Rare Plant and Vegetation Survey of the Bowen Mountain Section of the Methow Wildlife Area

Pacific Biodiversity Institute

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Introduction

Under contract with the Washington Department of Fish and Game, a section of the Methow Wildlife Area (located in Okanogan County) centered on Bowen Mountain (Figure 1) was surveyed for rare plant occurrences and mapped by existing vegetation communities. This report summarizes the activities and findings of the contracted work.

This work is a continuation of vegetation and botanical surveys conducted by Pacific Biodiversity Institute (PBI) in 2006 of Pearrygin Lake State Park, potential lands to be added to the park as part of its expansion plans, and adjacent portions of the Methow Wildlife Area to the north and west of the Bowen Mountain project area (Visalli et al 2006a and Visalli et al 2006b).

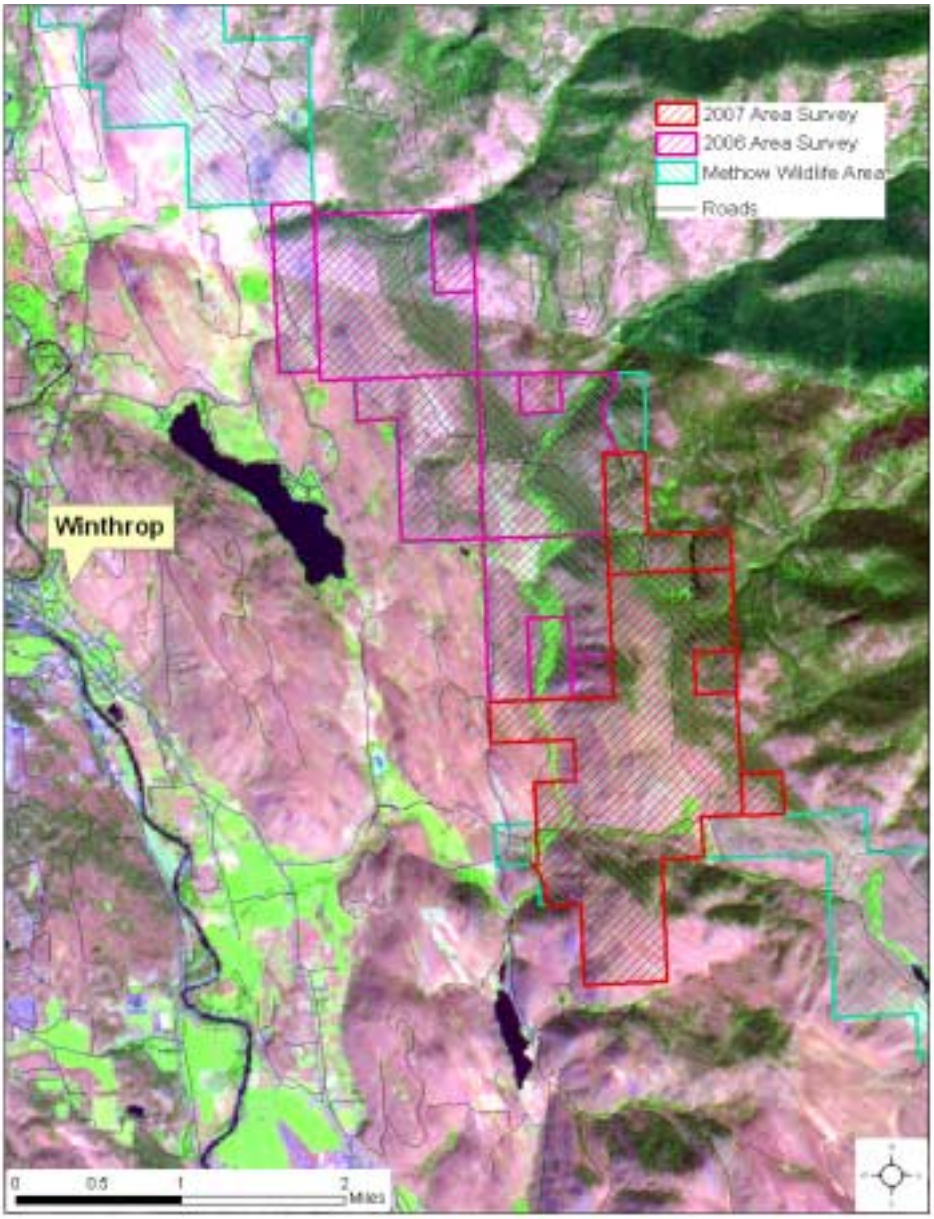


Figure 1: Project Area Boundaries

Vegetation Communities

Methods

The first step of this project was to delineate discrete vegetation polygons for the project area. Vegetation polygons represent specific plant communities or unique mosaics of plant communities. They may also represent a significant variation in the ecological condition within a plant community. Initially, we used aerial photography and satellite imagery to manually digitize plant communities or mosaics of plant communities in a GIS environment. We reviewed 1 meter color orthorectified aerial photography and recent ASTER satellite images for discernable vegetation or landform patterns. Topographic maps and digital elevation models (DEMs) were also employed to assist the process of vegetation community delineation. Vegetation polygons were created by hand in a GIS by ocular assessment. The vegetation community polygon data was edited and stored in an ESRI personal geodatabase.

We visited each vegetation polygon at least once during our field surveys, and assigned a vegetation community type (usually an established plant association name) to each polygon. We surveyed portions of total project area on April 15, May 12, June 4, June 6, June 7, July 3, July 7, July 21, September 6, September 7, September 26, October 3, October 5, October 6, October 8, October 11, October 12, and October 19. A map of our survey routes is presented in Appendix A. Most polygons contained more than one plant community type; therefore, we often assigned a secondary or tertiary vegetation community type (again often a plant association name) to each polygon. We relied on plant association keys and descriptions from several recognized sources to make vegetation community assignments, including the Field Guide for Forested Plant Associations of the Wenatchee National Forest (Lillybridge et al, 1995), Key to Sagebrush Alliances of the Western United States (Crawford, 1999), Classification and Management of Aquatic, Riparian and Wetland Sites on the National Forests of Eastern Washington (Kovalchik and Clausnitzer, 2004), Classification of Native Vegetation of Oregon (Kagan et al, 2000), A Preliminary Vegetation Classification of the Western United States (Bourgeron and Engelking, 1994) and Washington Natural Heritage Program (WANHP) unpublished data files. In some cases, the community descriptions in existing manuals were not adequate in describing distinctive vegetation associations in the project area. In these cases, new land cover type or plant association names and descriptions were created by PBI.

During field surveys, we took aerial imagery and digital vegetation polygons with us through the use of ArcPad (ESRI 2007) running on pocket PC, GPS enabled devices. This allowed us to easily view the data in the field, to evaluate our polygon delineations, and to make changes if necessary. The result was a highly accurate delineation of vegetation types that was field verified.

While we were visiting each vegetation polygon, we also recorded a wide variety of information about the vegetation, environmental characteristics, disturbance history and notes for each polygon. We used a plant community data collection format that was initially developed by the Washington State Parks and Recreation Commission (Appenix D).

Once gathered, the field data was edited and entered into a Microsoft Access database and linked to the vegetation polygon geodatabase. Further refinements and editing of the vegetation data stored in the personal geodatabase was made based on information collected in the field with ArcPad.

Results

We surveyed and mapped a total of 144 vegetation community polygons, comprised of 31 upland vegetation community types (Table 1), 7 wetland and riparian vegetation community types (Table 2) and 7 other land cover categories (Table 3), within the designated survey area. Vegetation community polygons are either stand-alone plant associations or mosaics of multiple plant associations.

Figure 2 shows the location of the vegetation community polygons mapped in the survey area, overlain on an aerial photograph of the area. Figure 3 indicates the primary plant association (PA1 in the database) attributed to each polygon. The GIS database created for this project can be queried and displayed to show the more complex mixtures of vegetation communities that occur in many polygons. Figures 4 and 5 are enlarged maps of the vegetation polygons in the northern and southern parts of the survey area, and illustrate boundaries of vegetation types against a background aerial photograph. Appendix E lists the attributes for each polygon in the project area.

Table 1. Upland Vegetation Community Types Encountered in the Project Area

Association Name	English Name	Abbreviation	Reference	Status
Acer glabrum	Rocky Mountain maple	ACGL	PBI (this report)	~G4
Amelanchier alnifolia / Helianthella uniflora var. douglasii - Calamagrostis rubescens	serviceberry / Douglas' helianthella - pinegrass	AMAL2/HEUND-CARU	PBI (this report)	na
Amelanchier alnifolia - Symphoricarpos oreophilus - Purshia tridentata / Balsamorhiza sagittata - Pseudoroegneria spicata	serviceberry - mountain snowberry - bitterbrush / Arrowleaf balsamroot - bluebunch wheatgrass	AMAL2-SYOR2-PUTR2/BASA3-PSSP6	PBI (this report)	na
Artemisia tridentata / Pseudoroegneria spicata	big sagebrush / bluebunch wheatgrass	ARTR2/PSSP6	Crawford (1999)	G4
Festuca idahoensis - Eriogonum heracleoides	Idaho fescue - tall buckwheat	FEID-ERHE2	Bourgeron (1994)	G2
Festuca idahoensis - Pseudoroegneria spicata	Idaho fescue - bluebunch wheatgrass	FEID-PSSP6	Bourgeron (1994)	G2
Pinus ponderosa / Calamagrostis rubescens	ponderosa pine / pinegrass	PIPO/CARU	Kagan (2004)	G2
Pinus ponderosa / Calamagrostis rubescens - Pseudoroegneria spicata	ponderosa pine / pinegrass - bluebunch wheatgrass	PIPO/CARU-PSSP6	Lillybridge (1995)	~G2
Pinus ponderosa / Pseudoroegneria spicata	ponderosa pine / bluebunch wheatgrass	PIPO/PSSP6	Lillybridge (1995)	G4
Pinus ponderosa / Purshia tridentada / Pseudoroegneria spicata	ponderosa pine / bitterbrush / bluebunch wheatgrass	PIPO/PUTR2/PSSP6	Lillybridge (1995)	G4
Pinus ponderosa / Symphoricarpos albus	ponderosa pine / common snowberry	PIPO/SYAL	Kagan (2004)	G4
Pinus ponderosa / Symphoricarpos oreophilus	ponderosa pine / mountain snowberry	PIPO/SYOR2	Kagan (2004)	~G5
Pinus ponderosa - Pseudotsuga menziesii / Calamagrostis rubescens	ponderosa pine - Douglas-fir / pinegrass	PIPO-PSME/CARU	Bourgeron (1994)	G2
Pinus ponderosa - Pseudotsuga menziesii / Pseudoroegneria spicata	ponderosa pine - Douglas-fir / bluebunch wheatgrass	PIPO-PSME/PSSP6	Bourgeron (1994)	G3
Pinus ponderosa - Pseudotsuega menziesii / Purshia tridentata	ponderosa pine - Douglas-fir / bitterbrush	PIPO-PSME/PUTR2	Bourgeron (1994)	G3
Prunus virginiana - Amelanchier alnifolia – Purshia tridentata / Pseudoroegneria spicata	chokecherry – serviceberry- bitterbrush / bluebunch wheatgrass	PRVI-AMAL2-PUTR2/PSSP6	PBI (this report)	na
Pseudotsuga menziesii / Calamagrostis rubescens	Douglas-fir / pinegrass	PSME/CARU	Lillybridge (1995)	G5
Pseudotsuga menziesii / Calamagrostis rubescens - Pseudoroegneria spicata	Douglas-fir / pinegrass - bluebunch wheatgrass	PSME/CARU-PSSP6	Lillybridge (1995)	~G5
Pseudotsuega menziesii / Purshia tridentata / Calamagrostis rubescens	Douglas-fir / bitterbrush / pinegrass	PSME/PUTR2/CARU	Lillybridge (1995)	~G3
Pseudotsuega menziesii / Purshia tridentata / Pseudoroegneria spicata	Douglas-fir / bitterbrush / bluebunch wheatgrass	PSME/PUTR2/PSSP6	Lillybridge (1995)	~G3
Pseudotsuga menziesii / Spiraea betulifolia	Douglas-fir / shiny-leaf spiraea	PSME/SPBE2	Lillybridge (1995)	~G5
Pseudotsuga menziesii / Spiraea betulifolia / Calamagrostis rubescens	Douglas-fir / shiny-leaf spiraea / Pinegrass	PSME/SPBE2/CARU	Lillybridge (1995)	~G5
Pseudotsuga menziesii / Symphoricarpos albus	Douglas-fir / common snowberry	PSME/SYAL	Lillybridge (1995)	G5
Pseudotsuga menziesii / Symphoricarpos albus / Calamagrostis rubescens	Douglas-fir / common snowberry / pinegrass	PSME/SYAL/CARU	Lillybridge (1995)	~G5
Pseudotsuga menziesii / Symphoricarpos albus / Pseudoroegneria spicata	Douglas-fir / common snowberry / bluebunch wheatgrass	PSME/SYAL/PSSP6	Lillybridge (1995)	~G5
Pseudotsuga menziesii / Symphoricarpos oreophilus	Douglas-fir / mountain snowberry	PSME/SYOR2	Lillybridge (1995)	G5
Pseudoroegneria spicata - Balsamorhiza sagittata	bluebunch wheatgrass - arrowleaf balsamroot	PSSP6-BASA3	PBI	~G2
Pseudoroegneria spicata - Eriogonum heracleoides	bluebunch wheatgrass - parsnip-flower	PSSP6-ERHE2	Kagan (2004)	G2
Purshia tridentata / Festuca idahoensis	bitterbrush / Idaho fescue	PUTR2/FEID	Crawford (1999)	G4
Purshia tridentata / Pseudoroegneria spicata	bitterbrush / bluebunch wheatgrass	PUTR2/PSSP6	Crawford (1999)	G3
Symphoricarpos albus - Rosa nutkana	snowberry - Nootka rose	SYAL-RONU	Kagan (2004)	G3

Table 2. Wetland and Riparian Vegetation Community Types Encountered in the Project Area

Association Name	English Name	Abbreviation	Reference	Status
Alnus incana - Betula occidentalis	mountain alder - western water birch	ALIN2-BEOC	Kagan (2004)	G2G3
Alnus incana - Cornus stolonifera - Symporicarpos albus	mountain alder - red-osier dogwood - common snowberry	ALIN2-COST4-SYAL	Kovalchik (2004)	G3G4
Phalaris arundinacea	reed canarygrass	PHAR3	PBI (this report)	na
Populus trichocarpa / Alnus incana / Cornus stolonifera	black cottonwood / mountain alder - red-oiser dogwood	POTR15/ALIN2-COST4	Kovalchik (2004)	G3
Populus tremuloides / Cornus stolonifera	trembling aspen / red-osier dogwood	POTR5/COST4	Kovalchik (2004)	G4
Populus tremuloides / Symphoricarpos albus	trembling aspen / common snowberry	POTR5/SYAL	Kovalchik (2004)	G3
Salix bebbiana	Bebb willow	SABE2	Bourgeron (1994)	G3

Table 3. Other Land Cover Types Encountered in the Project Area

Association Name	English Name	Abbreviation	Reference	Status
Disturbed meadow / grassland	disturbed meadow / grassland	disturbed grassland	PBI (this report)	na
Disturbed wetland	disturbed wetland	disturbed wetland	PBI (this report)	na
Former agricultural field	former agricultural field	former field	PBI (this report)	na
Rocky slope - sparse vegetation	rocky slope - sparse vegetation	rocky - sparse veg	PBI (this report)	na
Talus slope	talus slope	talus	PBI (this report)	na
Tree plantation	tree plantation	tree plantation	PBI (this report)	na
Water	water	water	PBI (this report)	na

The conservation status of a species or community is designated by a number from 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment. In the chart above, G = Global, S= State. The numbers indicate the following:
1 = critically imperiled
2 = imperiled
3 = vulnerable to extirpation or extinction
4 = apparently secure
5 = demonstrably widespread, abundant, and secure.
The presence of a "~" before the conservation status code reflects that the conservation status of the given community is not provided in existing literature but extrapolation from other closely related

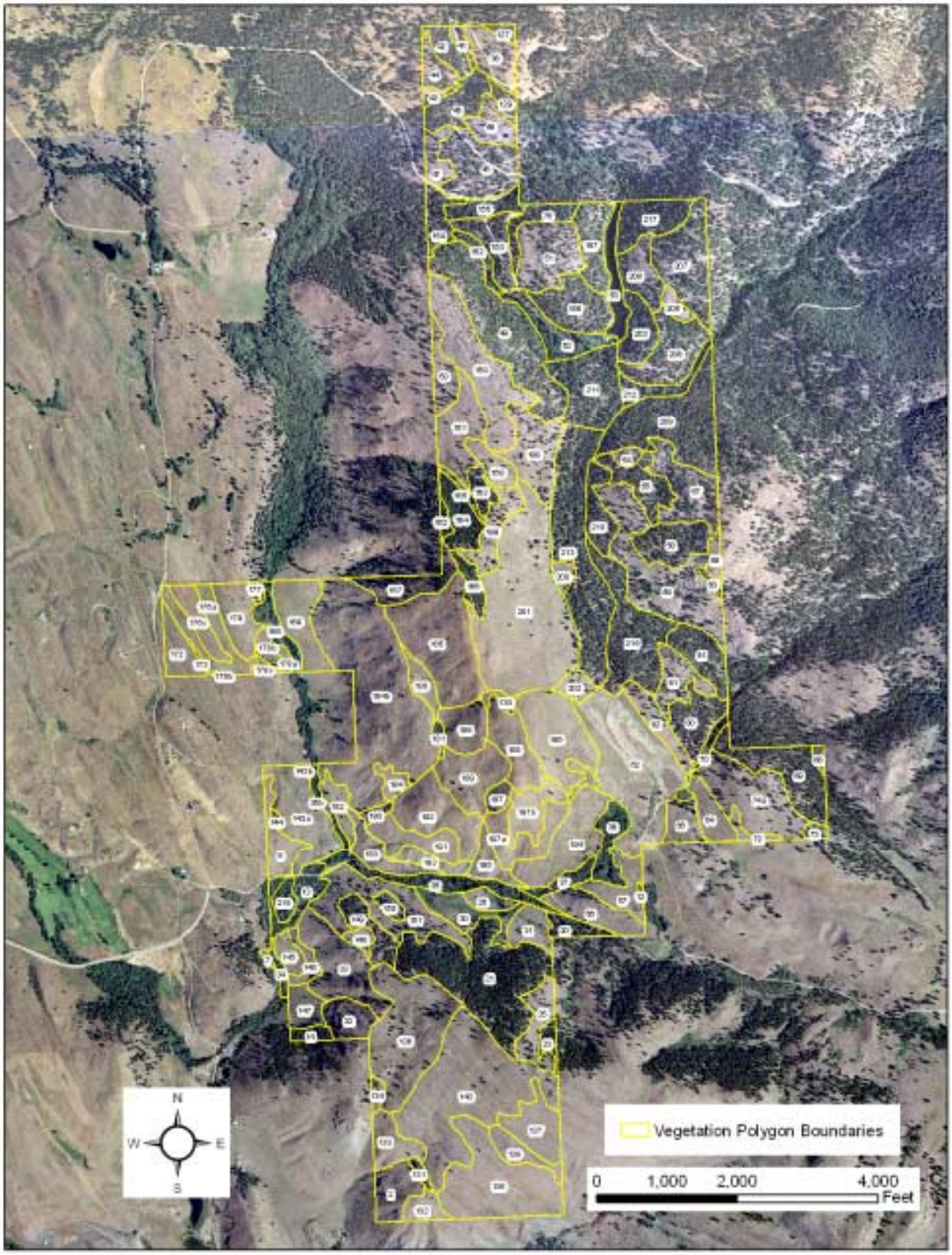


Figure 2: Vegetation community polygons in the survey area

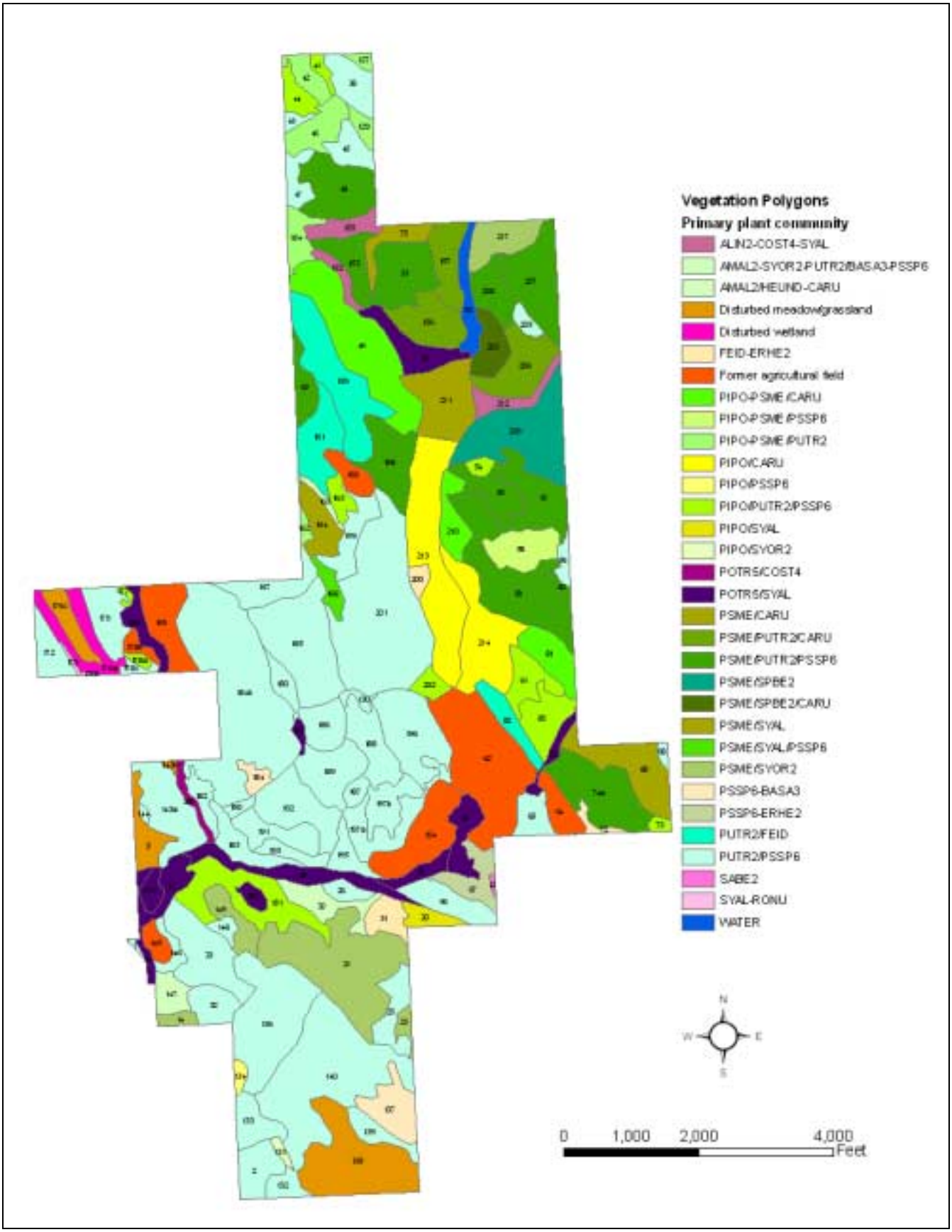


Figure 3: Primary plant associations attributed to each vegetation community polygon

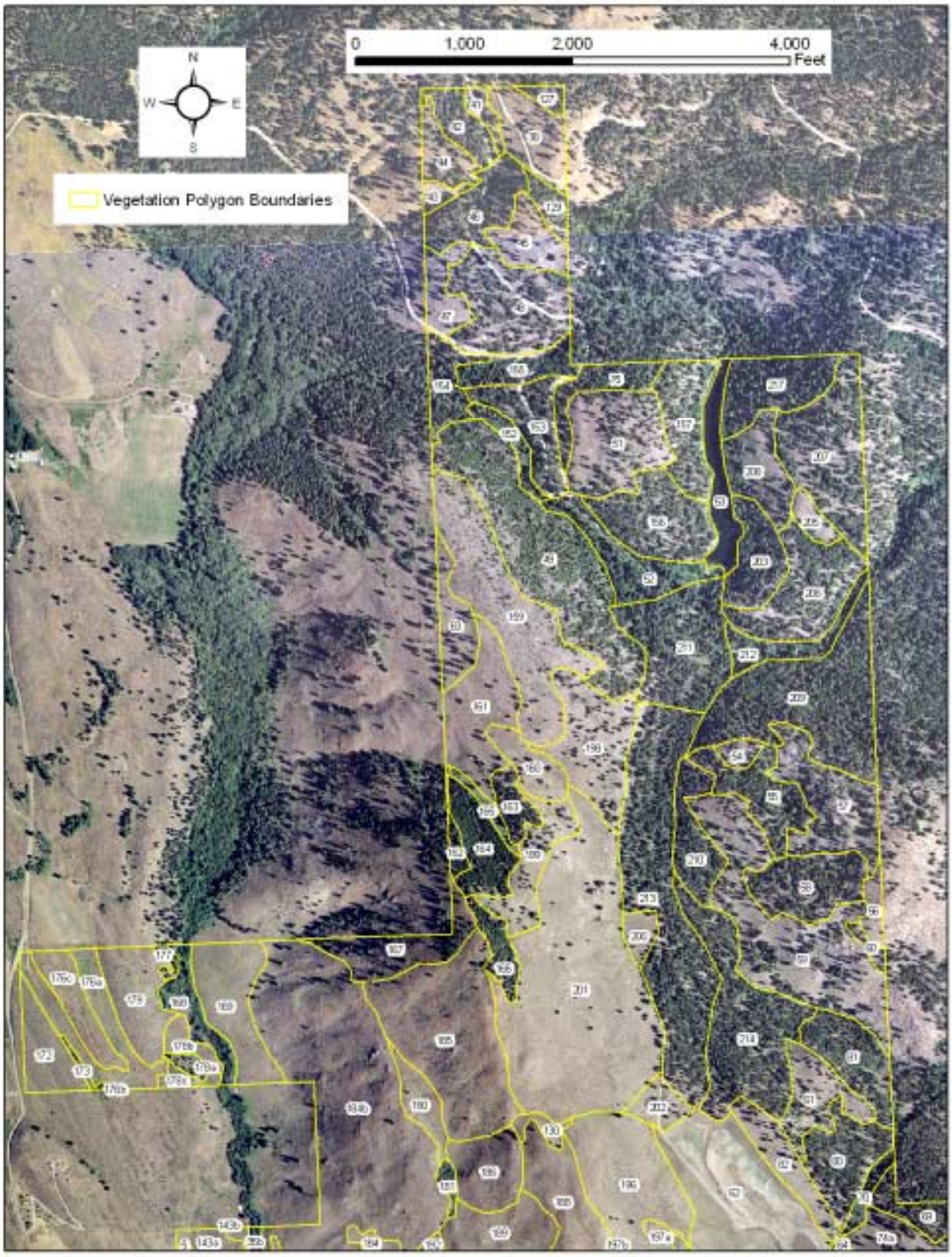


Figure 4: Vegetation polygons in northern portion of survey area

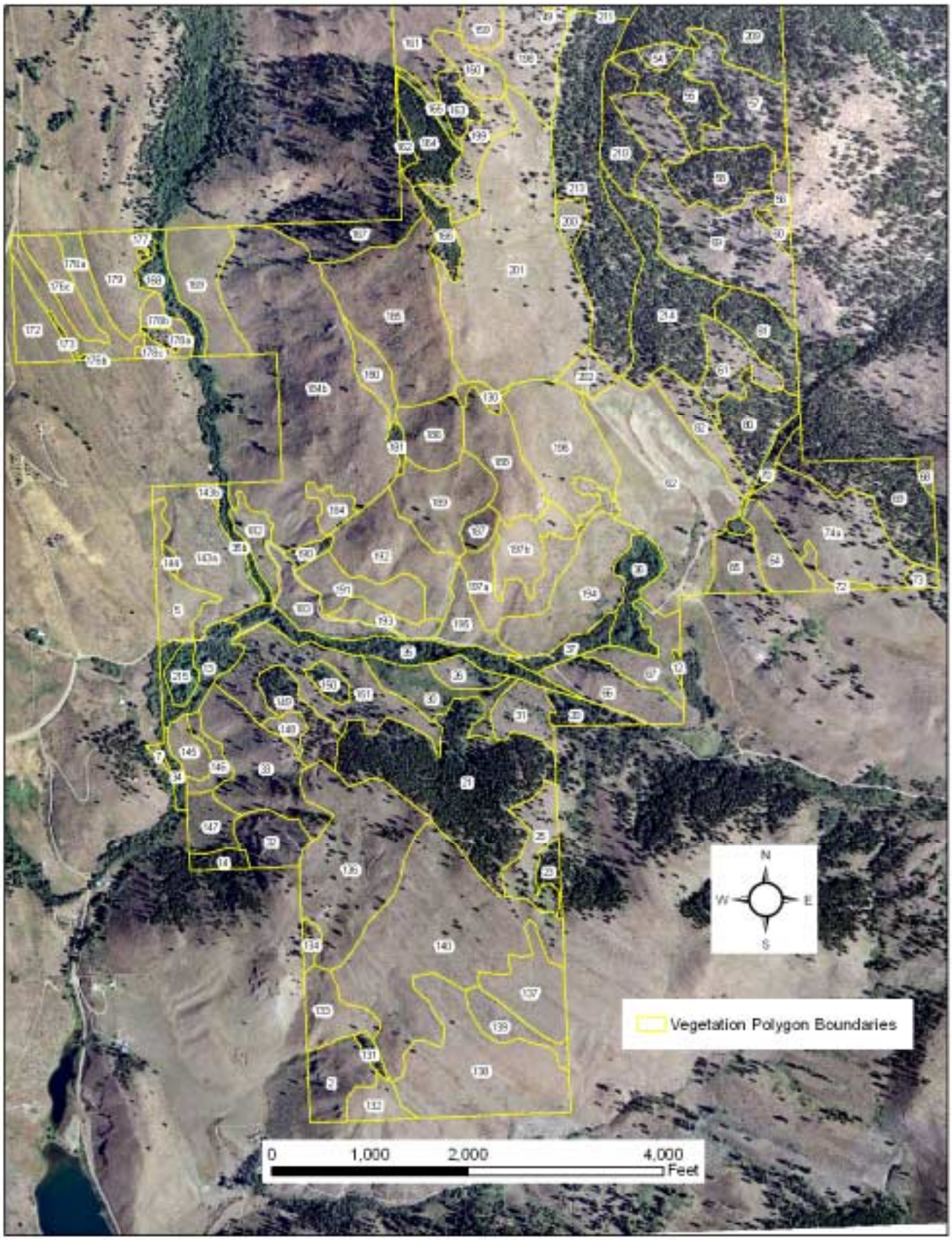


Figure 5: Vegetation polygons in southern portion of survey area

Vegetation Community Types

Upland Vegetation

Acer glabrum (ACGL)

On some of the more mesic, non-forested slopes in the lower elevations of the project area, dense patches of Rocky Mountain maple (*Acer glabrum*) occur. This shrub's leafage is thick and grow up to 20 feet tall in these areas, often shading the understory to the extent that few other plants can thrive. Snowberry often grows at the margins of this community. The maple resprouts readily after fire, which was frequent in a pre-settlement fire regime. We are not aware of this plant community being described for this area in existing literature, although similar communities have been described by Bourgeron et al. (1994) for the Rocky Mountains. The Rocky Mountain types described have a global conservation status G4 – G5 meaning it is a relatively secure plant community type.

***Amelanchier alnifolia / Helianthella uniflora var. douglasii - Calamagrostis rubescens* (AMAL2/HEUND-CARU)**

This plant community is a unique shrub-steppe variant that consists of serviceberry, Douglas' helianthella and pinegrass as dominants. It grows on more mesic sites than most shrub-steppe communities. We found only one occurrence in the project area on a northwest facing slope on Bowen Mountain. The configuration of the polygon, its aspect and slope position, suggest that infrequent avalanches in the winter may occur in this area and prevent forest development. Interestingly this community is almost completely surrounded by Douglas-fir forests. This plant community is not described in existing literature, but PBI decided that it was a unique vegetation association that warranted its own name and description.

***Amelanchier alnifolia - Symphoricarpos oreophilus - Purshia tridentata / Balsamorhiza sagittata - Pseudoroegneria spicata* (AMAL2-SYOR2-PUTR2/BASA3-PSSP6)**

This plant community consists of moderate to dense shrubs with serviceberry, mountain snowberry and bitterbrush as dominants. Arrowleaf balsamroot and bluebunch wheatgrass are common herb and grass species. This community tends to occur on the lower portions of northern facing slopes where soils are deeper and soil moisture is present longer into the summer. Many times it exists as a small patch community within a matrix of drier shrub-steppe plant associations or within the transitional zone between dry up-land shrub-steppe areas and mesic to wet riparian draws. Plant species diversity is typically high within this community type. This plant community is not described in existing literature, but PBI decided that it was a unique vegetation association that warranted its own name and description.

Artemisia tridentata / Pseudoroegneria spicata (ARTR2/PSSP6)

This plant association is characterized by the dominant occurrence of big sagebrush and bluebunch wheatgrass. It was described by Crawford (1999) and is listed as globally secure (G4). Its occurence in the upper Methow Sub-basin is less frequent than in other shrub-steppe zones of Washington State. While bluebunch wheatgrass is pervasive in the shrub-steppe throughout the Methow watershed, big sagebrush appears more erratically, with bitterbrush typically being a more dominant shrub. Big sagebrush typically requires better soils than bitterbrush. The latter species is capable of acquiring atmospheric nitrogen through association with nitrogen-fixing bacteria in the soil, an attribute that allows it to succeed on more marginal lands. Occerrences of ARTR2/PSSP6 in good condition may be important conservation elements in the upper Methow Sub-basin considering its lower abundance in this area.

***Festuca idahoensis - Eriogonum heracleoides* (FEID-ERHE2)**

This grass land steppe plant community consists of a grass and herb complex where the grass component is dominated by Idaho fescue and tall buckwheat is present, although many other forbs are present and can higher abundance than tall buckwheat. It has been described Bourgeron (1994) and has a G2 conservation rank, which implies that it is globally imperiled. We only found two patches of this community in the project area and have not identified this community in previous year's surveys of the Wildlife Area. Due to its sensitivity ranking, and its seeming rarity in the Methow Sub-basin steppe complex, this plant community should be considered for special protection. One polygon of this community in this year's survey area is adjacent to a major road and dispersed camping area and is most likely subjected to intense hunting and annual grazing pressure. Management attention may be needed here to protect this plant community from degradation.

***Festuca idahoensis - Pseudoroegneria spicata* (FEID-PSSP6)**

This meadow-steppe association was described by Bourgeron (1994) and contains Idaho fescue and bluebunch wheatgrass as the dominant plants, although a host of forbs and some other grasses may occur. This plant community has a G2 rank, which implies that it is globally imperiled. We only found small patches of this community within one polygon in the project area and did not identify this community in the previous years' surveys. Due to its sensitivity ranking, patches of this community should be considered for special protection.

Pinus ponderosa / Calamagrostis rubescens (PIPO/CARU)

This forested plant association was described by Kagan (2004). Although it can be similar in composition to other mixed-conifer dry forests, in this community ponderosa pine is dominant in the overstory and Douglas-fir is absent, and pinegrass dominates the understory. Some other grasses and herbs can be present, but are not as dominant as pinegrass. This plant community has a G2 sensitivity rank, which implies that it is globally imperiled. We only mapped three polygons of this community as a primary or secondary plant association in the project area. Based on our knowledge of the lower elevation Methow Sub-basin landscape, this community type is not common throughout much of the rest of the Methow Valley. Due to its sensitivity ranking, and its seeming rarity in the Methow Sub-basin, this plant community should be considered for special protection.

Both ponderosa pine and pinegrass are fire-adapted species. Ponderosa pine requires bright sunlight and mineral soil in order to germinate. In most locations in the Methow Valley, Douglas-fir, a more shade-tolelerant species is also present in the forest stand. In those locations, ponderosa pine will eventually give way to the Douglas-fir as forest succession progresses. Such stands would not meet the criteria of this plant association. Post-fire conditions are optimum for ponderosa seed germination. Once established, ponderosa pine quickly sheds it lower branches, thus preventing ground fires from speading into the canopy, while it's thick, corky bark protect the cambium layer from the heat of understory burns. Pinegrass grows luxuriantly in partial shade, but often it will only flower and set seeds after a fire. It also readily respouts from underground rhizomes after a fire. This plant association should be maintained by regular use of prescribed fire.

***Pinus ponderosa / Calamagrostis rubescens - Pseudoroegneria spicata* (PIPO/CARU-PSSP6)**

This plant association was described by Lillybridge (1995). This association is similar to the *Pinus ponderosa / Calamagrostis rubescens* association described above. The difference is that bluebunch wheatgrass is a co-dominant with pinegrass in the understory. It typically occurs in a mosaiced pattern with the *Pinus ponderosa / Calamagrostis rubescens* and the *Pinus ponderosa / Purshia tridentada / Pseudoroegneria spicata* associations. We mapped only one polygon with this community as a secondary plant association in the project area. As with the *Pinus ponderosa / Calamagrostis rubescens* association, due to this community's sensitivity ranking, and its seeming rarity in the Methow Sub-basin, this plant community should be considered for special protection and potential maintenance through a prescribed fire program.

Pinus ponderosa / Pseudoroegneria spicata (PIPO/PSSP6)

This association was described by Lillybridge (1995). It is similar to the *Pinus ponderosa / Calamagrostis rubescens - Pseudoroegneria spicata* association described above, but lacks the pinegrass component. It occurs on drier sites than the communities that contain pinegrass. It is more abundant in the Methow than the previous two ponderosa pine plant associations. It has a global ranking of G4, which indicates that it is relatively abundant and secure. However, in the project area only one small polygon was identified as having this as its primary plant association and another small patch in a small polygon was found as a secondary plant association. Examples of this plant association, which are in good or excellent ecological condition in the Methow Valley, are mostly within the Methow Wildlife Area and are relatively rare. This plant community should receive special management attention due to the local rarity of areas in good ecological condition.

This plant association is perhaps the most fire-adapted of all the forested plant associations. In pre-settlement times, fires would burn through this community every 5 to 15 years. Both the bluebunch wheatgrass and the litter from ponderosas are quite flammable and carry fire readily. They also survive fire very well. Since it occurs on relatively hot and dry slopes, the fuels are dry and ready to burn much of the late spring, summer and fall – so the burning window is quite wide. Since this community is so fire-adapted, we recommend maintaining this community with regular use of prescribed fire.

***Pinus ponderosa / Purshia tridentada / Pseudoroegneria spicata* (PIPO/PUTR2/PSSP6)**

This vegetation community is similar to the *Pinus ponderosa / Pseudoroegneria spicata* association describe above, except that it has a significant component of bitterbrush in the understory. It was described by Lillybridge (1995). It is much more common in the project area and in the Methow Sub-basin than the other pure ponderosa pine plant associations described in this report. It has a G4 ranking which implies that it is globally secure. There are 11 polygons with this plant association as the primary association, 7 with it as a secondary association and 2 with it as a tertiary association in the project area.

This association also occurs on relatively hot and dry slopes, but often the slopes have more shallow soils and are rockier. This plant association is also very fire-adapted. In pre-settlement times, fires would burn through this community every 5 to 20 years. The bluebunch wheatgrass and the litter from ponderosas are quite flammable and carry fire readily and bitterbrush is very flammable during the dry part of the year when live fuel moistures are low. All three major components of the plant association survive fire very well. Since this association occurs on dry sites, the fuels are ready to burn much of the late spring, summer and fall – so the burning window is quite wide. Since this community is so fire-adapted, it may be appropriate and necessary to maintain this community with the use of prescribed fire.

Pinus ponderosa / Symphoricarpos albus (PIPO/SYAL)

This community was described by Kagan (2004). It is composed of an overstory of ponderosa pine with an understory of common snowberry. It occurs on much moister sites that the other ponderosa pine associations. Although it is fairly abundant and secure globally (G4 ranking), it is not common in the project area. Only one polygon has this association listed as the primary plant association. Two more polygons have this association as the secondary plant association and two more as the tertiary plant association.

Like all the coniferous forest communities in the project area, this is a fire-evolved plant association, which would probably burn every 15-30 years in a natural fire-regime. Common snowberry sprouts readily from rhizomes after a fire. Periodic use of prescribed fire may be necessary to ensure maintenance of this plant association.

Pinus ponderosa / Symphoricarpos oreophilus (PIPO/SYOR2)

This plant association was described by Kagan (2004). It is similar to the *Pinus ponderosa / Symphoricarpos albus* association, except that mountain snowberry replaces common snowberry. It is not common in the project area, but is probably abundant and secure on a global basis (~G5 rank). In the project area, it occurs in small, dry swales and some other more mesic portions of south-facing slopes.

Like all the coniferous forest communities in the project area, this is a fire-evolved plant association, which would probably burn every 15-30 years in a natural fire-regime. As with common snowberry , mountain snowberry sprouts readily from rhizomes after a fire. Periodic use of prescribed fire may be necessary to ensure maintenance of this plant association.

Pinus ponderosa - Pseudotsuga menziesii / Calamagrostis rubescens (PIPO-PSME/CARU)

This plant association was described by Bourgeron (1994). It is similar to the *Pinus ponderosa / Calamagrostis rubescens* association described previously. However, the addition of Douglas-fir in the overstory is a key distinguishing characteristic. The presence of Douglas-fir indicates a slightly cooler and moister site than where we find the *Pinus ponderosa / Calamagrostis rubescens* association, and its presence may also be a consequence of human supression of the natural fire cycle. It is also very similar to the *Pseudotsuga menziesii / Calamagrostis rubescens* association described by Lillybridge (1995). In fact, Lillybridge's PSME/CARU plant association applies to stands containing both tree species and stands of pure Douglas-fir. His assumption is that with the exclusion of fire and because of the shade tolerance of Douglss-fir, the mixed stands will eventually become pure stands of Douglas-fir. This association has a G2 rank, which implies that it is globally imperiled due to restricted range, very few populations, and/or steep declines, and other factors. It is a relativley common community type in the Methow Sub-basin, and in the project area, but it deserves consideration for special protection due to its global conservation status.

Pinus ponderosa - Pseudotsuga menziesii / Pseudoroegneria spicata (PIPO-PSME/PSSP6)

This is a mixed forest of ponderosa pine and Douglas-fir with an understory of bluebunch wheatgrass and was described by Bourgeron (1994). It is similar to the *Pinus ponderosa / Pseudoroegneria spicata* association described above, with the inclusion of Douglas-fir in the overstory. It is also similar to the *Pseudotsuga menziesii / Pseudoroegneria spicata* association described by Lillybridge (1995). This plant association occupies relatively dry, cool forested sites in the study area. The forest overstory is usually quite open. This plant association has a G3 global status that indicates that it is rare and somewhat vulernable. The absence of bitterbrush may well be a result of fairly recent fires in the Methow Wildlife Area. Without fire, the plant community composition would probably shift to having more bitterbrush in the understory and more Douglas-fir in the overstory – more like the *Pseudotsuega menziesii / Purshia tridentata / Pseudoroegneria spicata* plant association described later in this report.

Pinus ponderosa - Pseudotsuega menziesii / Purshia tridentata (PIPO-PSME/PUTR2)

This plant association is similar to the one described above, but has an additional significant bitterbrush shrub understory. It is also similar to *the Pinus ponderosa / Purshia tridentada / Pseudoroegneria spicata* association and the *Pseudotsuega menziesii / Purshia tridentata / Pseudoroegneria spicata* association. It was described by Bourgeron (1994), and has a G3 global status which implies that it is rare and vulnerable. As mentioned in the description above, this plant community may occur where bitterbrush has become more common after years of fire suppression.

***Prunus virginiana –Amelanchier alnifolia – Purshia tridentata / Pseudoroegneria spicata* (PRVI – AMAL2 – PUTR2 / PSSP6)**

This plant community describes small patches of chokecherry mixed with serviceberry and bitterbrush and an understory of bluebunch wheatgrass. Although it is not recorded in existing literature, PBI decided that it was a unique community that warranted a name and description. The patches have varying compostition, but chokecherry is always present and best characterizes this community. The global rank is not known, but its occurence is infrequent within the Methow-subbasin and should probably be considered regionally scarce. These small chokecherry – serviceberry patches can occur on otherwise warm, dry, well drained slopes, where there is enough accessible underground water to support chokecherry and serviceberry. It should be considered a variant of the *Purshia tridentata / Pseudoroegneria spicata* association described below that occurs on micro-sites.

Pseudotsuga menziesii / Calamagrostis rubescens (PSME/CARU)

This is locally a common plant association in the Methow Sub-basin, and is globally abundant and secure (G5 rank). The overstory is dominated by Douglas-fir with an understory of pinegrass. It was described by Lillybridge (1995). This plant association is similar to the *Pinus ponderosa / Calamagrostis rubescens and Pinus ponderosa - Pseudotsuga menziesii / Calamagrostis rubescens* associations, but ponderosa pine is less abundant or completely absent in this association. It occurs on slightly to more cooler sites than the communities containing pure ponderosa pine. In some cases, where there is a dense overstory, such as the site where the above photo was taken, pinegrass cover can be very sparse.

Pseudotsuga menziesii / Calamagrostis rubescens - Pseudoroegneria spicata **(PSME/CARU-PSSP6)**

Ths plant community is also fairly common in the Methow Sub-basin and is probably secure globally. It was described by Lillybridge (1995). It is very similar to the *Pseudotsuga menziesii / Calamagrostis rubescens* association, with the inclusion of bluebunch wheatgrass in the understory. It occurs on somewhat drier and better drained sites than the *Pseudotsuga menziesii / Calamagrostis rubescens* association.

Pseudotsuega menziesii / Purshia tridentata / Calamagrostis rubescens **(PSME/PUTR2/CARU)**

This community is similar to the *Pseudotsuega menziesii / Calamagrostis rubescens* described above, but has a significant component of bitterbrush in the understory. It was described by Lillybridge (1995). It may result from fire exclusion in stands that were previously more characteristic of the *Pseudotsuega menziesii / Calamagrostis rubescens* association. Fire exclusion would allow bitterbrush to more successfully compete in the forest understory.

Pseudotsuega menziesii / Purshia tridentata / Pseudoroegneria spicata **(PSME/PUTR2/PSSP6)**

This plant community is similar to the previous community, but pinegrass is replaced by bluebunch wheatgrass in the understory. It was described by Lillybridge (1995). It occurs on drier sites than the previous community. It is similar to the *Pinus ponderosa / Purshia tridentada / Pseudoroegneria spicata* community except that Douglas-fir replaces ponderosa pine in the overstory.

Pseudotsuga menziesii / Spiraea betulifolia **(PSME/SPBE2)**

This community is characterized by an overstory of Douglas-fir and an understory dominated by shiny-leaf spiraea. It was described by Lillybridge (1995). It is common in the Methow and secure globally. This association occurs on moderately mesic, cool slopes, with good drainage and often relatively thin soils. It is quite common on adjacent national forest lands.

Pseudotsuga menziesii / Spiraea betulifolia / Calamagrostis rubescens (PSME/SPBE2/CARU)

This association is very similar to the previously described association, with the addition of pinegrass in the understory. It was described by Lillybridge (1995). It is also common in the Methow and secure globally. It occurs on slopes with more soil depth than the previous association which lacks pinegrass.

Pseudotsuga menziesii / Symphoricarpos albus (PSME/SYAL)

This plant association was described by Lillybridge (1995). It is a common association in the Methow Valley. It is similar to the *Pinus ponderosa / Symphoricarpos albus* association, except that Douglas-fir replaces ponderosa pine in the overstory. It can be found on sites that are higher elevation and somewhat cooler than the *Pinus ponderosa / Symphoricarpos albus* association.

Pseudotsuga menziesii / Symphoricarpos albus / Calamagrostis rubescens **(PSME/SYAL/CARU)**

This association is very similar to the previously described association with the addition of pinegrass in the understory. It was described by Lillybridge (1995) and is common in the Methow and secure globally.

Pseudotsuga menziesii / Symphoricarpos albus / Pseudoroegneria spicata **(PSME/SYAL/PSSP6)**

This association is similar to the previously described association, except that bluebunch wheatgrass replaces pinegrass. It was described by Lillybridge (1995).

Pseudotsuga menziesii / Symphoricarpos oreophilus (PSME/SYOR2)

This plant association is characterized by an overstory of Douglas-fir with an understory of mountain snowberry. It was described by Lillybridge (1995). It is relatively abundant in the Methow and is globally abundant and secure (G5 rank). It is very similar to the *Pseudotsuga menziesii / Symphoricarpos albus* association described above, but mountain snowberry replaces common snowberry. It occurs on somewhat drier, cool slopes.

Pseudoroegneria spicata - Balsamorhiza sagittata (PSSP6-BASA3)

This non-forested association is part of the meadow-steppe assembledge of the Methow Valley. It is characterized by the dominance of bluebunch wheatgrass and arrowleaf balsamroot cover and the absence of shrub and/or tree cover. The most similar published plant association matching this community type in the Methow Sub-basin is the Bluebunch wheatgrass - Arrowleaf balsamroot - Curly bluegrass (*Poa secunda*) association described by Kagan (2004). However Poa secunda does not occur on this site, nor has it been identified within any of the 2006 or 2007 project areas.

The Poa secunda phase of this plant community does infrequently occur elsewhere in the Methow Valley, but it is a globally imperiled community with a conservation rank of G2. Both the PSSP6-BASA3 and PSSP6-BASA3-POSE communities are very sensitive to damage due to livestock grazing and motorized recreational use and areas of these communities with low exotic plant cover should be protected from unnatural disturbances.

These plant associations grade into and mosaic with another closely related community type, this one dominated by bitterbrush (seen at the top part of the photo above). The bitterbrush phase of this plant association was described by Wooten and Morrison (2005) from four ecology plots in the Methow Valley. Historic fires probably helped impede bitterbrush establishment on the meadow-steppe phases of this larger steppe community complex.

Pseudoroegneria spicata - Eriogonum heracleoides (PSSP6-ERHE2)

This non-forested association is part of the meadow-steppe assembledge found in the Methow Sub-basin. It is characterized by the codominance of bluebunch wheatgrass and parsnip-flowered wild-buckwheat. This plant association is the Methow phase of a broad community type described within the Columbia Basin by Kagan (2004) and Johnson and Simon (1987). This plant community is uncommon in the Methow and has a G2 global rank, which implies that it is imperiled globally. The wild-buckwheat component of this community is very sensitive to damage due to livestock grazing and motorized recreational use. Since this community is imperiled globally and so rare in the Methow it should be targeted for special management attention and conflicting uses should be carefully controlled.

Purshia tridentata / Festuca idahoensis (PUTR2/FEID)

This plant community was described by Crawford (1999). It is a commonly occuring association in the wildlife area and it has a G4 global rank indicating it is globally secure. This association is very similar to the bitterbrush / bluebunch wheatgrass association except that Idaho fescue is also an abundant bunchgrass present on the site.

Purshia tridentata / Pseudoroegneria spicata (PUTR2/PSSP6)

This association was describe by Crawford (1999). It is considered globally vulnerable to extirpation or extinction (G3 rank), but is the most abundant plant association in the project area. This is the dominant shrub-steppe community in the Methow Sub-basin. It is another fire-evolved community, with a natural fire-return interval of 8-15 years.

As with the bluebunch wheatgrass / arrowleaf balsam root association, this plant community is very sensitive to damage due to livestock grazing and motorized recreational use and areas of these communities with low exotic plant cover should be protected from unnatural disturbances if good ecological conditions are going to be maintained.

Symphoricarpos albus - Rosa woodsii (SYAL-RONU)

Within the project area there occur some small shrubby patches or linear strips dominated by common snowberry and Nootka rose. These shrubland communities were described by Kagan (2004). They are relatively uncommon, rare and vulnerable globally (G3 rank). Generally, these small patches occur in the shrub-steppe matrix where there are moister, but still well drained pockets on otherwise dry slopes and flats. Often these patches occur at the border of aspen stands where there is a transition from a drier to a wetter community. Some patches are mostly dominated by Nootka rose, while others are dominated by common snowberry. In other patches, snowberry dominates one portion and rose, another portion.

Riparian and Wetland Vegetation

Alnus incana-Cornus stolonifera-Symphoricarpos albus community (ALIN2-COST4-SYAL)

This plant association was described by Kovalchik (2004). It consists of three layers of dominant shrubs, with mountain alder forming the top layer, red-osier dogwood the middle layer and common snowberry forming the understory. It occurs as a riparian community along some of the streams and wetlands in the project area. All of these three shrubs are common in the lower and middle elevation of the Methow Valley. Other herbaceous and graminoid vegetation is usually sparse due to the dense shrub cover.

Alnus incana - Betula occidentalis (ALIN2-BEOC)

This riparian community occurs along some of the streams and wet drainages in the project area. Mountain alder is a codominant with western water birch. The understory is often sparse, but can contain *Symphoriocarpus albus* and some other shrubs, herbs or grasses. It was described by Kagan (2004). This plant community has a G2G3 global rank, implying that it is imperiled to vulnerable on a global basis. It is also fairly uncommon in the Methow and should warrant special management attention in the Methow Wildlife Area so that its ecological condition is not degraded. Unfortunately, some areas within this community are currently subject to livestock use that can damage the understory plants of this community.

*Alnus incana - Cornus stolonifera - Symporicarpos albus (*ALIN2-COST4-SYAL)

This is another common riparian community in the project area which also has a significant component of mountain alder. It contains red-osier dogwood and common snowberry as codominants and was described by Kovalchik (2004). It has a G3G4 global rank, implying that it is somewhat vulnerable globally. However, it is one of the most common riparian plant associations in the project area.

Phalaris arundinacea (PHAR3)

This type of wetland community is dominated by the invasive, non-native reed canarygrass. It occurs in shallow water and along the mucky shorelines of Cougar Lake in the project area. *Phalaris arundinacea* is the dominant plant cover. However, many other native and non-native wetland graminoid and herbaceous species may occur interspersed. *Phalaris arundinacea* seems to be well established around the perimeter of Cougar Lake, and although full eradication of the grass through targeted hand pulling and removal probably isn't realistic, control of the spread of the infestation into more pristine parts of the lake shore may be feasible using a targeted hand-pulling program.

Populus trichocarpa / Alnus incana - Cornus stolonifera, (POTR15/ALIN2-COST4)

This plant association was described by Kovalchik (2004). It is a wetland/riparian community and is not common in the project area. While the occurrence of mountain alder and red-oiser dogwood is common in many of the riparian wetlands throughout the Methow Wildlife Area, the presence of black cottonwoods is far less frequent. This community is compositionally similar to the ALIN2-COST4-SYAL shrubland community. However, the presence of black cottonwood as an overstory component differentiates this community. The large cottonwoods can play an important ecological role because they provide elevated perches for hunting birds of prey, and protective roosts and nesting opportunities to some bird species. Overall this community is relatively common in the Methow, but has a G3 global rank, implying that it is vulnerable globally.

Populus tremuloides / Cornus stolonifera (POTR5/COST4)

This riparian plant community is characterized by an overstory of trembling aspen and an understory of red-osier dogwood. It grows adjacent to small streams in the project area and was described by Kovalchik (2004). It is stable and well distributed globally (G4 rank) and fairly common in the Methow.

Populus tremuloides / Symphoricarpos albus (POTR5/SYAL)

This riparian plant community is characterized by an overstory of trembling aspen and an understory of common snowberry. It grows in moist pockets and swales, sometimes as a linear strip at the outer border of riparian areas in the project area. It should be considered to be transitional between the riparian systems and the uplands. It was described by Kovalchik (2004). Areas that are covered by this association are usually fairly moist, at least in the spring, and have reasonably deep soils. It is globally vulnerable to extirpation or extinction (G3 status) and only occurs in small pockets throughout the Methow. This association is very important for many wildlife species. It should be managed carefully to avoid resource damage.

Salix bebbiana (SABE2)

This riparian plant community is characterized by dense thickets of Bebb willow. It was found in one polygon in the project area (on the eastern border) where a small pond is situated. Scattered occurrences of Bebb willow occur along the margins of most ponds in this area, but they seldom attain stand-level dominance. The community is situated in a swampy depression with a high water table and spring ponding. It was described by Bourgeron (2004) and Crawford (2003).

The understory of the pond site where this community is dominant has been thoroughly invaded by non-native *Poa pratensis*, but still has native *Maianthemum stellatum* present. This plant association is vulnerable globally (G3 rank) and uncommon in the Methow, where it is limited to lower elevation wetlands and meadows, typically with calcic soils. It should be targeted for special management attention to avoid deterioration of its ecological condition.

Other Land Cover Types

Former agricultural field

Part of the project area was an old homestead and agricultural land in the past. Some of the fields have been abandoned for years, and are in transition back to native vegetation. Other fields have been more actively managed by WDFW in recent years and do not have significant native vegetation. Most of the former agricultural fields are dominated by non-native species, which often comprise 50 to 95% of the vegetation cover. The primary non-native species are smooth brome (*Bromus inermis*), cheatgrass (*Bromus tectorum*), and diffuse knapweed (*Centauria diffusa*), although many others are present as well.

Disturbed meadow / grassland

These areas contain little shrub cover and are dominated by graminoids. They often occur in relatively level areas and may be sub-irrigated in the spring by water moving through the soil. They may also represent very old agricultural fields that have largely recovered to the point of having mostly native plant cover. Regardless, these plant communities are markedly different from the surrounding shrub-steppe. These areas often stay green later into summer than the shrub-steppe, and are therefore much more heavily grazed by cattle, with a resultant potential loss of a native species. Often non-native species are common and abundant in these areas.

Disturbed wetland

There are disturbed vernal wetlands in the project area that occur in shallow depressions where moisture accumulates in the springtime. Because of the moisture that accumulates at these sites, they are favored by grazing cattle in the summer, as the surrounding uplands dry out. Often heavy grazing occurs and the result is extensive disturbance to these wetland communities and invasion of non-native species. Over time, with the removal of grazing pressure, these areas would probably favor many more native species. We have found rare, listed plant species in similar areas in nearby areas of Pearrygin Lake State Park that have not been grazed for many years.

Rocky slope - sparse vegetation

There are several steep, rocky slopes in the project area that contain bedrock, scree and loose soil. These areas contain sparse vegetation and were mapped as a discrete natural community.

Talus slope

There is at least one sizeable talus slope in the project area above and east of Cougar Lake. It contains large talus blocks and very sparse vegetation.

Tree plantation

There is one polygon in the project area that was former agricultural field, a portion of which now contains a young plantation of ponderosa pine. The pine is spaced evenly and the understory is similar to the vegetation of the surrounding field. It is not a natural community; therefore we decided to map and describe it as a discrete entity.

Water

Cougar Lake is the one significant waterbody in the project area. There are also some small streams, but these are included in the riparian vegetation community surrounding the stream and too narrow to be considered mapable vegetation communities by themselves.

Rare Plant Surveys

Methods

We visited the project area of the Methow Wildlife Area multiple times during the 2007 field season to conduct rare plant surveys. We used the Washington Department of Natural Resources Natural Heritage Program's (DNR NHP) rare plant list to determine the conservation status of vascular plants encountered in the field. When a plant from the DNR NHP list was located, we used the standard DNR NHP rare plant sighting form to complete field descriptions for the observation.

Field surveys were conducted on **:** April 15, May 12, June 6, June 7, July 3, July 7, July 21, September 6, September 7, September 26, October 3, October 5, October 6, October 8, October 11, October 12, and October 19. During the field surveys, we were equipped with reference literature, rare plant lists for the area, maps showing rare plant locations from previous surveys, and a portable plant identification lab. We looked for rare plants in habitats previously identified as being likely occurrence sites. So as not to miss a rare plant, all vascular plant species encountered during the inventory were identified on site, at base camp in the portable laboratory, or back at our office.

Survey routes were determined based on the desire to efficiently cover a large proportion of the park's area throughout the field season. We surveyed habitats of the park where we felt rare plants were more likely to occur more intensively. Survey routes for the rare plant inventory and rare plant locations were recorded either by hand, on a hardcopy topographic map, or as GPS waypoints and trackpoints, all of which were later compiled into a single GIS data layer, depicted in Appendix A.

Results

Rare Plants

No plant species listed as threatened, endangered or sensitive were encountered in the project area. One species on the WA DNR NHP "watch" list was encountered, purple milkvetch (*Astragalus agrestis*). Watch status is assigned to each vascular plant taxon that is more abundant and/or less threatened in Washington than previously assumed. Although the Washington Natural Heritage Program does not focus on these taxa, some information about them is still gathered.

Scientific Name	Common Name	Global/State Rank
Astragalus agrestis	Purple milkvetch	G5 (Globally Secure) / Watch

Vascular Plant List for the 2007 Project Area

A total of 251 vascular plant species were identified during the 2007 surveys in the Methow Wildlife Area. Of these, 46 of the plant species are non-native, accounting for 18% of the total.

Key to Vascular Plant Species List

Column 2: "Code": Four-letter plant code as shown on the USDA PLANTS database.

Column 3: "Hitchcock Scientific Name": The species list primarily uses Hitchcock and Cronquist's *Flora of the Pacific Northwest* as the taxonomic authority, as this is still the standard reference for our area.

Column 4: "New Scientific Name": Updated nomenclature when it exists is shown in column 4. When updated nomenclature is an integral part of a community plant association, then the updated version appears in the association name and the new 4 letter code is not reflected in this table.

Column 7: "Alien": species that are not native to the Methow Wildlife Area are indicated with an "a" in this column.

Vascular Plant Species of the Project Area, MWA:

	Code	Hitchcock Scientific Name	New Scientific Name	Common Name	Family	Alien
1	ACGL	Acer glabrum Torr.		Rocky Mountain maple	Aceraceae	
2	ACMI2	Achillea millefolium L.		common yarrow	Asteraceae	
3	ACRU2	Actaea rubra (Ait.) Willd.		red baneberry	Ranunculaceae	
4	AGUR	Agastache urticifolia (Benth.) Kuntze		nettleleaf giant hyssop	Lamiaceae	
5	AGGL	Agoseris glauca (Pursh) Raf.		pale agoseris	Asteraceae	
6	AGCR	Agropyron cristatum (L.) Gaertn.		crested wheatgrass	Poaceae	a
7	AGSP	Agropyron spicatum Pursh	Pseudoroegneria spicata (Pursh) A. Löve ssp. spicata	bluebunch wheatgrass	Poaceae	
8	AGAL3	Agrostis alba auct. non L. [misapplied]	Agrostis gigantea Roth	redtop	Poaceae	a
9	AGSC5	Agrostis scabra Willd.		rough bentgrass	Poaceae	
10	ALPL	Alisma plantago-aquatica L.		European water plantain	Alismataceae	a
11	ALIN2	Alnus incana (L.) Moench		gray alder	Betulaceae	
12	AMAL2	Amelanchier alnifolia (Nutt.) Nutt. ex M. Roemer		Saskatoon serviceberry	Rosaceae	
13	ANMA	Anaphalis margaritacea (L.) Benth.		western pearly everlasting	Asteraceae	
14	ANAR3	Angelica arguta Nutt.		Lyall's angelica	Apiaceae	
15	ANLU2	Antennaria luzuloides Torr. & Gray		rush pussytoes	Asteraceae	
16	ANMI3	Antennaria microphylla Rydb.		littleleaf pussytoes	Asteraceae	
17	ANRA	Antennaria racemosa Hook.		raceme pussytoes	Asteraceae	
18	APAN2	Apocynum androsaemifolium L.		spreading dogbane	Apocynaceae	
19	ARHO2	Arabis holboellii Hornem.		Holboell's rockcress	Brassicaceae	
20	ARSP	Arabis sparsiflora Nutt.		sicklepod rockcress	Brassicaceae	
21	ARCA3	Arceuthobium campylopodum Engelm.		western dwarf mistletoe	Loranthaceae	
22	ARDO	Arceuthobium douglasii Engelm.		Douglas dwarf mistletoe	Loranthaceae	
23	ARMI2	Arctium minus Bernh.		lesser burdock	Asteraceae	a
24	ARNE	Arctostaphylos nevadensis Gray		pinemat manzanita	Ericaceae	
25	ARCO9	Arnica cordifolia Hook.		heartleaf arnica	Asteraceae	
26	ARAN3	Artemisia annua L.		sweet sagewort	Asteraceae	a
27	ARDR4	Artemisia dracunculus L.		tarragon	Asteraceae	a
28	ARTR2	Artemisia tridentata Nutt.		big sagebrush	Asteraceae	
29	ARTR4	Artemisia tripartita Rydb.		threetip sagebrush	Asteraceae	
30	ASCO3	Aster conspicuus Lindl.	Eurybia conspicua (Lindl.) Nesom	western showy aster	Asteraceae	
31	ASLAG	Aster laevis L. var. geyeri Gray	Symphyotrichum laeve var. geyeri		Asteraceae	
32	ASAG2	Astragalus agrestis Dougl. ex G. Don		purple milkvetch	Fabaceae	
33	ASMI9	Astragalus miser Dougl.		timber milkvetch	Fabaceae	
34	ASPU9	Astragalus purshii Dougl. ex Hook.		woollypod milkvetch	Fabaceae	
35	BASA3	Balsamorhiza sagittata (Pursh) Nutt.		arrowleaf balsamroot	Asteraceae	
36	BEOC2	Betula occidentalis Hook.		water birch	Betulaceae	
37	BEPA	Betula papyrifera Marsh.		paper birch	Betulaceae	
38	BRBR7	Bromus brizaeformis Fischer & C. Meyer	Bromus briziformis Fisch. & C.A. Mey.	rattlesnake brome	Poaceae	a
39	BRCA5	Bromus carinatus Hook. & Arn.		California brome	Poaceae	
40	BRCO4	Bromus commutatus Schrad.	Bromus racemosus L.	bald brome	Poaceae	a

	Code	Hitchcock Scientific Name	New Scientific Name	Common Name	Family	Alien
41	BRIN2	Bromus inermis Leyss.		smooth brome	Poaceae	a
42	BRJA	Bromus japonicus Thunb. ex Murr.	Bromus arvensis	field brome	Poaceae	
43	BRSE	Bromus secalinus L.		rye brome	Poaceae	a
44	BRTE	Bromus tectorum L.		cheatgrass	Poaceae	a
45	CARU	Calamagrostis rubescens Buckl.		pinegrass	Poaceae	
46	CALY	Calochortus lyallii Baker		Lyall's mariposa lily	Liliaceae	
47	CAMA5	Calochortus macrocarpus Dougl.		sagebrush mariposa lily	Liliaceae	
48	CABU	Calypso bulbosa (L.) Oakes		fairy slipper	Orchidaceae	
49	CADR	Cardaria draba (L.) Desv.		whitetop	Brassicaceae	a
50	CAPU6	Cardaria pubescens (C.A. Mey.) Jarmolenko		hairy whitetop	Brassicaceae	a
51	CAAM10	Carex amplifolia Boott		bigleaf sedge	Cyperaceae	
52	CADO2	Carex douglasii Boott		Douglas' sedge	Cyperaceae	
53	CAHO5	Carex hoodii Boott		Hood's sedge	Cyperaceae	
54	CAMU6	Carex multicostata Mackenzie		manyrib sedge	Cyperaceae	
55	CAPR5	Carex praegracilis W. Boott		clustered field sedge	Cyperaceae	
56	CARO5	Carex rossii Boott		Ross' sedge	Cyperaceae	
57	CAHI9	Castilleja hispida Benth.		harsh Indian paintbrush	Scrophulariaceae	
58	CAMI12	Castilleja miniata Dougl. ex Hook.		giant red Indian paintbrush	Scrophulariaceae	
59	CATH4	Castilleja thompsonii Pennell		Thompson's Indian paintbrush	Scrophulariaceae	
60	CEVE	Ceanothus velutinus Dougl. ex Hook.		snowbrush ceanothus	Rhamnaceae	
61	CEDI3	Centaurea diffusa Lam.		diffuse knapweed	Asteraceae	a
62	CHDO	Chaenactis douglasii (Hook.) Hook. & Arn.		Douglas' dustymaiden	Asteraceae	
63	CHFR3	Chenopodium fremontii S. Wats.		Fremont's goosefoot	Chenopodiaceae	
64	CHLE4	Chenopodium leptophyllum (Moq.) Nutt. ex S. Wats.		narrowleaf goosefoot	Chenopodiaceae	
65	CHUM	Chimaphila umbellata (L.) W. Bart.		pipsissewa	Pyrolaceae	
66	CILA2	Cinna latifolia (Trev. ex Goepp.) Griseb.		drooping woodreed	Poaceae	
67	CIAL	Circaea alpina L.		small enchanter's nightshade	Onagraceae	
68	CIAR4	Cirsium arvense (L.) Scop.		Canada thistle	Asteraceae	a
69	CIUN	Cirsium undulatum (Nutt.) Spreng.		wavyleaf thistle	Asteraceae	
70	CLLA2	Claytonia lanceolata Pall. ex Pursh		lanceleaf springbeauty	Portulacaceae	
71	CLLI2	Clematis ligusticifolia Nutt.		western white clematis	Ranunculaceae	
72	COPA3	Collinsia parviflora Lindl.		maiden blue eyed Mary	Scrophulariaceae	
73	COLI2	Collomia linearis Nutt.		tiny trumpet	Polemoniaceae	
74	COTE	Collomia tenella Gray		diffuse collomia	Polemoniaceae	
75	COUM	Comandra umbellata (L.) Nutt.		bastard toadflax	Santalaceae	
76	COAR4	Convolvulus arvensis L.		field bindweed	Convolvulaceae	a
77	COST4	Cornus stolonifera Michx.	Cornus sericea L. ssp. sericea	redosier dogwood	Cornaceae	
78	CRCO6	Crataegus columbiana T.J. Howell	Crataegus douglasii Lindl.	black hawthorn	Rosaceae	
79	CRAT	Crepis atribarba Heller		slender hawksbeard	Asteraceae	
80	CRIN4	Crepis intermedia Gray		limestone hawksbeard	Asteraceae	
81	CRTO4	Cryptantha torreyana (Gray) Greene		Torrey's cryptantha	Boraginaceae	
82	CUAP2	Cuscuta approximata Bab.		alfalfa dodder	Cuscutaceae	a
83	CYMO2	Cypripedium montanum Dougl. ex Lindl.		mountain lady's slipper	Orchidaceae	

	Code	Hitchcock Scientific Name	New Scientific Name	Common Name	Family	Alien
84	CYFR2	Cystopteris fragilis (L.) Bernh.		brittle bladderfern	Dryopteridaceae	
85	DAGL	Dactylis glomerata L.		orchardgrass	Poaceae	a
86	DENU2	Delphinium nuttallianum Pritz. ex Walp.		twolobe larkspur	Ranunculaceae	
87	DEPI	Descurainia pinnata (Walt.) Britt.		western tansymustard	Brassicaceae	
88	DITR2	Disporum trachycarpum (S. Wats.) Benth. & Hook. f.	Prosartes trachycarpa S. Wats.	roughfruit fairybells	Liliaceae	
89	DOPU	Dodecatheon pulchellum (Raf.) Merr.		darkthroat shootingstar	Primulaceae	
90	EPAN2	Epilobium angustifolium L.	Chamerion angustifolium (L.) Holub ssp. angustifolium	fireweed	Onagraceae	
91	EPMI	Epilobium minutum Lindl. ex Lehm.		chaparral willowherb	Onagraceae	
92	EPPA2	Epilobium paniculatum Nutt. ex Torr. & Gray	Epilobium brachycarpum	tall annual willowherb	Onagraceae	
93	EQLA	Equisetum laevigatum A. Braun		smooth horsetail	Equisetaceae	
94	ERCO5	Erigeron corymbosus Nutt.		longleaf fleabane	Asteraceae	
95	ERFI2	Erigeron filifolius (Hook.) Nutt.		threadleaf fleabane	Asteraceae	
96	ERLI	Erigeron linearis (Hook.) Piper		desert yellow fleabane	Asteraceae	
97	ERPU2	Erigeron pumilus Nutt.		shaggy fleabane	Asteraceae	
98	ERSUC	Erigeron subtrinervis Rydb. ex Porter & Britt. var. conspicuus (Rydb.) Cronq.		threenerve fleabane	Asteraceae	
99	ERHE2	Eriogonum heracleoides Nutt.		parsnipflower buckwheat	Polygonaceae	
100	ERNI2	Eriogonum niveum Dougl. ex Benth.		snow buckwheat	Polygonaceae	
101	ERUM	Eriogonum umbellatum Torr.		sulphur-flower buckwheat	Polygonaceae	
102	FEID	Festuca idahoensis Elmer		Idaho fescue	Poaceae	
103	FEOV2	Festuca ovina auct. non L. [misapplied]	Festuca brachyphylla J.A. Schultes ex J.A. & J.H. Schultes ssp. brachyphylla	alpine fescue	Poaceae	
104	FRVI	Fragaria virginiana Duchesne		Virginia strawberry	Rosaceae	
105	GABO2	Galium boreale L.		northern bedstraw	Rubiaceae	
106		Galium sp.			Rubiaceae	
107	GATR3	Galium triflorum Michx.		fragrant bedstraw	Rubiaceae	
108	GADI2	Gayophytum diffusum Torr. & Gray		spreading groundsmoke	Onagraceae	
109	GEVI2	Geranium viscosissimum Fisch. & C.A. Mey. ex C.A. Mey.		sticky purple geranium	Geraniaceae	
110	GETR	Geum triflorum Pursh		old man's whiskers	Rosaceae	
111	GIAG	Gilia aggregata (Pursh) Spreng.	Ipomopsis aggregata (Pursh) V. Grant ssp. aggregata	scarlet gilia	Polemoniaceae	
112	HAUN	Habenaria unalascensis (Spreng.) S. Wats.	Piperia unalascensis		Orchidaceae	
113	HAAR3	Hackelia arida (Piper) I.M. Johnston	Hackelia diffusa (Lehm.) I.M. Johnston var. arida (Piper) R.L. Carr	sagebrush stickseed	Boraginaceae	
114	HAWH	Halimolobos whitedii (Piper) Rollins		Whited's fissurewort	Brassicaceae	
115	HABL3	Haplopappus bloomeri Gray	Ericameria bloomeri (Gray) J.F. Macbr.	rabbitbush	Asteraceae	
116	HEUND	Helianthella uniflora (Nutt.) Torr. & Gray var. douglasii (Torr. & Gray) W.A. Weber		Douglas' helianthella	Asteraceae	
117	HEPE	Helianthus petiolaris Nutt.		prairie sunflower	Asteraceae	
118	HECY2	Heuchera cylindrica Dougl. ex Hook.		roundleaf alumroot	Saxifragaceae	

	Code	Hitchcock Scientific Name	New Scientific Name	Common Name	Family	Alien
119	HISC2	Hieracium scouleri Hook.		Scouler's woollyweed	Asteraceae	
120	HIUM	Hieracium umbellatum L.		narrowleaf hawkweed	Asteraceae	
121	HODI	Holodiscus discolor (Pursh) Maxim.		oceanspray	Rosaceae	
122	HYCA4	Hydrophyllum capitatum Dougl. ex Benth.		ballhead waterleaf	Hydrophyllaceae	
123	HYPE	Hypericum perforatum L.		common St. Johnswort	Clusiaceae	a
124	IVXA	Iva xanthifolia Nutt.	Cyclachaena xanthifolia (Nutt.) Fresen.	giant sumpweed	Asteraceae	a
125	JUBA	Juncus balticus Willd.	Juncus arcticus Willd. ssp. littoralis (Engelm.) Hultén	Baltic rush	Juncaceae	
126	JUCO6	Juniperus communis L.		common juniper	Cupressaceae	
127	KOCR	Koeleria cristata auct. p.p., non Pers.	Koeleria macrantha (Ledeb.) J.A. Schultes	prairie Junegrass	Poaceae	
128	LASE	Lactuca serriola L.		prickly lettuce	Asteraceae	a
129	LAEC	Lappula echinata Gilib.	Lappula squarrosa	European stickseed	Boraginaceae	a
130	LARE	Lappula redowskii auct. non (Hornem.) Greene [misapplied]	Lappula occidentalis var. occidentalis	flatspine stickseed	Boraginaceae	
131	LEVI3	Lepidium virginicum L.		Virginia pepperweed	Brassicaceae	
132	LERE7	Lewisia rediviva Pursh		bitter root	Portulacaceae	
133	LIPH3	Linanthus pharnaceoides (Benth.) Greene	Leptosiphon liniflorus (Benth.) J.M. Porter & L.A. Johnson	narrowflower flaxflower	Polemoniaceae	
134	LIDA	Linaria dalmatica (L.) P. Mill.		Dalmatian toadflax	Scrophulariaceae	a
135	LIBU2	Lithophragma bulbiferum Rydb.	Lithophragma glabrum	bulbous woodland-star	Saxifragaceae	
136	LIAR4	Lithospermum arvense L.	Buglossoides arvensis (L.) I.M. Johnston	corn gromwell	Boraginaceae	a
137	LIRU4	Lithospermum ruderale Dougl. ex Lehm.		western stoneseed	Boraginaceae	
138	LOAM	Lomatium ambiguum (Nutt.) Coult. & Rose		Wyeth biscuitroot	Apiaceae	
139	LODI	Lomatium dissectum (Nutt.) Mathias & Constance		fernleaf biscuitroot	Apiaceae	
140	LOGE2	Lomatium geyeri (S. Wats.) Coult. & Rose		Geyer's biscuitroot	Apiaceae	
141	LOMA3	Lomatium macrocarpum (Nutt. ex Torr. & Gray) Coult. & Rose		bigseed biscuitroot	Apiaceae	
142	LONU2	Lomatium nudicaule (Pursh) Coult. & Rose		barestem biscuitroot	Apiaceae	
143	LOIN5	Lonicera involucrata (Richards.) Banks ex Spreng.		twinberry honeysuckle	Caprifoliaceae	
144	LUPO2	Lupinus polyphyllus Lindl.		bigleaf lupine	Fabaceae	
145	LUSE4	Lupinus sericeus Pursh		silky lupine	Fabaceae	
146	LYAL	Lychnis alba P. Mill.	Silene latifolia Poir. ssp. alba (P. Mill.) Greuter & Burdet	bladder campion	Caryophyllaceae	a
147	LYBA4		Lycium barbarum L.	matrimony vine	Solanaceae	a
148	MACI2	Madia citriodora Greene		lemonscented madia	Asteraceae	
149	MAGR3	Madia gracilis (Sm.) Keck & J. Clausen ex Applegate		grassy tarweed	Asteraceae	
150	MAAQ2	Mahonia aquifolium (Pursh) Nutt.		hollyleaved barberry	Berberidaceae	
151	MARE11	Mahonia repens (Lindl.) G. Don		creeping barberry	Berberidaceae	
152	MELU	Medicago lupulina L.		black medick	Fabaceae	a
153	MESA	Medicago sativa L.		alfalfa	Fabaceae	a
154	MEBU	Melica bulbosa Geyer ex Porter & Coult.		oniongrass	Poaceae	
155	MEOF	Melilotus alba Medikus [orthographic variant]	Melilotus officinalis (L.) Lam.	yellow sweetclover	Fabaceae	a

	Code	Hitchcock Scientific Name	New Scientific Name	Common Name	Family	Alien
156	MEAL6	Mentzelia albicaulis (Dougl. ex Hook.) Dougl. ex Torr. & Gray		whitestem blazingstar	Loasaceae	
157	MELA2	Mentzelia laevicaulis (Dougl. ex Hook.) Torr. & Gray		smoothstem blazingstar	Loasaceae	
158	MELO4	Mertensia longiflora Greene		small bluebells	Boraginaceae	
159	MITR5	Microseris troximoides Gray	Nothocalais troximoides	weevil prairie-dandelion	Asteraceae	
160	MIGR	Microsteris gracilis (Hook.) Greene		slender phlox	Polemoniaceae	
161	MIGU	Mimulus guttatus DC.		seep monkeyflower	Scrophulariaceae	
162	MOLI4	Montia linearis (Dougl. ex Hook.) Greene		narrowleaf minerslettuce	Portulacaceae	
163	MOPE3	Montia perfoliata (Donn ex Willd.) T.J. Howell	Claytonia perfoliata Donn ex Willd. ssp. perfoliata	miner's lettuce	Portulacaceae	
164	MUAS	Muhlenbergia asperifolia (Nees & Meyen ex Trin.) Parodi		scratchgrass	Poaceae	
165	MUFI2	Muhlenbergia filiformis (Thurb. ex S. Wats.) Rydb.		pullup muhly	Poaceae	
166	MYLA	Myosotis laxa Lehm.		bay forget-me-not	Boraginaceae	
167	NEBR	Nemophila breviflora Gray		basin nemophila	Hydrophyllaceae	
168	NECA2	Nepeta cataria L.		catnip	Lamiaceae	a
169	OSCH	Osmorhiza chilensis Hook. & Arn.	Osmorhiza berteroi DC.	sweetcicely	Apiaceae	
170	OSOC	Osmorhiza occidentalis (Nutt. ex Torr. & Gray) Torr.		western sweetroot	Apiaceae	
171	PAMY2	Pachystima myrsinites (Pursh) Raf. [orthographic variant]	Paxistima myrsinites (Pursh) Raf.	Oregon boxleaf	Celastraceae	
172	PECO6	Penstemon confertus Dougl. ex Lindl.		yellow penstemon	Scrophulariaceae	
173	PEFR3	Penstemon fruticosus (Pursh) Greene		bush penstemon	Scrophulariaceae	
174	PEPR3	Penstemon pruinosus Dougl. ex Lindl.		Chelan beardtongue	Scrophulariaceae	
175	PHHA	Phacelia hastata Dougl. ex Lehm.		silverleaf phacelia	Hydrophyllaceae	
176	PHHU	Phacelia humilis Torr. & Gray		low phacelia	Hydrophyllaceae	
177	PHLI	Phacelia linearis (Pursh) Holz.		threadleaf phacelia	Hydrophyllaceae	
178	PHAR3	Phalaris arundinacea L.		reed canarygrass	Poaceae	a
179	PHOC3	Philotria occidentalis (Pursh) House	Elodea nuttallii	western waterweed	Hydrocharitaceae	
180			Photinia spp.	chokeberry	Rosaceae	a
181	PIPO	Pinus ponderosa P.& C. Lawson		ponderosa pine	Pinaceae	
182	POBU	Poa bulbosa L.		bulbous bluegrass	Poaceae	a
183	POCO	Poa compressa L.		Canada bluegrass	Poaceae	a
184	PONE3	Poa nevadensis Vasey ex Scribn.	Poa secunda J. Presl	Sandberg bluegrass	Poaceae	
185	POPR	Poa pratensis L.		Kentucky bluegrass	Poaceae	a
186	POAV	Polygonum aviculare L.		prostrate knotweed	Polygonaceae	
187	POCO8	Polygonum coccineum Muhl. ex Willd.	Polygonum amphibium L. var. emersum Michx.	water smartweed	Polygonaceae	
188	POCO10	Polygonum convolvulus L.		black bindweed	Polygonaceae	a
189	PODOD4	Polygonum douglasii Greene ssp. douglasii		Douglas' knotweed	Polygonaceae	
190	PORA3	Polygonum ramosissimum Michx.		bushy knotweed	Polygonaceae	
191	POTR5	Populus tremuloides Michx.		quaking aspen	Salicaceae	
192	POTR15	Populus trichocarpa Torr. & Gray ex Hook.	Populus balsamifera L. ssp. trichocarpa (Torr. & Gray ex Hook.)	black cottonwood	Salicaceae	

	Code	Hitchcock Scientific Name	New Scientific Name	Common Name	Family	Alien
			Brayshaw			
193	POGR8	Potamogeton gramineus L.		variableleaf pondweed	Potamogetonaceae	
194	POGL9	Potentilla glandulosa Lindl.		sticky cinquefoil	Rosaceae	
195	POGR9	Potentilla gracilis Dougl. ex Hook.		slender cinquefoil	Rosaceae	
196	PORE5	Potentilla recta L.		sulphur cinquefoil	Rosaceae	a
197	PRVU	Prunella vulgaris L.		common selfheal	Lamiaceae	
198	PREM	Prunus emarginata (Dougl. ex Hook.) D. Dietr.		bitter cherry	Rosaceae	
199	PRVI	Prunus virginiana L.		chokecherry	Rosaceae	
200	PSME	Pseudotsuga menziesii (Mirbel) Franco		Douglas-fir	Pinaceae	
201	PTAQ	Pteridium aquilinum (L.) Kuhn		western brackenfern	Dennstaedtiaceae	
202	PUTR2	Purshia tridentata (Pursh) DC.		antelope bitterbrush	Rosaceae	
203	PYSE	Pyrola secunda L.	Orthilia secunda (L.) House	sidebells wintergreen	Pyrolaceae	
204	RAGL	Ranunculus glaberrimus Hook.		sagebrush buttercup	Ranunculaceae	
205	RAMA2	Ranunculus macounii Britt.		Macoun's buttercup	Ranunculaceae	
206	RAUN	Ranunculus uncinatus D. Don ex G. Don		woodland buttercup	Ranunculaceae	
207	RIBR	Ribes bracteosum Dougl. ex Hook.		stink currant	Grossulariaceae	
208	RICE	Ribes cereum Dougl.		wax currant	Grossulariaceae	
209	RIHU	Ribes hudsonianum Richards.		northern black currant	Grossulariaceae	
210	RILA	Ribes lacustre (Pers.) Poir.		prickly currant	Grossulariaceae	
211	RONU	Rosa nutkana K. Presl		Nootka rose	Rosaceae	
212	ROWO	Rosa woodsii Lindl.		Woods' rose	Rosaceae	
213	RUID	Rubus idaeus L.		American red raspberry	Rosaceae	
214	RUPA	Rubus parviflorus Nutt.		thimbleberry	Rosaceae	
215	RUCR	Rumex crispus L.		curly dock	Polygonaceae	a
216	SABE2	Salix bebbiana Sarg.		Bebb willow	Salicaceae	
217	SASC	Salix scouleriana Barratt ex Hook.		Scouler's willow	Salicaceae	
218	SACE3	Sambucus cerulea Raf. [orthographic variant]	Sambucus nigra L. ssp. caerulea (Raf.) R. Bolli	blue elderberry	Caprifoliaceae	
219	SARA	Sambucus racemosa L.		red elderberry	Caprifoliaceae	
220	SAMI3	Sanguisorba minor Scop.		small burnet	Rosaceae	a
221	SAOC4	Saxifraga occidentalis S. Wats.		Alberta saxifrage	Saxifragaceae	
222	SCGA	Scutellaria galericulata L.		marsh skullcap	Lamiaceae	
223	SELA	Sedum lanceolatum Torr.		spearleaf stonecrop	Crassulaceae	
224	SEDE2	Selaginella densa Rydb.		lesser spikemoss	Selaginellaceae	
225	SEIN2	Senecio integerrimus Nutt.		lambstongue ragwort	Asteraceae	
226	SIDO	Silene douglasii Hook.		seabluff catchfly	Caryophyllaceae	
227	SIMEM	Silene menziesii Hook. ssp. menziesii		Menzies' campion	Caryophyllaceae	
228	SIAL2	Sisymbrium altissimum L.		tall tumblemustard	Brassicaceae	a
229	SILO3	Sisymbrium loeselii L.		small tumbleweed mustard	Brassicaceae	a
230	SMRAA	Smilacina racemosa (L.) Desf. var. amplexicaulis (Nutt.) S. Wats.	Maianthemum racemosum (L.) Link ssp. amplexicaule (Nutt.) LaFrankie	feathery false lily of the valley	Liliaceae	
231	SMST	Smilacina stellata (L.) Desf.	Maianthemum stellatum (L.) Link	starry false lily of the valley	Liliaceae	
232	SODU	Solanum dulcamara L.		climbing nightshade	Solanaceae	a
233	SPBE2	Spiraea betulifolia Pallas		white spirea	Rosaceae	
234	SPRO	Spiranthes romanzoffiana Cham.		hooded lady's tresses	Orchidaceae	

	Code	Hitchcock Scientific Name	New Scientific Name	Common Name	Family	Alien
235	STTE2	Stephanomeria tenuifolia (Raf.) Hall	Stephanomeria minor (Hook.) Nutt. var. minor	narrowleaf wirelettuce	Asteraceae	
236	STOCC	Stipa occidentalis Thurb. ex S. Wats. var. californica (Merr. & Burtt-Davy) C.L. Hitchc.	Achnatherum occidentale (Thurb.) Barkworth ssp. californicum (Merr. & Burtt-Davey) Barkworth	California needlegrass	Poaceae	
237	STOCM	Stipa occidentalis Thurb. ex S. Wats. var. minor sensu C.L. Hitchc., non (Vasey) C.L. Hitchc.	Achnatherum nelsonii (Scribn.) Barkworth ssp. dorei (Barkworth & Maze) Barkworth	Dore's needlegrass	Poaceae	
238	SYAL	Symphoricarpos albus (L.) Blake		common snowberry	Caprifoliaceae	
239	SYOR2	Symphoricarpos oreophilus Gray		mountain snowberry	Caprifoliaceae	
240	TAOF	Taraxacum officinale G.H. Weber ex Wiggers		common dandelion	Asteraceae	a
241	TRDU	Tragopogon dubius Scop.		yellow salsify	Asteraceae	a
242	TYLA	Typha latifolia L.		broadleaf cattail	Typhaceae	
243	URDI	Urtica dioica L.		stinging nettle	Urticaceae	
244	VETH	Verbascum thapsus L.		common mullein	Scrophulariaceae	a
245	VEAM2	Veronica americana Schwein. ex Benth.		American speedwell	Scrophulariaceae	
246	VEBI2	Veronica biloba L.		twolobe speedwell	Scrophulariaceae	a
247	VIAD	Viola adunca Sm.		hookedspur violet	Violaceae	
248	VINUV2	Viola nuttallii Pursh ssp. vallicola (A. Nels.) Taylor & MacBryde	Viola vallicola A. Nels. var. vallicola	sagebrush violet	Violaceae	
249	WOOR	Woodsia oregana D.C. Eat.		Oregon cliff fern	Dryopteridaceae	
250	WOSC	Woodsia scopulina D.C. Eat.		Rocky Mountain woodsia	Dryopteridaceae	
251	ZIVE	Zigadenus venenosus S. Wats.		meadow deathcamas	Liliaceae	

Non-native Plant Species of the Project Area, arranged alphabetically by scientific name.
For the implication of the Washington State noxious "class" rating, see Appendix B.

	Code	Hitchcock Scientific Name	New Scientific Name	Common Name	Family	Class
1	AGCR	Agropyron cristatum (L.) Gaertn.		crested wheatgrass	Poaceae	
2	AGAL3	Agrostis alba auct. non L. [misapplied]	Agrostis gigantea Roth	redtop	Poaceae	
3	ALPL	Alisma plantago-aquatica L.		European water plantain	Alismataceae	
4	ARMI2	Arctium minus Bernh.		lesser burdock	Asteraceae	
5	ARAN3	Artemisia annua L.		sweet sagewort	Asteraceae	
6	ARDR4	Artemisia dracunculus L.		tarragon	Asteraceae	
7	BRBR7	Bromus brizaeformis Fischer & C. Meyer	Bromus briziformis Fisch. & C.A. Mey.	rattlesnake brome	Poaceae	
8	BRCO4	Bromus commutatus Schrad.	Bromus racemosus L.	bald brome	Poaceae	
9	BRIN2	Bromus inermis Leyss.		smooth brome	Poaceae	
10	BRSE	Bromus secalinus L.		rye brome	Poaceae	
11	BRTE	Bromus tectorum L.		cheatgrass	Poaceae	
12	CADR	Cardaria draba (L.) Desv.		whitetop	Brassicaceae	C
13	CAPU6	Cardaria pubescens (C.A. Mey.) Jarmolenko		hairy whitetop	Brassicaceae	C
14	CEDI3	Centaurea diffusa Lam.		diffuse knapweed	Asteraceae	B
15	CIAR4	Cirsium arvense (L.) Scop.		Canada thistle	Asteraceae	C
16	COAR4	Convolvulus arvensis L.		field bindweed	Convolvulaceae	C
17	CUAP2	Cuscuta approximata Bab.		alfalfa dodder	Cuscutaceae	C
18	DAGL	Dactylis glomerata L.		orchardgrass	Poaceae	
19	HYPE	Hypericum perforatum L.		common St. Johnswort	Clusiaceae	C
20	IVXA	Iva xanthifolia Nutt.	Cyclachaena xanthifolia (Nutt.) Fresen.	giant sumpweed	Asteraceae	
21	LASE	Lactuca serriola L.		prickly lettuce	Asteraceae	
22	LAEC	Lappula echinata Gilib.	Lappula squarrosa	European stickseed	Boraginaceae	
23	LIDA	Linaria dalmatica (L.) P. Mill.		Dalmatian toadflax	Scrophulariaceae	B
24	LIAR4	Lithospermum arvense L.	Buglossoides arvensis (L.) I.M. Johnston	corn gromwell	Boraginaceae	
25	LYAL	Lychnis alba P. Mill.	Silene latifolia Poir. ssp. alba (P. Mill.) Greuter & Burdet	bladder campion	Caryophyllaceae	
26	MELU	Medicago lupulina L.		black medick	Fabaceae	
27	MESA	Medicago sativa L.		alfalfa	Fabaceae	
28	MEOF	Melilotus alba Medikus [orthographic variant]	Melilotus officinalis (L.) Lam.	yellow sweetclover	Fabaceae	
29	NECA2	Nepeta cataria L.		catnip	Lamiaceae	
30	PHAR3	Phalaris arundinacea L.		reed canarygrass	Poaceae	C
31	POBU	Poa bulbosa L.		bulbous bluegrass	Poaceae	
32	POCO	Poa compressa L.		Canada bluegrass	Poaceae	
33	POPR	Poa pratensis L.		Kentucky bluegrass	Poaceae	
34	POCO10	Polygonum convolvulus L.		black bindweed	Polygonaceae	
35	PORE5	Potentilla recta L.		sulphur cinquefoil	Rosaceae	B
36	RUCR	Rumex crispus L.		curly dock	Polygonaceae	
37	SAMI3	Sanguisorba minor Scop.		small burnet	Rosaceae	
38	SIAL2	Sisymbrium altissimum L.		tall tumblemustard	Brassicaceae	

39	SILO3	Sisymbrium loeselii L.		small tumbleweed mustard	Brassicaceae	
40	SODU	Solanum dulcamara L.		climbing nightshade	Solanaceae	
41	TAOF	Taraxacum officinale G.H. Weber ex Wiggers		common dandelion	Asteraceae	
42	TRDU	Tragopogon dubius Scop.		yellow salsify	Asteraceae	
43	VETH	Verbascum thapsus L.		common mullein	Scrophulariaceae	
44	VEBI2	Veronica biloba L.		twolobe speedwell	Scrophulariaceae	
45	LYBA4		Lycium barbarum L.	matrimony vine	Solanaceae	
46			Photinia spp.	chokeberry	Rosaceae	

Ecological Condition of the Project Area

The ecological condition of each polygon was evaluated according to a simple ranking system (Appendix C) during our field visits and recorded in our polygon forms (Appendix E). Ecological condition is a simple ranking system to evaluate the overall condition of an area and estimate its value for conservation. It is also useful for selecting areas for restoration, development or protection. The current ecological condition of the primary plant associations in the study area is illustrated in Figure 6.

The portion of the Methow Wildlife Area surveyed and mapped in the course of this project earns a mixed ecological scorecard. On the positive side, there are numerous plant communities that are well within parameters that indicate good ecological condition. With over 250 vascular plant species identified in a relatively small project area, it appears that most of the native plant species that were present before Anglo-American settlement are still extant. The 251 vascular plant species identified in the project area represent 23% of the 1100 plant species known in the entire Methow watershed, while the land area involved is about 0.1% of the watershed (1630 acres surveyed). On the negative side of the ledger, non-native plant species have become a major component of the overall flora of the project area due to human-caused disturbance, with the attendant loss of native plant species abundance, and an inevitable ripple effect on native wildlife species. The 45 non-native plant species in the project area comprise 18% of the total number of species identified. While some polygons had no recorded occurrence of exotic plants, other polygons had at least 60% overall ground cover by exotics (Figure 7). In general, this project area is in slightly better condition than the one we surveyed last year, as far as exotic plant infestations are concerned.

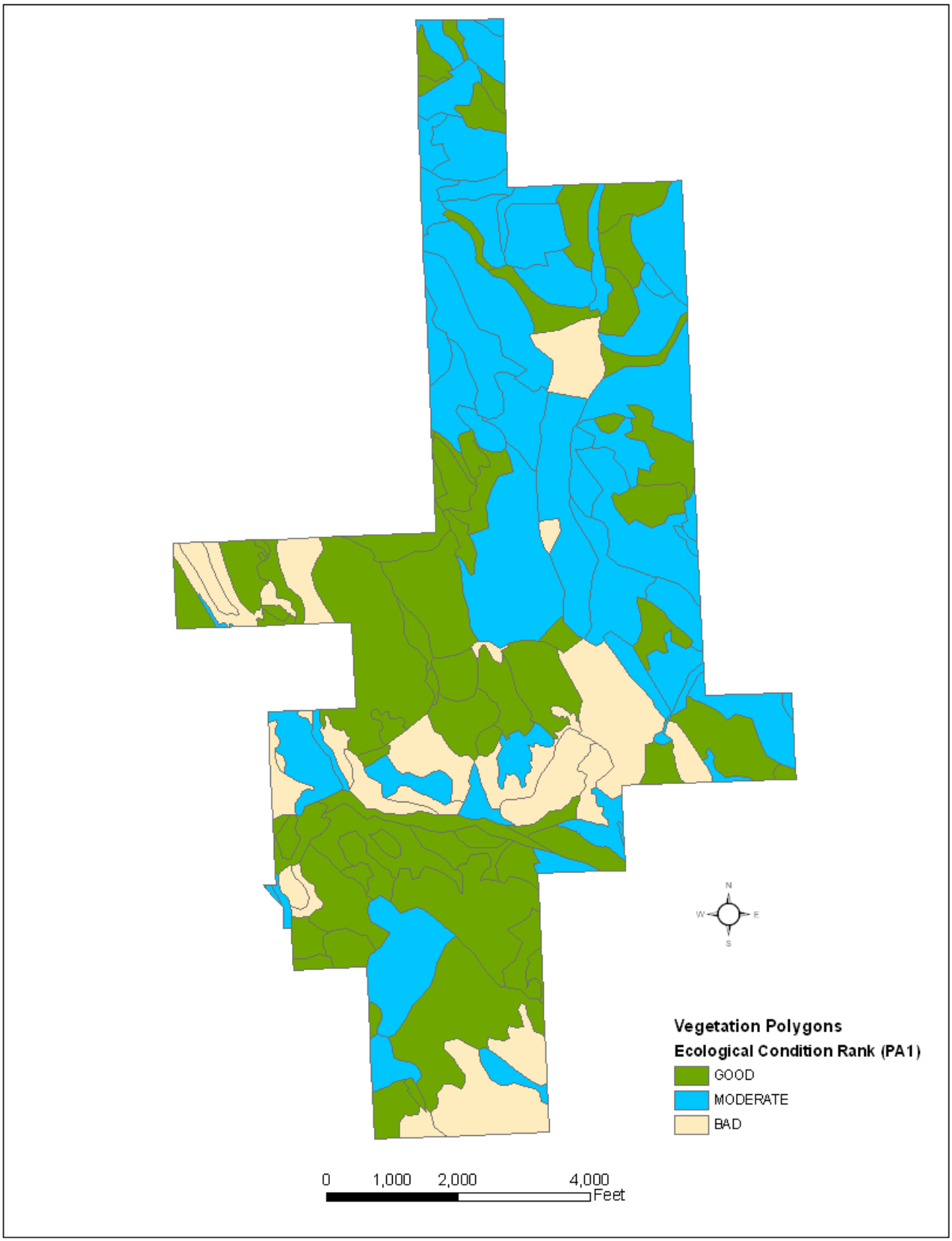


Figure 6. Ecological condition ranks of vegetation community polygons.

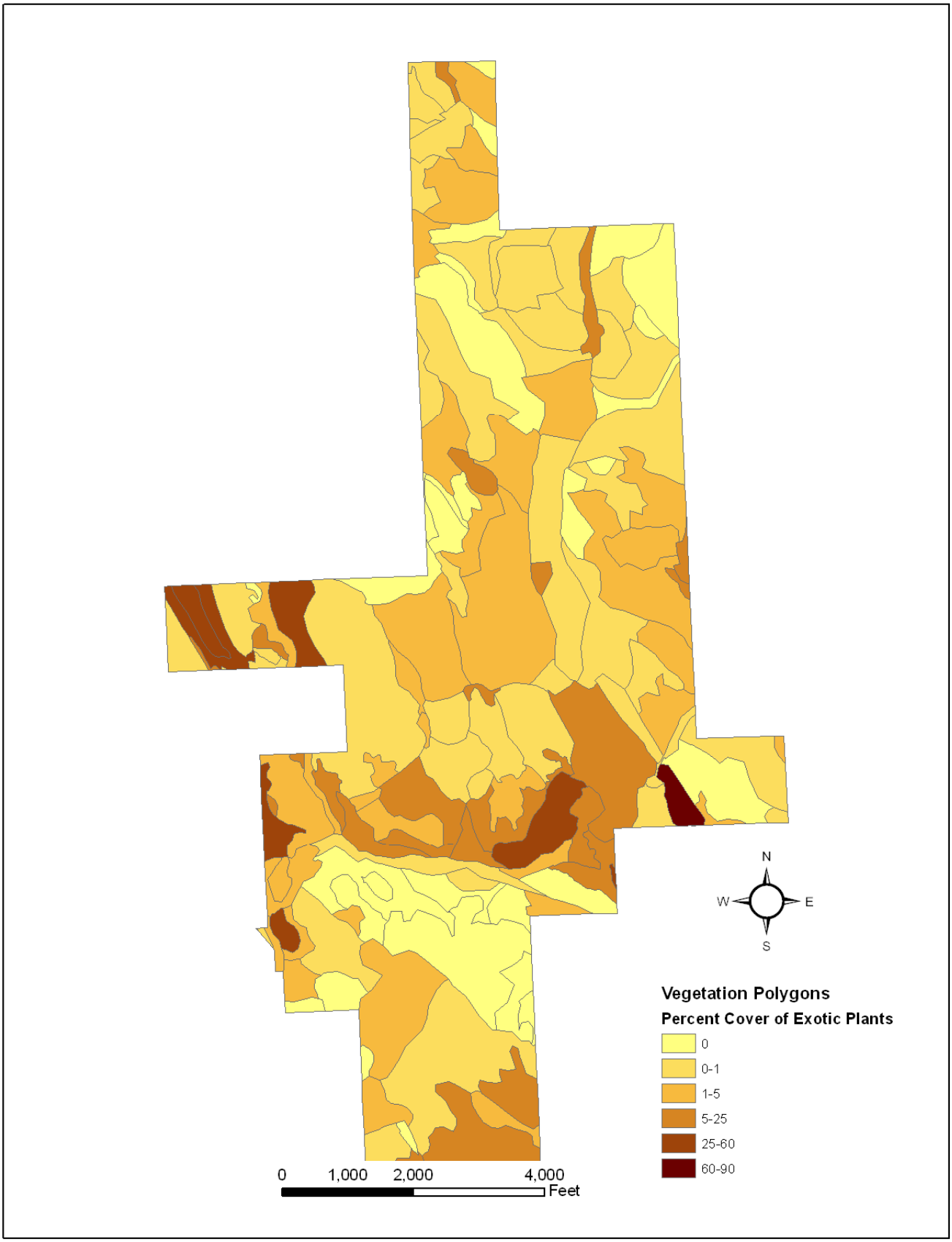


Figure 7. Exotic species cover in the project area.

Many parts of the project area have been impacted by a variety of human-induced stresses. Much of the lower project area has been farmed in the past. Of this, most is now covered largely by non-native plants such as cheatgrass (*Bromus tectorum),* bulbous bluegrass *(Poa bulbosa)* and diffuse knapweed (*Centaurea diffusa*). The remains of an old homestead exist in the middle of the project area in the headwaters of Bear Creek. Many forested areas were selectively logged throughout much of the 1900's. There are numerous roads that serve as dispersal corridors for a variety of human-induced stressors, including non-native plants. Wildfires have been suppressed in the project area and forest succession has been altered as a result. Most of the project area is actively grazed by cattle. Some riparian areas experienced recent intensive grazing pressure as well as soil and hydrologic impacts from cattle grazing during our survey period.

As stated above, many riparian areas are actively grazed and have been grazed extensively in the past. We observed resource damage in these areas during the field season. Fences to control livestock around riparian areas are either non-existant or in poor repair. The grazing that has occurred in this area is responsible for a substantial increase in non-native species and a corresponding loss of native species.

Most of the project area under natural conditions would have a fire frequency of 8-50 years (Ohlson 1996, Agee 1994). Alteration of the natural fire regime has caused a corresponding alteration in the ecological communities and their condition. In the shrub-steppe biome, fire exclusion has resulted in a shift away from bunchgrass and herbaceous dominated communities to communities dominated by shrubs. In the forest biome, fire exclusion has resulted in a shift toward more dominance by Douglas-fir and denser forest stands. Understories have also increased in shrub composition.

On the positive side of the ledger, we have previously mentioned that the overall plant diversity of the project area remains high, and there are areas of shrub-steppe and forest that are in remarkably good ecological condition, given the challenges of the past century. Biological insect controls are active on several of the non-native plant species and have resulted in a substantial contraction of their population. Changes in management practices could substantially reduce human-induced stresses and the natural communities of the project area would soon rebound to a healthier ecological condition. Management activities should be directed to continue to improve the areas in poor and moderate condition and maintain the areas that are in good condition.

There are some remarkable examples of old growth ponderosa pine and Douglas-fir trees in the project area. Some of these trees exceed 4 feet in diameter.

GIS Products Produced

Associated with this report are polygon layers created by PBI depicting the vegetation community types mapped in the project area of the Methow Wildlife Area. The datasets have been converted into ESRI shapefile formats and provided to the Washington Department of Fish and Wildlife Methow Wildlife Area office. The spatial datasets are complete with metadata meeting FGDC standards. Refer to the associated metadata for descriptions and attribute definitions for each spatial dataset.

References

Bourgeron, P. S., and L. D. Engelking, editors. 1994. *A preliminary vegetation classification of the western United States*. Unpublished report. The Nature Conservancy, Western Heritage Task Force, Boulder, CO. 175 pp. plus appendix.

Crawford, Rex C. 2003. A riparian vegetation classification of the Columbia Basin, Washington. 2003. Washington Natural Heritage Program, Washington Department of Natural Resources, Olympia, WA 98504-7016. Published in coordination with Bureau of Land Management, Spokane District and The Nature Conservancy.

Crawford, R., 1999. *Key to Alliances with Sagebrush Species in Washington State.*

Hitchcock, C.L. and A. Cronquist. 1973. *Flora of the Pacific Northwest: An Illustrated Manual* University of Washington Press, Seattle.

Hitchcock, C.L., Cronquist, A., Ownbey, M., and J. W. Thompson. 1955. *Vascular Plants of the Pacific Northwest.* University of Washington Press, Seattle.

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.

Kagan, J. S., J. A. Christy, M. P. Murray, and J. A. Titus. 2000. *Classification of native vegetation of Oregon.* Oregon Natural Heritage Program, Portland. 63 pp.

Kovalchik, B.L and R.R. Clausnitzer. 2004. *Classification and Management of Aquatic, Riparian, and Wetland Sites on the National Forests of Eastern Washington.* USDA Forest Service GTR-593.

Lillybridge, T.R, Kovalchik, B.L., Williams, C.K., and Smith, B.G. 1995. *Field Guide for Forested Plant Associations of the Wenatchee National Forest.* USDA Forest Service GTR-359.

Ohlson, T.H. 1996 Fire *Regimes of the Ponderosa Pine-Douglas-fir/Bluebunch Wheatgrass Plant Association in the Methow Valley of North Central Washington*. 85 pp. Unpublished document. On file with: U.S. Department of Agriculture, Forest Service, Methow Valley Ranger District, Winthrop, WA 98862.

Visalli, J.D., Smith, H.M. IV, and P.H. Morrison, 2006. *Rare plant and vegetation survey of Pearrygin Lake State Park.* Pacific Biodiversity Institute, Winthrop, Washington.

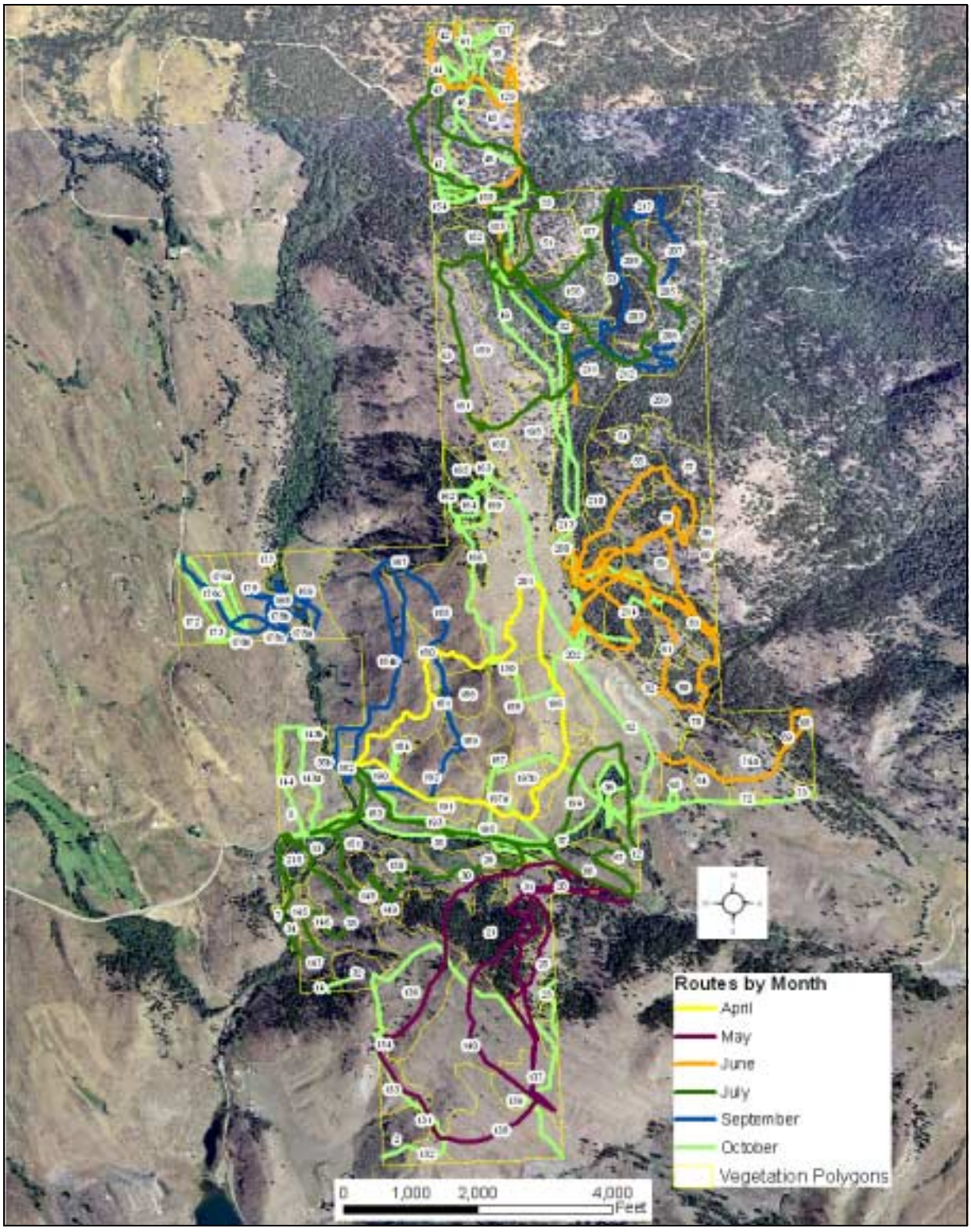
Wooten, G.F., P. Morrison. 2005. Classification of vascular plant communities of the North Cascades using discreet space boundary analysis (Appendix 5, p. 19 of Appendices; online at http://www.okanogan1.com/natural/ecology/eco-ncas/).

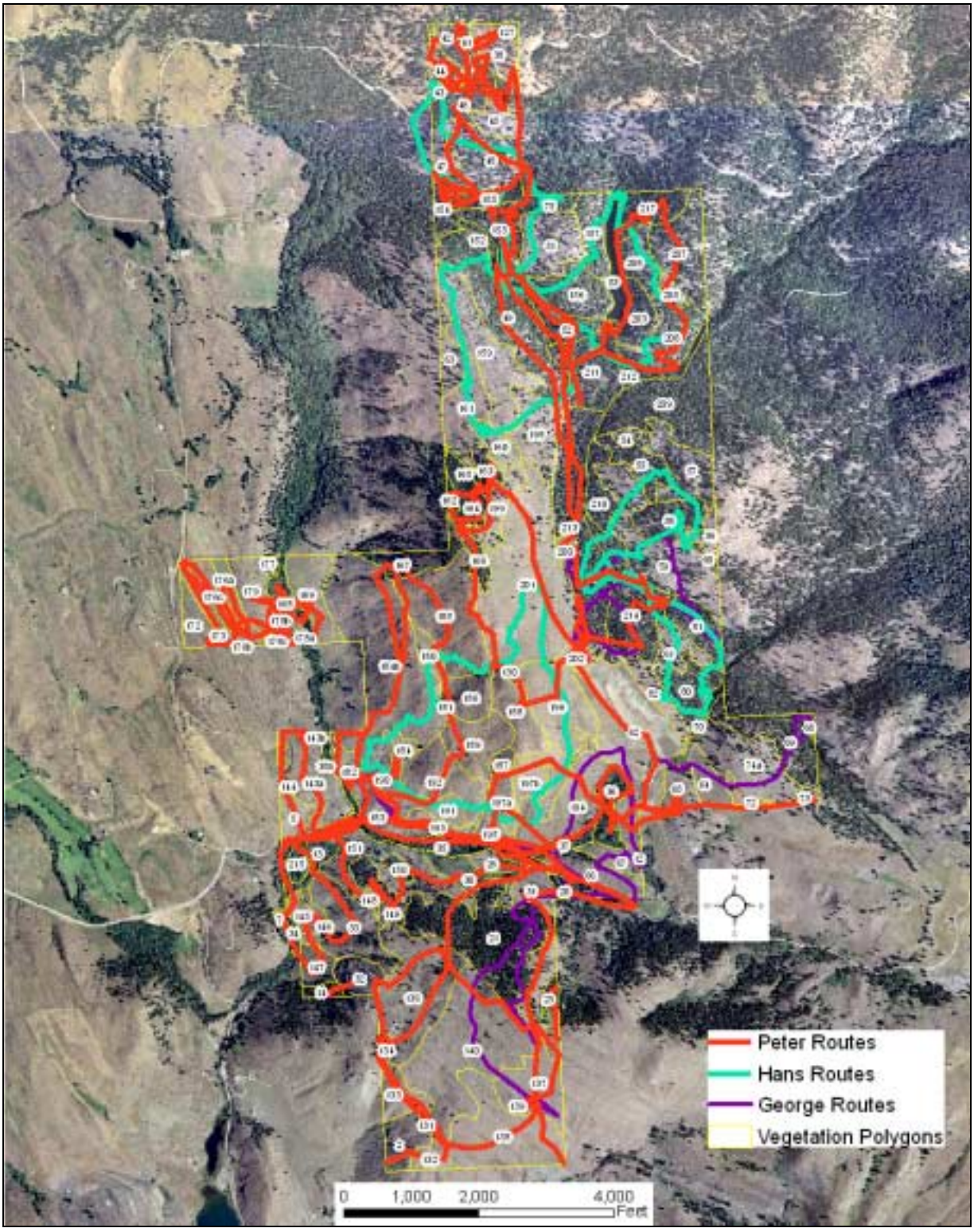
WANHP [Washington Natural Heritage Program]. No date. Unpublished data files. Washington Natural Heritage Program, Department of Natural Resources, Olympia, WA.

Western Ecology Working Group of NatureServe. No date. *International Ecological Classification Standard: International Vegetation Classification -Terrestrial Vegetation.* NatureServe, Boulder, CO.

Appendix A – Field Survey Schedule and Routes

Field Survey Dates: April 15, May 12, June 6, June 7, July 3, July 7, July 21, September 6, September 7, September 26, October 3, October 5, October 6, October 8, October 11, October 12, and October 19.




Peter Routes
Hans Routes
George Routes
Vegetation Polygons
0
1,000
2,000
4,000
Feet

Appendix B – Noxious Weed Ratings

Class A noxious weeds are non-native species whose distribution in Washington State is still limited.

- Eradicating existing infestations and preventing new infestations are the highest priorities.
- Eradication of all Class A plants is required by law.

Class B noxious weeds are non-native species whose distribution is limited to portions of Washington State.

- Species are designated for control in state regions where they are not yet widespread. Prevention of new infestations in these areas is the primary goal.
- In regions where a Class B species is already abundant, control is decided at the local level. Containment of these weeds is the primary goal so that they do not spread into uninfested regions.

Class C noxious weeds are either already widespread in Washington or are of special interest to the agricultural industry.

- The Class C status allows a county to enforce control if it beneficial to that county (for example, to protect crops).
- Other counties may choose to provide education or technical support for the removal or control of these weeds.

Appendix C – Ecological Condition Ranking System

Ecological Condition Ranks

When assessing conservation priorities and management decisions, it can be useful to rank natural communities into levels of ecological condition. For example, an unfragmented area with high native species diversity, absence of non-native species and little soil erosion often has greater conservation value than another area in the same habitat type that is fragmented, infested with weeds or has erosion problems. Likewise, areas with a lower ecological condition rank may be targets for restoration activities.

The flowing ecological condition ranks were applied to vegetation polygons that were surveyed in this project:

- **Excellent Ecological Condition**

Areas in this class have very few non-native plants. The composition and structure of native vegetation in this condition class correspond to the natural range of variation characteristic to this habitat type. Old-growth conditions often exist. Species diversity of native plants and animals is often high relative to the natural community under consideration. Wildlife habitat conditions are optimal for species of conservation concern. Soil compaction, accelerated erosion and hydrologic alteration are absent. Direct signs of human-induced ecological stress is absent. Many rare plant and animal species may only exist within this condition class.

- **Good Ecological Condition**

Areas in this class have few non-native plants. The composition and structure of native vegetation in this condition class correspond to the natural range of variation characteristic to this habitat type. Old-growth conditions may exist , but have been subject to some human-induced stress. Species diversity of native plants and animals is moderately high relative to the natural community under consideration. Wildlife habitat conditions are adequate for species of conservation concern. Soil compaction, accelerated erosion and hydrologic alteration do not significantly impact the area. Direct signs of human-induced ecological stress are infrequent. Some rare plant and animal species may exist within this condition class.

- **Marginal Ecological Condition**

Areas in this class often have both native and non-native plants. The composition and structure of native vegetation in this condition class is altered from the natural range of variation characteristic to this habitat type. Old-growth conditions are absent. Species diversity of native plants and animals is lower than the two high condition classes. Wildlife habitat conditions may be adequate for some species of conservation concern, but not adequate for many. Soil compaction, accelerated erosion and hydrologic alteration may impact the area. Direct signs of human-induced ecological stress are frequent. Most rare plant and animal species are only infrequently encountered within this condition class.

- **Poor Ecological Condition**

Areas in this class are often dominated by non-native plants. The composition and structure of native vegetation in this condition class is often dramatically altered from the natural range of variation characteristic to this habitat type. Old-growth conditions are absent. Species diversity of native plants and animals is often low. Wildlife habitat conditions are not adequate for most species of conservation concern. Soil compaction, accelerated erosion and hydrologic alteration often impact the area. Direct signs of human-induced ecological stress are frequent. Rare plant and animal species are seldom encountered within this condition class.

Appendix D – Vegetation Survey Data

Legend:

Site = name of locality of map project

Polygon = number you put on map

Name/Date = your name / day-month-year completed polygon survey

Photo roll/number = number of roll (on canister) and number of shot

Survey intensity
1 = walked or could see most of polygon (high confidence in survey data)
2 = walked or could see part of polygon interior (moderate confidence)
3 = walked perimeter or could see part of polygon interior (low confidence)
4 = photo interpretation or other remote survey

VEGETATION COVER includes all vascular plants, mosses, lichens and foliose lichens (crustose lichens excluded they are considered rock); this never exceeds 100%. Space between leaves/branches is included in "cover".

Code	**Cover (%)**	Cover mid-pt
0	0	0
1	<1	0.5
2	1-5	3
3	5-25	15
4	25-60	43
5	60-90	75
6	>90	95

TOTAL VEGETATION COVER includes all vascular plants, mosses, lichens and foliose lichens (crustose lichens excluded they are considered rock); this never exceeds 100%.

TREES, SHRUBS, GRAMINOIDS, FORBS, EXOTICS cover includes the space between leaves/branches. Each Life form category canopy cover must be 0-100%. Therefore, the sum of all life forms (layers) can exceed 100%. List most abundant species in each life form category; when trees are cored, note DBH, species, length of core, number of rings counted.

SOIL SURFACE estimate to nearest **%** the following, the sum of the categories adds to 100%
Rock outcrop = exposed bedrock including detached boulders over 1m across
Gravel/cobble = large fragments between sand and boulder
Bare ground = exposed mineral soil
Mosses/lichens = nonvascular plant cover on soil
Litter = includes logs, branches, and basal area of plants
Describe in comments if there is wide variation in any category; note % standing water if it is persistent or characteristic of site.

LAND USE - put 0 (zero) if not applicable to site.

Logging
1 = unlogged, no evidence of past logging or occasional cut stumps not part of systematic harvest of trees, no or very little impact on stand composition
2 = selectively logged: frequent cut stumps but origin of dominant or co-dominant cohort appears to be natural disturbance
3 = heavy logging disturbance with natural regeneration: many cut stumps that predate the dominant or co-dominant cohort with no tree planting
4 = tree plantation: dominant cohort appears to be planted after clearcutting

Stand Age
1 = very young 0-40 yr
2 = young 40-90 yr
3 = mature 90-200 yr
4 = old-growth 200+ yr
5 = young with scattered old trees (2-10 old trees per acre)
6 = mature with scattered old trees

Agriculture
1 = active annual cropping
2 = active perennial herbaceous cropping
3 = active woody plant cultivation
4 = fallow, plowed no crops this yr
5 = Federal CRP
6 = other

Livestock
1 = active heavy grazing (most forage used to ground soil compaction or churning)
2 = active moderate grazing (25-75% forage used)
3 = active light grazing (lots of last years litter left)
4 = no current, heavy past grazing
5 = no current, light past grazing
6 = no obvious sign of grazing

Development
1 = actively used facilities
2 = roads
3 = established trails
4 = abandoned facilities
5 = none obvious
6 = multiple types (detail in comments)

Wildlife
1 = heavy ungulate use
2 = moderate ungulate use
3 = light to no ungulate use
4 = burrowing animals
5 = active beaver
6 = active porcupine
7 = other, list animal

Recreation Use Severity
1 = heavy use, abundant soil and vegetation displacement off trail/road
2 = moderate use, frequent soil and vegetation displacement off trail/road
3 = light use, little sign of activity off trail/road

Recreation Use Primary Type
1 = wheeled
2 = hoofed
3 = pedestrian
4 = combination of above
5 = other

Hydrology
1 = unaltered
2 = altered; dams, dikes, ditches, culverts, etc
3 = not assessed

Plant Association (PA) = list all PAs encountered in polygon survey, in comments list source of name if not on provided key.

Condition Rank of PA in key or estimate

% of Polygon = your estimate

Pattern = how PA is distributed in polygon
1 = matrix (most of polygon)
2 = large patches
3 = small patches
4 = clumped, clustered, contiguous
5 = scattered, more or less evenly repeating
6 = linear
7 = other

Exotic = primary species observed; secondary species observed.

Plot Number = number of any plots established for EO (element occurrence), or other more detail sheets within polygon.