSPI cover type, with less than 10% sagebrush cover; ARTRIG cover type inclusions; deciduous shrub patch inclusions.
- 415 Mosaic of 60% ARTTRV/FESIDA cover type; 30% MIXED DECIDUOUS SHRUB cover type, dominated by bittercherry, ninebark and serviceberry, with the deciduous shrubfields most common on shoulder topographic positions; 10% PSEMEN cover type, with seedling, sapling and pole size trees scattered within shrubfields; POPTRE inclusion along draw bottoms; Idaho fescue is replaced by elk sedge (*Carex geyeri*) along lower slopes adjoining draw bottoms.

- 416 ARTTRV/PURTRI cover type; with combined canopy cover of less than 10%, Idaho fescue is sparse and the vegetation is dominated by bluebunch wheatgrass in many places; MIXED DECIDUOUS SHRUB cover type inclusions.
- 417 Mosaic of 65% ARTTRV/FESIDA cover type; 15% MIXED DECIDUOUS SHRUB cover type, predominately bittercherry and black hawthorn; 10% POPTRE cover type; 10% PSEMEN cover type, comprised of scattered small clusters of conifers, with common snowberry the understory dominant, and most trees are under 7 meters tall.
- 418 Mosaic of 85% ARTTRV/PURTRI cover type, with a few very widely scattered conifer trees; 15% PURTRI/AGRSPI cover type; inclusions of POPTRE and MIXED DECIDUOUS SHRUB cover types, the latter dominated by bittercherry; annual grassland cover type inclusion that is adjacent to stockpond and dominated by bulbous bluegrass and smooth brome.
- 419 PSEMEN cover type, with shrub understory dominated by ninebark and bittercherry.
- 420 MIXED DECIDUOUS SHRUB cover type.
- 421 ARTTRV/FESIDA cover type; area has burned (prescribed fire?) and majority of sagebrush killed; PRUEMA cover type inclusions.
- 422 MIXED DECIDUOUS SHRUB cover type, with scattered Douglas-fir seedlings and saplings.
- 423 POPTRE cover type, with a few Douglas-fir present at lower end of drainage.
- 424 ARTTRV/AGRSPI cover type, mix of late and mid-seral; sagebrush cover is low, reaching approximately 10% in some places.
- 425 Mosaic of ARTTRV/PURTRI and ARTTRV/FESIDA cover types, with 90% mix of early and mid-seral, and 10% late seral; mosaic of burned, unburned and partially burned (prescribed fire?) vegetation, with most of the sagebrush killed in places.
- 426 85% ANNUAL GRASSLAND cover type; mesic meadow that is 85% very early and early seral, and 15% mid-seral vegetation and supporting native mesic graminoids and forbs; 15% CRADOU cover type clumps.
- 427 Shrub/grass/conifer mosaic - 50% MIXED DECIDUOUS SHRUB cover type, dominated by ninebark; 35% FESIDA-AGRSPI cover type; 15% PSEMEN cover type, with a ninebark-dominated understory.
- 428 FESIDA/AGRSPI cover type, late seral.
- 429 Grass/shrub/conifer mosaic - 70% FESIDA-AGRSPI cover type; 15% MIXED DECIDUOUS SHRUB cover type, dominated by ninebark; 15% PSEMEN cover type, with a ninebark-dominated understory.
- 430 ARTRIG cover type, late seral.

- 431 ARTTRV/FESIDA cover type, early and mid-seral understory; sagebrush cover is variable, averaging between 10 and 30%.
- 432 PSEMEN cover type; shrub layer diverse, but often dominated by ninebark; stand is probably 50-70 years old, although some larger trees are present; ponderosa pine is uncommon within stand.
- 433 FESIDA-AGRSPI cover type, late seral and climax.
- 434 Mosaic of 75% ARTTRV/FESIDA and FESIDA-KOECRI cover types; with sagebrush density low overall and great majority fire-killed (prescribed burn?); 15% ANNUAL GRASSLAND cover type inclusion in weedy mesic meadow; PRUEMA, SYMALB cover type inclusions, with serviceberry shrubs common in places; CRADOU cover type inclusion in draw; inclusions of scattered individual ponderosa pine and Douglas-fir trees.
- 435 PSEMEN cover type, with ninebark in understory, stand is probably 50-70 year old, although some larger trees are present; canopy openings support diverse mix of deciduous shrubs; ponderosa pine is uncommon.
- 436 PSEMEN cover type, with an open canopy (about 20%); understory is mix of deciduous shrubs, while mountain big sagebrush dominates open canopy areas.
- 437** Brownlee Creek - POPTRI cover type; with mountain alder common and in places replacing black cottonwood as the canopy dominant; red-osier dogwood, rose, willow, syringa and poison ivy are common understory shrubs; introduced trees such as black walnut (*Juglans nigra*) occur in places; weeds are common in the herbaceous layer; construction of Highway 71 has impacted the riparian zone of Brownlee Creek.
- 438 Middle Brownlee Creek - POPTRI cover type; syringa, rose and water birch are probably the most common understory shrubs, while other deciduous shrubs are more intermittent; white alder is uncommon; canopy cover of black cottonwood is variable, and it is absent in several short stretches; open canopy segments support greater amounts of black hawthorne and willows (*Salix rigida* and *S. exigua*) than closed canopy areas; herbaceous layer tends to be weedy; Middle Brownlee Creek carries less water than the other major forks and has the narrowest riparian strip.
- 439 MIXED DECIDUOUS SHRUB cover type.
- 440 POPTRE shrub cover type.

Rare plants at Brownlee WMA

Snake Canyon milkvetch (*Astragalus vallis*) and Sheldon's sedge (*Carex sheldonii*) are the only two rare plant species known to occur within Brownlee WMA.

Snake Canyon milkvetch

Snake Canyon milkvetch is endemic to the grassland and sagebrush habitats of the Snake River canyon

and its tributaries in Washington and Adams counties, Idaho, and adjacent parts of Oregon (Moseley 1989). Snake Canyon milkvetch is tracked by the Conservation Data Center and is considered a conservation concern by the Idaho Native Plant Society (INPS - sponsors the annual Idaho Rare Plant Conference and Interagency Rare Plant Meeting). The Conservation Data Center state rank for Snake Canyon milkvetch is S3 (Conservation Data Center 1994). This rank is designated for taxa considered rare or uncommon in Idaho, but not imperiled. It is an INPS Monitor species (Idaho Native Plant Society 1995), a designation pertaining to taxa common within a limited range, as well as those which are uncommon, but have no identifiable threats.

Four occurrences of Snake Canyon milkvetch have been documented from the WMA (polygons 222, 247, 255, 298-299). Two occurrences were discovered during our 1995 field mapping work, and information regarding the other two populations was brought up to date. All occurrences are located in the southern part of the WMA, in the West Brownlee Creek, Box Gulch and upper Cave Creek drainages. Map locations are provided (Appendix 4). Each occurrence is assigned a reference three digit code by the Conservation Data Center. The Element Occurrence Records (EOR) for populations at Brownlee WMA are 007, 008, 009, 010.

All of the populations within the WMA are local and support relatively small numbers of plants. The major threat facing the species within the WMA is degradation of its canyon grassland habitat. Snake Canyon milkvetch was observed only where the native vegetation is relatively intact. Plants are absent from adjacent areas dominated by invasive annual grasses. Additional population, location and other information are contained in the appropriate Element Occurrence Record (formatted data base records - Appendix 5).

Sheldon's sedge

A population of Sheldon's sedge (*Carex sheldonii*) is known from lower Dukes Creek, about 0.1 mile upstream from the Brownlee Reservoir high water mark (polygon 1). It occurs in a small wet opening adjacent to the black cottonwood-white alder riparian zone and contains at least 1000 ramets. Adjacent upland vegetation is in very early and early ecological condition. Although more common in other parts of its distribution, Sheldon's sedge is known from only a handful of scattered sites in Idaho and is on the INPS Review list, a category used for taxa which may be of conservation concern, but for which we have no significant data upon which to base a recommendation regarding the appropriate classification (Conservation Data Center 1994). A location map for the Brownlee WMA population is included (Appendix 4).

Other rare plants

Suitable habitat for several other rare plant species exist within the WMA. There is a historical occurrence (004) for Snake River goldenweed (*Haplopappus radiatus*) from the Brownlee vicinity. It has not been relocated in recent years despite several attempts Mancuso 1993). Snake River goldenweed is a U.S. Fish and Wildlife Category 1 species (U.S. Fish and Wildlife Society 1993) and is endemic to the dry rolling hills and canyons near the Snake River in Washington County, Idaho, and adjacent eastern Oregon.

Cusick's camas (*Camassia cusickii*) had been reported from the WMA. Our field investigations found the location of this population to be erroneous. The population in question occurs at Warm Spring Creek, Oxbow Reservoir, not Spring Creek at Brownlee Reservoir. Although not found, it is possible Cusick's

camas occurs elsewhere within the WMA. At least two yellow-flowered, annual monkeyflower (*Mimulus* spp.) species potentially occur at the WMA. Stalk-leaved monkeyflower (*Mimulus patulus* ssp. *patulus*) has recently been discovered in Idaho in Hells Canyon, north of the WMA. Spacious monkeyflower (*Mimulus washingtonensis* ssp. *ampliatius*) is also known from the Hells Canyon area, north of the WMA. Both are found in vernal wet basalt rock outcrops and damp ground. Until the U.S. Fish and Wildlife Service recently abolished the Category 2 designation, both species were designated at the federal Category 2 level.

Plant community conservation values

Using the classification devised by Caicco *et al.* (1995) in their analysis of the vegetation of Idaho, the approximate frequency of vegetation types within the WMA are - canyon grassland (32%), annual grassland (23%), montane sagebrush and antelope bitterbrush mosaic (17%), mountain brush (13%) and Douglas-fir-aspen/montane brush or sagebrush mosaic (9%). About 6% are vegetation complexes not encompassed by their classification, such as scabland and riparian habitats. The Caicco *et al.* analysis reveals that 17.7 % of all the statewide canyon grassland types occur in areas that receive active management, or are generally managed for natural values (e.g., Research Natural Areas, The Nature Conservancy preserves, most Wilderness, etc.). Similar conservation protection is much less for all of the other vegetation complexes - 7.7% for montane sagebrush-antelope bitterbrush mosaic, 2.1% for mountain brush, and 1% for Douglas-fir-aspen/montane shrub or sagebrush mosaic. The authors note there is a general paucity of protection for ecotonal or transitional complexes between forest and non-forest vegetation. Brownlee WMA contains an estimated 1500 acres of this kind of transitional vegetation along its southern and eastern edges. Stiff sagebrush communities are specifically mentioned by Caicco *et al.* as a type overlooked by their map analysis due to the small patch size these scabland communities occur, but which are of conservation concern. Additional description information regarding the vegetation complexes used for the vegetation of Idaho map can be found in Caicco (1989). Considering statewide protection patterns, it is clear that IDFG management at Brownlee WMA is an important opportunity for increased conservation at the plant community level.

There are a number of plant communities within the WMA that are poorly described or undescribed in the published literature. They are of limited geographical extent and add to the areas plant diversity and conservation values. These scabland, riparian and shrubland communities add to the area's habitat diversity and, therefore, its wildlife value as well.

The Brownlee area represents the northern boundary of low elevation big sagebrush (*Artemisia tridentata* complex) communities in Idaho. Low elevation big sagebrush communities are extensive further south, but north of Brownlee Creek become very sparse and soon disappear. The area encompassed by Brownlee WMA is a transition zone between big sagebrush vegetation to the south and the canyon grasslands characterizing Hells Canyon to the north. Large areas supporting big sagebrush plant communities contain depleted herbaceous understories dominated by annual grasses. Combined with the fact that it is at the northern end of its southward extending distribution, the few big sagebrush communities still relatively intact take on added conservation value. All of the big sagebrush within the WMA was field identified as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). In retrospect, we should have made some collections to verify this identification because it is very possible xeric sagebrush (*Artemisia tridentata* ssp. *xericensis*) also occurs along the face of the Snake River canyon.

Flora of Brownlee WMA

A vascular plant species list has been compiled for Brownlee WMA (Appendix 2). Field work for the vegetation map was completed by early July. This is prior to the flowering period for many plants, especially in the Asteraceae (Aster) family. Therefore, the list is recognized to be incomplete. The list contains a total of 363 species in 61 families. Asteraceae and Poaceae (grass family) contain the most taxa, with 55 and 38 species respectively. Genera such as *Lomatium* (7 species) and *Cryptantha* (6 species) are particularly well represented. The plant list is comprised of approximately 75 (20% of the flora) introduced species.

Specimens of 132 species were collected during field work. These will be labelled and deposited at Brownlee WMA to serve as a beginning reference collection for managers and researchers. Specimens of Snake Canyon milkvetch and Sheldon's sedge are included in this reference collection. A small number of voucher collections will also be deposited at the University of Idaho Herbarium in Moscow.

Recommendations

Weed Control

Weed control is one of the primary management challenges at Brownlee WMA. Some areas of particularly bad infestations are noted in the polygon descriptions for the vegetation map. In all habitats within WMA, but especially grassland, bitterbrush and certain sagebrush habitats, disturbance is a primary conduit for weed establishment and subsequent increase. Therefore, control of disturbance will be an important management tool. Livestock grazing and associated activities are the most widespread disturbances presently occurring within the WMA. We recommend weed management focus on preventive measures. In addition, a priority system should be developed based on habitat vulnerability and wildlife and conservation values. This shifts weed control emphasis away from particular species toward the ecosystem (Hobbs and Humphries 1995). Foremost in this regard is the prevention of weed invasions into areas of intact and relatively intact native vegetative. It is probably too late to do much good in many areas where weeds strongly dominate the vegetation. Restoration efforts may be possible on some accessible, fairly flat areas, but much less likely on the extensive steep canyon slopes presently in poor ecological condition. These sites are lost.

There are many habitat and weed control problems common to both Craig Mountain WMA and the Brownlee WMA. Because of this overlap, many of the following weed management recommendations are similar to those made for the Craig Mountain WMA (Mancuso and Moseley 1994).

1. A weed management plan should be written with the consultation of people familiar with local weed management problems and options. Prevention should be the focus of the weed management plan and priority should be given to areas which are currently weed-free or minimally infested.
2. Coordinate with other land owners and agencies when formulating the weed management plan. It will take a coordinated effort for weed control to be efficient and effective.
3. Changing long-standing livestock grazing practices will help control a main vector of weed spread. Livestock overgrazing has been a chronic disturbance factor and will jeopardize weed control efforts in many areas. This will be important in preventing the establishment of weeds not yet occurring on Fish and Game lands, such as yellow starthistle (*Centaurea solstitialis*), or those just recently introduced, such as leafy spurge (*Euphorbia escula*).

4. Roads and trails are important weed dispersal conduits, and access plans should take this concern into account. This includes road maintenance activities which leave open spaces for invasion. Managers may want to consider grading less frequently.
5. Ground disturbing management actions should evaluate the potential for spread or establishment of weeds. This is especially important in areas where infestations are presently not too severe.
6. Presently, hoary whitetop (*Cardaria draba*) is the most widespread and serious noxious weed within the WMA. Hoary whitetop control efforts should focus on outlying and satellite spot infestations, and along travel routes. Most invasions radiate from multiple, disjunct points, not from a single expanding area. For all serious weeds, controlling satellite populations will be very important in decreasing the rate and degree of invasion into susceptible, but presently uninvaded habitat. With current technology, it is extremely difficult to reduce infestations once well established in canyon habitats.
7. Personnel working at Brownlee WMA should learn to identify noxious and other serious weeds they may encounter, now, or in the near future. These include leafy spurge (*Euphorbia escula*), spotted knapweed (*Centaurea maculosa*), yellow starthistle, Russian knapweed (*C. repens*), Canada thistle (*Cirsium arvense*), Scotch thistle (*Onopordum acanthium*), field bindweed (*Convolvulus arvensis*), sulphur cinquefoil (*Potentilla recta*), Dalmatian toadflax (*Linaria dalmatica*) and bur buttercup. Pamphlets discussing each of these weeds, including identification, are available from the Agricultural Publications Office at the University of Idaho. If questions arise concerning the identification of a suspected weed, verification can be obtained from Agricultural Extension Agents or weed specialists associated with the University of Idaho or Washington State University.
8. If possible, weed surveys should be conducted annually along travel routes and at newly disturbed sites. Broader survey efforts should be conducted periodically to note and assess any new invasions. This type of vigilance will be especially important to combat weeds that are not yet well established on the WMA, such as spotted knapweed, leafy spurge, and likely yellow starthistle in a few years. One limitation of our field work for the vegetation map was that it was conducted earlier in the season than the flowering period of several noxious weeds.
9. If new infestations are discovered they should be controlled immediately. A few specific sites deserve immediate attention. 1) A few rosettes of spotted knapweed were observed in upper Flat Creek (polygon 92) (Figure 5), but this species may be more extensive in the area. 2) Hoary whitetop is much less common in the upper Pine Creek than most other places within the WMA. Areas (polygon 418) near stock ponds and along the four-wheel drive road that accesses the very southern end of the WMA from USFS road 085 currently support local infestations. 3) A few individuals of Dalmatian toadflax were observed along USFS road 085 (polygon 418). 4) Apparently, leafy spurge was recently discovered on the WMA (John O'Neill, personal communication). This should be controlled as soon as possible. Following control, surveillance of all these sites needs to be continued for several years.

Figure 5

10. Prescribed burning projects should evaluate the prospects of increased weed invasion, especially in areas where bunchgrass vigor is poor. Regarding prescription burning sagebrush stands, our field observations suggest mountain big sagebrush/ bluebunch wheatgrass sites are more susceptible to post-fire weed invasion and establishment than mountain big sagebrush/Idaho fescue sites. Post-fire livestock grazing patterns are important in weed establishment within sagebrush communities too.

11. Properly chosen and applied herbicides may be used in areas where there is access. Timing is absolutely critical when using herbicides, especially if they are used in conjunction with other management tools such as prescribed burning or reseeding.

12. The sponsorship of a graduate student to more fully evaluate weed control options and make more site specific recommendations should be considered. We also recommend making Brownlee WMA available to weed researchers and to solicit weed research compatible with management goals.

13. Monitoring should be an integral part of any weed management plan.

Livestock Management

We recommend livestock be concentrated in areas already converted to pasturelands and nearby poor condition grasslands. Native habitat has been lost from these sites and under current knowledge and technology, cannot be recovered. These areas have relatively gentle topography and ready access. Examples of areas supporting this kind of vegetation include portions of upper Dukes Creek (polygons 13, 16, 17, 18, 22), Board Gulch (polygons 23, 29, 31), Flat Creek (polygons 80, 102, 128), lower Grade Creek (polygons 16, 119, 157, 166, 168), and Middle Brownlee Creek (polygons 359, 361). Lower elevation slopes near the Idaho Power access road from Brownlee Creek to Spring Creek are another area already in mostly very early seral condition. However, adjacent steeper middle and upper slopes, and from Spring Creek westward to Cave Creek are in much better ecological condition. If a choice must be made regarding the extensive sagebrush communities near the southern part of the WMA, we recommend livestock grazing be excluded from the Cherry Creek (e.g. polygons 397, 308, 309, 381) and upper Pine Creek areas over west of West Brownlee Creek (e.g. polygons 288, 290, 291, 295). This latter area is in poorer (earlier) ecological condition overall, although prescribed burns have affected all areas.

Areas supporting high quality grassland, bitterbrush or sagebrush plant communities should be off-limits to livestock grazing. Minimal amounts, and proper season of use rotation emphasizing wildlife needs and plant community protection needs is recommended where plant communities are partly intact but may support a mosaic of ecological conditions. Eliminating a major source of disturbance such as livestock grazing will enable these mid-seral plant communities to improve, or at least minimize further retrogression to earlier seral stages. Ecological condition assessments were made for most polygons supporting grassland, bitterbrush and sagebrush vegetation and are included with the polygon descriptions and in Appendix 1.

These recommendations would necessitate fewer animals and more diligent livestock management than past practices for the Brownlee WMA area. They also complicate the development of a grazing management plan. For instance, a simple rotation method such as grazing livestock east of Highway 71 one year and west of the highway the following year, may not work using our recommendations. traditional range management approach is to spread grazing impacts over a larger area in hopes of recovering vegetation in lower ecological condition. In our 20+ years of collective experience working in the

grasslands of Hells Canyon, we have seen no examples of depleted sites recovering using this strategy. We believe that excluding livestock grazing from good condition (mid-seral and better) sites is the most prudent alternative for wildlife management, especially given the high probability of further, irreversible weed infestations that will result using traditional livestock management practices. We believe the wildlife habitat benefits and plant conservation values at stake are worth the effort.

Vegetation sampling

A vegetation monitoring program should be developed conducive to management objectives. During our field work we identified several areas containing excellent condition plant communities that can serve as baseline monitoring sites. Vegetation sampling would also serve to better define the cover types outlined in this report. Grassland, bitterbrush, mountain big sagebrush and scabland communities recommended as possible monitoring sites include the following:

Bluebunch wheatgrass - polygons 279, 349, 371, 404.

Idaho fescue - the upper slopes of polygons 192, 203, 204, 216; portions of polygon 279; polygon 350.

Bitterbrush - 103,106,115; portions of polygon 264.

Mountain big sagebrush - polygons 54, 183, 307, 356.

Scabland - polygons 74, 380, 384; portions of polygon 105.

The riparian vegetation within the WMA received only cursory investigation during our field work. We recommend additional vegetation studies for this group of important wildlife habitats. A series of transects along the length of several drainages would be one approach.

References

- Bailey, R.G. 1995. Description of the Ecoregions of the United States. USDA, Forest Service, Miscellaneous Publication No. 1391. 77 p.
- Bush, J.H., and W.P. Seward, 1992. Geologic field guide to the Columbia River Basalt, northern Idaho and southeastern Washington. Information Circular 49. Idaho Geographical Survey, Univ. of Idaho, Moscow, ID. 35 p.
- Caicco, S.L. 1989. Manual to accompany the map of the existing vegetation of Idaho. Unpublished report on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise, ID. 114 p. Editorial Draft.
- Caicco, S.L., J.M. Scott, B. Butterfield, and B. Csuti. 1995. A Gap Analysis of the management status of the vegetation of Idaho (U.S.A.). *Conservation Biology* 9(3):498-511.
- Campbell, J. 1962. Grasslands of the Snake River drainage in northern Idaho and adjacent Washington. M.S. Thesis, Univ. of Idaho, Moscow. 86 p.
- Conservation Data Center. 1994. Rare, threatened and endangered plants and animals of Idaho. Third edition. Idaho Department of Fish and Game, Boise, ID. 39 p.
- Cooper, S.V., K.E. Neiman, R. Steele, and D.W. Roberts. 1987. Forest habitat types of northern Idaho: a

- second approximation. Gen. Tech. Rep. INT-236. Ogden, UT: USDA, Forest Service, Intermountain Research Station. 135 p.
- Daubenmire, R. 1970. Steppe vegetation of Washington. Technical Bulletin 62. Pullman, WA: Washington Agricultural Experiment Station. 131 p.
- Daubenmire, R. and J.B. Daubenmire. 1968. Forest vegetation of eastern Washington and northern Idaho. Technical Bulletin 60. Pullman, WA: Washington Agricultural Experiment Station. 104 p.
- Driver, C.H. 1982. Potentials for the management of bitterbrush habitats by the use of prescribed fire. Pages 137-141, *In: Proceedings - Research and management of bitterbrush and cliffrose in western North America*; A.R. Tiedemann and K.L. Johnson eds. Gen. Tech. Rep. INT-152. Ogden, UT: USDA, Forest Service, Intermountain Forest and Range Experiment Station.
- Fitzgerald, J.F. 1982. Geology and basalt stratigraphy of the Weiser Embayment, west-central Idaho. Pages 103-128, *In: Cenozoic geology of Idaho*; B. Bonnicksen, and R.M. Breckenridge eds. Idaho Bureau of Mines and Geology, Univ. of Idaho, Moscow.
- Hall, F.C. 1973. Plant communities of the Blue Mountains of Oregon. R6-ECOL-79-001. USDA, Forest Service, Pacific Northwest Region, Portland OR.
- Hansen, P., K. Boggs, R. Pfister, and J. Joy. 1990. Classification and Management of riparian and wetland sites in central and eastern Montana. Univ. of Montana, Montana Forest and Conservation Experiment Station, School of Forestry, Missoula. 279 p. Draft Version 2.
- Hironaka, M., M.A. Fosberg, and A.H. Winward. 1983. Sagebrush-grass habitat types of southern Idaho. Bulletin No. 35. Forest, Wildlife and Range Experiment Station, University of Idaho, Moscow. 44 p.
- Hitchcock, C.L., and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle, WA. 730 p.
- Hobbs, R.J., and S.E. Humphries. 1995. An integrated approach to the ecology and management of plant invasions. *Conservation Biology* 9(4):761-770.
- Huschle, G. 1975. Analysis of the vegetation along the middle and lower Snake River. M.S. Thesis. Univ. of Idaho, Moscow. 271 p.
- Idaho Native Plant Society. 1995. Results of the eleventh annual Idaho rare plant conference. Unpublished manuscript on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise, ID.
- Johnson, C.G., and S.A. Simon. 1987. Plant associations of the Wallowa-Snake Province. R6-ECOL-TP-255A-86. USDA, Forest Service, Pacific Northwest Region, Wallowa-Whitman National Forest, Baker City, OR. 399 p., plus appendices.
- Johnson, C.G., and R.R. Clausnitzer. 1992. Plant associations of the Blue and Ochoco Mountains.

- R6-ECOL-TP-036-92. USDA, Forest Service, Pacific Northwest Region. 164 p., plus appendices.
- Johnson, F.D. 1981. Idaho: climate/vegetation life zone data. Forestry, Wildlife and Range Science Experiment Station, Univ. of Idaho, Moscow.
- Kauffman, J.B., W.C. Krueger, and M. Vavra. 1985. Ecology and plant communities of the riparian area associated with Catherine Creek in northeastern Oregon. Agricultural Experiment Station Technical Bulletin 147. Oregon State University, Corvallis. 35 p.
- Kovalchik, B.L. 1987. Riparian zone associations of the Deschutes, Fremont, Ochoco and Winema National Forests. R6-ECOL-TP-279-87. USDA, Forest Service, Pacific Northwest Region, Portland, OR. 171 p.
- Mancuso, M., and R.K. Moseley. 1993. Report on the conservation status of *Haplopappus radiatus*, in Idaho. Unpublished report prepared for the Idaho Department of Parks and Recreation, on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise, ID. 32 p., plus appendices.
- Mancuso, M., and R. Moseley. 1994. Vegetation description, rare plant inventory, and vegetation monitoring for Craig Mountain, Idaho. Report prepared for Bonneville Power Administration, Portland, OR. 146 p., plus appendices.
- Moseley, R.K. 1989. Field investigations of *Leptodactylon pungens* ssp. *hazeliae* (Hazel's prickly phlox) and *Mirabilis macfarlanei* (Macfarlane's four-o'clock), Region 4 sensitive species on the Payette National Forest, with notes on *Astragalus vallaris* (Snake Canyon milkvetch) and *Rubus bartonianus* (bartonberry). Unpublished report on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise, ID. 16 p., plus appendices.
- Moseley, R.K., and M. Mancuso. 1990. Field investigations of three sensitive plant species on the Payette National Forest: *Allium tolmiei* var. *persimile*, *Castilleja oresbia* and *Penstemon elegantulus*. Unpublished report on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise, ID. 21 p., plus appendices.
- Miller, T.B. 1976. Ecology of riparian communities dominated by white alder in western Idaho. M.S. Thesis, Univ. of Idaho, Moscow. 154 p.
- Mueggler, W.F. 1988. Aspen community types of the Intermountain Region. Gen. Tech. Rep. INT-250. Ogden, UT: USDA, Forest Service, Intermountain Research Station. 135 p.
- Mueggler, W.F., and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. Gen. Tech. Rep. INT-66. USDA, Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 154 p.
- Natural Resources Conservation Service. 1995. Soil survey for Adams and Washington counties, Idaho. Weiser, ID. Draft 1995.

- Nelson, L., and M. Jensen. 1987. Sagebrush-grass community types of the Humbolt National Forest. USDA Forest Service, Humbolt National Forest, Elko, NV. 54 p., plus appendices.
- Omernik, J.M., and A.L. Gallant. 1986. Ecoregions of the Pacific Northwest. EPA/600/3-86/033. U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR. 39 p.
- Padgett, W.G., A.P. Youngblood, and A.H. Winward. 1989. Riparian community type classification of Utah and southeastern Idaho. Gen. Tech. Rep. R4-ECOL-89-01. Ogden, UT: USDA, Forest Service. 191 p.
- Roberts, R.W. 1971. Bitter cherry vegetation on the Boise National Forest. M.S. Thesis, Univ. of Idaho, Moscow. 53 p.
- Ross, S.H., and C.N. Savage. 1967. Idaho earth science: geology, fossils, climate, water, and soils. Idaho Bureau of Mines and Geology, Earth Science Series No. 1, Moscow, ID. 271 p.
- Schlatterer, E.G. 1972. A preliminary description of plant communities found on the Sawtooth, White Cloud, Boulder, and Pioneer Mountains. USDA, Forest Service, Intermountain Region, Ogden, UT. 111 p.
- Steele, R., R.D. Pfister, R.A. Ryker, and J.A. Kittams. 1981. Forest habitat types of central Idaho. Gen. Tech. Rep. INT-114. Ogden, UT: USDA, Forest Service, Intermountain Forest and Range Experiment Station. 138 p.
- Steele, R., and K. Geier-Hayes. 1989. The Douglas-fir/ninebark habitat type in central Idaho: succession and management. Gen. Tech. Rep. INT-252. Ogden, UT: USDA, Forest Service, Intermountain Research Station. 65 p.
- Tisdale, E.W. 1986. Canyon grasslands and associated shrublands of west-central Idaho and adjacent areas. Bulletin No. 40. Forest, Wildlife and Range Experiment Station, University of Idaho, Moscow. 42 p.
- Tuhy, J.S., and S. Jensen. 1982. Riparian classification for the upper Salmon/Middle Fork Salmon River drainages, Idaho. White Horse Associates, Smithfield, UT. 183 p.
- U.S. Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; review of plant taxa for listing as endangered or threatened species; notice of review. Federal Register 50 CFR Part 17:51144-51190 (Thursday, September 30, 1993).

APPENDIX 1

Summary of Brownlee Vegetation Map polygon data
(Lotus 1-2-3 Windows, Release 5, data file).

Interpretation of Appendix 1

Poly # = Polygon number (1-440).

Size = Acreage of polygon (within the WMA boundaries).

C.T. = Cover type for polygon. Each cover type has a corresponding alphanumeric code within the Grassland (G), Bitterbrush (B), Sagebrush (S), Scabland (A), Deciduous shrub (D), Riparian (R), or Conifer (C) habitat classes. Cover types and corresponding codes are listed in the chart below.

% = Percentage of cover type comprising a polygon. Note that 95% is used for polygons dominated by one cover type, but containing minor amounts (<10%) of one or more additional cover types inclusions.

Ecological Condition - V = very early seral; E = early seral; M = mid-seral; L = late seral; C = climax . The percentage of each seral stage is listed for polygons comprised of multiple seral stages. "X" means a particular seral stage is present within a polygon, but a percentage was not estimated.

Inclusions = List of cover types occurring in minor amounts (<10%) within a polygon and, therefore, not listed in the C.T. column. The same alphanumeric codes as for cover type are used.

ID Map = A polygon's equivalent map unit based on the Vegetation of Idaho Map (Caicco *et al.* 1995). The numeric codes (1-5) correspond to the following Vegetation of Idaho Map types: 1 = canyon grassland; 2 = annual grassland; 3 = montane sagebrush and antelope bitterbrush mosaic; 4 = mountain brush; 5 = Douglas-fir-aspen/montane brush or sagebrush mosaic; NA = not applicable (meaning there is no corresponding vegetation listed for the Vegetation of Idaho Map). Codes and their corresponding cover types are listed in the chart below.

H.T. = The habitat type for the polygon. Cover types are linked to the appropriate habitat type via a numeric coded (1-17). These are listed in the chart below. Habitat types are based on the following references: 1 = *Agropyron spicatum-Poa sandbergii/Balsamorhiza sagittata* (Tisdale 1986); 2 = *Festuca idahoensis-Agropyron spicatum* (Tisdale 1986); 3 = *Festuca idahoensis-Koeleria cristata* (Tisdale 1986); 4 = *Purshia tridentata/Agropyron spicatum* (Johnson and Simon 1987); 5 = *Purshia tridentata/Stipa comata* (Daubenmire 1970); 6 = *Purshia tridentata/Festuca idahoensis-Agropyron spicatum* (Johnson and Simon 1987); 7 = *Artemisia tridentata ssp. vaseyana/Festuca idahoensis* (Johnson and Simon 1987); 8 = *Artemisia tridentata ssp. vaseyana/Agropyron spicatum* (Hironaka *et al.* 1983); 9 = *Artemisia tridentata ssp. vaseyana-Purshia tridentata/Festuca idahoensis* (Johnson and Simon 1987); 10 = *Artemisia rigida/Poa sandbergii* (Tisdale 1986); 11 = *Physocarpus malvaceus* (Johnson and Simon 1987); 12 = *Symphoricarpos albus* (Tisdale 1986); 13 = *Symphoricarpos albus-Rosa woodsii* (Johnson and Simon 1987); 14 = Talus shrub garland (Johnson and Simon 1987); 15 = *Alnus rhombifolia/Philadelphus lewisii* (Miller 1976); 16 = *Pseudotsuga menziesii/Physocarpus malvaceus* (Steele *et al.* 1981); 17 = *Pseudotsuga menziesii/Symphoricarpos albus* (Steele *et al.* 1981).

List of cover types and their corresponding cover type (C.T.), Vegetation of Idaho Map (ID Map), and

habitat type (H.T.) codes.

<u>Cover type</u>	<u>C.T.</u>	<u>ID Map</u>	<u>H.T.</u>
Bluebunch wheatgrass-Sandberg's bluegrass	G1	1	1
Idaho fescue-bluebunch wheatgrass	G2	1	2
Idaho fescue-prairie Junegrass	G3	1	3
Annual grassland	G4	2	-
Pastureland	G5	2	-
Bitterbrush/annual bromes	B1	2	-
Bitterbrush/bluebunch wheatgrass	B2	3	4
Bitterbrush/needle-and-thread grass	B3	3	5
Bitterbrush/Idaho fescue	B4	3	6
Mountain big sagebrush/Idaho fescue	S1	3	7
Mountain big sagebrush/bluebunch wheatgrass	S2	3	8
Mountain big sagebrush-bitterbrush	S3	3	9
Mountain big sagebrush/annual bromes	S4	2	-
Stiff sagebrush	A1	NA	10
Scabland	A2	NA	-
Ninebark	D1	4	11
Common snowberry	D2	4	12
Wood's rose	D3	4	13
Bittercherry	D4	4	-
Mixed deciduous shrub	D5	4	-
Talus-shrub garland	D6	NA	14
Black cottonwood/mixed deciduous shrub	R1	NA	-
Aspen/mixed deciduous shrub	R2	5	-
White alder	R3	NA	15
Water birch	R4	NA	-
Black hawthorne	R5	4	-
Douglas-fir/deciduous shrub	C1	5	16,17

Note: The data matrix used for analysis of the vegetation map are stored on diskette in Lotus 1-2-3 (Release 5) and in GIS data files. All are on file at IDFG, Natural Resources Policy Bureau, Boise.

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
31	30.2	G4	100		90	10			2	1	
32	15	G2	70		35	65			1	2	
32		D3	20							13	
32		D1	10							11	
33	0.7	G2	95			100		rock	1	2	
34	0.6	B1	100	X	X				3	4	
35	40.4	R1	100						NA		
36	45	G2	95		30	70		D1 D3 B1	1	2	
37	26.9	G1	100	20	50	30			1	1	
38	18.6	G4	95	X	X	20		D1 D3	2	2	
39	3.4	D3	100						4	13	
40	20.6	G4	100	X	X	20			2	2	
41	188.3	G1	40	10	20	70		D5 rock	1	1	
41		A2	35								
41		B1	15							4	
42	42.6	G4	95		95	5		D1 D3	2	1	
43	8.1	D1	100						4	11	
44	48.3	G4	100		90	10			2	1	
45	20	D5	100						4		
46	10.2	G2	90			100		D3	1	2	
46		D1	10								
47	107.8	G2	75						1	2	
47		D1	15							11	
47		D3	10							13	
48	13.7	R2	30						5		
48		D1	30							11	
48		G2	30					D5		2	
49	35.7	G2	60						1	2	
49		D1	20							11	
49		D2 D3	20							12 13	
50	52.4	G2	65			100			1	2	
50		D1	15							11	
50		D2	20							12	
51	16.7	G2	80			100			1	2	
51		S1	20							7	
52	1.7	D4	100						4		
53	5.1	G3	100		75	25			1		
54	41.9	G2	60		10	80	10	rock	1	2	
54		S1	40							7	
55	20.5	G1	100			20	80		1	1	
56	18	D1	50					D5	4	11	
56		G2	40							2	
57	9.5	D1	30						4	11	
57		D2 D4	25							12	

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
57		R2	10								
57		G2	35							2	
58	4.6	G2	80			100			1	2	
58		D1	10							11	
58		D2	10							12	
59	90.9	G1	100		60	40			1	1	
60	34.6	G1	95		30	70		D5	1	1	
61	19.3	G1	80		75	25			1	2?	
61		D1	10							11	
61		D3	10							13	
62	9.9	D5	100						4		
63	51.9	G4	100	100					2		
64	23.2	D1	40						1	11	
64		D3	10							13	
64		G2	50							2	
65	119.7	G2	95			100		A2	1	2	
66	47.5	G4	90	80	20				2	1	
66		B1	10							4	
67	9.3	B1	95					Celret	2	4	
68	12.7	R1	100						NA		
69	22.2	G2	70		20	80		Amealn	1	2	
69		D1	10							11	
69		D3	10							13	
70	74.1	S4	100		100				2	7	
71	120.9	A2	70					rock D6	NA		
71		A1	10							10	
72	94.5	G1	100	10	20	70			1	1	
73	419.5	G4	90	90	10				2	1	
73		B1	10							4	
74	29.6	A1	100						NA		
75	52.9	G4	100	100					2		
76	66	G4	95	15	70	15		B1	2	1	
77	36.2	A2	100						NA		
78	70.1	B1	100	10	90				2	4	
79	10.7	D5	100						4		
80	78.2	G5	100	100					2		
81	52	G2	100			X	X		1	2	
82	171.9	G2	95			X	X	S1 D2 D3	1	2	
83	1.5	R2	100						5		
84	102.6	G4	100	X	X				2	1	
85	10.3	A1	100						NA		
86	15	R2	100						5		
87	17.9	C1	100						5		
88	32.9	G3	90			X	X	A1	1	3	

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
88		S1	10							7	
89	1.5	G3	70						1	3	
89		S1	20							7	
89		A1	10							10	
90	out	D4	100						4		
91	15.8	D4	100						4		
92	5.9	S1	100			100			3	7	
93	14.9	D4	100						4		
94	2.2	R2	100						5		
95	1.9	R2	100						5		
96	10.1	G3	65						1	3	
96		D4	35								
97	32.8	G3	95			100		D5	1	3	
98	156.3	G1	100			20	80		1	1	
99	66.8	G3	95			100		D5	1	3	
100	1.8	R2	100						5		
101	152.1	B1	100						2	4	
102	292.6	G4	100	X	X	10			2	1	
103	21.3	B2	100		X	X	X		3	4	
104	7.4	R2	100						5		
105	45.8	G2	65			80	20		1	2	
105		S1	25				100			7	
105		A1	10					100		10	
106	32.3	B2	100			100			3	4	
107	17.1	D5	100						4		
108	41.7	R2	100						5		
109	42.4	D1	25						1	11	
109		D4	25					D5			
109		G2	50		50	50				2	
110	68.3	G4	100	50	35	15			2	1	
111	155.9	G1	100		25	75			1	1	
112	158.4	G2	95		10	85	5	G1 Amealn	1	2	
113	127.2	G1	75		15	80	5	rock-20% G2	1	1	
114	110.9	G1	85	10	25	65		rock-15%	1	1	
115	10.6	B2	100		X	X			3	4	
116	144.1	G4	100	65	15	20			2	1	
117	26.5	G4	100	X	X	20			2	2?	
118	55.4	G4	95	X	X			B1 A2	2	1	
119	65.8	G4	100	100					2		
120	11.9	D5	80						4		
120		R1	20								
121	64.6	G4	95	10	80	10		A1 D5 rock	2	1	
122	22.6	G4	75	10	80	10		D5 rock-15%	2		
123	35.6	G1	100	X	X	X			1	2	

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
124	2.3	D5	100						4		
125	30.9	G4	100		100				2	1	
126	23	B2	80		X	X		rock-20%	3	4	
127	33	G1	100		25	75			1	1	
128	55.3	G4	100	100					2		
129	76.7	G4	95	X	X	X		D5 rock	2		
130	138.2	G1	95	15	25	65		A2	1	1	
131	64.7	R1	100						NA		
132	174.4	G1	100	10	20	70			1	1	
133	61	G4	95	40	60			D5	2	1	
134	60.7	G4	100	X	X				2	1	
135	15.6	D5	95					R2	4		
136	26.8	G1	100		10	75	15		1	1	
137	13.8	G4	100	X	X				2	1	
138	151	G2	60		50	40	10	D1 D4 D5	1	2	
138		S1	30			100				7	
139	11.3	G2	60		X	X			1	2	
139		D1 D2 D3	40							11 12 13	
140	27.5	R2	100						5		
141	38.9	G4	100	80	20				2	1	
142	8.2	D1 D2 D3	65						4	11 12 13	
142		G2	35		X	X				2	
143	8.8	C1	100						5		
144	9.4	G4	100	80	20				2	1	
145	27.7	D2 D3	65					D1 Amealn	4	12 13	
145		G2	20			100				2	
145		C1	15							18	
146	4.4	C1	100						5	17	
147	20.2	D1	60					D5	4	11	
147		D4	30								
148	41.7	G2	95			100		C1	1	2	
149	15.8	C1	100						5	17 18	
150	3.8	D4	100						4		
151	15.5	S1	100			100			3	7	
152	2.3	R2	100						5		
153	11.2	C1	100						5	17 18	
154	34	G2	95		20	80		G1	2	2	
155	23.3	S1	100			100			3	7	
156	4.5	G1	100		20	80			1	1	
157	46.3	G5	100	100					2		
158	60.1	G1	95	X	X	X		A1	1	8?	
159	66	G2	100	5	20	75			1	1	
160	17.7	R2	100						5		
161	23.6	S1	100			100			3	7	

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
189	123.4	S1	100		25	50	25			3	7
190	72	G2	95	10	60	30			D5	1	1
191	156.3	G4	90		80	20			rock-10% A1	2	1
192	272.8	G1	70	X	X	25	5			1	1
192		G2	30		10	20	X	X			2
193	0.4	A1	100							NA	
194	11.3	D5	100							4	
195	1	G2	60							1	2
195		D5	40								
196	27.1	G4	100	X	X					2	1
197	15.9	B1	100							2	4
198	7.4	G2	75							1	2
198		D5	25								
199	19.2	S4	100							2	8?
200	10.8	B1	100							2	4
201	6.2	B1	100							2	4
202	6.2	D5	100							4	
203	22.1	G2	95		20	X	X		D1 D2 A1	4	2
204	58.4	D5	100							1	
205	15.8	G2	65			X	X	X	rock D5	1	2
205		G1	35			X	X	X			1
206	40.9	G2	80		15	X	X			1	2
206		D1 D2 D3	20						D4		11 12 13
207	50.2	G1	100	X	X	25				1	1
208	6.6	D5	100							4	
209	31.8	G2	80							1	2
209		D5	20								
210	38.6	G4	100	X	X					2	1
211	8.8	D5	100							4	
212	12.8	S4	100	X	X					2	8?
213	91.8	B1	100		100					2	4
214	13.1	G2	65						Celret-20%	1	2
214		D5	15								
215	65.6	G4	100	X	X	20				2	1
216	209.5	G1	100		20	80				1	1
217	9.8	D5	100							4	
218	149.4	G1	80	X	X	65	10		rock-15% G2 D5	1	1
219	162.6	G2	70	X	X	50	30		rock-25% D5 D6	1	2
220	398.7	G1	95	30	45	25			D5 rock	1	1
221	18.3	B1	100		100					2	4
222	151.2	G2	65		10	80	10		D5 rock	1	2
222		G1	35		10	80	10				1
223	14.2	B1	100		100					2	4
224	9.8	G4	100	100						2	

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
225	42.8	G4	100	X	X	15			2	1	
226	2.2	D5	100						4		
227	10.6	B1	95					D5	2	4	
228	20.6	G2	65		X	X			1	2	
228		D1 D2 D5	35							11 12	
229	68.5	G1	100			100			1	1	
230	104.9	G2	90		20	70	10	rock	1	2	
230		D1 D2	10							11 12	
231	20.5	D5	100						4		
232	92	G2	100	X	X	80			1	7	
233	32.4	S1	100	X	X	80			3	7	
234	19.5	G2	95					D5	1	2	
235	27.2	G2	100			100			1	1	
236	40.6	G2	100						1	2	
237	28.8	G1	100			25	X	X	1	1	
238	81.1	S1	100		X	X			3	7	
239	61.5	G2	75		X	X	75		1	2	
239		D6	25							15	
240	41.8	B1	95		100			S4	2	4	
241	127.4	G4	100	20	70	5			2	1	
242	5.3	G5	100	100					2		
243	10.6	B2	100			100			3	4	
244	106.5	G1	95		20	80		G2 D5 D2 S4	1	1	
245	2.8	D6	100						4	15	
246	77	B2	80		X	X	60	rock A2	3	4	
247	154.4	G1	100	15	35	50			1	1	
248	34.5	G4	100	X	X				2	1	
249	52.5	G4	100	100					2	7?	
250	8.8	D5	100						4		
251	12.2	G2	95			100		D1	1	2	
252	68.6	G2	100	X	X	75			1	2 7	
253	5	B2	100			100			3	4	
254	92.3	S4	100		100				2	7	
255	11	S2	100			100			3	8	
256	15.1	D5	100						4		
257	15.9	B2	100			100			3	4	
258	117.6	G1	95		20	80		D5 rock	1	1	
259	55.4	G2	100			15	X	X	1	2	
260	48.2	S1	100						3	2 7	
261	87.4	R1	95					R3 R4	NA		
262	50.9	B2	100		X	X			3	4	
263	18.5	S1	100						3	7	
264	101	B2	100		20	65	15		3	4	
265	129.6	G2	80		X	X	X	R1	1	2	

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
265		D1	10							11	
265		D5	10								
266	38.9	B2	75						3	4	
266		G2 D5	25								
267	29.9	B2	95		20	80		S2	3	4	
268	147.8	G2	100	10	10	X	X		1	2	
269	53.5	G2	65		X	X	X		1	2	
269		S1	25							7	
269		D1 D2 D5	10							11 12	
270	54.9	S1	100						3	7	
271	245.5	S4	100	X	X				2	8?	
272	24.9	G2	95	X	X	50		D5	1	1	
273	2.2	S4	100						2	8	
274	48.9	S4	75					rock	2	8?	
274		D6	20							15	
275	203.6	S4	100	X	X				2	8?	
276	27.1	D5	95					R2	4		
277	68.2	B2	100		X	X			3	4	
278	12.6	S4	100		100				2	8?	
279	398.7	G1	75		30	X	X	D5	1	1	
279	0.5	G2	25		30	X	X			2	
280	23.1	R3	100						NA	16	
281	94.8	G2	90					D1 D5 S1 rock	1	2	
282	8	S4	100	X	X				2		
283	60.8	G2	70			100			1	2	
283		D5	30								
284	35.2	G2	85						1	2	
284		S1	15							7	
285	6.5	S4	100	X	X	X			2	7	
286	39.2	G2	95					D5	1	2	
287	26.6	G2	100		X	X			1	2	
288	146.3	S1	95					A1	3		
289	31	A1	100						NA	10	
290	353.9	S1	95	X	X	X		A1 A2	3	7	
291	119.9	G2	95	X	X	X		A1 A2	1	7	
292	16.6	G3	100		X	X			1	7	
293	52.1	G2	75		X	X			1	7	
293		A1	25							10	
294	19.9	S1	100						3	7	
295	135.4	S1	80		20	80			3	7	
295		A1	20							10	
296	20.9	G4	100	X	X				2	1	
297	17.5	G2	70		X	X		rock	1	1	
297		D6	20							15	

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
332	51	G2	100	X	X	75			1	2	
333	41.5	S1	100						3	7	
334	82	G1	95					G2	1	1	
335	19	D5	100						4		
336	133	G2	100			X	X		1	2	
337	2.4	B2	100						3	4	
338	42.4	S1	95		X	X		R1 B2	3	7	
339	19.8	D5	75						4		
339		G2	25							2	
340	50.5	G2	100			X	X		1	2	
341	13.8	D5	70						4		
341		G2	30							2	
342	2.5	B2	100						3	4	
343	6.5	D5	100						4		
344	24.6	B2	100						3	4	
345	122.2	G1	90		X	X	X	D5 D2 S1 rock	1	1 2	
346	159.5	G1	95	25	50	25		G2 D5 rock	1	1	
347	9.8	B2	100						3	4	
348	71.5	G2	60			X	X	rock	1	2	
348		B2	20								
348		D5	20								
349	169.7	G1	95			X	X	D6 rock	1	1	
350	48.4	G2	85			X	X	A1 rock	1	2	
350		D5	15								
351	37.7	G2	100	X	X	X			1	2	
352	45.9	G2	100	X	X	50			1	2	
353	25.4	G2	85			100			1	2	
353		D1	15							11	
354	42.3	B3	100	X	X				3	5?	
355	63.8	G4	95	100				D5	2		
356	30.1	S1	95		X	X		G1 D4 D5	3	7	
357	114.1	S1	85		X	X	X	D5	3	7	
357		D1 D2 D3	15								
358	17.1	B1	95		90	10		A2	3	4	
359	25.6	G4	100	100					2	7?	
360	52.8	G1	95	X	X	65		rock D5	1	1	
361	20.1	G5	100	100					2		
362	27.2	D5	100						4		
363	50.9	G2	75						1	2	
363		D5	25								
364	18.1	D4	100						4		
365	9.5	G2	75						1	2	
365		D5	25								
366	7.1	G4	100	100					2		

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
367	8.1	G2	80						1	2	
367		D5	20								
368	66.7	S1	95					S2	3	7	
369	90	G1	80		X	X		rock	1	1	
369		G2 D5	20								
370	9.8	G1	95		X	X		rock	1	1	
371	12.4	G1	100				X	X	1	1	
372	60.3	G4	95	X	X	10		D5	2	7?	
373	2.6	G4	100	100					2		
374	49.2	G2	75			100			1	2	
374		D1 D2 D3	25								
375	47.8	D1	65					D2 D4	5	11	
375		S1	20							7	
375		C1	10							17	
376	49	S1	55						4	7	
376		D4	35								
376		D1	10							11	
377	168	G3	95		15	X	X	D1 D4	1	7	
378	17.1	D4	100						4		
379	47.2	G2	95		20	80		S2	1	2	
380	57.1	A1 A2	100		10	X	X		NA		
381	64.6	S1	75		10	90			3	7	
381		A1 A2	25								
382	15	S1	95			100		D1	3	7	
383	69.2	S1	40		X	X			3	7	
383		D1	10								
383		G2	50	X	X	65				2	
384	25.4	A1	100				100		NA	10	
385	85.1	S1	95					S2	3	7	
386	32.6	S1	40						5		
386		D1 D4	30								
386		G2	20								
386		C1	10								
387	47.3	S1	95					A2	3	7	
388	32.5	D4	100						4		
389	45.1	S1	95					A2	3	7	
390	31	S1	75						3	7	
390		D4	25					D5			
391	34.9	S1	95					D4 D5	3	7	
392	15.7	G2	100		X	X	X		1	2	
393	22.2	S1	70						5		
393		D1 D4	20								
393		C1	10								
394	128.7	S3	95					D1 D4	3	9	

Poly #	Size	C.T.	%	Ecological Condition (%)					Inclusions	ID Veg Map	H.T.
				V	E	M	L	C			
395	2.9	D4	100							4	
396	9.3	R2	100							5	
397	38.9	S1	100			20	X	X		3	7
398	9	C1	100							5	17
399	9.3	R2	100							5	
400	2.8	C1	100							5	17
401	10.9	D4	75							4	
401		S1	25								
402	24.7	D4	75							4	
402		C1	25								
403	14.5	B4	95						D4	3	6
404	65.9	S2	90	5	10	50	X	X	G2	3	8
405	41.5	C1	100							5	17
406	1	S1	60							5	
406		D1 D4	30								
406		C1	10								
407	0.6	C1	100							5	
408	1.1	C1	100							5	
409	60.9	S1 G2 G1	100							1	
410	117.2	S1	40								
410		D4	15							5	
410		G2 G3	35								
410		C1	10								
411	13.5	D4	85							4	
411		S1	15	X	X	50					
412	4	C1	100							5	17
413	34.5	S1	50							5	
413		D5	35								
413		C1	15								
414	35.9	S3	60						A1 D5	3	
414		S2	40								
415	38.9	S1	60						R2	5	
415		D5	30								
415		C1	10								
416	33.1	S3	95						D5	3	9
417	61.6	S1	65							5	
417		D5	15								
417		R2	10								
417		C1	10								
418	343.5	S3	85						R2 D5 G4	3	9
418		B2	15								
419	11	C1	100							5	17
420	8.4	D5	100							4	
421	39	S3	95						D4	3	7

APPENDIX 2

Vascular plant species list for Brownlee WMA.

Note: The species list is arranged alphabetically by family. Common names are provided for all species. Taxonomy follows that in *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973).

The list contains the common habitat(s) for each species within the WMA. The habitats are coded as "G" = grassland; "B" = bitterbrush; "S" = mountain big sagebrush; "A" = scabland; "D" = deciduous shrub; "R" = riparian; "C" = conifer. Only the common habitat(s) is listed and a particular species may sometimes occur in habitats not checked.

VASCULAR PLANT LIST FOR BROWNLEE WMA

SCIENTIFIC NAME	COMMON NAME	G	B	S	A	D/R/C
Aceraceae	Maple family					
Acer glabrum	Rocky Mtn. maple				x	x
Anacardiaceae	Sumac family					
Rhus glabra	smooth sumac	x				x
Rhus radicans	poison ivy	x				x
Apiaceae	Parsley family					
Angelica arguta	sharptooth angelica					x
Anthriscus scandicina	chervil					x
Conium maculatum	poison-hemlock					x
Cicuta douglasii	western water-hemlock				x	
Heracleum lanatum	cow parsnip					x
Lomatium ambiguum	swale desert-parsley	x			x	
Lomatium cous	cous desert-parsley	x			x	
L. dissectum multifidum	fern-leaved desert-parsley	x	x			
Lomatium grayi	Gray's lomatium	x			x	
Lomatium macrocarpum	large-fruit lomatium	x			x	
Lomatium nudicaule	barestem lomatium	x			x	
Lomatium triternatum	nine-leaf lomatium	x		x		
Osmorhiza chilensis	mountain sweet-cicely					x
Osmorhiza occidentalis	western sweet-cicely					x
Perideridia bolanderi	Bolander's yampah	x				
Perideridia gairdneri	Gairdner's yampah	x	x	x		
Zizia aptera	heart-leaved Alexanders			x		
Apocynaceae	Dogbane family					
Apocynum androsaemifolium	spreading dogbane	x	x			
Asclepiadaceae	Milkweed family					
Asclepias speciosa	showy milkweed	x				
Asteraceae	Aster family					
Achillea millefolium	common yarrow	x	x	x		x
Agoseris glauca	pale agoseris	x	x	x		

		G	B	S	A	D/R/C
Antennaria dimorpha	low puss-toes	x			x	
Antennaria luzuloides	woodrush pussy-toes	x				
Antennaria microphylla	rosy pussy-toes		x			
Anthemis arvensis	dogfennel	x				
Arctium minus	common burdock					x
Arnica sororia	twin arnica	x		x		
Artemisia dracunculus	dragon sagewort	x				
Artemisia ludoviciana	Louisiana mugwort	x		x		x
Artemisia rigida	stiff sagebrush				x	
Art. tridentata vaseyana	mountain big sagebrush			x		
Balsamorhiza hookeri	Hooker's balsamroot				x	
Balsamorhiza sagittata	arrowleaf balsamroot	x	x	x		
Blepharipappus scaber	blepharipappus	x				
Centaurea maculosa	spotted knapweed	x				
Chaenactis douglasii	false yarrow	x			x	
Chichorium intybus	chicory	x				
Chrysopsis villosa villosa	hairy goldenaster	x				
Chrysothamnus nauseosus	gray rabbitbrush		x			
Chrysothamnus viscidiflorus	green rabbitbrush	x				
Cirsium arvense	Canada thistle					x
Cirsium canovirens	gray-green thistle	x				
Cirsium vulgare	bull thistle	x				x
Conzya canadensis	horseweed	x				
Crepis acuminata	long leaved hawksbeard	x				
Crepis atrabarba	slender hawksbeard	x				
Crepis occidentalis	western hawksbeard	x	x	x		
Erigeron corymbosus	foothill daisy	x				
Erigeron linearis	desert yellow daisy		x		x	
Erigeron pumilus	shaggy fleabane	x	x			
Erigeron sp	fleabane	x				
Eriophyllum lanatum	common eriophyllum	x				
Gnaphalium palustre	lowland cudweed					x
Grindelia squarrosa	curly-gup gumweed	x		x		
Gutierrezia sarothrae	matchbrush	x				
Haplopappus lanuginosus	woolly goldenweed				x	
Helianthella uniflora douglasii	Rocky Mtn. helianthella	x		x		x
Helianthus annuus	common sunflower	x				
Hieracium albertinum	western hawkweed	x				
Lactuca serriola	prickly lettuce	x				
Lagophylla ramosissima	rabbitleaf	x				
Madia gracilis	slender tarweed	x				
Microseris nutans	nodding microseris	x		x		
Onopordum acanthium	Scotch thistle	x				x

		G	B	S	A	D/R/C
Rudbeckia occidentalis	western coneflower	x		x		
Senecio crassulus	thick-leaved groundsel			x		
Senecio foetidus	sweetmarsh butterweed				x	
Senecio serra	tall butterweed	x		x		
Solidago canadensis	Canada goldenrod	x		x		
Taraxacum officinale	common dandelion	x	x	x		x
Tetradymia canescens	spineless horse-brush			x		
Tragopogon dubius	yellow salsify	x				
Wyethia amplexicaulis	northern mule ears	x				x
Wyethia helianthoides	white-head mule's ears					x
Berberidaceae	Barberry family					
Berberis repens	creeping Oregon grape		x			
Betulaceae	Birch family					
Alnus incana	thinleaf alder					x
Alnus rhombifolia	white alder					x
Betula occidentalis	water birch					x
Boraginaceae	Borage family					
Amsinckia lycopsoides	tarweed fiddleneck	x	x			
Amsinckia retrorsa	rigid fiddleneck	x	x	x		
Amsinckia tessellata	tessellate fiddleneck	x				
Asperugo procumbens	madwort	x				
Cryptantha ambigua	obscure cryptantha	x				
Cryptantha celosioides	northern cryptantha	x				
Cryptantha flaccida	weak-stemmed cryptantha	x	x			
Cryptantha intermedia	common cryptantha	x	x			
Cryptantha interrupta	bristly cryptantha	x				
Cryptantha torreyana	Torrey's cryptantha	x				
Cynoglossum officinale	common houndstongue	x				x
Hackelia deflexa	nodding stickseed	x				
Hackelia micrantha	blue stickseed	x		x		x
Lappula redowskii	western stickseed	x				
Lithospermum arvense	corn gromwell	x	x	x		
Lithospermum ruderale	wayside gromwell	x				
Myosotis arvensis	field forget-me-not	x				
Plagiobothrys leptocladus	slender popcorn-flower	x				
Plagiobothrys scouleri	Scouler's popcorn-flower	x				

		G	B	S	A	D/R/C
Brassicaceae	Mustard family					
Alyssum alyssoides	yellow alyssum	x	x	x		
Arabis glabra	towermustard			x		
Arabis holboellii	Holboell's rockcress	x		x		
Arabis microphylla	small-leaved rockcress	x				
Arabis sparsiflora	elegant rockcress	x	x	x		
Camelina microcarpa	hairy falseflax	x				
Capsella bursa-pastoris	shepherd's- purse	x				x
Cardamine breweri	Brewer's bittercress					x
Cardaria draba	hoary whitetop	x	x	x		
Chorispora tenella	blue mustard	x				
Descurania pinnata	western tansymustard	x	x			
Descurania richardsonii	mountain tansymustard	x	x			
Draba verna	spring whitlow-grass	x	x	x		
Erysimum asperum	rough wallflower	x				
Idaho scapigera	scalegod	x			x	
Lepidium perfoliatum	clasping pepperweed	x	x			
Phoenicaulis cheiranthoides	daggerpod				x	
Physaria sp. (oregana?)	twinpod	x				
Rorippa nasturium-aquaticum	water-cress					x
Sisymbrium altissimum	tumbling mustard	x	x			
Thlaspi arvense	field pennycress	x				
Thlaspi montanum	pennycress	x				
Caprifoliaceae	Honeysuckle family					
Lonicera involucrata	bearberry honeysuckle		x		x	
Sambucus cerulea	blue elderberry				x	
Sambucus racemosa	black elderberry					x
Symphoricarpos albus	common snowberry			x		x
Symphoricarpos oreophilus	mountain snowberry					x
Caryophyllaceae	Pink family					
Arenaria congesta	capitate sandwort	x				
Holosteum umbellatum	holosteum	x				
Lychnis alba	white campion	x				
Silene scouleri	Scouler's catchfly	x		x		
Stellaria media	chickweed	x				x
Stellaria nitens	shining chickweed	x				
Stellaria sp.	chickweed	x				
Vaccaria segetalis	cowcockle	x				

		G	B	S	A	D/R/C
Celastraceae	Staff-tree family					
Glossopetalon nevadense	spiny green-bush	x				
Chenopodiaceae	Goosefoot family					
Chenopodium album	lambsquarter	x				
Convolvulaceae	Morning glory family					
Convolvulus arvensis	field bindweed	x				
Cornaceae	Dogwood family					
Cornus stolonifera	red-osier dogwood					x
Crassulaceae	Stonecrop family					
Sedum lanceolatum	lanceleaved stonecrop	x				
Sedum stenopetalum	wormleaf stonecrop				x	
Cuscutaceae	Dodder family					
Cuscuta approximata	clustered dodder	x		x		
Cyperaceae	Sedge family					
Carex douglasii	Douglas' sedge				x	
Carex geyeri	elk sedge			x		
Carex hoodii	Hood's sedge			x		x
Carex microptera	small-winged sedge					x
Carex sheldonii	Sheldon's sedge					x
Carex stipata	sawbeak sedge					x
Carex vallicola	valley sedge					x
Eleocharis bolanderi	Bolander's spike-rush					x
Eleocharis palustris	creeping spike-rush					x
Dipsacaceae	Teasel family					
Dipsacus sylvestris	teasel				x	

		G	B	S	A	D/R/C
Equisetaceae	Horsetail family					
Equisetum arvense	common horsetail				x	
Equisetum laevigatum	smooth horsetail				x	
Ericaceae	Heath family					
Arctostaphylos uva-ursi	kinikinnick		x			
Euphorbiaceae	Spurge family					
Euphorbia escula	leafy spurge	x				
Euphorbia serpyllifolia	thyme-leaved spurge	x				
Fabaceae	Pea family					
Astragalus cusickii cusickii	Cusick's milkvetch	x	x			
Astragalus eremiticus	hermit milkvetch	x	x			
Astragalus inflexus	hairy milkvetch	x	x			
Astragalus purshii	Pursh's milkvetch	x				
Astragalus vallis	Snake Canyon milkvetch	x				
Glycyrrhiza lepidota	licorice-root	x				
Lathyrus pauciflorus utahensis	few-flowered peavine				x	
Lathyrus rigidus	bushy peavine				x	
Lupinus argenteus	silvery lupine	x			x	
Lupinus caudatus	tailcup lupine				x	
Lupinus laxiflorus	spurred lupine	x	x		x	
Lupinus lepidus	prairie lupine	x				
Lupinus wyethii	Wyeth's lupine	x			x	
Medicago sativa	alfalfa	x				
Medicago lupulina	black medic	x				x
Melilotus officinalis	yellow sweet-clover	x				
Robinia psuedoacacia	black locust					x
Trifolium macrocephalum	big head clover				x	
Trifolium pratense	red clover	x			x	
Trifolium repens	white clover	x			x	x
Vicia americana	American vetch		x		x	
Gentianaceae	Gentian family					
Frasera albicaulis	white-stemmed frasera	x				
Frasera speciosa	giant frasera				x	

		G	B	S	A	D/R/C
Geraniaceae	Geranium family					
Erodium cicutarium	filaree	x				
Geranium viscosissimum	sticky geranium	x		x		
Grossulariaceae	Currant family					
Ribes cereum cereum	squaw currant	x				x
Ribes cereum colubrinum	squaw currant	x				x
Ribes lacustre	swamp currant					x
Ribes setosum	Missouri currant					x
Ribes viscosissimum	sticky currant		x			
Hydrangeaceae	Hydrangea family					
Philadelphus lewisii	syringa		x	x		
Hydrophyllaceae	Waterleaf family					
Hydrophyllum capitatum	waterleaf woolly breeches	x		x		x
Phacelia hastata	silverleaf phacelia	x				
Phacelia heterophylla	varileaf phacelia	x				
Phacelia linearis	threadleaf phacelia	x				
Nemophila breviflora	Great Basin nemophila	x				
Nemophila kirtleyi	Snake Canyon nemophila	x				x
Iridaceae	Iris family					
Iris missouriensis	blue flag					x
Sisyrinchium inflatum	purple-eyed grass	x				
Isoetaceae	Quillwort family					
Isoetes sp.	quillwort					x
Juncaceae	Rush family					
Juncus balticus	Baltic rush					x
Juncus sp.	rush					x
Juncus tenuis	slender rush					x

		G	B	S	A	D/R/C
Lamiaceae	Mint family					
Agastache urticifolia	nettle-leaf horse-mint	x		x		x
Marrubium vulgare	horehound	x				
Nepeta cataria	catnip					x
Prunella vulgaris	self-heal					x
Scutellaria angustifolia	narrow-leaved skullcap	x				
Liliaceae	Lily family					
Allium acuminatum	tapertip onion			x	x	
Allium tolmiei tolmiei	Tolmie's onion			x		
Brodiaea douglasii	Douglas' brodiaea	x		x		
Calochortus eurycarpus	big pod mariposa lily	x		x		
C. macrocarpus macrocarpus	green-band mariposa lily	x				
Cammasia quamash	common camas	x				
Fritillaria pudica	yellow bell	x				
Fritillaria atropurpurea	chocolate lily					x
Smilacina stellata	star-flowered solomon-plume					x
Veratrum californicum	California false hellebore					x
Zigadenus paniculatus	panicked death camas			x		
Zigadenus venenosus	meadow death camas	x				
Loasaceae	Blazing star family					
Mentzelia albicaulis	white-stemmed mentzelia	x				
Mentzelia laevicaulis	blazing-star	x				
Malvaceae	Mallow family					
Sidalcea oregana	Oregon sidalcea					x
Onagraceae	Evening primrose family					
Clarkia pulchella	deer horn	x	x	x		
Clarkia rhomboidea	common clarkia			x		
Epilobium angustifolium	fireweed	x		x		x
Epilobium glaberrimum	smooth willow-herb					x
Epilobium paniculatum	tall annual willow-herb	x	x			
Oenothera caespitosa	desert evening-primrose	x				
Oenothera pallida	white-stem evening-primrose	x				
Oenothera subacaulis	long-leaved evening-primrose					x

		G	B	S	A	D/R/C
Orchidaceae	Orchid family					
Spiranthes romanzoffiana	ladies-tresses	x				
Orobanchaceae	Broomrape family					
Orobanche uniflora	naked broomrape	x		x		
Pinaceae	Pine family					
Pinus ponderosa	ponderosa pine		x			
Pseudotsuga menziesii	Douglas-fir		x			
Plantaginaceae	Plantain family					
Plantago major	common plantain					x
Plantago patagonica	Indian-wheat	x	x	x		
Poaceae	Grass family					
Aegilops cylindrica	goatgrass	x				
Agropyron cristatum	crested wheatgrass	x				
Agropyron intermedium	intermediate wheatgrass	x				
Agropyron spicatum	bluebunch wheatgrass	x	x	x	x	
Agropyron trichophorum	pubescent wheat	x				
Agrostis alba stolonifera	redtop					x
Aristida longiseta	red threeawn	x				
Bromus brizaeformis	rattlesnake brome	x	x	x		
Bromus carinatus	mountain brome	x		x		
Bromus inermis	smooth brome	x				
Bromus japonicus	Japanese brome		x	x	x	
Bromus mollis	soft brome	x	x	x		
Bromus tectorum	cheatgrass	x	x	x		
Calamagrostis rubescens	pinegrass					x
Dactylis glomerata	orchard grass	x				
Danthonia unispicata	onespike oatgrass	x			x	
Elymus caput-medusea	medusahead rye	x	x			
Elymus cineris	basin wildrye	x				x
Elymus glaucus	blue wildrye			x		x
Festuca bromoides	six-week fescue		x		x	
Festuca idahoensis	Idaho fescue	x	x	x	x	
Festuca pratensis	meadow fescue				x	
Glyceria striata	fowl mannagrass					x

		G	B	S	A	D/R/C
Koeleria cristata	prairie Junegrass	x		x		
Melica bulbosa	oniongrass	x		x		
Phleum pratense	common timothy	x				x
Poa bulbosa	bulbous bluegrass	x	x	x	x	
Poa compressa	Canada bluegrass	x				
Poa fendleriana	muttongrass			x		
Poa nervosa	Wheeler's bluegrass			x		
Poa nevadensis	Nevada bluegrass			x		
Poa pratensis	Kentucky bluegrass	x		x		x
Poa sandbergii	Sandberg's bluegrass	x	x	x	x	
Secale cereale	cultivated rye	x				
Sitanion hystrix	squirrel-tail	x	x	x	x	
Sporobolus cryptandrus	sand dropseed	x				
Stipa comata comata	needle-and-thread	x	x			
Stipa occidentalis	western needlegrass	x		x		
Triticum aestivum	wheat	x				
Polemoniaceae		Phlox family				
Collomia grandiflora	large-flowered collomia	x				
Collomia linearis	narrow-leaf collomia	x				
Gilia aggregata	skyrocket	x	x			
Navarretia intertexta	needle-leaf navarretia	x				x
Phlox colubrina	Snake River phlox	x		x		
Phlox viscida	sticky phlox				x	
Polygonaceae		Buckwheat family				
Eriogonum compositum	northern buckwheat	x	x			
Eriogonum heracleoides	Wyeth buckwheat	x		x		
Eriogonum ovalifolium	oval-leaved buckwheat				x	
Eriogonum strictum	strict buckwheat	x	x		x	
Eriogonum umbellatum	sulfur buckwheat	x	x		x	
Eriogonum vimineum	wirestem buckwheat	x				
Eriogonum spaerocephalum	rock buckwheat				x	
Polygonum aviculare	prostrate knotweed	x				
Polygonum douglasii	Douglas' knotweed	x			x	
Polygonum kelloggii	Kellogg's knotweed				x	
Polygonum polygaloides	white margined knotweed	x				
Rumex crispus	curly dock					x

		G	B	S	A	D/R/C
Polypodiaceae	Common fern family					
Cysopteris fragilis	brittle bladder-fern	x				
Portulacaceae	Purslane family					
Lewisia rediviva	bitterroot				x	
Montia linearis	narrowleaved montia					x
Montia perfoliata	miner's lettuce					x
Ranunculaceae	Buttercup family					
Actea rubra	baneberry					x
Clematis ligusticifolia	western clematis			x		x
Delphinium nuttallianum	Nutthall's larkspur	x				
Delphinium occidentale	western larkspur			x		
Ranunculus aquatilis	water crowfoot				x	
Ranunculus testiculatus	hornseed buttercup	x		x		
Ranunculus uncinatus	little buttercup			x		
Thalictrum occidentale	western meadowrue					x
Rhamnaceae	Buckthorn family					
Ceanothus sanguineus	redstem ceanothus					x
Rosaceae	Rose family					
Amelanchier alnifolia	serviceberry	x	x	x		x
Cercocarpus ledifolius	curl leaf mountain mahogany	x				
Crataegus douglasii douglasii	black hawthorn		x		x	
Geum macrophyllum	large-leaf avens					x
Geum triflorum triflorum	prairie smoke	x		x		
Physocarpus malvaceus	mallow ninebark			x		x
Potentilla arguta	tall cinquefoil			x		
Potentilla glandulosa	sticky cinquefoil	x				
Potentilla gracilis	slender cinquefoil	x		x		x
Prunus emarginata	bitter cherry			x		x
Prunus virginiana	chokecherry	x	x	x		x
Purshia tridentata	bitterbrush		x	x		
Rosa nutkana	Nootka rose					x
Rosa woodsii ultramontana	Wood's rose	x		x		x
Rubus leucodermis	black raspberry				x	
Rubus parviflorus	thimbleberry					x

		G	B	S	A	D/R/C
Spiraea betulifolia	white spiraea			x		x
Rubiaceae	Madder family					
Galium aparine	goose-grass cleavers	x		x		x
Galium aspernum	rough bedstraw				x	
Galium multiflorum	shrubby bedstraw	x			x	
Salicaceae	Willow family					
Populus tremuloides	quacking aspen		x		x	
Populus trichocarpa	black cottonwood					x
Salix amigdaloides	peach-leaf willow					x
Salix exigua	coyote willow					x
Salix rigida	Watson's willow					x
Salix scouleriana	Scouler's willow			x		x
Saxifragaceae	Saxifrage family					
Heuchera sp	alumroot	x				
Lithophragma bulbifera	bulbiferous prairie star	x		x		
Lithophragma parviflora	small flowered prairie star	x		x		
Scrophulariaceae	Figwort family					
Besseyia rubra	red besseyia	x				
Castilleja hispida	harsh paintbrush	x		x		
Castilleja miniata	scarlet paintbrush	x	x			x
Castilleja oresbia	pale Wallowa paintbrush				x	
Castilleja sp.	paintbrush			x		
Collinsia parviflora	blue-eyed Mary	x	x			
Linaria dalmatica	Dalmatian toadflax			x		
Mimulus guttatus guttatus	yellow monkeyflower					x
Mimulus nanus	dwarf purple monkeyflower				x	
Orthocarpus pusillus	dwarf owl-clover	x				
Orthocarpus tenuifolius	thinleaf owl-clover	x		x		
Penstemon attenuatus	sulphur penstemon	x		x		
Penstemon deustus	hot rock penstemon	x	x			
Penstemon gairdneri	Gairdner's penstemon	x	x		x	
Penstemon glandulosus	sticky penstemon	x		x		x
Penstemon fruiticosus	bush penstemon	x				
Penstemon payettensis	Payette penstemon			x		
Penstemon venustus	Blue Mtn. penstemon	x				

		G	B	S	A	D/R/C
Tonella floribunda	large flowered tonella	x	x			
Verbascum blatteria	moth mullein	x				
Verbascum thaspus	flannel mullein	x				x
Veronica angagalis-aquatica	water pimpernel					x
Veronica peregrina xalopensis	purslane speedwell					x
Selaginaceae	Selaginella family					
Selaginella wallacei	Wallace's selaginella	x				
Solanaceae	Nightshade family					
Solanum dulcamara	climbing nightshade	x				x
Typhaceae	Cat-tail family					
Typha latifolia	common cat-tail					x
Ulmaceae	Elm family					
Celtis reticulata	netleaf hackberry	x	x			x
Urticaceae	Nettle family					
Urtica dioica	stinging nettle			x	x	
Valerianaceae	Valerian family					
Plectritis macrocera	white plectritis	x				x
Verbenaceae	Verbena family					
Verbena bracteata	bracted verbena	x				
Violaceae	Violet family					
Viola adunca	early blue violet	x		x		x
Viola nuttallii	Nutthall's violet			x		

APPENDIX 3

Idaho Rare Plant Observation Form.

APPENDIX 4

Map locations for Snake Canyon milkvetch (*Astragalus vallis*) and Sheldon's sedge (*Carex sheldonii*) within Brownlee WMA.

Map 1. *Astragalus vallis* (009). Portion of Brownlee Dam 7.5' USGS topographic quad.

Map 2. *Astragalus vallis* (007, 008, 010). Portion of Neil Gulch 7.5' USGS topographic quad.

Map 3. *Carex sheldonii* at lower Dukes Creek. Portion of Brownlee Dam 7.5' USGS topographic quad.

APPENDIX 5

Element Occurrence Records for Snake Canyon milkvetch (*Astragalus vallis*)
at Brownlee WMA.