



**An Assessment of the
Ecological Characteristics and
Ecological Integrity of the
Palouse Prairie of Washington**

Prepared for U.S. Fish and Wildlife
Service Section 6 Segment 62,

Prepared by
Rex C. Crawford
F. Joseph Rocchio

December 2011



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Washington State**

Report Prepared for:
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3E2 Segment 62

Prepared by:
Rex C. Crawford and F. Joseph Rocchio
Washington Natural Heritage Program
Washington Department of Natural Resources
Olympia, Washington 98504-7014

December 28, 2011

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1.0 Introduction

1.1 Project Objective

In order to prioritize conservation actions among the Palouse Prairie fragments in Washington State, the Washington Natural Heritage Program collected information pertaining to the biodiversity and current ecological conditions associated with sites in the Palouse Atlas (Arnett 2009). This knowledge will inform the development of strategies to conserve the biodiversity supported by these ecological systems. It will also help to stratify Palouse sites for further evaluation and conservation action.

The project assessment area included Palouse sites identified in the Palouse Atlas (Arnett 2009). Thirty of 38 sites were evaluated in the summer of 2010. An additional three sites were evaluated in with 2001 and 2007 information and by land use changes apparent on 2011 aerial imagery. The following information was collected at each site: (1) identification of ecological systems present, using NatureServe's Ecological System's Classification (Comer et al. 2003); (2) data on ecological condition by conducting a rapid assessment (walking or with binoculars) of ecological condition using the Ecological Integrity Assessment method (Faber-Langendoen et al. 2006, 2008a, 2009a, WNHP 2010); and (3) a description of the biological and ecological characteristics including a stressors evaluation.

1.2 Vegetation

Dryland agriculture and rangeland are the primary land uses in the project area and occupy over 94% of the landscape (Black et al. 1998). In areas not suitable for dryland agriculture, livestock grazing is the most common land use. The natural and semi-natural uplands in the project area are dominated by shrubland and grassland vegetation. According to NatureServe's Ecological System classification, the matrix of the upland vegetation would be considered Columbia Basin Palouse Prairie with a transition into the Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland along the forest edges, and the Columbia Basin Foothill and Canyon Dry Grassland on steep dry aspects along the Snake River and its larger tributaries. These ecological systems are bunchgrass grasslands dominated by cool-season perennial grasses such as Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*). Also common in the uplands are the Northern Rocky Mountain Montane-Foothill Deciduous Shrubland ecological system, often dominated by hawthorn (*Crataegus* spp.), rose (*Rosa* spp.) and snowberry (*Symphoricarpos* spp.) and the Columbia Plateau Scabland Shrublands, which are lithosolic communities dominated by rigid sagebrush (*Artemisia rigida*), various buckwheats (*Eriogonum* spp.), and Sandberg's bluegrass (*Poa sandbergii*). The predominant upland grassland plant associations are Idaho fescue/common snowberry, Idaho fescue-bluebunch wheatgrass and bluebunch wheatgrass-Sandberg's bluegrass.

2.0 Methods

2.1 Field Methods

The following section provides an overview of methods and a description of the types of data collected at each of the randomly selected polygons. The field forms are included in Appendix A. Rex Crawford and Joe Rocchio, ecologists with the Washington Natural Heritage Program, each surveyed approximately one-half of the sites evaluated. The assessment included 33 of 38

Palouse sites indentified in the Palouse Atlas (Arnett 2009). Thirty sites were evaluated in the summer of 2010, and three sites were evaluated with information gathered by Natural Heritage in 2001 and 2007 and with land use changes apparent on 2011 aerial imagery. Due to time constraints five sites were not evaluated. Sites in the Palouse Atlas were evaluated either as a single site or as multiple polygons or survey areas at an individual site, as illustrated in Figure 1. Site assessments included on-site reconnaissance surveys (31%) or, most frequently, roadside or binocular inspection of the ecological condition of each ecological system at each site or individual survey area polygon. Selected metrics of biological condition (see EIA discussion below) were assessed for these reconnaissance sites. All information collected is included in the site evaluation Appendices and in the accompanying Microsoft Excel Workbook.

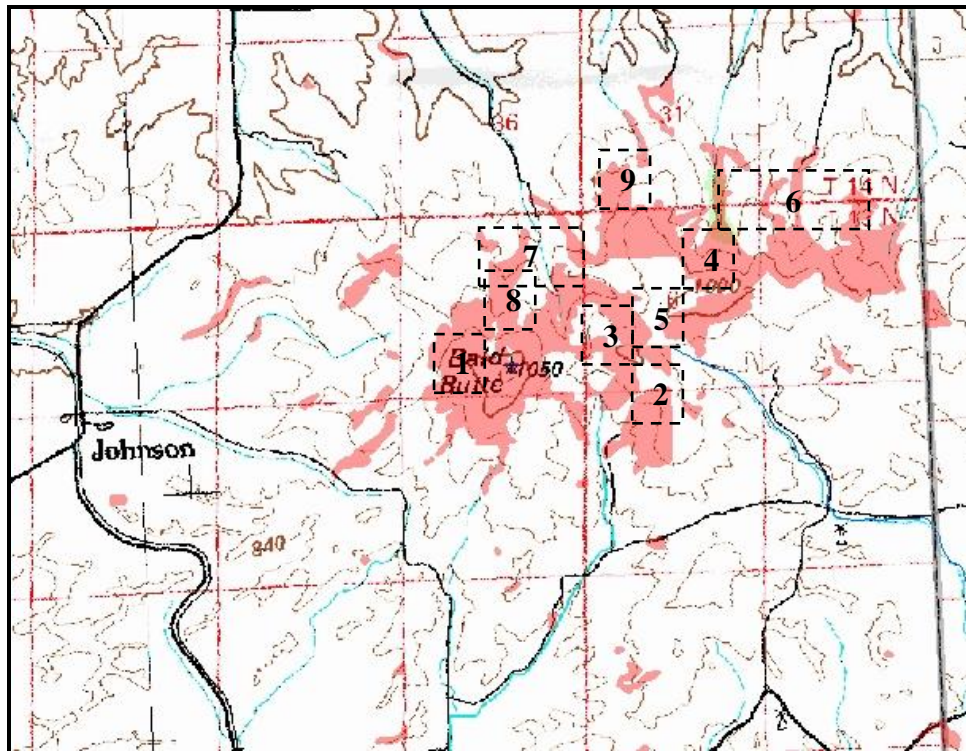


Figure 1 Large and diverse Palouse sites in the Palouse Atlas (Arnett 2009), such as Bald Butte illustrated above, were assessed with two or more survey areas or polygons with similar apparent ecological system, condition or visibility for evaluation. Numbers designate survey locations; the surrounding outline approximates area evaluated.

2.3.1 Classification

Each polygon or survey area was classified as an Ecological System (Comer et al. 2003) and where a possible Plant Association (NatureServe 2011). Ecological Systems integrate vegetation with natural dynamics, soils, hydrology, landscape setting, and other ecological processes; they provide an integrated approach that is effective at constraining both biotic and abiotic variability within one classification unit. Ecological system also facilitate mapping at meso-scales (1:24,000 – 1:100,000; Comer and Schulz 2007); a comprehensive map of all ecological system types exists for the State of Washington. The *Draft Field Guide to Washington's Ecological Systems* was used to identify the ecological system at each site (Rocchio and Crawford 2008).

The plant association is the finest-scale unit of the U.S. National Vegetation Classification (NVC), supported by the Federal Geographic Data Committee (FGDC 2008), NatureServe (Faber-Langendoen et al. 2009c), and the Ecological Society of America (Jennings et al. 2009). The association represents diagnostic species which reflect topo-edaphic, climate, substrates, hydrology, and/or natural disturbance regimes. The NVC is hierarchical and consists of eight levels which allows for a link to NatureServe's Ecological Systems classification (described above) and meets several important needs for conservation and resource management. It provides a multi-level, ecologically based framework that allow users to address conservation and management concerns at appropriate scales, a characterization of ecosystem patterns across the entire landscape or watershed, information on the relative rarity of types (associations has been assessed for conservation status), and relationships to other classification systems explicitly linked to the NVC types (e.g. the Ecological System classification) a federal standard for all federal agencies, facilitating sharing of information on ecosystem types (FGDC 2008).

2.3.2 Ecological and Biological Characteristics

At each Palouse Atlas site surveyed, the following ecological attributes were documented or recorded:

- Classification (see above)
- Location
- General descriptive information
- Partial Plant species list
- Ecological condition (using Ecological Integrity Assessment; see below)
- List of stressors, following NatureServe methodology (Master et al. 2009)

2.3.3 Ecological Integrity Assessments

NatureServe and the Natural Heritage Network have developed an approach for assessing ecological condition that is scaled both in terms of the ecosystem type being assessed and the level of information required to conduct the assessment. This method is called the Ecological Integrity Assessment (Faber-Langendoen et al. 2006, 2008, 2009a, 2009b) and is being implemented at a variety of small- and large-scale projects (Rocchio and Crawford 2009, Lemly and Rocchio 2009, Faber-Langendoen et al. 2009b, Tierney et al. 2009, Vance et al. *In Progress*). Such indicator-based (ecological endpoints) approaches to assessing and reporting on ecological integrity (Harwell et al. 1999, Young and Sanzone 2002) are being used by numerous organizations to assist with regulatory decisions (Mack 2004), to set mitigation performance standards (Mack 2004, Faber-Langendoen et al. 2006, 2008a), and to set conservation priorities (Faber-Langendoen et al. 2008b).

The Ecological Integrity Assessment method (EIA) aims to measure the current ecological integrity of a site through a standardized and repeatable assessment of conditions associated with the structure, composition, and ecological processes of a particular ecological system. These

conditions are then compared or ranked according to conditions expected in those sites operating within the bounds of their natural range of variation. The purpose of assigning an index of ecological integrity is to provide a succinct assessment of the current status of the composition, structure and function of occurrences of a particular ecosystem type and to give a general sense of conservation value, management effects, restoration success, etc. As such, the objectives of an EIA include: (1) to assess ecological integrity on a fixed, objective scale; (2) to compare ecological integrity of various occurrences of the same ecological system; (3) to determine the best examples of a individual ecological system types and to support selection of sites for conservation priority; (4) to inform decisions on monitoring individual ecological attributes of a particular occurrence; and (5) to provide an aggregated index of integrity to interpret monitoring data, including tracking the status of ecological integrity over time. The EIA aims to standardize expert opinion and existing data up front so that a single, qualified ecologist could apply the EIA in a rapid manner to get an estimate of a site's ecological integrity. The EIA can improve an understanding of current ecological conditions which can lead to more effective and efficient use of available resources for ecosystem protection, management, and restoration efforts.

For this project, EIAs developed by the Washington Natural Heritage Program (WNHP 2010) were used to rapidly assess the ecological integrity of Ecological Systems at each Palouse site. The metrics and rating criteria used in the EIA assessment are found in the field forms presented in Appendix A. Letter rankings for each metric, such as "Bunchgrass Cover" were given numeric scores (arranged from high to low integrity: A=5.0, B=4.0, C=3.0, D=1.0) which were then used to aggregate metric and Key Ecological Attribute (KEA), such as Landscape Context, scores into higher level ranks through simple, weight-based algorithms (Table 1). For example, metrics associated with each KEA were summed and divided by the total number of metrics (i.e., metrics were given equal weight in this project). KEA scores are averaged to arrive at an overall Ecological Integrity Assessment Score. This score was then converted back into a letter ranking.

Table 1. Summary of scores and ranks for metrics, factors, and the overall ecological integrity for a level 2 rapid field-based assessment vegetation, hydrology and soils are key ecological attributes (KEA) within the condition rank factor.

KEY ATTRIBUTES	Assigned Metric Rating	Assigned Metric Points	Weight (W)	Metric Score (M)	Rank Factor Score (M/W)	Rank Factor Rank	Ecological Integrity Score	Ecological Integrity Rank (
LANDSCAPE CONTEXT					4.3	B		
Landscape Connectivity	A	5	1	5				
Buffer Index	B	4	1	4				
Surrounding Land Use	B	4	1	4				
			$\Sigma=3$	$\Sigma=13$				
SIZE					4.3	B		
Relative Size	A	5	0.5	2.5				
Absolute Size	B	4	1	4				
			$\Sigma=1.5$	$\Sigma=6.5$				
VEGETATION (BIOTA)					3.6	C		
Vegetation Structure	C	3	1	3				
Organic Matter Accumulation	C	3	0.5	1.5				
Vegetation Composition	B	4	1	4				
Cover of Native Plants	B	4	1	4				
			$\Sigma=3.5$	$\Sigma=12.5$				
HYDROLOGY					4.0	B		
Water Source	C	3	1	3				
Hydroperiod	B	4	1	4				
Hydrologic Connectivity	A	5	1	5				
			$\Sigma=3$	$\Sigma=12$				
SOILS (PHYSICOCHEMISTRY)					4.0	B		
Physical Patch Types	B	4	0.5	2				
Water Quality	B	4	1	4				
Soil Surface Condition	B	4	1	4				
			$\Sigma=2.5$	$\Sigma=10$				
RATING A=4.5-5.0, B = 3.5-4.4, C=2.5-3.4, D=1.0-2.4							4.1	B

3.0 Results and Discussion

3.1 Ecological Characteristics of Palouse Prairie Fragments

A summary of the ecological characteristics of each Palouse site surveyed is presented in Appendix C. All of the data collected for this project are found in the accompanying “Palouse EIA tables.xlsx” Microsoft Excel workbook. Some of the key ecological characteristics are discussed below. Thirty of the 38 sites in the Palouse Atlas were visited in 2010; an additional evaluation of 3 sites using previous information and 2011 imagery are included. A total of 139 polygons or survey areas were evaluated.

3.1.1 Classification

Ecological System Classification

Most survey areas visited were classified as either Columbia Basin Palouse Prairie (65%) or the Northern Rocky Mountain Montane-Foothill Deciduous Shrubland (11%). Eight other ecological systems were recorded during assessments: Columbia Basin Foothill and Canyon Dry Grassland (9 survey areas), Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland (7), Columbia Basin Foothill Riparian Woodland and Shrubland (6), North American Arid West Emergent Marsh (3), Columbia Plateau Scabland Shrubland (2), Northern Rocky Mountain Ponderosa Pine Woodland and Savanna (2), Northern Rocky Mountain Foothill Conifer Wooded Steppe (2), and a single Columbia Plateau Vernal Pool.

Plant Associations

Plant associations, as listed on NatureServe Explorer (NatureServe 2011), assigned in the field are presented in Table 2. Because most sites were remotely evaluated, only 28 of 139 locations were assigned a plant association name. Over half of the associations assigned were either the *Festuca idahoensis* - *Symphoricarpos albus* or *Pseudoroegneria spicata* - *Festuca idahoensis* Palouse plant associations, both considered globally endangered vegetation types (NatureServe 2011).

Table 2. Plant associations identified during surveys, global conservation rank and the number of polygons or survey areas.

NVC Association	Global Rank	Number of locations
<u><i>Festuca idahoensis</i> - <i>Symphoricarpos albus</i> Herbaceous Vegetation</u>	G1	11
<u><i>Pseudoroegneria spicata</i> - <i>Festuca idahoensis</i> Palouse Herbaceous Vegetation</u>	G1	5
<u><i>Festuca idahoensis</i> - <i>Eriogonum heracleoides</i> Herbaceous Vegetation</u>	G2	2
<u><i>Pseudoroegneria spicata</i> - <i>Festuca idahoensis</i> Canyon Herbaceous Vegetation</u>	G3	2
<u><i>Pseudoroegneria spicata</i> - <i>Poa secunda</i> Lithosolic Herbaceous</u>	G3	2
<u><i>Artemisia rigida</i> / <i>Poa secunda</i> Shrub Herbaceous Vegetation</u>	G4	1
<u><i>Crataegus douglasii</i> / <i>Heracleum maximum</i> Shrubland</u>	G1	1
<u><i>Crataegus douglasii</i> / <i>Rosa woodsii</i> Shrubland</u>	G2	1
<u><i>Festuca idahoensis</i> - <i>Pseudoroegneria spicata</i> Herbaceous Vegetation</u>	G4	1
<u><i>Pinus ponderosa</i> / <i>Festuca idahoensis</i> Woodland</u>	G4	1
<u><i>Pinus ponderosa</i> / <i>Symphoricarpos albus</i> Forest</u>	G4?	1

3.1.2 Overall Ecological Condition

The overall ecological condition of surveyed sites is summarized in this section. The overall EIA rank represents an aggregation of the ranks associated with four key ecological attributes (KEA): (1) Landscape Context; (2) Biotic Condition; (3) Abiotic Condition; and (4) Size. Size attributes were not assessed for this project. The ranks for each of the KEAs are derived from a roll-up of underlying metric ranks associated with each KEA (see Table 1). Each level of rank (overall EIA rank down to a metric rank) is suited for specific prioritization or analysis objectives. For example, metric ranks are most useful for assessing and monitoring specific ecological characteristics associated with an Ecological System while the KEA and EIA rank provide a more useful rank for prioritizing conservation and management actions. KEA and EIA ranks for sites surveyed in this project are presented in Table 3.

Table 3. Summary of EIA, Landscape, Vegetation and Physical Site Condition Ranks and the numeric EIA Scores of Palouse Prairie polygons and sites. Site and Polygon/Plot locations are mapped in Appendix B. Palouse Atlas-Ecological Integrity Assessments. All rank factor and KEA ranks appear in the accompanying “Palouse EIA tables.xlsx” Microsoft excel workbook “rank table” sheet. A hyphen “-“ appears where the attribute was not assessed.

Survey Site Name	Polygon/Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
Angel Butte	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	C	C	-	3.17
Bald Butte	1	Columbia Basin Palouse Prairie	CD	D	B	-	2.54
Bald Butte	2	Columbia Basin Palouse Prairie	D	D	C	-	2.13
Bald Butte	3	Columbia Basin Palouse Prairie	D	D	C	-	2.21
Bald Butte	4	Columbia Basin Palouse Prairie	CD	D	B	-	2.50
Bald Butte	5	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	D	D	C	-	2.38
Bald Butte	6	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	CD	D	B	-	2.54
Bald Butte	7	Columbia Basin Palouse Prairie	CD	D	B	-	2.46

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
Bald Butte	8	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	D	D	C	-	2.38
Bald Butte	9	Columbia Basin Palouse Prairie	CD	D	B	-	2.46
Campus Prairie BSA	-	Columbia Basin Palouse Prairie	CD	D	C	B	2.56
Campus Prairie BSA	-	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	CD	D	B	-	2.40
Ewartsville	1	Columbia Basin Palouse Prairie	C	D	D	C	2.73
Ewartsville	2	Columbia Basin Palouse Prairie	CD	D	D	C	2.50
Ewartsville	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	D	D	D	C	2.13
Ewartsville	4	Columbia Basin Palouse Prairie	CD	D	C	C	2.53
Ewartsville	5	Columbia Basin Palouse Prairie	D	D	D	C	2.27
Ewartsville	6	Columbia Basin Palouse Prairie	D	D	D	C	1.67
Ewartsville	7	Columbia Basin Palouse Prairie	CD	D	D	C	2.50
Ewartsville	8	Columbia Basin Palouse Prairie	BC	D	B	C	3.40
Ewartsville	9	Columbia Basin Palouse Prairie	D	D	D	C	2.17
Ewartsville	10	Columbia Basin Palouse Prairie	D	D	D	C	2.33
Ewartsville	-	Columbia Basin Palouse Prairie	CD	D	D	C	2.40
Fairchild	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	D	D	D	-	1.83
Fairchild	-	Columbia Plateau Vernal Pool	D	D	C	-	2.13
Fishtrap	-	Columbia Plateau Scabland Shrubland	B	B	C	-	3.83
Fishtrap	-	North American Arid West Emergent Marsh	B	B	-	-	4.25

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
Fishtrap	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	BC	B	C	-	3.48
Fishtrap	-	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	B	B	-	-	4.25
Fishtrap	-	North American Arid West Emergent Marsh	B	B	-	-	4.25
Fishtrap	-	Northern Rocky Mountain Foothill Conifer Wooded Steppe	B	B	-	-	4.25
Fishtrap	-	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	-	-	4.25
Fourmile Creek	1	Columbia Basin Palouse Prairie	C	D	C	C	2.67
Fourmile Creek	2	Columbia Basin Palouse Prairie	C	D	B	C	2.87
Fourmile Creek	3	Columbia Basin Palouse Prairie	D	D	C	C	2.20
Fourmile Creek	4	Columbia Basin Palouse Prairie	C	D	B	C	3.20
Fourmile Creek	5	Columbia Basin Palouse Prairie	D	D	D	C	1.67
Fourmile Creek	6	Columbia Basin Palouse Prairie	CD	D	C	C	2.53
Fourmile Creek	7	Columbia Basin Palouse Prairie	D	D	D	C	2.00
Fourmile Creek	8	Columbia Basin Palouse Prairie	D	D	D	C	1.67
Fourmile Creek	9	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	C	D	D	C	2.67
Fourmile Creek	10	Columbia Basin Palouse Prairie	C	D	C	C	2.87
Fourmile Creek	11	Columbia Basin Palouse Prairie	D	D	D	C	2.00
Fourmile Creek	site	Columbia Basin Palouse Prairie	CD	D	C	C	2.53

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
George Creek DNR	-	Columbia Basin Foothill and Canyon Dry Grassland	C	B	C	-	3.06
George Creek DNR	-	Columbia Basin Foothill and Canyon Dry Grassland	B	B	B	B	3.90
George Creek DNR	-	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	B	B	3.96
Granite Butte	-	Columbia Basin Palouse Prairie	D	D	D	-	1.50
Hog Lake DNR	-	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	B	B	B	-	3.88
Hog Lake DNR	-	Northern Rocky Mountain Foothill Conifer Wooded Steppe	C	B	D	-	3.13
Hog Lake DNR	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	B	D	A	3.80
Hog Lake DNR	-	North American Arid West Emergent Marsh	C	B	D	-	2.63
Hog Lake DNR	-	Columbia Plateau Scabland Shrubland	BC	B	C	-	3.43
Kahlotus Ridgetop	1	Columbia Basin Palouse Prairie	BC	D	A	A	3.53
Kahlotus Ridgetop	2	Columbia Basin Palouse Prairie	C	D	B	A	3.19
Kamiak	-	Columbia Basin Palouse Prairie	C	C	C	C	3.13
Kramer Palouse BSA	-	Columbia Basin Palouse Prairie	C	D	BC	A	3.08
Kramer Palouse BSA	-	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	CD	D	B	-	2.40
N. Palouse River Rd	1	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	C	D	C	B	2.72

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
N. Palouse River Rd	2	Columbia Basin Foothill Riparian Woodland and Shrubland	C	D	C	B	2.64
Nisqually John HMU	-	Columbia Basin Foothill and Canyon Dry Grassland	B	B	B	-	3.69
Nisqually John HMU	-	Columbia Basin Foothill and Canyon Dry Grassland	C	B	C	-	3.25
Nisqually John HMU	-	Columbia Basin Foothill Riparian Woodland and Shrubland	BC	B	D	A	3.42
North Wilcox	-	Columbia Basin Palouse Prairie	CD	D	C	B	2.53
North Wilcox	-	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	D	D	D	D	1.63
North Wilcox	-	Columbia Basin Foothill Riparian Woodland and Shrubland	D	D	D	D	1.10
Palouse River - Albion	1	Columbia Basin Palouse Prairie	D	D	D	C	2.28
Palouse River - Albion	2	Columbia Basin Palouse Prairie	C	D	C	C	2.92
Palouse River - Albion	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	C	D	B	D	2.63
Palouse River - Albion	4	Columbia Basin Palouse Prairie	C	D	C	C	2.95
Palouse River - Albion	5	Columbia Basin Palouse Prairie	D	D	C	C	2.28
Palouse River - Albion	6	Columbia Basin Palouse Prairie	CD	D	D	C	2.42
Palouse River - Albion	7	Columbia Basin Palouse Prairie	C	D	C	C	3.08
Palouse River - Albion	8	Columbia Basin Palouse Prairie	C	D	C	C	2.62

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
Palouse River - Albion	9	Columbia Basin Palouse Prairie	C	D	C	C	3.15
Palouse River - Albion	10	Columbia Basin Palouse Prairie	C	D	C	C	2.82
Palouse River - Albion	11	Columbia Basin Palouse Prairie	C	D	C	C	2.82
Palouse River - Albion	12	Columbia Basin Palouse Prairie	D	D	D	C	1.95
Palouse River - Albion	13	Columbia Basin Palouse Prairie	CD	D	D	C	2.55
Palouse River - Albion	14	Columbia Basin Palouse Prairie	C	D	C	C	3.18
Palouse River - Albion	15	Columbia Basin Palouse Prairie	C	D	C	C	2.95
Palouse River - Albion	16	Columbia Basin Palouse Prairie	C	D	D	C	2.68
Palouse River - Albion	17	Columbia Basin Palouse Prairie	C	D	D	C	2.68
Palouse River - Albion	18	Columbia Basin Palouse Prairie	C	D	D	C	2.68
Palouse River - Albion	19	Columbia Basin Palouse Prairie	CD	D	D	C	2.42
Palouse River - Albion	20	Columbia Basin Palouse Prairie	D	D	D	C	2.35
Palouse River - Albion	site	Columbia Basin Palouse Prairie	D	D	D	D	1.53
Parker Butte	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	C	B	-	3.33
Rattlesnake Rd	Deciduous Shrubs	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	C	C	B	-	3.00

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
Rattlesnake Rd	Palouse riparian	Columbia Basin Foothill Riparian Woodland and Shrubland	C	C	C	B	3.00
Rattlesnake Rd	-	Columbia Basin Foothill and Canyon Dry Grassland	CD	C	D	C	2.60
Rattlesnake Rd	-	Columbia Basin Foothill and Canyon Dry Grassland	C	C	C	B	3.26
Ringo Butte	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	C	C	-	3.00
Rosalia	-	Columbia Basin Palouse Prairie	CD	D	C	C	2.60
Rose Creek	1	Columbia Basin Palouse Prairie	B	C	C	A	3.68
Rose Creek	2	Columbia Basin Palouse Prairie	B	C	C	A	3.68
Rose Creek	3	Columbia Basin Palouse Prairie	BC	C	C	A	3.45
Rose Creek	4	Columbia Basin Palouse Prairie	CD	D	D	A	2.42
Rose Creek	site	Columbia Basin Palouse Prairie	BC	C	C	A	3.58
Seltice Butte	-	Columbia Basin Palouse Prairie	C	C	B	-	3.33
Silver Creek	1	Columbia Basin Palouse Prairie	CD	D	C	C	2.57
Silver Creek	2	Columbia Basin Palouse Prairie	D	D	D	C	1.80
Silver Creek	3	Columbia Basin Palouse Prairie	D	D	D	C	2.13
Silver Creek	4	Columbia Basin Palouse Prairie	D	D	D	C	2.13
Silver Creek	-	Columbia Basin Palouse Prairie	D	D	D	C	2.33
Smoot Hill BSA	-	Columbia Basin Palouse Prairie	C	D	BC	A	3.22
Steptoe Butte	1	Columbia Basin Palouse Prairie	BC	D	B	A	3.44
Steptoe Butte	2	Columbia Basin Palouse Prairie	CD	D	C	B	2.56
Steptoe Butte	3	Columbia Basin Palouse Prairie	C	D	B	B	3.13

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
Steptoe Canyon DNR	-	Columbia Basin Palouse Prairie	C	D	B	-	2.63
Strattum Butte	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	C	B	-	3.00
Thorn Creek	1	Columbia Basin Palouse Prairie	D	D	D	-	1.30
Thorn Creek	2	Columbia Basin Palouse Prairie	C	D	D	A	2.80
Thorn Creek	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	CD	D	C	B	2.60
Thorn Creek	4	Columbia Basin Palouse Prairie	D	D	D	D	1.00
Thorn Creek	5	Columbia Basin Palouse Prairie	CD	D	D	B	2.47
Thorn Creek	6	Columbia Basin Palouse Prairie	C	D	C	A	2.87
Thorn Creek	7	Columbia Basin Palouse Prairie	D	D	D	C	1.67
Union Center	1	Columbia Basin Palouse Prairie	D	D	D	C	1.80
Union Center	2	Columbia Basin Palouse Prairie	C	D	D	C	2.67
Union Center	3	Columbia Basin Palouse Prairie	D	D	D	C	1.93
Union Center	4	Columbia Basin Palouse Prairie	D	D	D	C	2.07
Union Center	5	Columbia Basin Palouse Prairie	CD	D	C	C	2.53
Union Center	6	Columbia Basin Palouse Prairie	D	D	D	C	1.67
Union Center	-	Columbia Basin Palouse Prairie	D	D	D	C	2.10
Wawawai Canyon	-	Columbia Basin Foothill and Canyon Dry Grassland	BC	C	B	-	3.50
Wawawai Canyon	-	Columbia Basin Foothill and Canyon Dry Grassland	D	C	D	-	1.88
Wawawai Canyon	-	Columbia Basin Foothill and Canyon Dry Grassland	C	C	C	-	2.96

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank	EIA SCORE
Wilcox & SE	1	Columbia Basin Palouse Prairie	D	D	D	D	1.50
Wilcox & SE	1	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	D	D	C	D	1.75
Wilcox & SE	2	Columbia Basin Palouse Prairie	CD	D	B	D	2.60
Wilcox & SE	2	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	D	D	B	D	2.38
Wilcox & SE	3	Columbia Basin Palouse Prairie	D	D	C	D	1.95
Wilcox & SE	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	C	D	A	D	3.00
Wilcox & SE	-	Columbia Basin Palouse Prairie	CD	D	C	C	2.53
West Kamiak	1	Columbia Basin Palouse Prairie	C	D	C	A	3.07
West Kamiak	2	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	C	D	B	A	3.22
West Kamiak	3	Columbia Basin Palouse Prairie	C	D	C	A	3.00
West Kamiak	site	Columbia Basin Palouse Prairie	C	D	C	A	3.19

Overall EIA rank provides a means to compare across sites. Because the Palouse landscape is typically rank “D” due to the pervasive impact of dryland agriculture, the overall EIA rank is biased toward sites within more natural or semi-natural landscapes (Table 4). Landscape Rank was assessed for all survey areas and when other attributes were assessed the overall EIA is only the Landscape Rank (Table 4). Thus evaluation of EIA rank requires an evaluation of other attribute ranks before drawing conclusions.

Table 4. EIA rank of predominant ecological system in polygons/sites for highest ranking sites. EIA rank is the average of factors with ranks, thus areas with only a single ranked attribute may not reflect the overall integrity of a location; see Fishtrap below where only a single attribute, Landscape Rank, generated the EIA rank.

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank
Ewartsville	8	Columbia Basin Palouse Prairie	BC	D	B	C
Fishtrap	-	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	-	-
Fishtrap	-	North American Arid West Emergent Marsh	B	B	-	-
Fishtrap	-	Northern Rocky Mountain Foothill Conifer Wooded Steppe	B	B	-	-
Fishtrap	-	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	B	B	-	-
Fishtrap	-	Columbia Plateau Scabland Shrubland	B	B	C	-
Fishtrap	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	BC	B	C	-
George Creek DNR	-	Columbia Basin Foothill Riparian Woodland and Shrubland	B	B	B	B
George Creek DNR	-	Columbia Basin Foothill and Canyon Dry Grassland	B	B	B	B
Hog Lake DNR	-	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	B	B	B	-
Hog Lake DNR	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	B	B	D	A
Hog Lake DNR	-	Columbia Plateau Scabland Shrubland	BC	B	C	-
Kahlotus Ridgetop	1	Columbia Basin Palouse Prairie	BC	D	A	A
Nisqually John HMU	-	Columbia Basin Foothill and Canyon Dry Grassland	B	B	B	-
Nisqually John HMU	-	Columbia Basin Foothill Riparian Woodland and Shrubland	BC	B	D	A
Rose Creek	site	Columbia Basin Palouse Prairie	BC	C	C	A
Rose Creek	3	Columbia Basin Palouse Prairie	BC	C	C	A
Rose Creek	2	Columbia Basin Palouse Prairie	B	C	C	A

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Physical Rank
Rose Creek	1	Columbia Basin Palouse Prairie	B	C	C	A
Steptoe Butte	1	Columbia Basin Palouse Prairie	BC	D	B	A
Wawawai Canyon	-	Columbia Basin Foothill and Canyon Dry Grassland	BC	C	B	-

Vegetation Rank typically had the most metrics assessed during site surveys and may be a better common denominator for comparison across sites. Polygons or survey areas with “BC” or higher vegetation rank appear in Table 5.

Table 5. Palouse survey locations with Vegetation Ranks A through BC.

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Site Condition Rank
Bald Butte	9	Columbia Basin Palouse Prairie	CD	D	B	-
Bald Butte	7	Columbia Basin Palouse Prairie	CD	D	B	-
Bald Butte	6	Northern Rocky Mountain Montane- Foothill Deciduous Shrubland	CD	D	B	-
Bald Butte	4	Columbia Basin Palouse Prairie	CD	D	B	-
Bald Butte	1	Columbia Basin Palouse Prairie	CD	D	B	-
Campus Prairie BSA	-	Northern Rocky Mountain Montane- Foothill Deciduous Shrubland	CD	D	B	-
Fourmile Creek	4	Columbia Basin Palouse Prairie	C	D	B	C
Fourmile Creek	2	Columbia Basin Palouse Prairie	C	D	B	C
Kahlotus Ridgetop	2	Columbia Basin Palouse Prairie	C	D	B	A
Kramer Palouse BSA	-	Columbia Basin Palouse Prairie	C	D	BC	A
Kramer Palouse BSA	-	Northern Rocky Mountain Montane- Foothill Deciduous Shrubland	CD	D	B	-
Palouse River - Albion	3	Northern Rocky Mountain Montane- Foothill Deciduous Shrubland	C	D	B	D

Survey Site Name	Polygon/ Plot #	NatureServe Ecological System	EIA Rank	Landscape Rank	Vegetation Rank	Site Condition Rank
Parker Butte	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	C	B	-
Rattlesnake Rd	-	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	C	C	B	-
Seltice Butte	-	Columbia Basin Palouse Prairie	C	C	B	-
Smoot Hill BSA	-	Columbia Basin Palouse Prairie	C	D	BC	A
Step toe Butte	3	Columbia Basin Palouse Prairie	C	D	B	B
Step toe Canyon DNR	-	Columbia Basin Palouse Prairie	C	D	B	-
Strattum Butte	-	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	C	C	B	-
Wilcox & SE	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	C	D	A	D
Wilcox & SE	2	Columbia Basin Palouse Prairie	CD	D	B	D
Wilcox & SE	2	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	D	D	B	D
West Kamiak	2	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	C	D	B	A

Grassland and Prairie Ecological Systems with an overall EIA rank (Table 4) or a Vegetation Rank (Table 5) of BC (good to fair integrity) or better were found at 18 of the 33 Palouse Atlas sites assessed. The Columbia Basin Palouse Prairie ecological system occurred at eleven sites, the Columbia Basin Foothill and Canyon Dry Grassland and the Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland systems occurred at 3 and 4 sites, respectively.

The Palouse Atlas sites with high ranked grassland polygons are arranged in Table 6 within an EIA and Vegetation Rank matrix. Those sites contain the highest ranked polygons but are not necessarily the sites with the most grassland patches, overall diversity, largest size, etc. For example, the Kahlotus Ridgetop survey included only two polygons each with different EIA and Vegetation Ranks, while the Ewartville site has a single high ranked polygon in Table 6 and six additional grassland polygons with C through D ranks plus a shrubland polygon. The Hog Lake site appears in a mostly natural landscape yielding a high EIA rank although it received a D rank for a single grassland polygon. This ranking information provides a means for comparing and setting priorities among sites for future conservation planning along with other specific site information.

Table 6. Palouse Atlas sites with grassland or prairie polygons with an EIA rank or vegetation condition rank of A through BC. Numeric values are the number of sites in that cell with lower ranked grassland polygons. Sites with more than one grassland polygon can occur in more than one rank cell.

Vegetation Rank	EIA Rank	B	BC	C	CD	D
A		0	Kahlotus Ridgetop	0	0	0
B		George Creek DNR, Nisqually John HMU	Ewartville, Steptoe Butte, Wawawai Canyon	Fourmile Creek, Kahlotus Ridgetop, Parker Butte, Seltice Butte, Steptoe Butte, Steptoe Canyon, Strattum Butte	Bald Butte, Wilcox & SE	0
BC		0	0	Kramer Palouse BSA, Smoot Hill BSA	Campus Prairie BSA	0
C		Rose Creek	Fishtrap, Rose Creek	11 sites	8 sites	4 sites
D		Hog Lake DNR	0	4 sites	5 sites	10 sites

3.1.3 Stressors

Stressors associated with four ecological attributes were documented at each Palouse Atlas site using NatureServe’s Stressor checklist methodology (Master et al. 2009). These categories are (1) Landscape Stressors; (2) Vegetation Stressors; (3) Soil Stressors; and (4) Hydrology Stressors. The Stressor data sheet, with definition of categories used to assign ratings, is found in Appendix A. A summary of stressor ratings (i.e. overall stressor impact) is in Table 7.

Hydrological Stressors were rarely applied and are not included in Table 7. Inspection of the Table 7 reveals that most (53%) Landscape stressors are “High” and most (46%) on-site Biotic stressors for the Palouse Atlas sites evaluated during this project are “Very High”.

Table 7. Summary of overall stressor values for representative ecological systems at 27 Palouse Atlas sites. VH = very high impact; H = high impact; M = moderate impact; L = low impact. “*” indicates sites selected to begin initial conservation evaluation and planning in previous section. See Appendix A for stressor definitions.

Survey Site Name	NatureServe Ecological System	Overall Landscape	Overall Biotic	Overall Soil
Angel Butte	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	L	M	
Campus Prairie BSA*	Columbia Basin Palouse Prairie	VH	VH	
Ewartsville*	Columbia Basin Palouse Prairie	VH	VH	L
Fairchild	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	VH	H	L
Fishtrap*	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	M	H	
Fourmile Creek*	Columbia Basin Palouse Prairie	H	VH	L
George Creek DNR*	Columbia Basin Foothill and Canyon Dry Grassland	H	VH	
George Creek DNR*	Columbia Basin Foothill and Canyon Dry Grassland	H	M	
Granite Butte	Columbia Basin Palouse Prairie	L	H	
Hog Lake DNR*	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	M	H	
Kamiak	Columbia Basin Palouse Prairie	H	VH	
Kramer Palouse BSA*	Columbia Basin Palouse Prairie	H	VH	
Nisqually John HMU*	Columbia Basin Foothill and Canyon Dry Grassland	H	H	M

Survey Site Name	NatureServe Ecological System	Overall Landscape	Overall Biotic	Overall Soil
Nisqually John HMU*	Columbia Basin Foothill and Canyon Dry Grassland	H	VH	M
North Wilcox	Columbia Basin Palouse Prairie	H	M	
Palouse River - Albion	Columbia Basin Palouse Prairie	H	VH	
Parker Butte*	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	L	M	
Rattlesnake Rd	Columbia Basin Foothill and Canyon Dry Grassland	M	VH	
Rattlesnake Rd	Columbia Basin Foothill and Canyon Dry Grassland	M	H	
Ringo Butte	Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	H	H	
Rosalia	Columbia Basin Palouse Prairie	M	VH	
Rose Creek*	Columbia Basin Palouse Prairie	M	M	
Silver Creek	Columbia Basin Palouse Prairie	H	H	H
Smoot Hill BSA*	Columbia Basin Palouse Prairie	H	VH	
Steptoe Canyon DNR*	Columbia Basin Palouse Prairie	H	M	L
Thorn Creek	Columbia Basin Palouse Prairie	H	H	L
Union Center	Columbia Basin Palouse Prairie	VH	VH	
Wawawai Canyon	Columbia Basin Foothill and Canyon Dry Grassland	M	M	
Wilcox & SE*	Columbia Basin Palouse Prairie	H	VH	L
West Kamiak	Columbia Basin Palouse Prairie	H	VH	

The individual stressor lists will help inform site selection for conservation planning by more specifically indicating which stressors are important at the site-level. The most common stressors associated with the surrounding landscape of surveyed sites were “Dryland Farming” (83%) and “Lack of treatment of invasive species” (67%) (Table 8). Primary stressors identified for Vegetation on-site are “Lack of appropriate treatment of invasive plant species”, by far the most common (83%) and “Mowing, grazing, excessive herbivory” at 63% (Table 8). These stressors are the primary reason that the biological condition of most sites was degraded. The worksheet

Table 8. Frequency of stressors rated at Palouse Atlas sites. “Stressor Table” sheet in the accompanying “Palouse EIA tables.xlsx” Microsoft excel workbook lists all stressors and ratings.

LANDSCAPE CONTEXT STRESSORS CHECKLIST		VEGETATION (BIOTA) STRESSORS CHECKLIST		SOIL (& SUBSTRATE) STRESSORS CHECKLIST	
(30 locations)		(30 locations)		(9 locations)	
Dryland farming	83%	Lack of appropriate treatment of invasive plant species in the area	83%	Physical disturbance of soil / substrate by recreational vehicle tracks, livestock, logger skidding	56%
Lack of appropriate treatment of invasive plant species in surrounding area	67%	Mowing, grazing, excessive herbivory (within occurrence)	63%	Trash or refuse dumping	56%
Urban residential	43%	Lack of fire or too frequent fire	43%	Filling or dumping of sediment or soils (N/A for restoration areas)	33%
Ranching, moderate density livestock (enclosed livestock grazing or horse paddock)	33%	Damage caused by treatment of non-native and nuisance plant species	10%	Grading/ compaction (N/A for restoration areas)	22%
Transportation corridor (paved roads, highways)	27%	Pesticide application or vector control	10%	Resource extraction (sediment, gravel, mineral, oil and/or gas)	11%
Industrial / commercial	10%	Excessive human visitation	3%	Excessive sediment or organic debris (e.g. excessive erosion, gullyng, slope failure)	11%
Passive recreation (bird-watching, hiking, etc.)	10%	Predation and habitat destruction by non-native vertebrates,	3%	Pesticides or toxic chemicals (PS or Non-PS pollution) (on-site evidence)	11%
Rangeland, low density livestock (livestock rangeland also managed for native vegetation)	7%	Lack of floods or excessive floods for riparian areas	3%		
Physical resource extraction, mining, quarrying (rock, sediment, oil/gas)	7%	Other lack of vegetation management to conserve natural resources	3%		
Military training/Air traffic	3%				
CRP	3%				
Dairies	3%				
Commercial feedlots (high density livestock)	3%				
Active recreation (off-road vehicles, mountain biking, hunting, fishing)	3%				

3.2 Biodiversity Significance

This is an initial assessment of Palouse Atlas (Arnett 2009) sites based on rapid measures of presence/absence of elements of biodiversity and ecological condition. In order to provide a

more comprehensive assessment of the biodiversity values of these Palouse sites, additional on-site inventory and assessment is needed to better estimate the more specific ecological condition and elements of biodiversity. Nonetheless, the data collected in this project provide a good first measure of biodiversity significance of Palouse Prairie sites in Washington.

3.2.1 Elements of Conservation Concern

Plant Associations

In addition to the presence of rare species at prairie remnants the prairie communities themselves are conservation concern. Of the 11 plant associations identified in the field, five have a Global Rank of G1 or G2 (critically imperiled or imperiled across their full range) and two others are G3 or vulnerable (Table 2). These rankings further emphasize the conservation needs of the region.

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Appendices

Appendix A - Field Forms

Ecological Integrity Assessment for Columbia Basin Palouse Prairie

1. Landscape Context and Buffer Condition - Circle the applicable letter score

1a. Edge Length		1b. Edge Width		1c. Edge Condition	
75 – 100% of edge is bordered by natural communities	A	Average width of edge is at least 100 m.	A	>95% cover native vegetation, <5% cover of non-native plants, intact soils	A
50 – 74% of edge is bordered by natural communities	B	Average width of edge is 75-100 m.	B	75–95% cover of native vegetation, 5–25% cover of non-native plants, intact or moderately disrupted soils	B
25 – 49% of edge is bordered by natural communities	C	Average width of edge is 25-75 m.	C	25–50% cover of non-native plants, moderate or extensive soil disruption	C
< 25% of edge is bordered by natural communities	D	Average width of edge is <25 m.	D	>50% cover of non-native plants, barren ground, highly compacted or otherwise disrupted soils	D
1d. Connectivity		1e. Landscape Condition Model Index		2a. Cover Native Plant Species	
Intact: Embedded in 90-100% natural habitat; connectivity is expected to be high.	A	Landscape Condition Model Index > 0.8	A/B	Cover of native plants = 100%.	A
Variegated: Embedded in 60-90% natural or semi-habitat; habitat connectivity is generally high, but lower for species sensitive to habitat modification;	B	Landscape Condition Model Index 0.75 – 0.5	C	Cover of native plants 90 to <100%.	B
Fragmented: Embedded in 20-60% natural or semi-natural habitat; connectivity is generally low, but varies with mobility of species and arrangement on landscape.	C	Landscape Condition Model Index < 0.5	D	Cover of native plants 50 to <90%.	C
Relictual: Embedded in < 20% natural or semi-natural habitat; connectivity is essentially absent	D			Cover of native plants <50%.	D
2b. Native Bunchgrass		2c. Cover Invasive Species		2d. Cover of Native Increasers	
Perennial bunchgrasses 80% relative cover and near site potential.	A	None present.	A	Absent or incidental	A
Perennial bunchgrasses 50-80% relative cover and reduced from site potential.	B	Present, but sporadic (<3% cover).	B	<10% cover	B
Perennial bunchgrasses 30-50% relative cover and reduced from site potential.	C	Prevalent (3–10% absolute cover).	C	10-20% cover	C
Perennial bunchgrass <30% relative cover and much reduced from site potential.	D	Abundant (>10% absolute cover).	D	>20% cover	D
2g. Species Composition		2h. Rabbitbrush Cover		2i. Biological Soil Crust	
Species diversity/abundance at or near reference standard condition in species present and their proportions. Native species sensitive to anthropogenic degradation are present, functional groups indicative of anthropogenic disturbance are absent to minor, and full range of diagnostic / indicator species are present.	A	Rabbitbrush absent, or if present then < 5% cover	A	Largely intact biological soil crust that nearly matches the site capability where natural site characteristics are not limiting, i.e. steep unstable, south aspect, dense native grass	A

Close to reference standard condition. Some native species reflective of past anthropogenic degradation present. Some indicator/ diagnostic species may be absent.	B	5-10% cover	B	Biological soil crust is evident throughout the site but its continuity is broken	B
Different from reference standard condition in, but still largely composed of native species characteristic of the type. This may include ruderal species. Many indicator/diagnostic species may be absent.	C	10-30% cover	C	Biological soil crust is present in protected areas and with a minor component elsewhere	C
Vegetation severely altered from reference standard. Expected strata are absent or dominated by ruderal species, or comprised of planted stands of non-characteristic species, or unnaturally dominated by a single species. Most or all indicator/diagnostic species are absent.	D	>30% cover; rabbitbrush density is decreasing cover of bunchgrass	D	Biological soil crust, if present, is found only in protected areas and there is a very limited suite of morphological groups	D
2j. Soil Surface Condition		3a. Patch Size		3b. Relative Patch Size	
Bare soil areas are limited to naturally caused disturbances such as burrowing or game trails	A	Over 1000 ha (2500 ac) Very large compared to other examples of the same type (e.g., top 10% based on known and historic occurrences, or area-sensitive indicator species very abundant within occurrence).	A	Occurrence is at, or only minimally reduced from, its full original, natural extent (<95%), and has not been artificially reduced in size.	A
Some bare soil due to human causes but the extent and impact is minimal. The depth of disturbance is limited to only a few inches	B	500-1000 ha (1250-<2500 ac) Large compared to other examples of the same type (e.g. within 10-30%, based on known and historic occurrences, or most area-sensitive indicator species moderately abundant within occurrence).	B	Occurrence is only modestly reduced from its original natural extent (80-95% or more).	B
Bare soil areas due to human causes are common. There may be disturbance/compaction to several inches. ORVs or other machinery may have left some shallow ruts.	C	10 –500 ha (25 -1250 ac) Moderate compared to other examples of the same type, (e.g., within 30-70% of known or historic sizes; or many area-sensitive indicator species are able to sustain a minimally viable population, or many characteristic species are sparse but present).	C	Occurrence is substantially reduced from its original, natural extent (50-80%).	C
Bare soil areas substantially & contribute to long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock and/or trails are widespread.	D	Less than 10 ha (25 ac) Too small to sustain full diversity and full function of the type. (e.g., smallest 30% of known or historic occurrences, or both key area-sensitive indicator species and characteristic species are sparse to absent).	D	Occurrence is heavily reduced from its original, natural extent (>50%).	D
	A		A		A

Stressors Rating Form for Columbia Basin Palouse Prairie

LANDSCAPE CONTEXT STRESSORS CHECKLIST	Scope	Severity	Impact
Urban residential			
Industrial/commercial			
Military training/Air traffic			
Transportation corridor (paved roads, highways)			
Dryland farming			
Intensive row-crop agriculture			
CRP			
Orchards/nurseries			
Dairies			
Commercial feedlots (high density livestock)			
Ranching, moderate density livestock (enclosed livestock grazing or horse paddock)			
Rangeland, low density livestock (livestock rangeland also managed for native vegetation)			
Sports fields and urban parklands (golf courses, soccer fields, etc.)			
Passive recreation (bird-watching, hiking, etc.)			
Active recreation (off-road vehicles, mountain biking, hunting, fishing)			
Physical resource extraction, mining, quarrying (rock, sediment, oil/gas)			
Biological resource extraction (aquaculture, commercial fisheries, horticultural and medical plant collecting)			
Lack of appropriate treatment of invasive plant species in surrounding area			
Overall Landscape Context Stressor Impact			
Comments			
VEGETATION (BIOTA) STRESSORS CHECKLIST	Scope	Severity	Impact

Mowing, grazing, excessive herbivory (within occurrence)			
Excessive human visitation			
Predation and habitat destruction by non-native vertebrates, including feral introduced naturalized species, such as feral livestock, exotic game animals, pet predators (e.g., Virginia possum, oryx, pigs, goats, burros, cats, dogs).			
Tree / sapling or shrub removal (cutting, chaining, cabling, herbiciding)			
Removal of woody debris			
Lack of appropriate treatment of invasive plant species in the area			
Damage caused by treatment of non-native and nuisance plant species			
Pesticide application or vector control			
Lack of fire or too frequent fire			
Lack of floods or excessive floods for riparian areas			
Biological resource extraction or stocking (e.g., aquaculture, commercial fisheries, horticultural and medical plant collecting)			
Excessive organic debris (for recently logged sites)			
Other lack of vegetation management to conserve natural resources [please specify]			
Overall Vegetation (Biota) Stressor Impact			
Comments			
SOIL (& SUBSTRATE) STRESSORS CHECKLIST	Scope	Severity	Impact
Filling or dumping of sediment or soils (N/A for restoration areas)			
Grading/ compaction (N/A for restoration areas)			
Plowing/Discing (N/A for restoration areas)			
Resource extraction (sediment, gravel, mineral, oil and/or gas)			
Impact of vegetation management on soils /substrate (e.g., terracing, pitting, drilling seed, chaining, root plowing)			

Excessive sediment or organic debris (e.g. excessive erosion, gully, slope failure)			
Physical disturbance of soil / substrate by recreational vehicle tracks, livestock, logger skidding, etc.			
Pesticides or toxic chemicals (PS or Non-PS pollution) (on-site evidence)			
Trash or refuse dumping			
Overall Soil / Substrate Stressor Impact			
Comments			
HYDROLOGY STRESSORS CHECKLIST	Scope	Severity	Impact
Point Source (PS) Discharges (POTW, other non-stormwater discharge)			
Non-point Source (Non-PS) Discharges (urban runoff, farm drainage on to site)			
Flow diversions or unnatural inflows (restrictions and augmentations)			
Dams (reservoirs, detention basins, recharge basins)			
Flow obstructions (culverts, paved stream crossings)			
Weir/drop structure, tide gates			
Dredged inlet/channel			
Engineered channel (riprap, armored channel bank, bed)			
Dike/levees			
Groundwater extraction (water table lowered)			
Ditches (borrow, agricultural drainage, mosquito control, etc.)			
Actively managed hydrology (e.g. lake levels controlled)			
Overall Hydrology Stressor Impact			
Comments			

Threat Scope (typically assessed within a 10-year time frame)
<i>Pervasive</i> = Affects all or most (71-100%) of total occurrence
<i>Large</i> = Affects much (31-70%) of the total occurrence
<i>Restricted</i> = Affects some (11-30%) of the total occurrence

<i>Small</i> = Affects a small (1-10%) proportion of the total occurrence
Threat Severity (within the scope. Assessed within max of 10 yrs)
<i>Extreme</i> = likely to extremely degrade/destroy or eliminate occurrence (71-100%)
<i>Serious</i> = likely to seriously degrade/reduce occurrence (31-70%)
<i>Moderate</i> = likely to moderately degrade/reduce occurrence (11-30%)
<i>Slight</i> = likely to only slightly degrade/reduce occurrence (1-10%)

Threat Impact Calculation		Scope				Threat Impact
		Pervasive	Large	Restricted	Small	
Severity	Extreme	Very High	High	Medium	Low	A = Very High
	Serious	High	High	Medium	Low	B = High
	Moderate	Medium	Medium	Low	Low	C = Medium
	Slight	Low	Low	Low	Low	D = Low

Impact Values of Stressor Categories	OVERALL THREAT IMPACT
1 or more Very High, OR 2 or more High, OR 1 High + 2 or more Medium	Very High
1 High, OR 3 or more Medium, OR 2 Medium + 2 Low, OR 1 Medium + 3 or more Low	High
1 Medium, or 4 or more Low	Medium
1 to 3 Low	Low

Appendix B

Palouse Atlas – Ecological Integrity Assessments

(Modified Appendix B in Arnett, 2009)

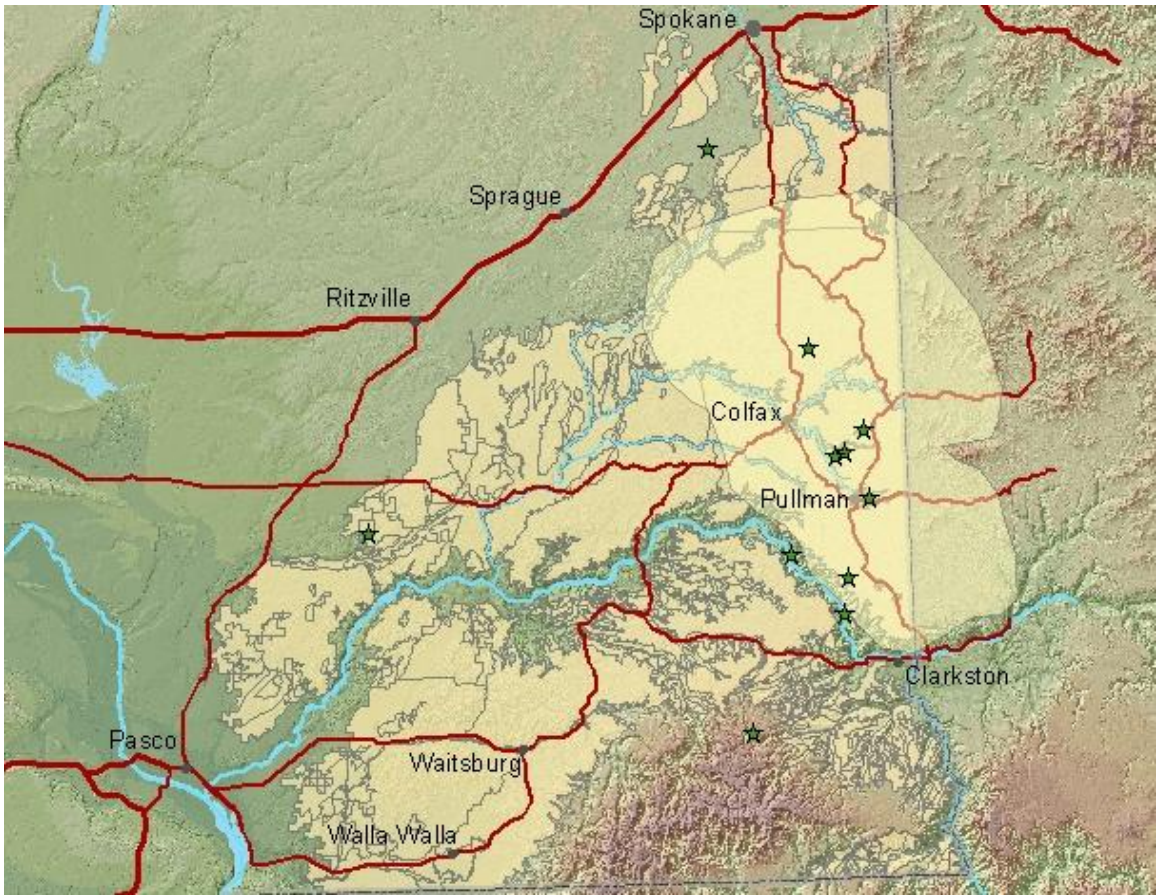
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Overview Maps.....	38
Distribution of Palouse rare plant species.....	40
Selected Palouse Sites	44

Overview Maps



Map 1. Overview of the Palouse area of the Columbia Plateau Ecoregion. The dark green lines are ecoregion boundaries, as used by the Washington Natural Heritage Program. The brighter yellow polygon is a broader concept of the Palouse region, as treated in the GAP analysis. The pale polygon centered over Pullman and Colfax is a more narrow concept of the central Palouse.



Map 2. Map of the Palouse area illustrating with a star symbol the general location of Natural Areas and other publically owned land or areas already with conservation as a management priority.

Distribution of Palouse rare plant species

Map 3. *Astragalus arthurii*

Map 4. *Astragalus riparius*

Map 5. *Calochortus nitidus*

Map 6. *Howellia aquatilis*

Map 7. *Lomatium rollinsii*

Map 8. *Lomatium serpentinum*

Map 9. *Lupinus sabianus*

Map 10. *Lupinus sulphureus* var. *asotinensis*

Map 11. *Oenothera caespitosa* ssp. *marginata*

Map 12. *Pyrrocoma liatrifomis*/*P. scaberula*

Map 13. *Rubus nigerrimus*

Map 14. *Sclerolinon digynum*

Map 15. *Silene spaldingii*

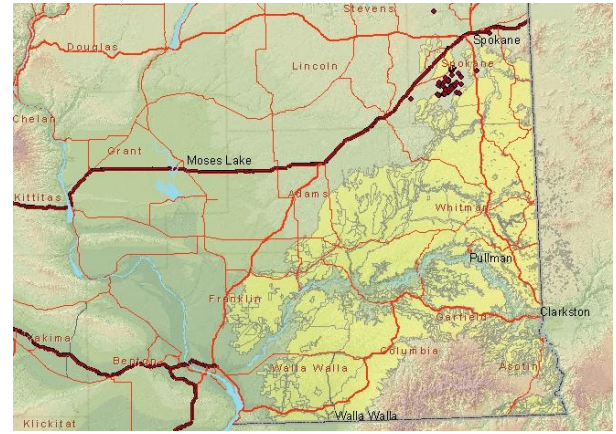
Map 16. *Symphyotrichum jessicae*

Map 17. *Trichostema oblongum*

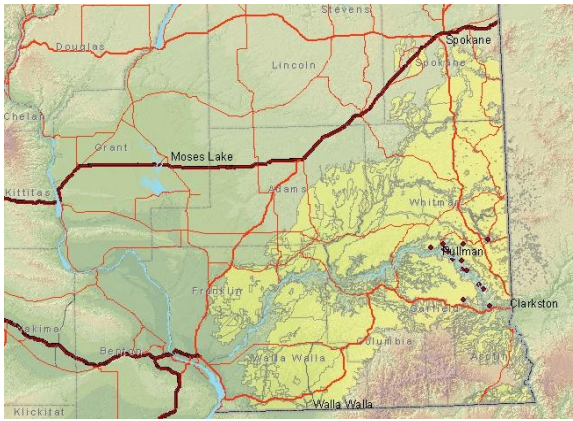
Map 18. *Trifolium douglasii*



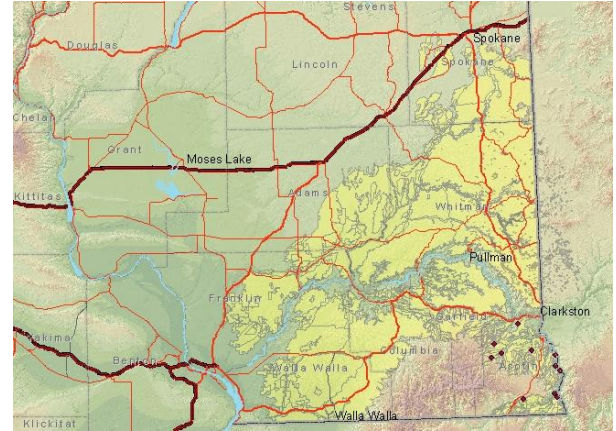
Map 3. Distribution of *Astragalus arthurii* in Washington State



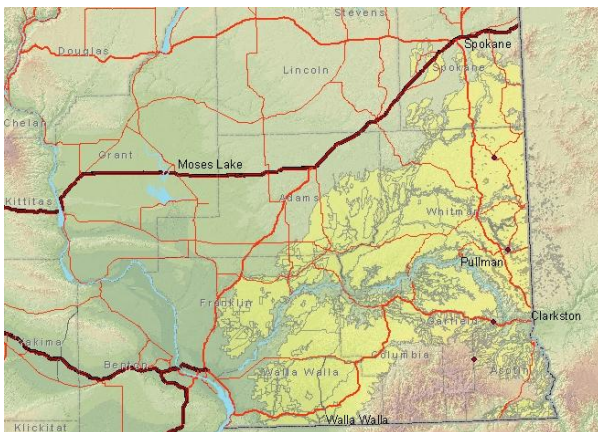
Map 6. Distribution of *Howellia aquatilis* in Washington State



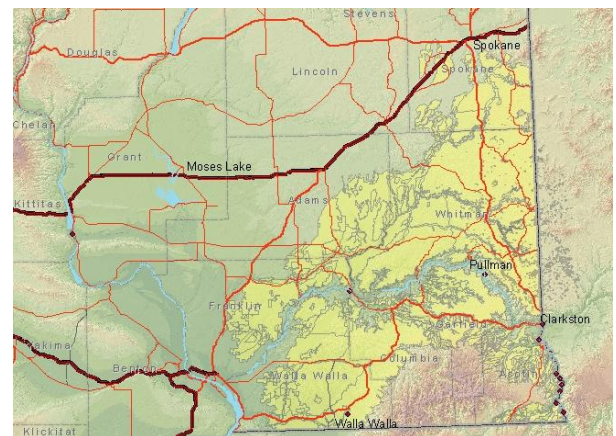
Map 4. Distribution of *Astragalus riparius* in Washington State



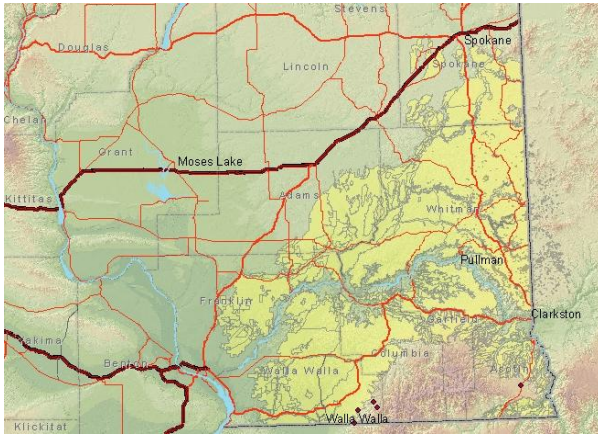
Map 7. Distribution of *Lomatium rollinsii* in Washington State



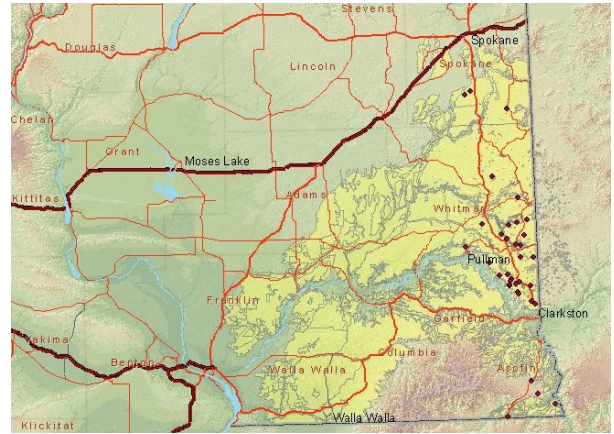
Map 5. Distribution of *Calochortus nitidus* in Washington State



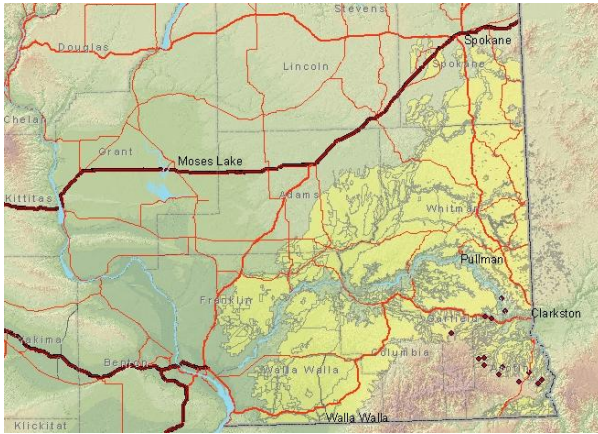
Map 8. Distribution of *Lomatium serpentinum* in Washington State



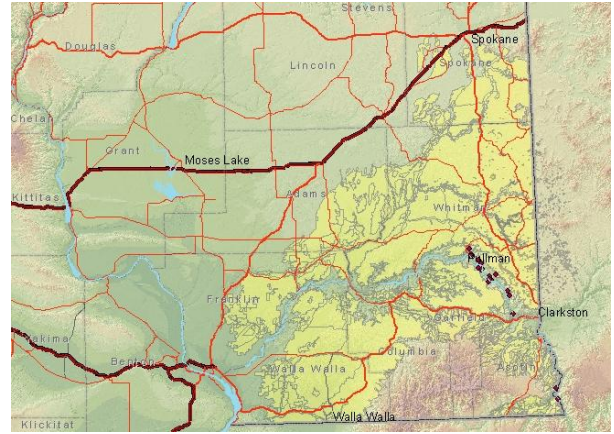
Map 9. Distribution of *Lupinus sabianus* in Washington State



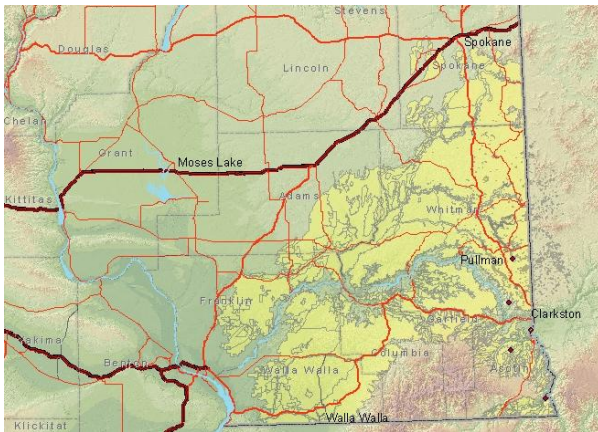
Map 12. Distribution of *Pyrocoma liatrifomis*/*P. scaberula* in Washington State



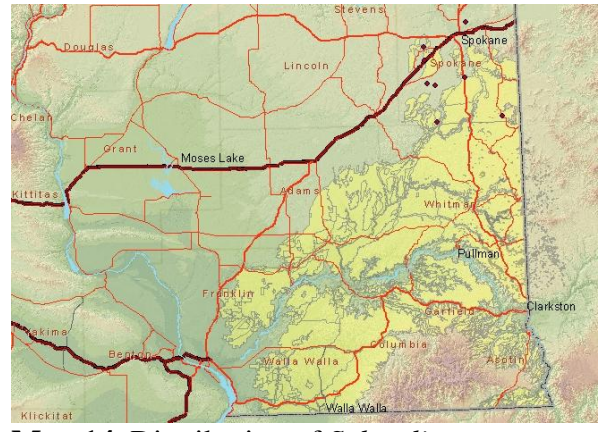
Map 10. Distribution of *Lupinus sulphureus* var. *asotinensis* in Washington State



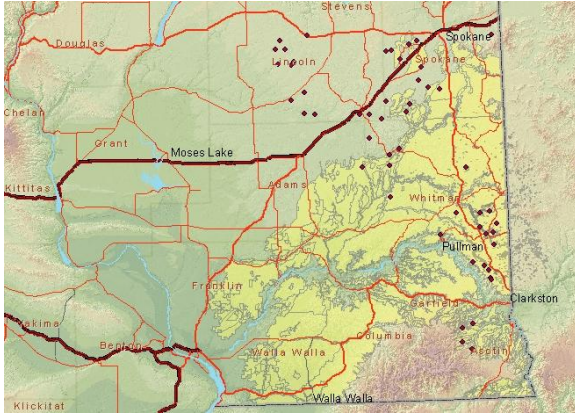
Map 13. Distribution of *Rubus nigerrimus* in Washington State



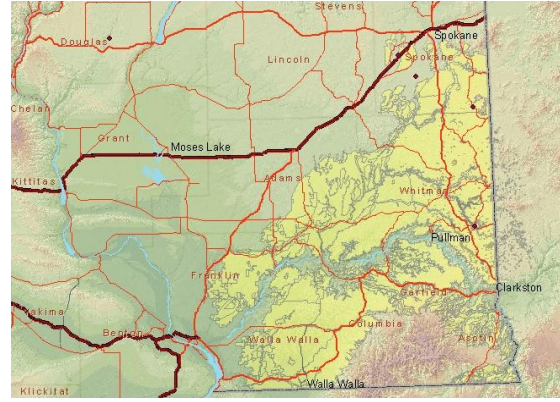
Map 11. Distribution of *Oenothera caespitosa* ssp. *marginata* in Washington State



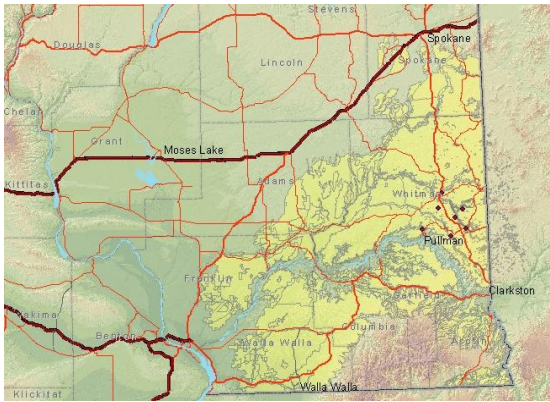
Map 14. Distribution of *Sclerolinon digynum* in Washington State



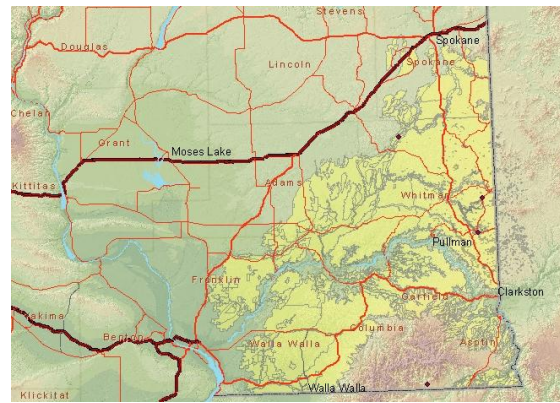
Map 15. Distribution of *Silene spaldingii* in Washington State



Map 17. Distribution of *Trichostema oblongum* in Washington State



Map 16. Distribution of *Symphyotrichum jessicae* in Washington State



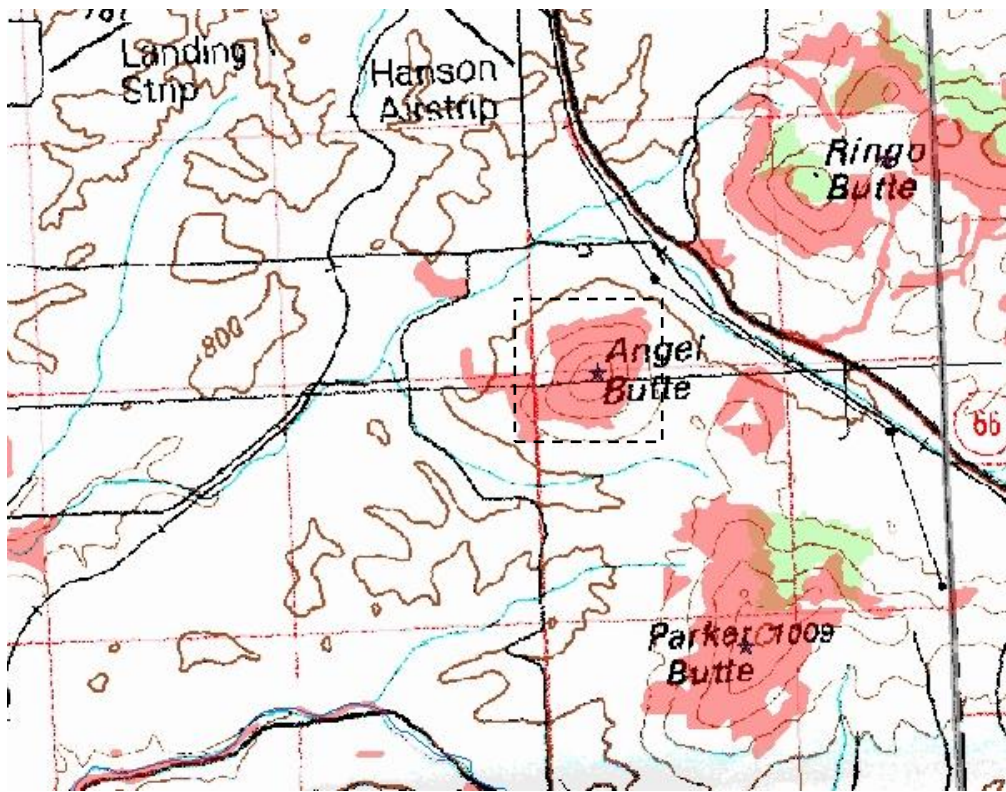
Map 18. Distribution of *Trifolium douglasii* in Washington State

Selected Palouse Sites

The following site maps and aerial photographs are presented alphabetically. Sites evaluated with EIA methodology in 2010 are designated with an asterisk *. Numerals on individual maps refer to polygon or plot information summarized in the report in Table 3, Table 7, and Appendix D and detailed in the accompanying “Palouse EIA tables.xlsx” Microsoft excel workbook.

name	location	county
*Angel Butte	3 miles south of Palouse; T16N R46E Section 18	Whitman
*Bald Butte	5 miles SE of Pullman; T14N R45E Section 1	Whitman
*Campus Prairie WSU BSA	E edge of WSU; T15N R45E Section 33	Whitman
Clarkston DNR	Above the Snake River, adjacent to the Idaho border; T11N R26E Section 16	Whitman
*Ewartsville	Around Ewartsville; T14N R44E Section 17	Whitman
*Fairchild AFB	Eight miles west of Spokane; T24N R41E Section 4	Spokane
*Fishtrap Lake BLM	8 miles northeast of Sprague; T22N R40E Section 31	Spokane
Fourmile Creek	6 miles north of Pullman; T16N R45E Section 32	Whitman
*George Creek	3 miles southwest of Asotin; T10N R45E Section 36	Asotin
*Granite Butte	3 miles west of Oakdale; T19N R44E Section 17	Whitman
*Hog Lake DNR	3 miles east of Fishtrap; T22N R40E Section 16	Spokane
*Kahlotus Ridgetop NAP	13 southwest of Washtucna; T14N R34E Section 16	Franklin
*Kamiak Butte County Park	9 miles north of Pullman; T16N R45E Section 20	Whitman
*Kramer Palouse WSU BSA	10 miles south of Pullman; T13N R44E Section 25	Whitman
Lime Hill	25 miles SSE of Clarkston; T7N R47E Section 30	Asotin
*Nisqually John WMU	Above the Snake River 16 miles downstream from Clarkston; T12N R45E Section 19	Whitman
*North Palouse River DNR	2 miles northeast of Colfax; T17N R43E Section 36	Whitman
North Pine	4 miles north of Rosalia; T21N R43E Section 23	Spokane
*North Wilcox	North of Wilcox; T16N R42E Section 36	Whitman
*Palouse River Albion	Between Pullman and Albion; T15N R44E Section 23	Whitman

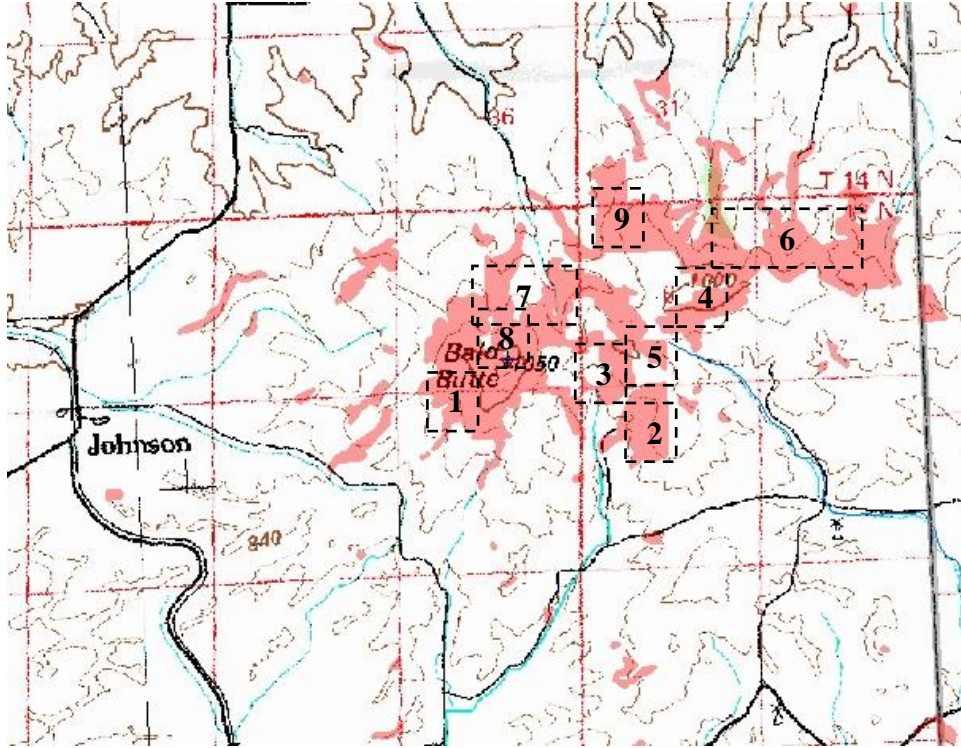
*Parker Butte	4 miles south of Palouse, T16N, R46E, Section 30	Whitman
Pataha Bunchgrass RNA	14 miles SSE of Pomeroy; T9N R42E Section 1	Garfield
*Rattlesnake Road DNR	9 miles northwest of Colfax; T17N R42E Section 16	Whitman
*Ringo Butte	3 miles southeast of Palouse, T16N, R46E, Section 17	Whitman
*Rosalia	West edge of Rosalia; T20N R43E Section 15	Whitman
*Rose Creek	6 miles NNW of Pullman; T16N R44E Section 36	Whitman
*Seltice Butte	2 miles southeast of Seltice; T19N R45E Section 24	Whitman
Silcott DNR	Above the Snake River 6 miles downstream from Clarkston; T11N R45E Section 16	Whitman
*Silver Creek	1 mile west of Garfield; T17N R45E Section 6	Whitman
*Smoot Hill WSU BSA	6 miles north-northwest of Pullman; T15N R44E Section 2	Whitman
*Step toe Butte	7 miles SSW of Oakesdale; T18N R44E Section 29	Whitman
*Step toe Canyon DNR	Three miles southwest of Colton; T12N R45E Section 16	Whitman
*Stratton Butte	2 miles south of Farmington; T18N R46E Section 7	Whitman
*Thom Creek	1 mile NE of Uniontown; T2N R46E Section 5	Whitman
*Union Center	7 miles west of Pullman; T15N R43E Section 36	Whitman
*Wawawai County Park	11 miles southwest of Pullman; T13N R43E Section 2	Whitman
*West Kamiak Butte	8 miles north of Pullman; T16N R44E Section 24	Whitman
*Wilcox	Wilcox and SE; T15N R42E Section 11	Whitman



*Angel Butte; 3 miles south of Palouse; T16N R46E Section 18



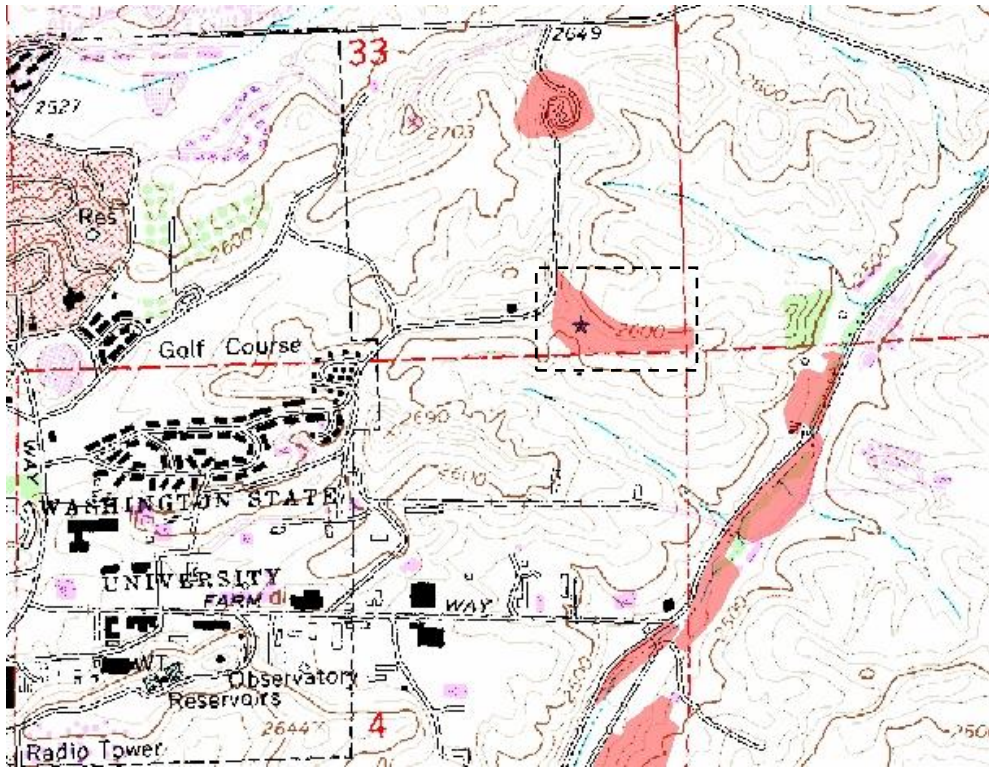
Angel Butte; 3 miles south of Palouse; T16N R46E Section 18



*Bald Butte; 5 miles SE of Pullman; T14N R45E Section 1



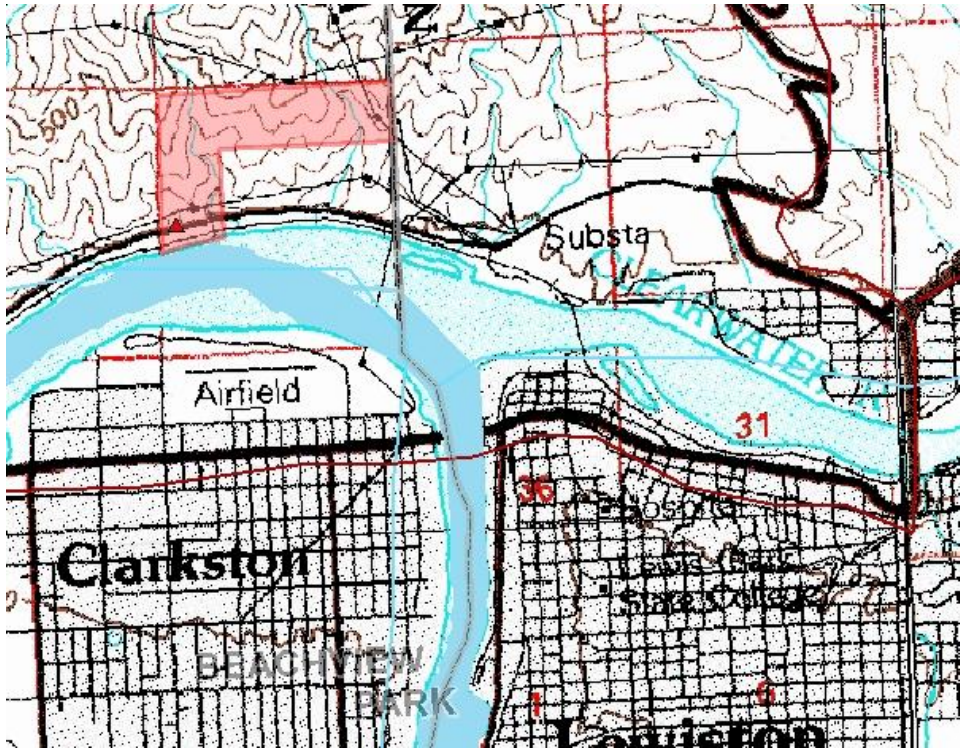
Bald Butte; 5 miles SE of Pullman; T14N R45E Section 1



*Campus Prairie; east edge of WSU; T15N R45E Section 33



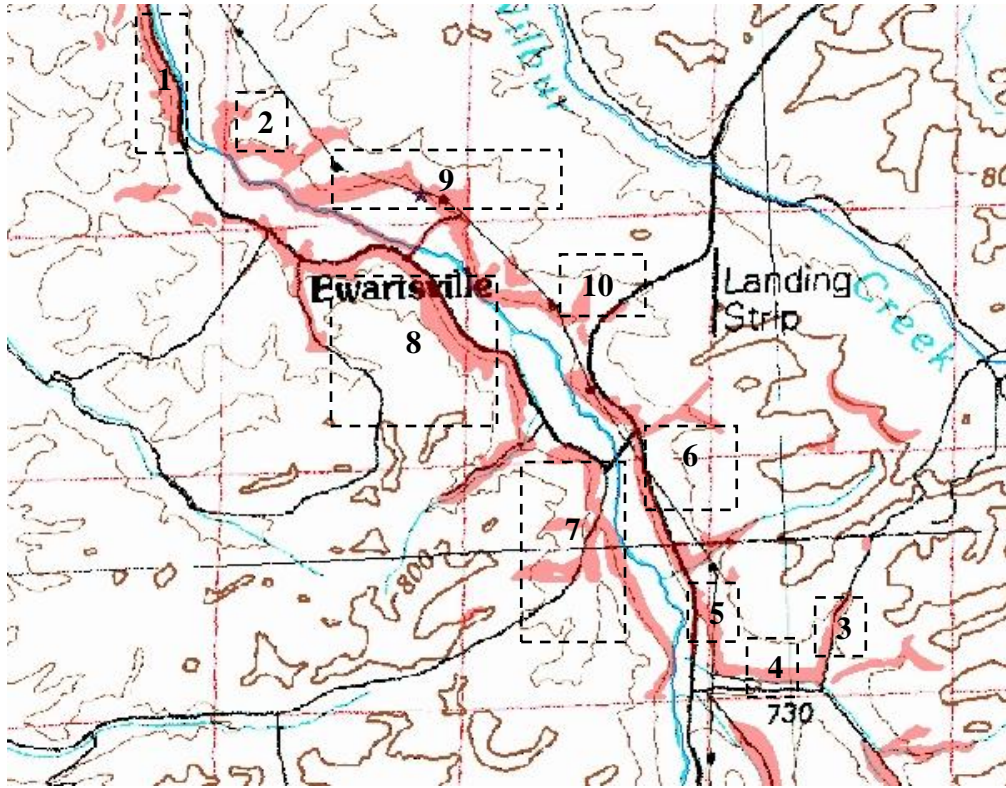
Campus Prairie; east edge of WSU; T15N R45E Section 33



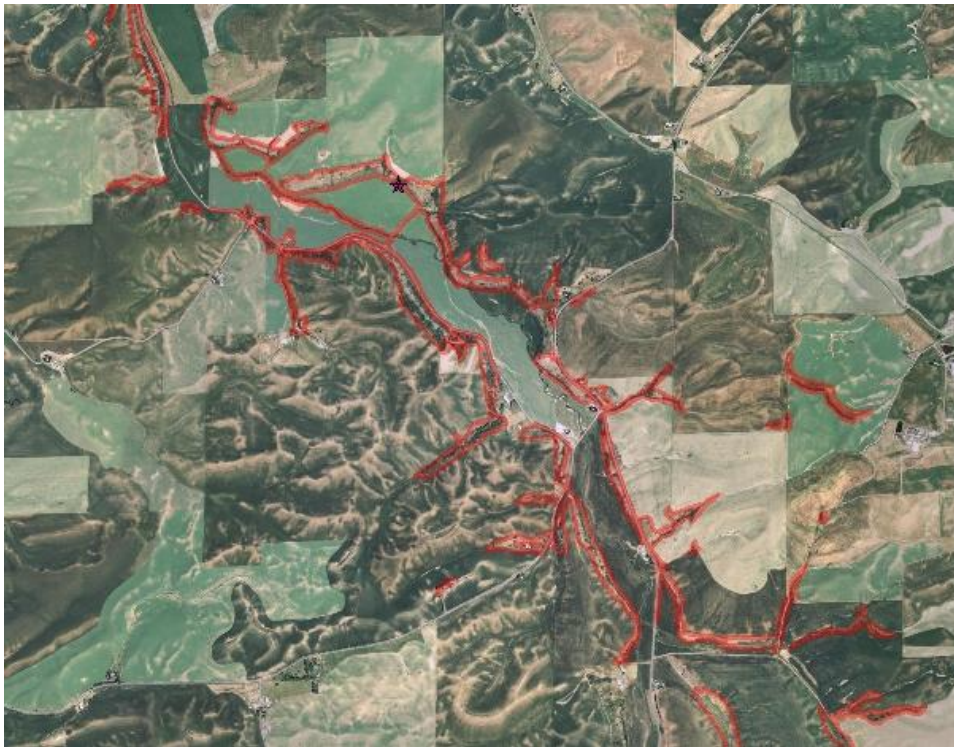
Clarkston, DNR land; above the Snake River, adjacent to the Idaho border; T11N R26E Section 16



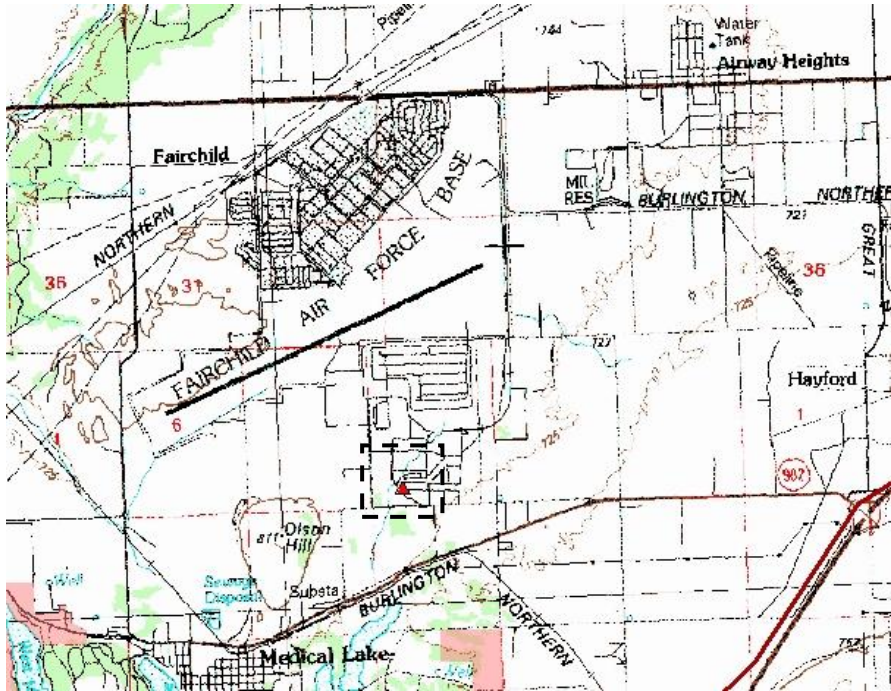
Clarkston, DNR land; above the Snake River, adjacent to the Idaho border; T11N R26E Section 16



*Ewartsville; T14N R44E Section 17



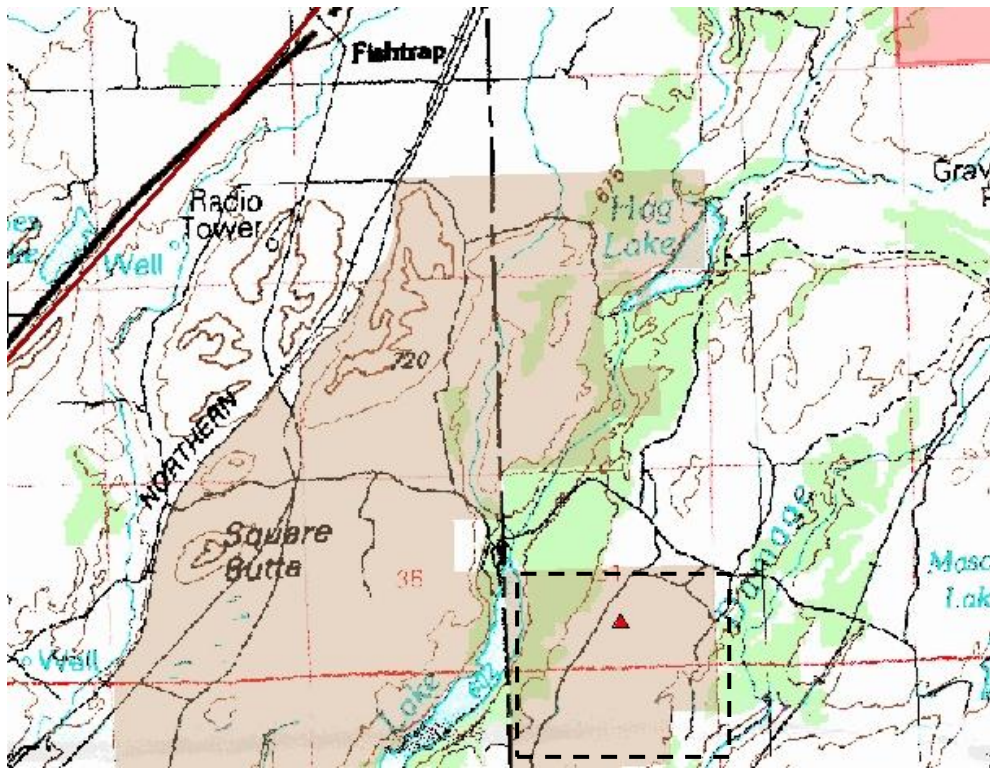
Ewartsville; T14N R44E Section 17



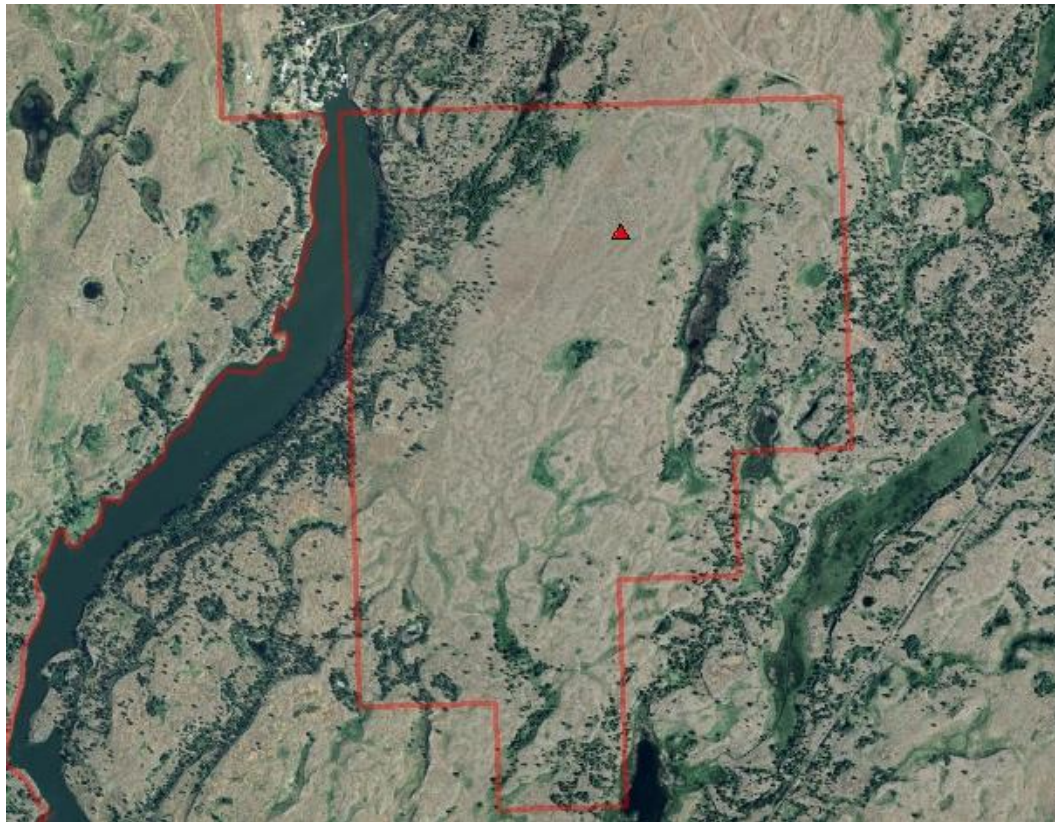
***Fairchild AFB;** vernal pools and biscuit swale area, eight miles west of Spokane; T24N R41E Section 4



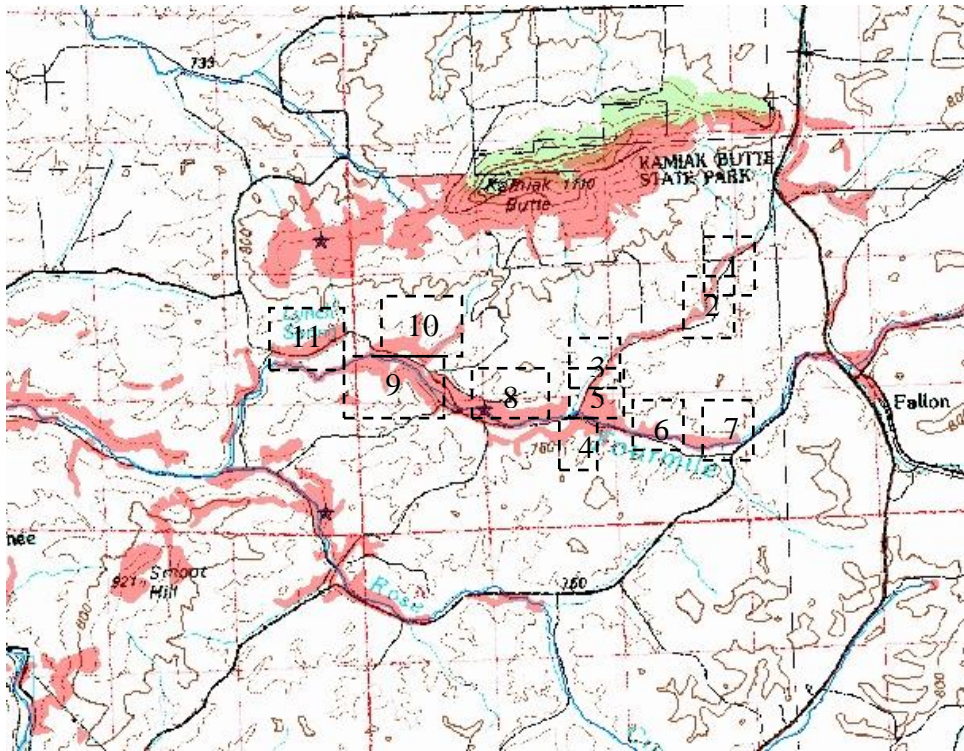
Fairchild AFB; vernal pools and biscuit swale area, eight miles west of Spokane; T24N R41E Section 4



*Fishtrap Lake area; 8 miles northeast of Sprague; T22N R40E Section 31



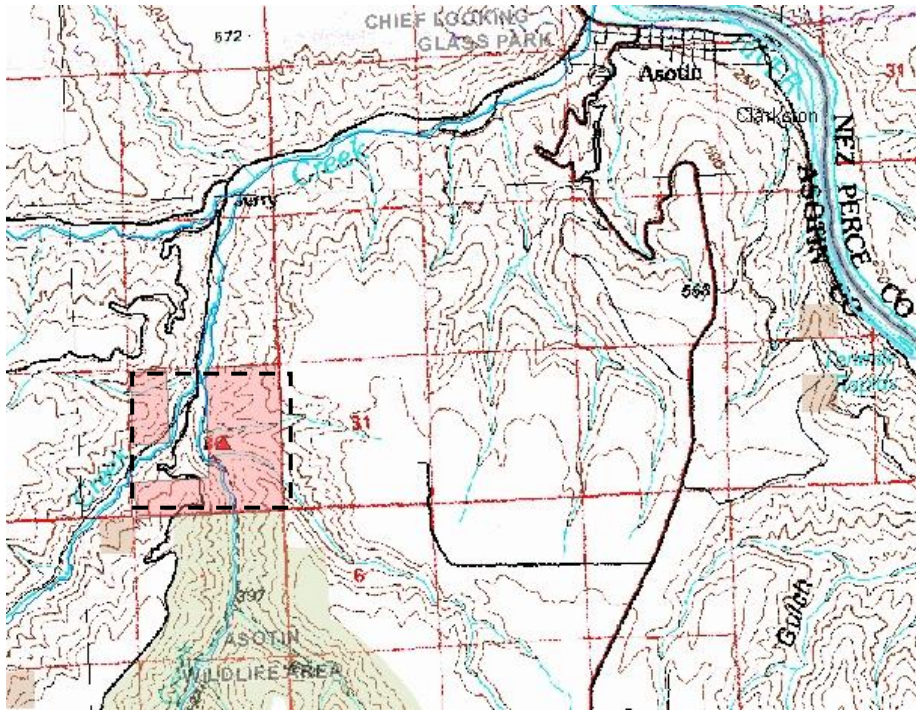
Fishtrap Lake area; 8 miles northeast of Sprague; T22N R40E Section 31



*Fourmile Creek; 6 miles north of Pullman; T16N R45E Section 32



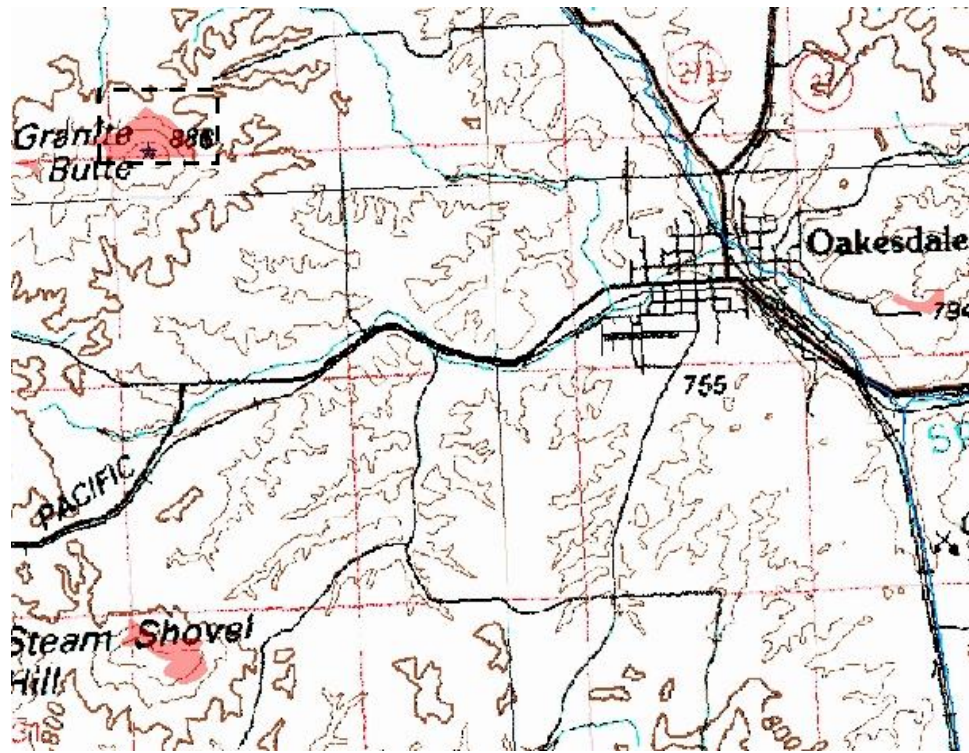
Fourmile Creek; 6 miles north of Pullman; T16N R45E Section 32



*George Creek DNR land; 3 miles southwest of Asotin; T10N R45E Section 36



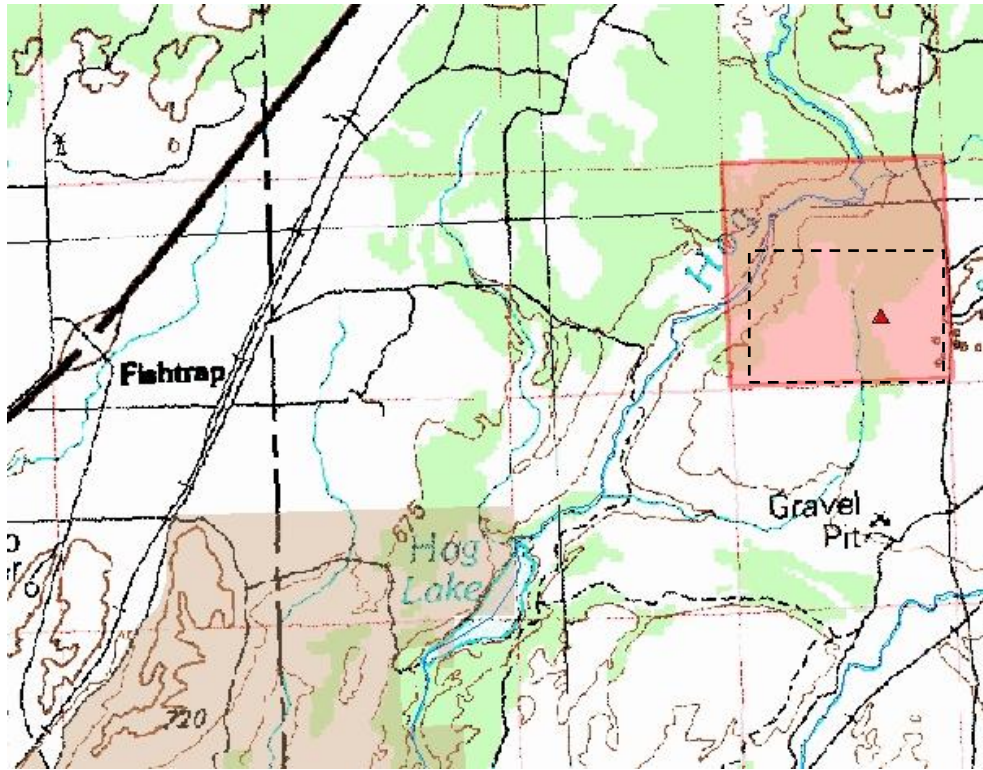
George Creek DNR land; 3 miles southwest of Asotin; T10N R45E Section 36



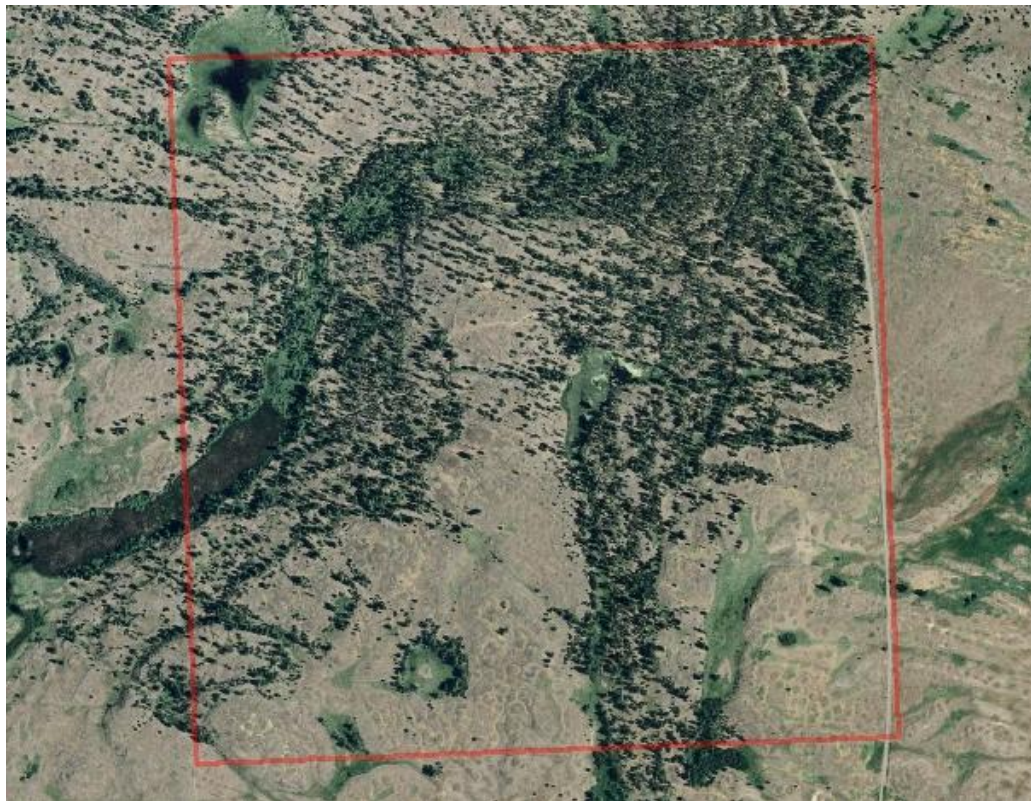
*Granite Butte; 3 miles west of Oakesdale; T19N R44E Section 17



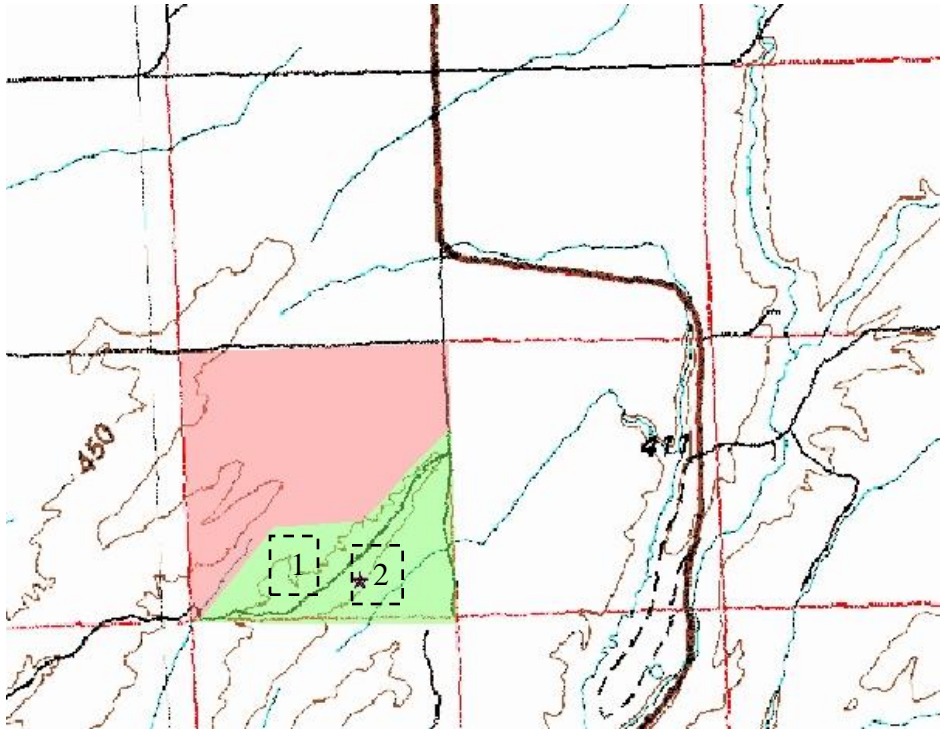
Granite Butte; 3 miles west of Oakesdale; T19N R44E Section 17



*Hog Lake area; 3 miles east of Fishtrap; T22N R40E Section 16



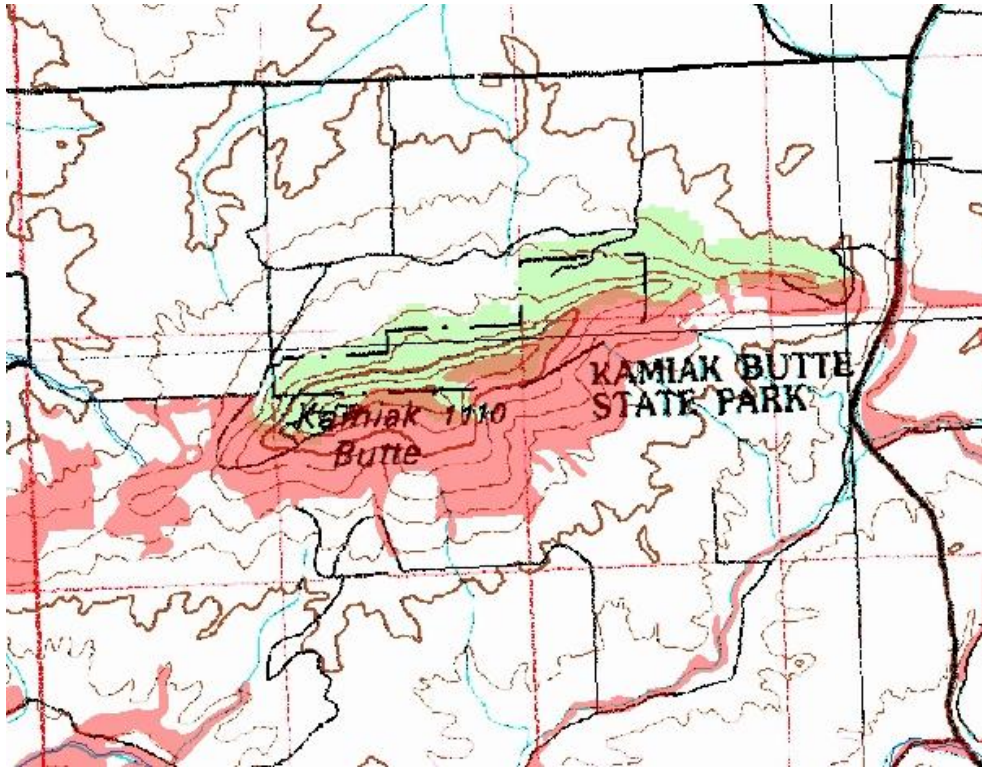
Hog Lake area; 3 miles east of Fishtrap; T22N R40E Section 16



*Kahlotus Ridgetop NAP; 13 southwest of Washtucna; T14N R34E Section 16



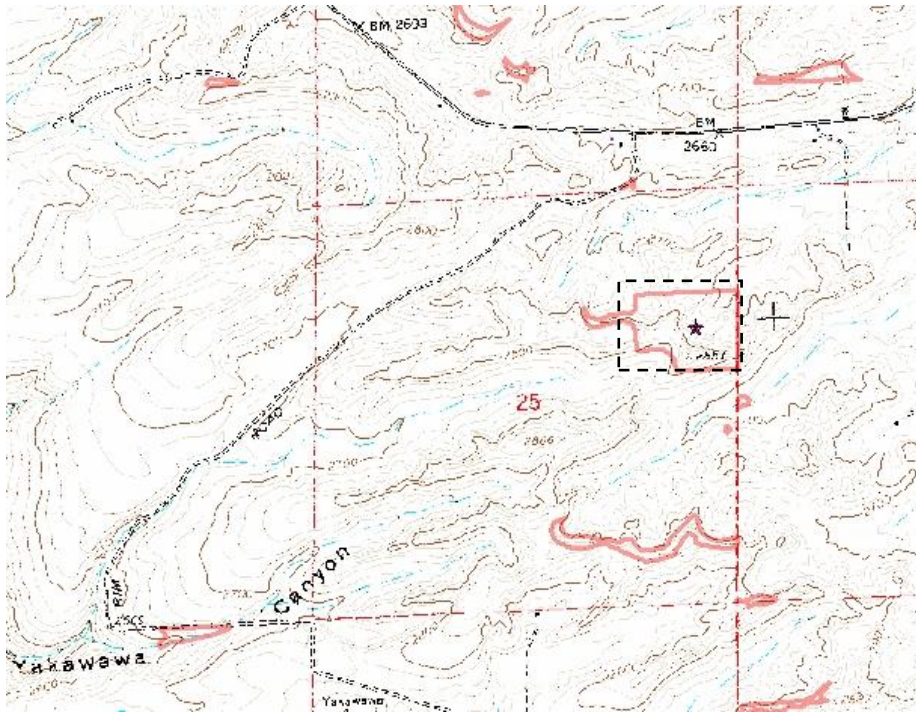
Kahlotus Ridgetop NAP; 13 southwest of Washtucna; T14N R34E Section 16



***Kamiak Butte County Park; 9 miles north of Pullman; T16N R45E Section 20**



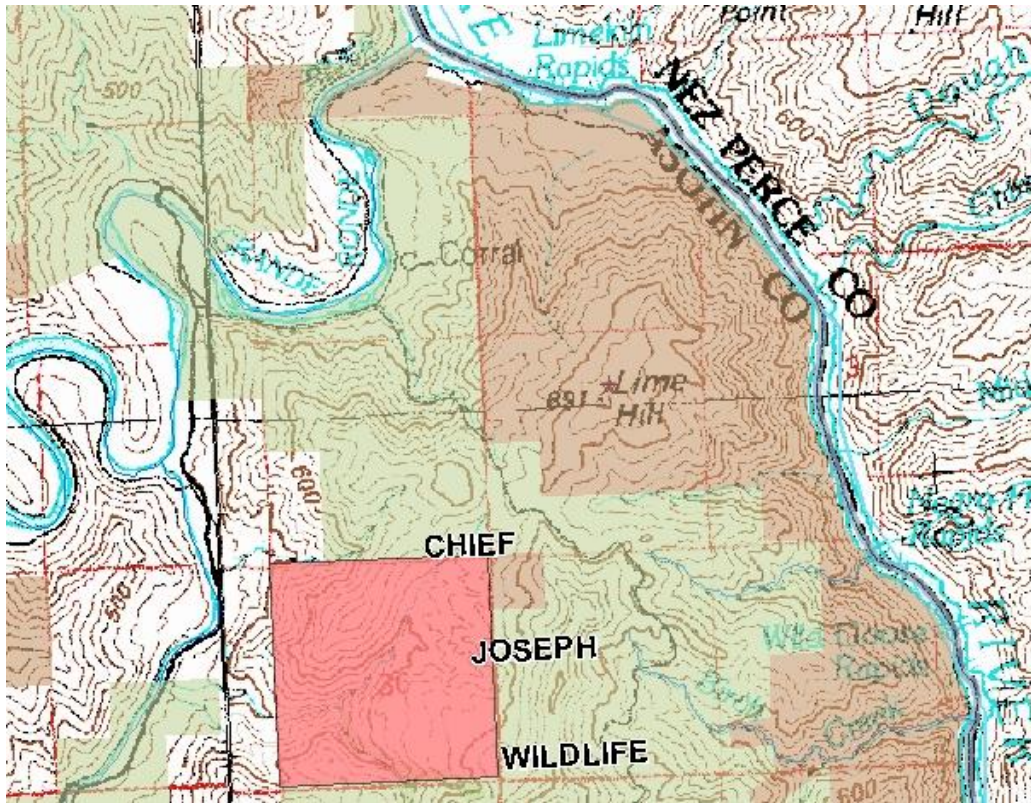
Kamiak Butte County Park; 9 miles north of Pullman; T16N R45E Section 20



*Kramer Palouse WSU BSA; 10 miles south of Pullman; T13N R44E Section 25



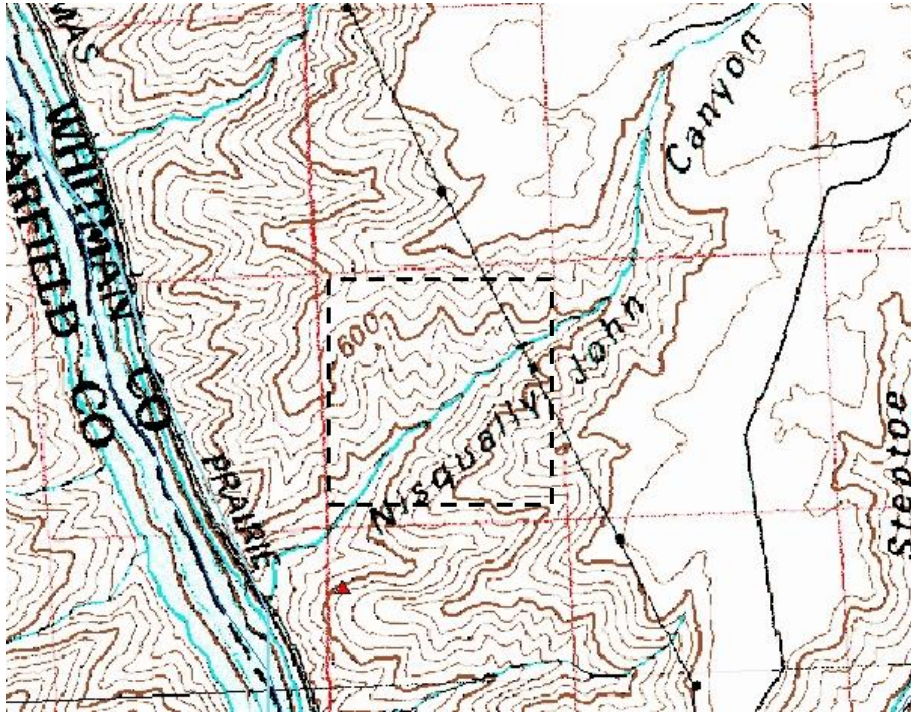
Kramer Palouse WSU BSA; 10 miles south of Pullman; T13N R44E Section 25



Lime Hill; 25 miles SSE of Clarkston; T7N R47E Section 30



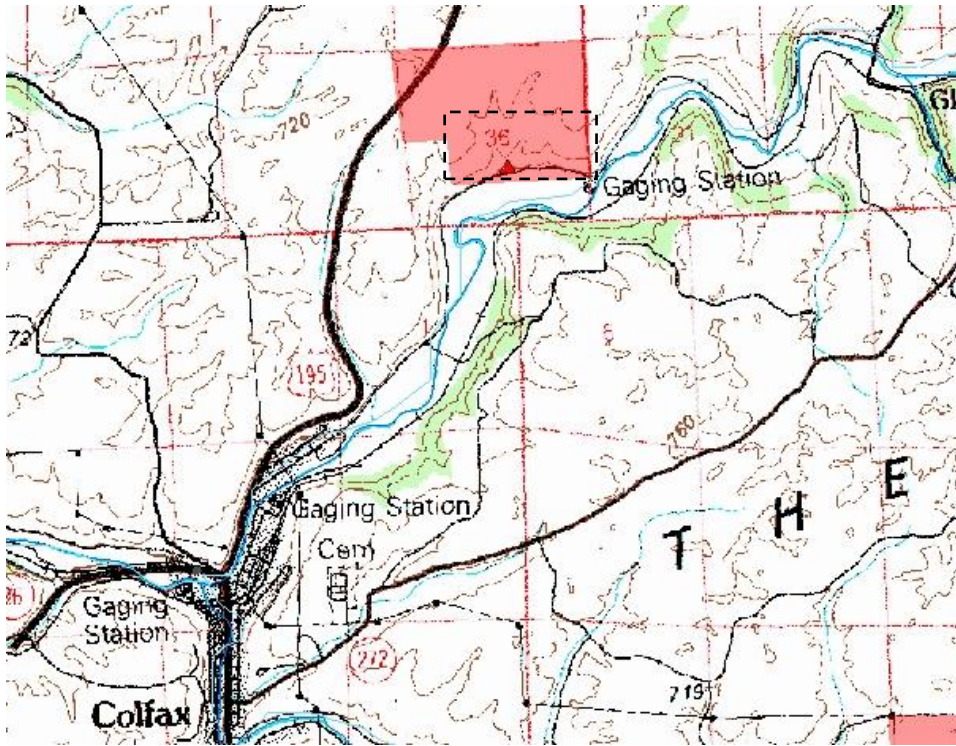
Lime Hill; 25 miles SSE of Clarkston; T7N R47E Section 30



*Nisqually John HMU; above the Snake River 16 miles downstream from Clarkston; T12N R45E Section 19



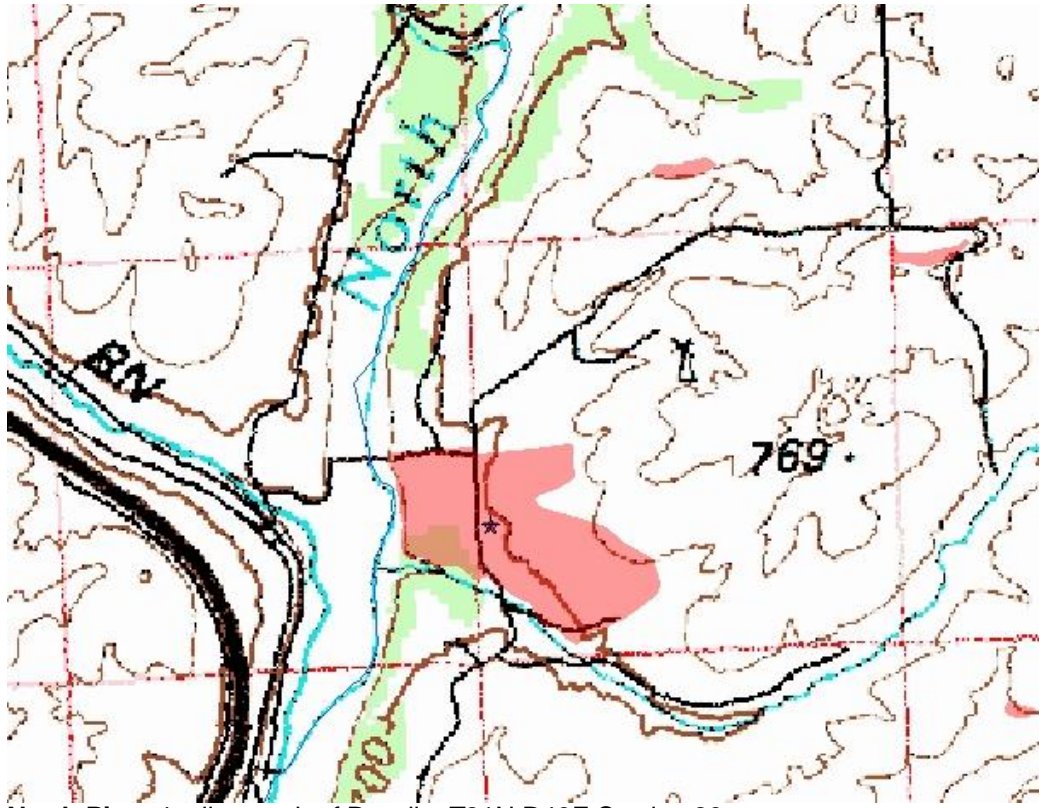
Nisqually John HMU; above the Snake River 16 miles downstream from Clarkston; T12N R45E Section 19



*North Palouse River Rd; DNR land 2 miles northeast of Colfax; T17N R43E Section 36



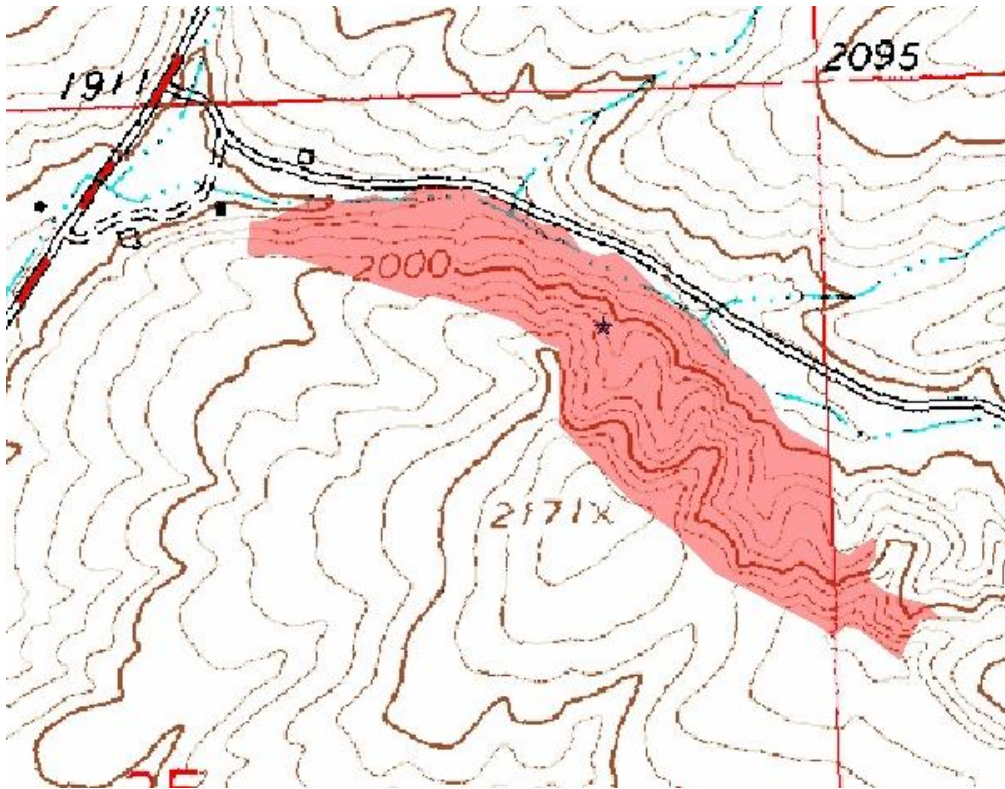
North Palouse River Rd; DNR land 2 miles northeast of Colfax; T17N R43E Section 36



North Pine; 4 miles north of Rosalia; T21N R43E Section 23



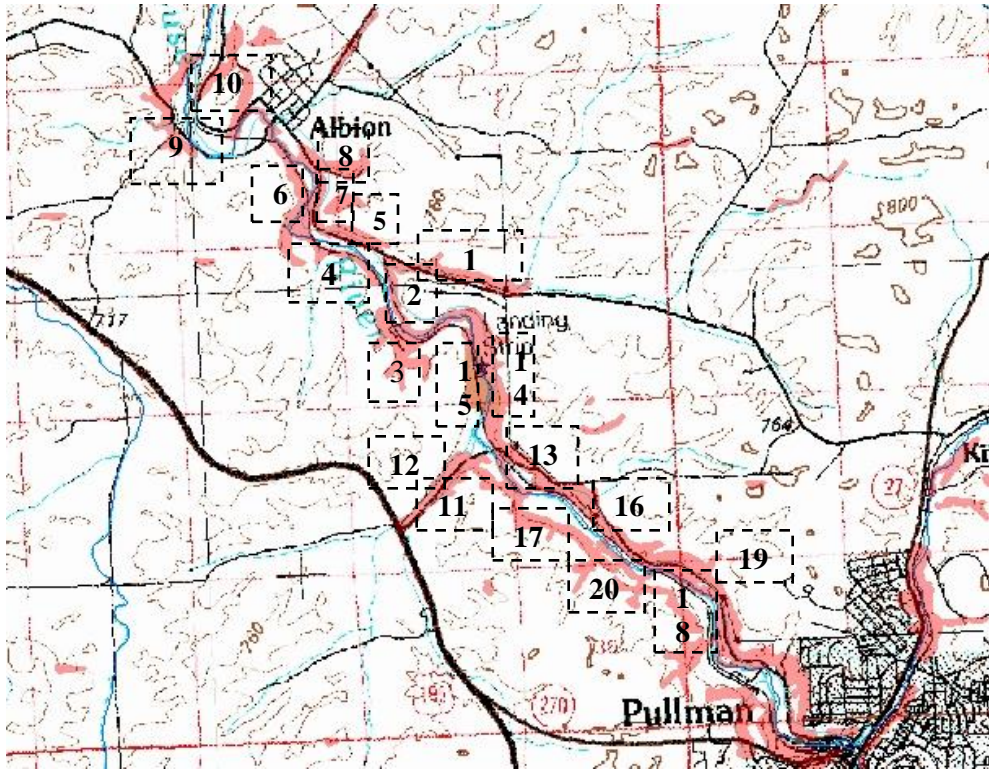
North Pine; 4 miles north of Rosalia; T21N R43E Section 23



*North Wilcox; North of Wilcox; T16N R42E Section 36



North Wilcox; North of Wilcox; T16N R42E Section 36



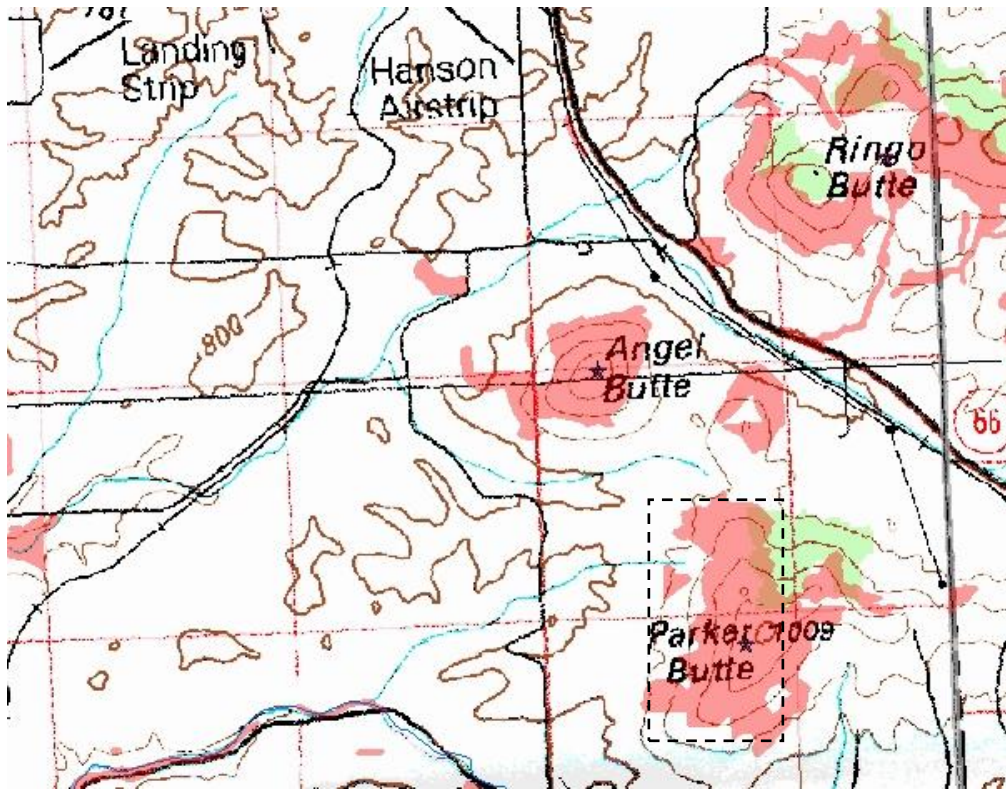
*Palouse River Albion; Between Pullman and Albion; T15N R44E Section 23



Palouse River Albion; the northern portion of the area between Pullman and Albion; T15N R44E Section 23



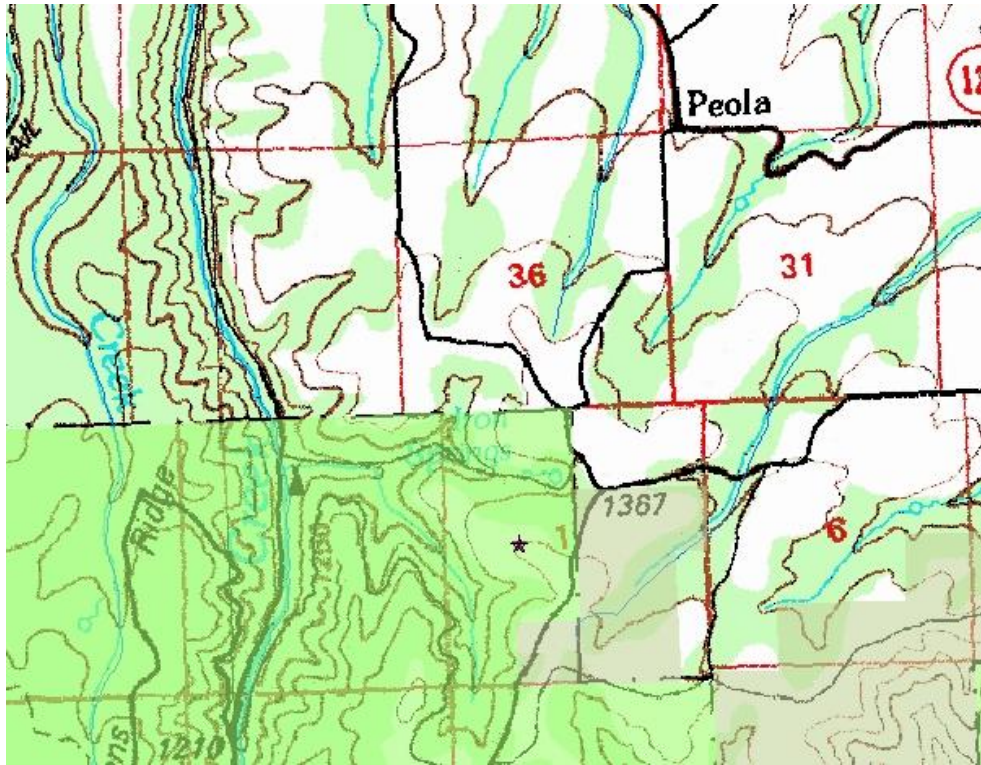
Palouse River Albion; the southern portion of the area between Pullman and Albion; T15N R44E Section 23



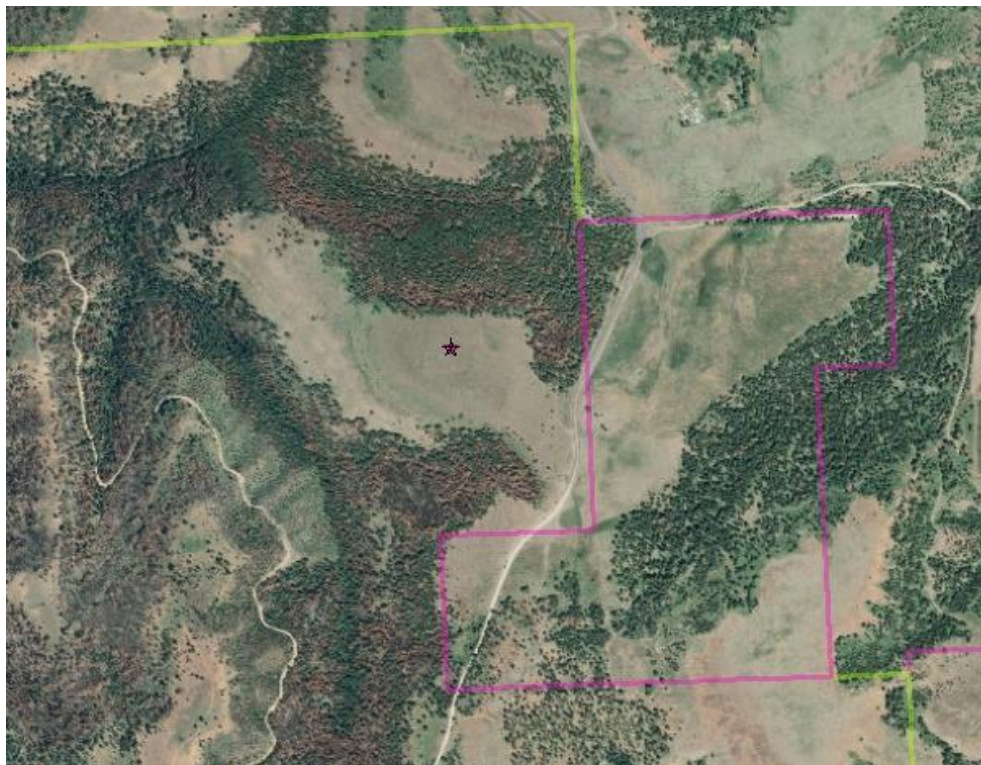
*Parker Butte; 4 miles south of Palouse, T16N, R46E, Section 30



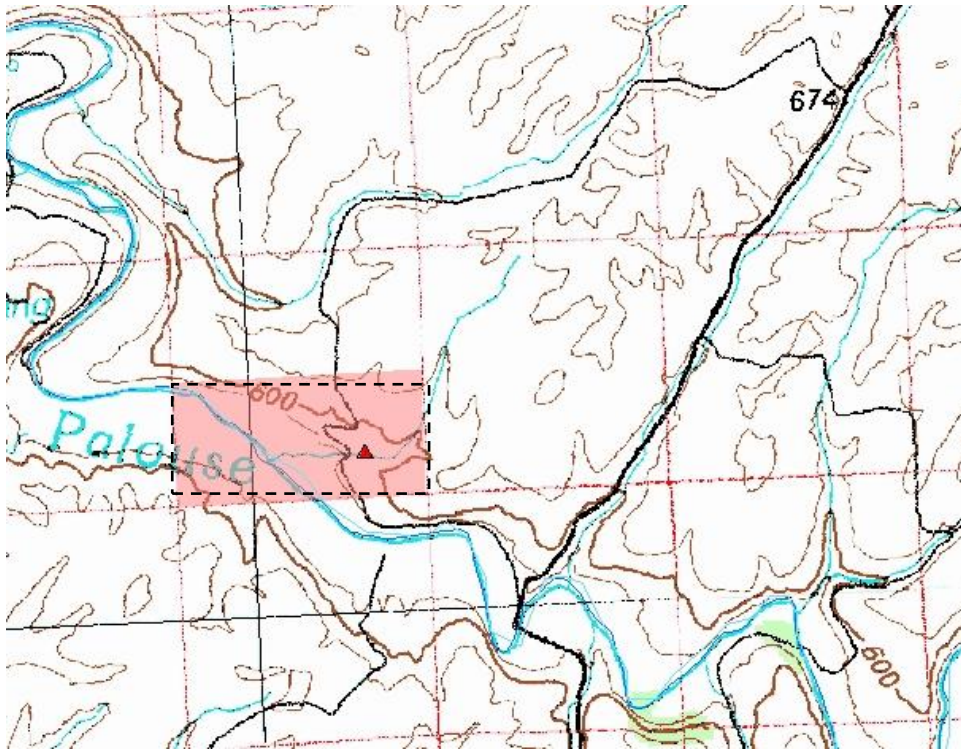
Parker Butte; 4 miles south of Palouse, T16N, R46E, Section 30



Pataha Bunchgrass RNA; 14 miles SSE of Pomeroy; T9N R42E Section 1. National Forest land is highlighted with bright green, WDFW with olive green.



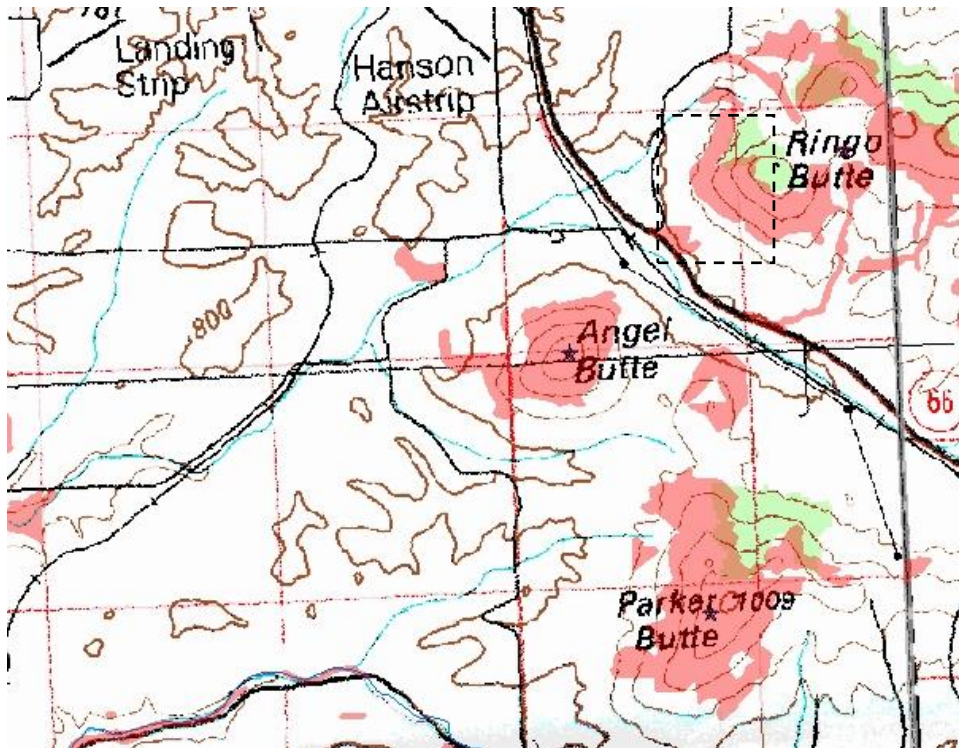
Pataha Bunchgrass RNA; 14 miles SSE of Pomeroy; T9N R42E Section 1



***Rattlesnake Road; 9 miles northwest of Colfax; T17N R42E Section 16**



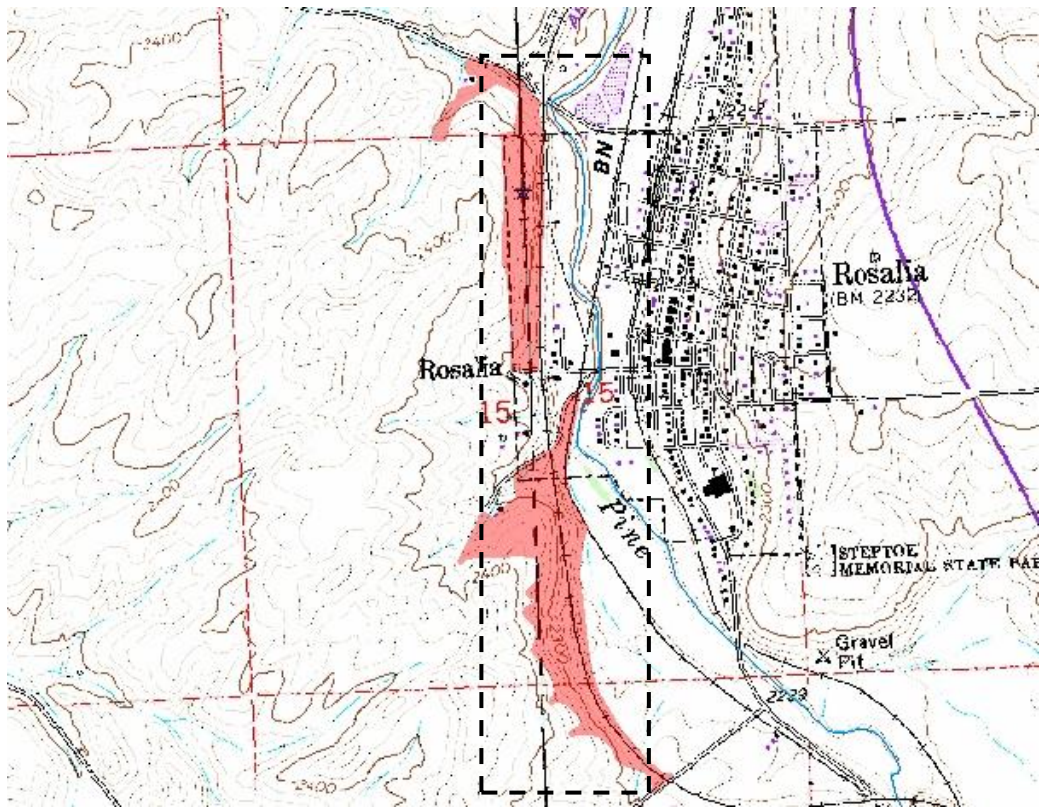
***Rattlesnake Road; 9 miles northwest of Colfax; T17N R42E Section 16**



*Ringo Butte; 3 miles southeast of Palouse, T16N, R46E, Section 17



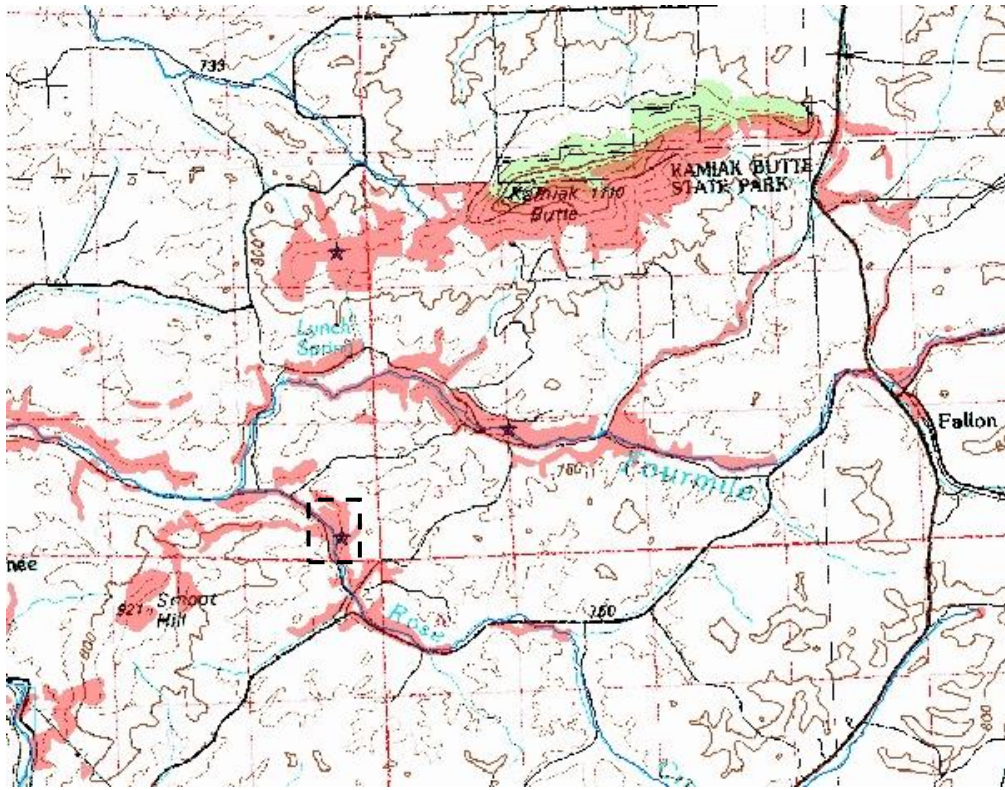
Ringo Butte; 3 miles southeast of Palouse, T16N, R46E, Section 17



*Rosalia, at the west edge of the town; T20N R43E Section 15



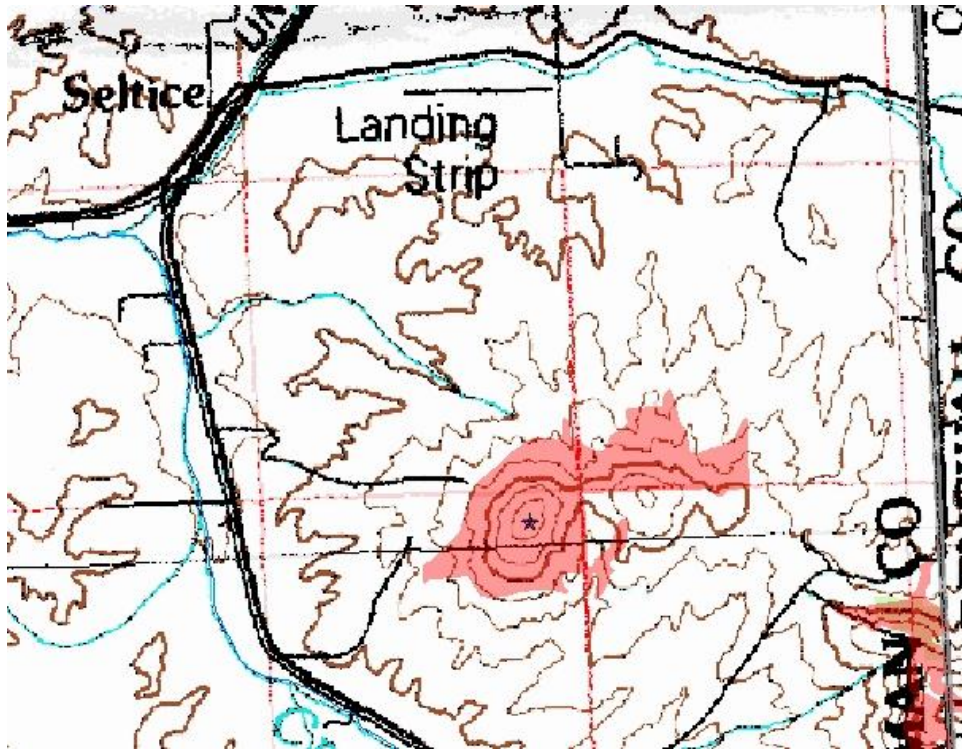
Rosalia, at the west edge of the town; T20N R43E Section 15



*Rose Creek; 6 miles NNW of Pullman; T16N R44E Section 36



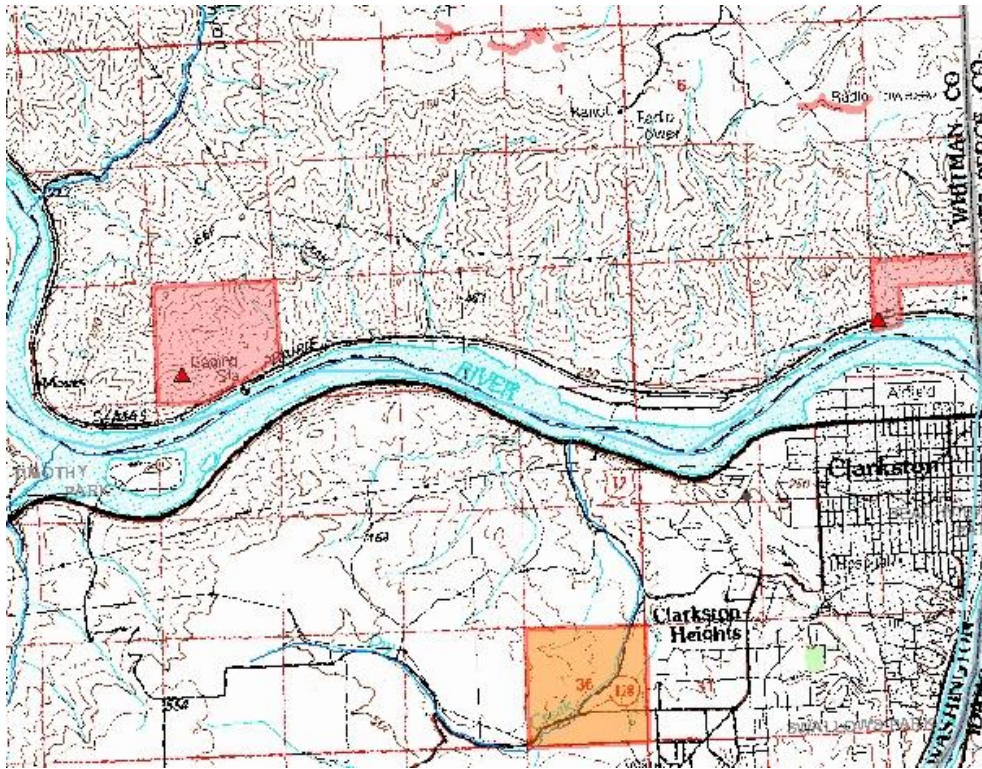
Rose Creek; 6 miles NNW of Pullman; T16N R44E Section 36



*Seltice Butte; 2 miles southeast of Seltice; T19N R45E Section 24



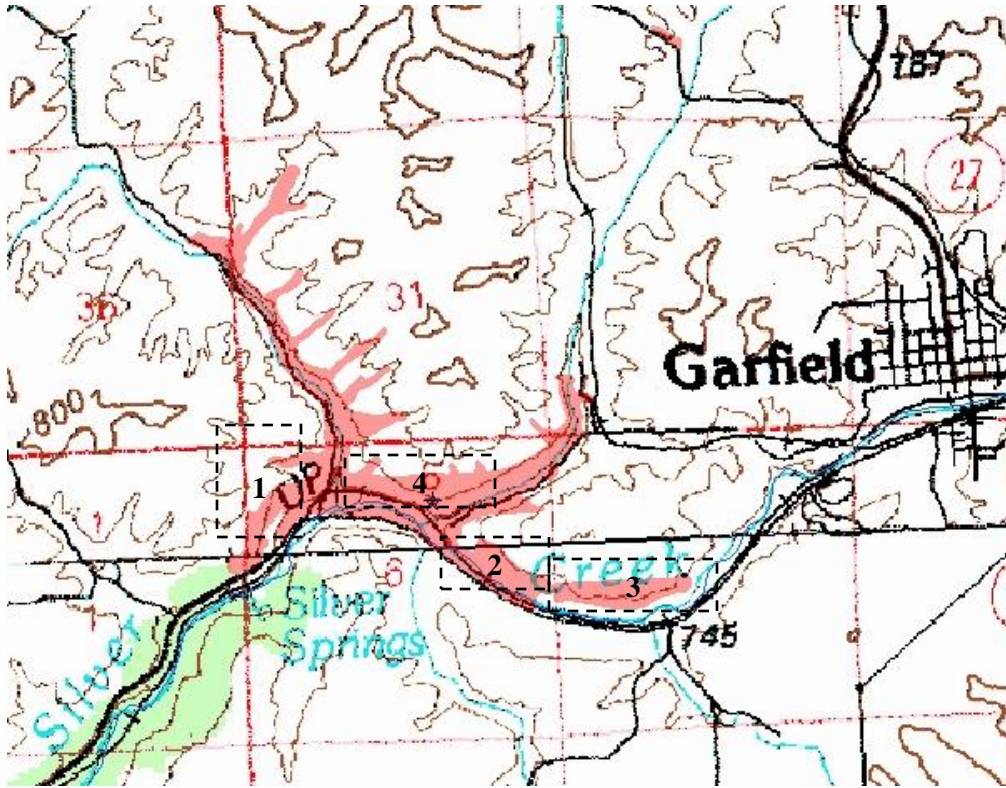
Seltice Butte; 2 miles southeast of Seltice; T19N R45E Section 24



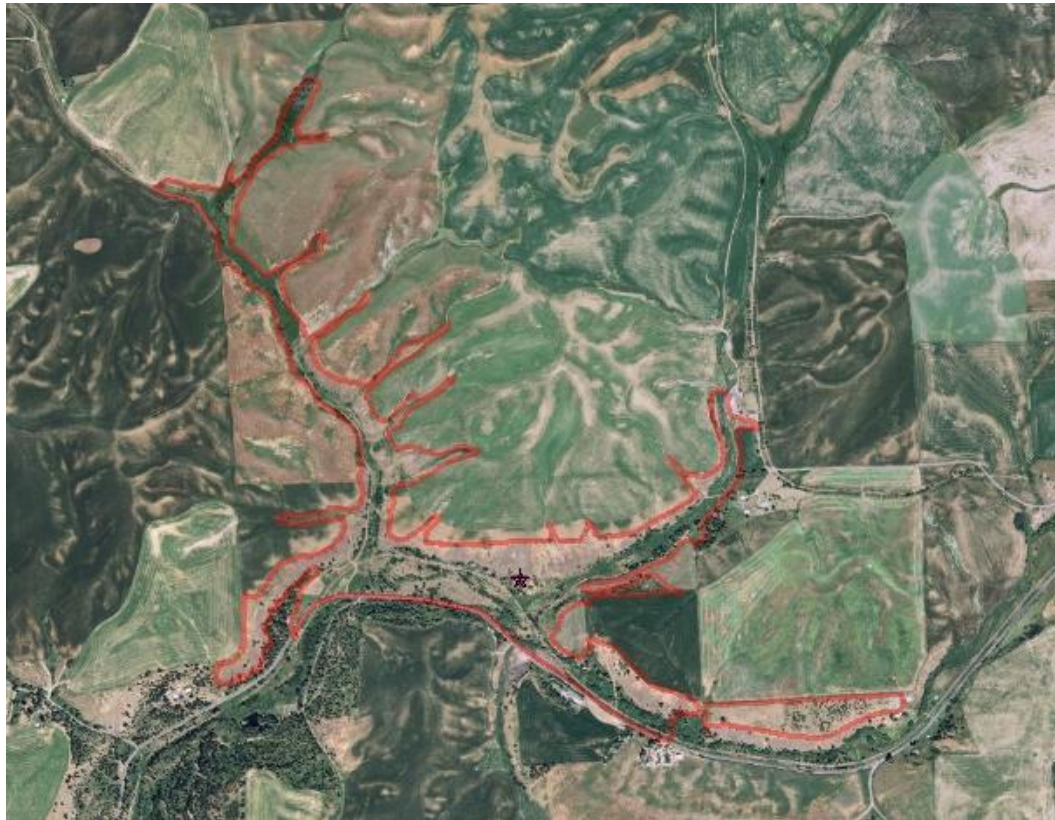
Silcott; DNR land above the Snake River, 6 miles downstream from Clarkston; T11N R45E Section 16



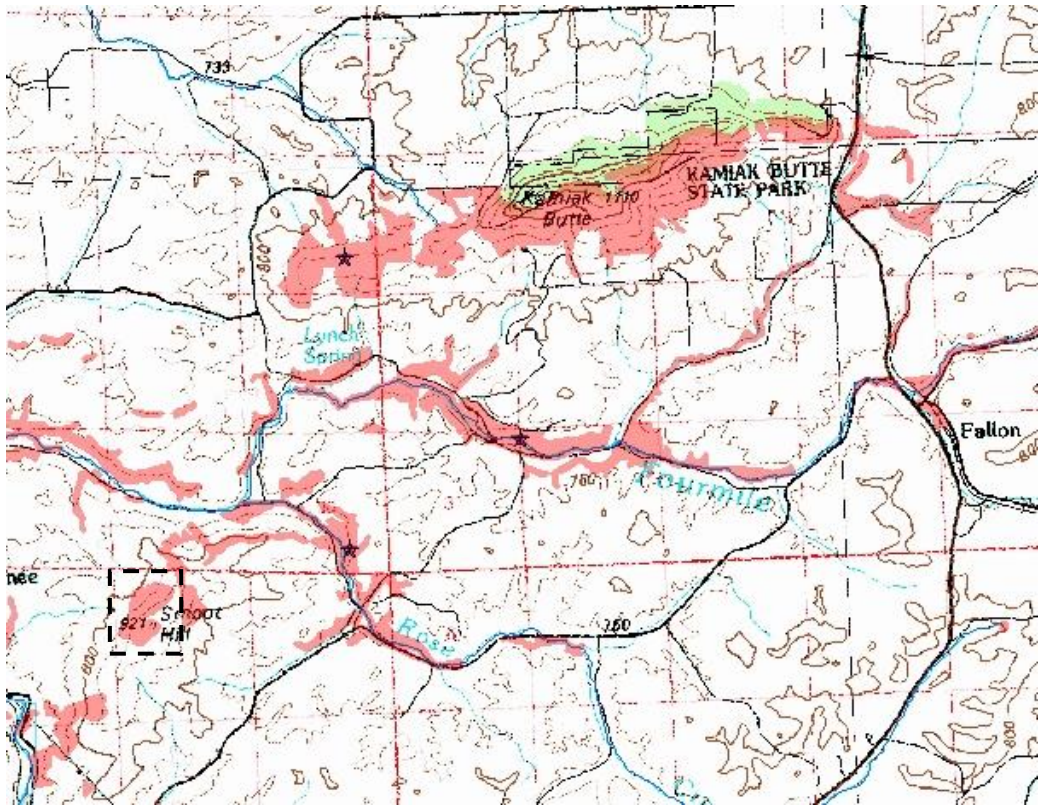
Silcott; DNR land above the Snake River 6 miles downstream from Clarkston; T11N R45E Section 16



*Silver Creek remnant, 1 mile west of Garfield; T17N R45E Section 6



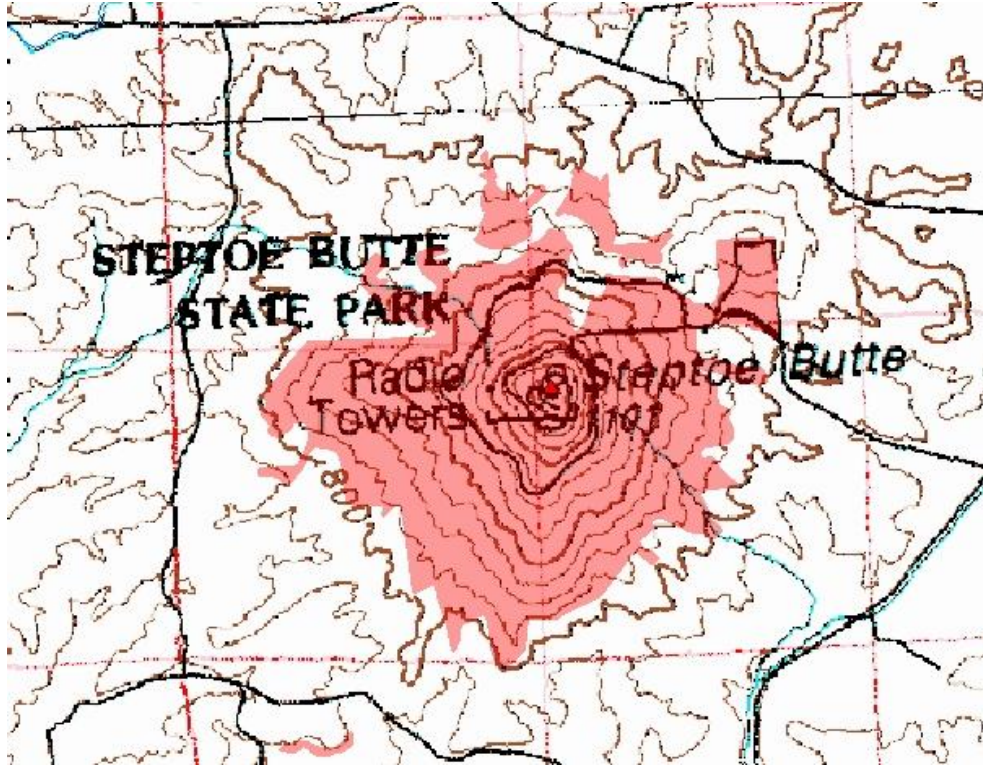
Silver Creek remnant, 1 mile west of Garfield; T17N R45E Section 6



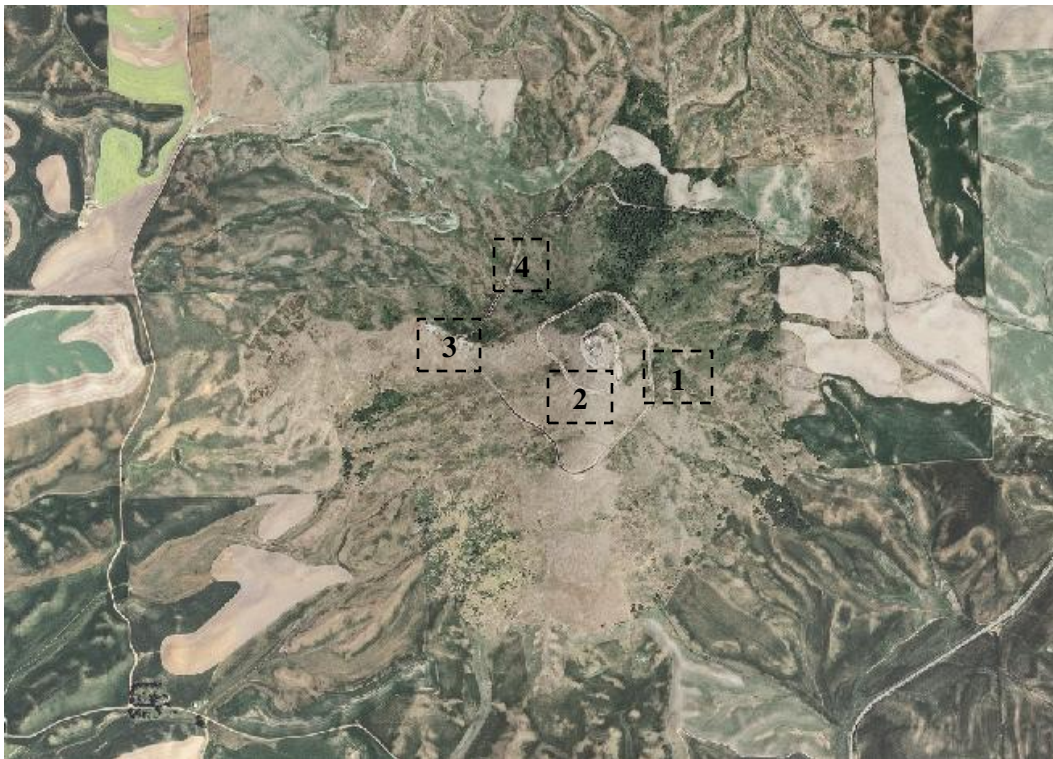
*Smoot Hill WSU BSA; 6 miles north-northwest of Pullman; T15N R44E Section 2



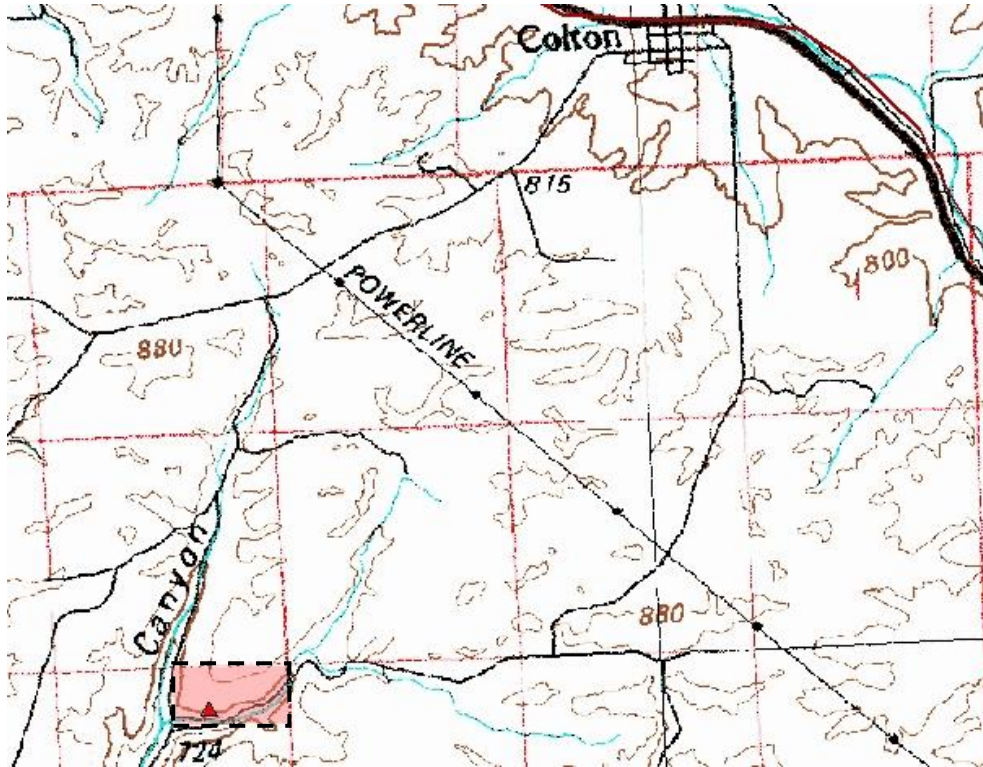
Smoot Hill WSU BSA; 6 miles north-northwest of Pullman; T15N R44E Section 2



*Steptoe Butte State Park; 7 miles SSW of Oakesdale; T18N R44E Section 29



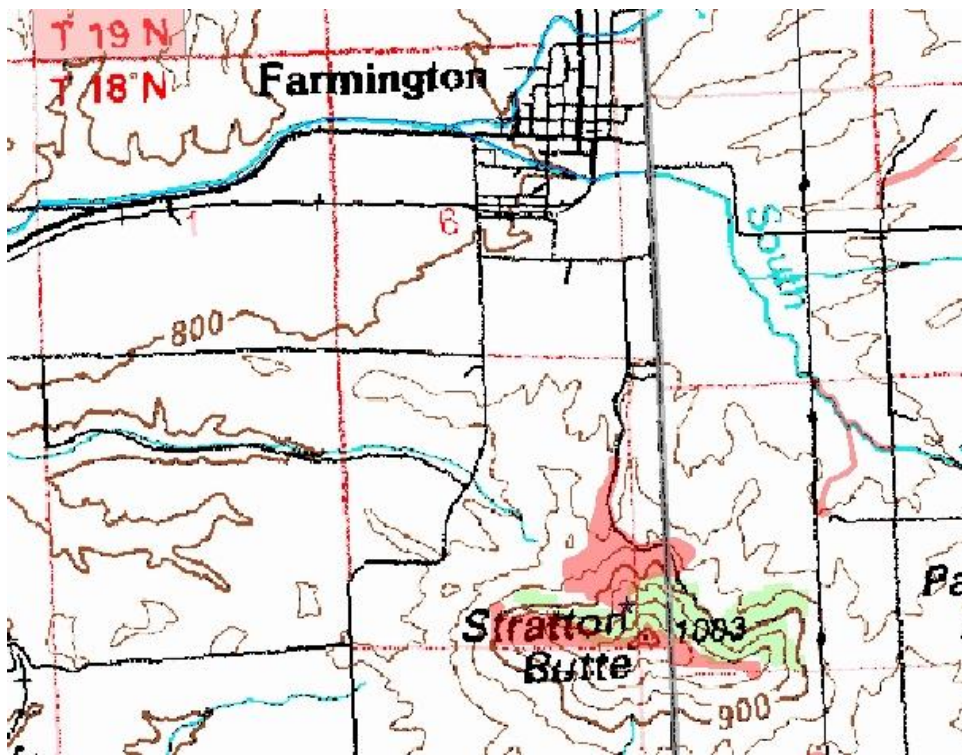
Steptoe Butte State Park; 7 miles SSW of Oakesdale; T18N R44E Section 29



***Steptoe Canyon DNR land; three miles southwest of Colton; T12N R45E Section 16**



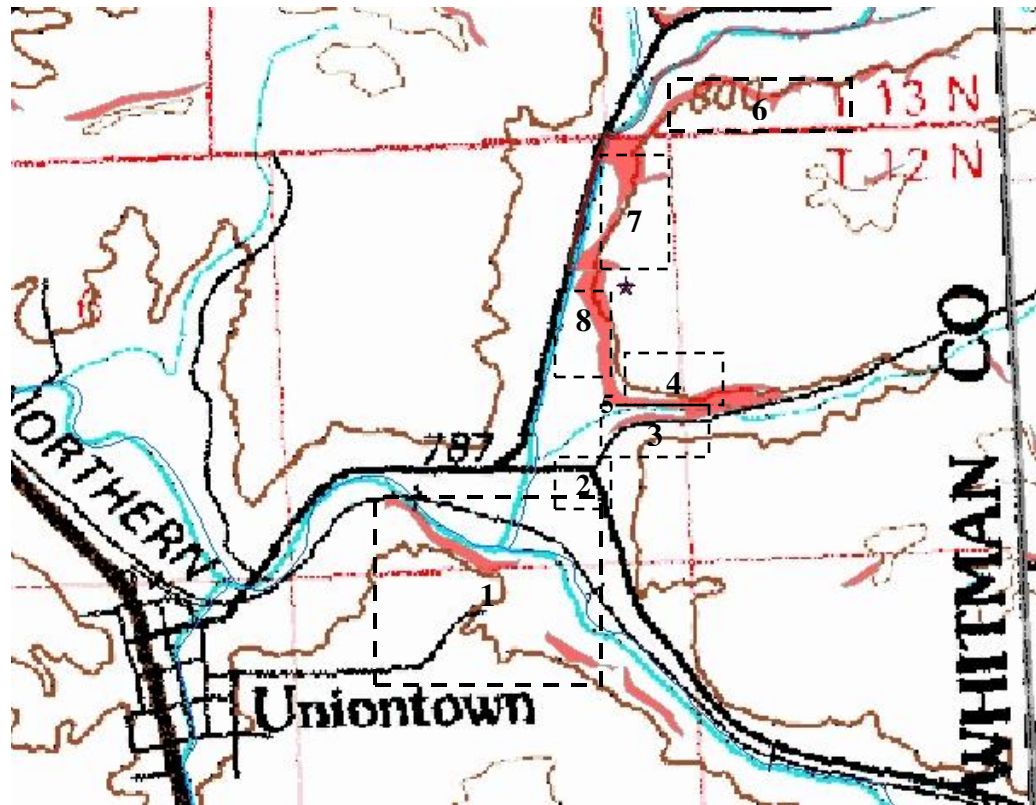
Steptoe Canyon DNR land; three miles southwest of Colton; T12N R45E Section 16



*Stratton Butte; 2 miles south of Farmington; T18N R46E Section 7



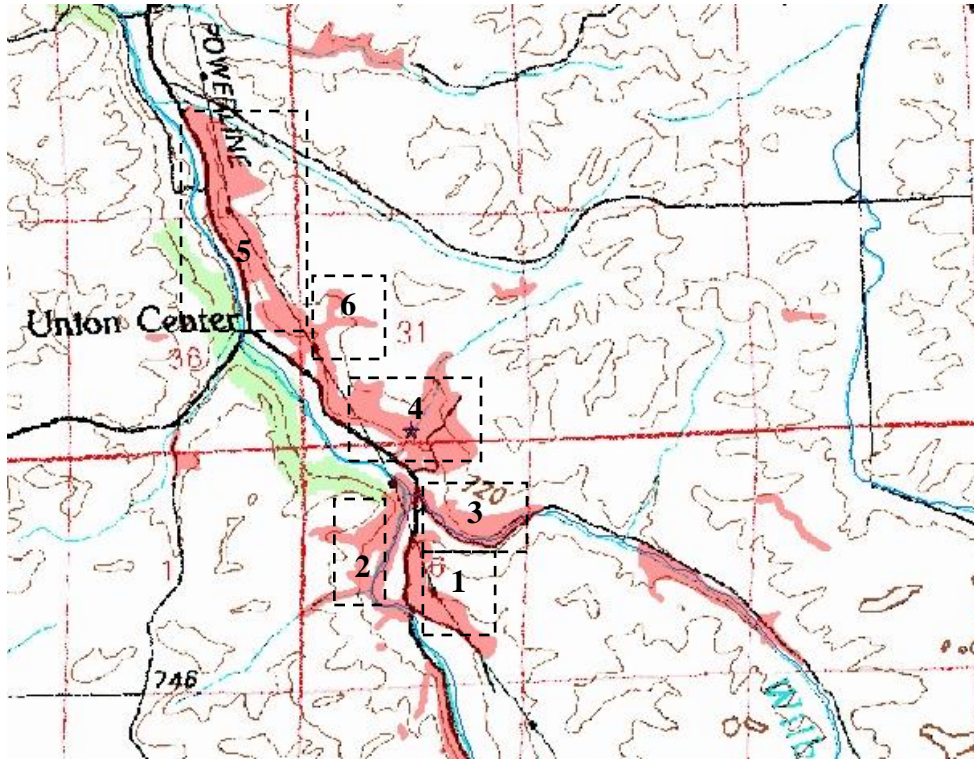
Stratton Butte; 2 miles south of Farmington; T18N R46E Section 7



*Thorn Creek; 1 mile NE of Uniontown; T2N R46E Section 5



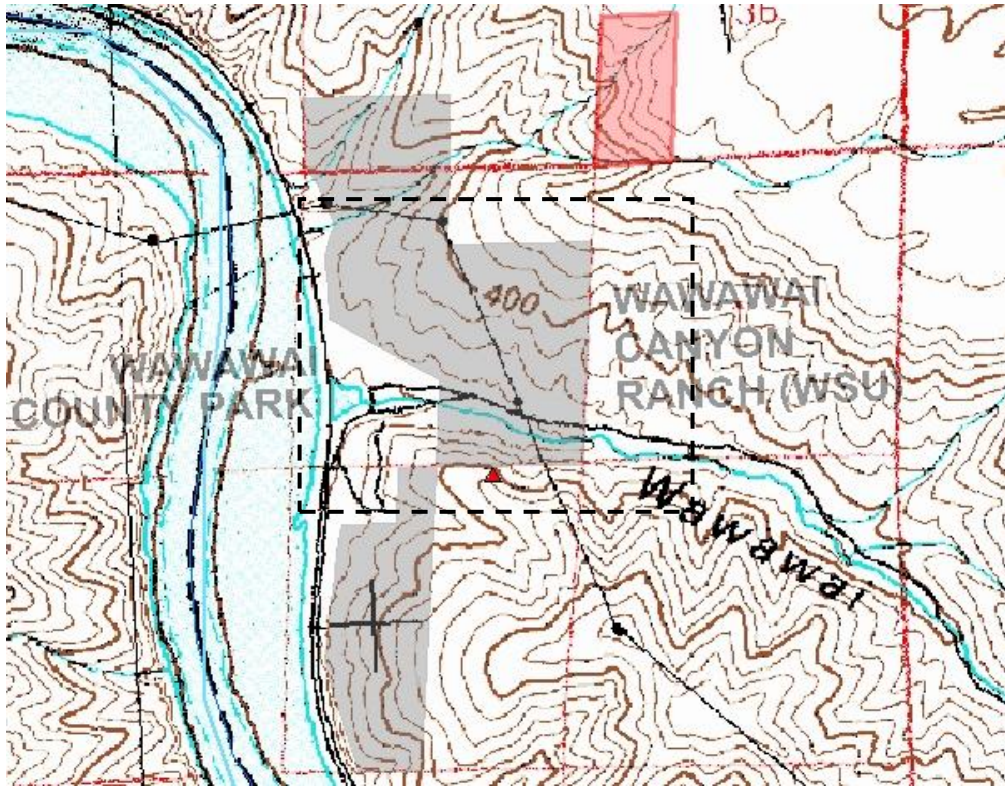
Thorn Creek; 1 mile NE of Uniontown; T2N R46E Section 5



*Union Center; 7 miles west of Pullman; T15N R43E Section 36



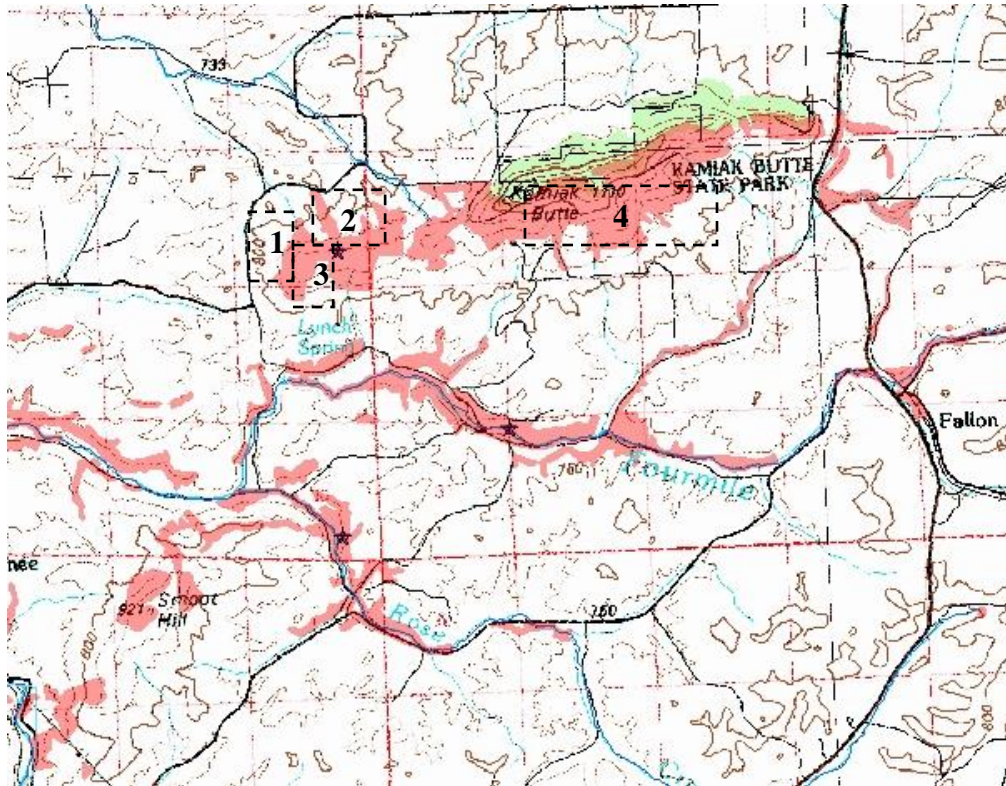
Union Center; 7 miles west of Pullman; T15N R43E Section 36



*Wawawai Canyon; 11 miles southwest of Pullman; T13N R43E Section



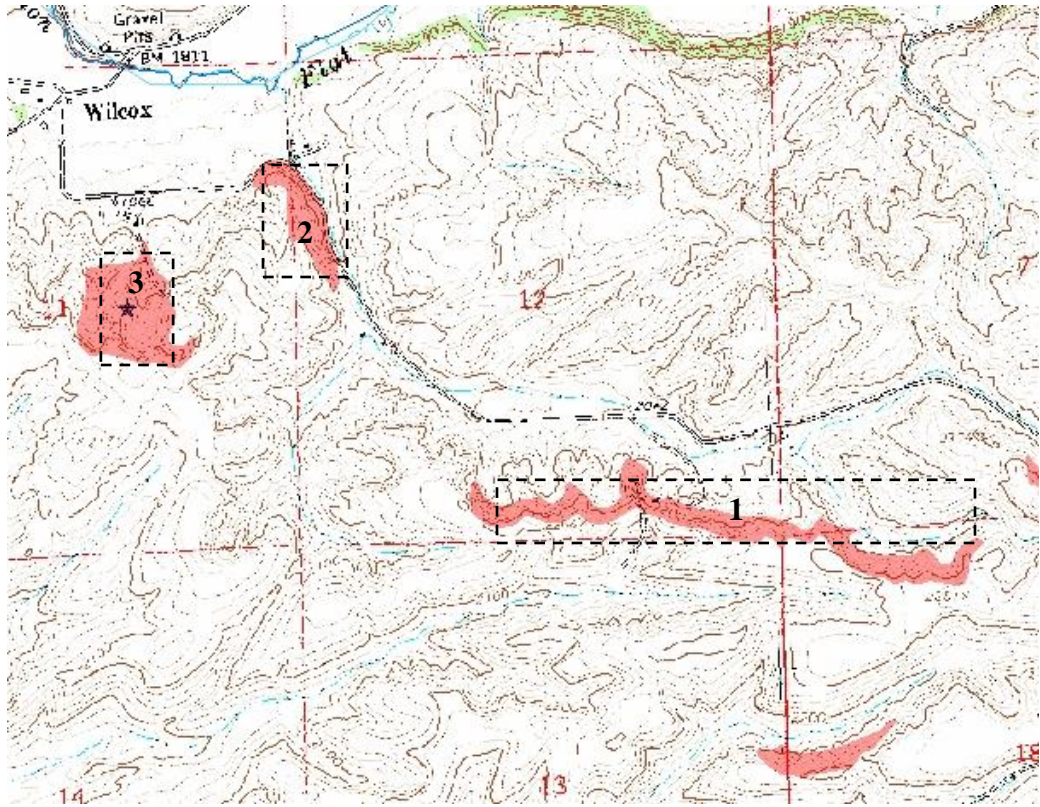
Wawawai Canyon; 11 miles southwest of Pullman; T13N R43E Section



*West Kamiak Butte; 8 miles north of Pullman; T16N R44E Section 24



West Kamiak Butte; 8 miles north of Pullman; T16N R44E Section 24



*Wilcox and SE; T15N R42E Section 11



Wilcox and SE; T15N R42E Section 11

Appendix C. Selected site descriptive information of survey areas or polygons assessing Palouse Atlas sites (Arnett 2009). All site fields and information collected for the project are the “Palouse EIA tables.xlsx” Microsoft Excel file, “SiteDescriptions” sheet.

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Angel Butte		Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	binocs	Deciduous shrubland on n side is large and dense. PINPON is mostly concentrated around lower edge of shrubland. Grazed at least inpart in past. Low shrubs w/whitish tint. Grassland on SE face looks weedy. Southside has decent bunchgrass cover but invasives/nonnatives are common. deserves field visit. not sure if grazed but looks it was in the past. NW side of butte looks decent at least the best part of the site.				agriculture grazed?
Bald Butte	1	Columbia Basin Palouse Prairie	binocs					
Bald Butte	2	Columbia Basin Palouse Prairie	binocs					
Bald Butte	3	Columbia Basin Palouse Prairie	binocs					
Bald Butte	4	Columbia Basin Palouse Prairie	binocs					
Bald Butte	5	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	binocs					
Bald Butte	6	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	binocs					
Bald Butte	7	Columbia Basin Palouse Prairie	binocs					
Bald Butte	8	Northern Rocky Mountain Montane-Foothill Deciduous	binocs					

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
		Shrubland						
Bald Butte	9	Columbia Basin Palouse Prairie	binocs					
Campus Prairie BSA		Columbia Basin Palouse Prairie	site walk thru					
Campus Prairie BSA		Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	site walk thru					
Ewartsville	1	Columbia Basin Palouse Prairie	roadside	north end				
Ewartsville	2	Columbia Basin Palouse Prairie	binocs	north end				
Ewartsville	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	roadside	south end				
Ewartsville	4	Columbia Basin Palouse Prairie	binocs	south end				
Ewartsville	5	Columbia Basin Palouse Prairie	binocs	south end				
Ewartsville	6	Columbia Basin Palouse Prairie	site walk thru	middle				
Ewartsville	7	Columbia Basin Palouse Prairie	roadside	south end				
Ewartsville	8	Columbia Basin Palouse Prairie	site walk thru	middle				
Ewartsville	9	Columbia Basin Palouse Prairie	binocs	north end				
Ewartsville	10	Columbia Basin Palouse Prairie	binocs	middle; Hawthorn dead and dying				

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Ewartsville		Columbia Basin Palouse Prairie		This a section of the canyon along Union Flat Creek. Flat valley bottom 200-400 ft wide is agriculture, pasture, road and ag support buildings. Plateau above is wheat. Canyon slopes with very few cliffs, mostly revegetated with grassland, shrubland and patches of ponderosa pine woodlands. looked at 10 locations along site either form roadside or w/binocs, this rating summarizes all.	weeds and shrub invasion major management issue. Better grassland sites are isolated, rest (most) of grassland needs restoration	easement active of eo an eo quality sites	removal of PRUA VI and ACENIG	development agriculture grazing comp from exotics no fire
Fairchild		Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	site walk thru	this bisquit/swale topography is located at the southend of Fairchild AFB. It is bisected by a diagonal rd and a few local access roads. It is fenced off from the public at large but does get passive rec use, some training excercises from ABF personnel. the grasslands occur on mounds of various sizes on a shallow basalt scabland that supports stiff sagebrush and Poa secunda scablland vegetation. Ponderosa pine occupies the sw corner of the area associated with intermittent ponds. a few Vernal pool complexes are scattered among the mounds. condition is variable but generally good bunchgrass and forb diversity with high annual invasive cover. perennial invasives are frequently encountered.				Military operations, competition from exotics
Fairchild		Columbia Plateau Vernal Pool	site walk thru					
Fishtrap		Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	site walk thru					
Fishtrap		Columbia Basin Foothill Riparian Woodland and Shrubland	site walk thru					
Fishtrap		Columbia Plateau Scabland Shrubland	site walk thru	this DNR section is within the channeled scabland topography composed of mostly bunchgrass mounds, stiff sagebrush scabland and ponderosa pine woodlands on the breaks down to Fishtrap Lake. Wetlands and intermittant ponds are scattered. Invasive annuals are common thruout although bunchgrass cover is often good on				grazing; competition from exotics

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
				mounds, perennial invasive grasses are common to dominant in wetlands and wet meadows.				
Fishtrap		North American Arid West Emergent Marsh	site walk thru					
Fishtrap		North American Arid West Emergent Marsh	site walk thru					
Fishtrap		Northern Rocky Mountain Foothill Conifer Wooded Steppe	site walk thru					
Fishtrap		Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	site walk thru					
Fourmile Creek	1	Columbia Basin Palouse Prairie	roadside	northeast end top of drainage				
Fourmile Creek	2	Columbia Basin Palouse Prairie	roadside	northeast end top of drainage				
Fourmile Creek	3	Columbia Basin Palouse Prairie	roadside	at convergence				
Fourmile Creek	4	Columbia Basin Palouse Prairie	site walk thru	at convergence, this is best part				
Fourmile Creek	5	Columbia Basin Palouse Prairie	site walk thru	at convergence				
Fourmile Creek	6	Columbia Basin Palouse Prairie	roadside	east end top of drainage				
Fourmile Creek	7	Columbia Basin Palouse Prairie	roadside	east end top of drainage				
Fourmile Creek	8	Columbia Basin Palouse Prairie	binocs	middle				

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Fourmile Creek	9	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	roadside	west end				
Fourmile Creek	10	Columbia Basin Palouse Prairie	binocs	west end				
Fourmile Creek	11	Columbia Basin Palouse Prairie	roadside	farwest end				
Fourmile Creek		Columbia Basin Palouse Prairie		Valley sides w/semi-natural vegetation w/native prairie spp. several patches of good diversity in eybrows. Basalt exposed on more southerly aspects, more palouse like on north aspects. Looked at 11 areas roadside or binocs. Rating summary of areas	weeds and isolated patches of native has major issues; active agriculture, not much grazing	few residences could be viewed as connector between kamiak and Rose ck.		grazing; competition from exotics; agland slope failures
George Creek DNR		Columbia Basin Foothill and Canyon Dry Grassland	site walk thru	Steep north slopes with abundant FESIDA. Some grazing on slope I visited. Only occupies small% of entire site 5-10%	lightly grazed	condition good but LC problematic		grazing; competition from exotics
George Creek DNR		Columbia Basin Foothill and Canyon Dry Grassland	site walk thru	occupies most of site, even occurs in all but steep N-facing slopes. Grazed lots of invasives	grazed invasives are widespread and abundant	not high priority		grazing; competition from exotics
George Creek DNR		Columbia Basin Foothill Riparian Woodland and Shrubland		2% of area				
Granite Butte		Columbia Basin Palouse Prairie	binocs	the westside of the polygon looks fair to poor. Can't see many forbs in flw. Looks like bunchgrass is patchy. Some dense bunchgrasses occurs a apex of butte. Deciduous shrubslan also occurs on site many CRADOU shrubs look dead or dying. Overall look fair. bunchgrass doesn't appear dense and grass overall has a greener color than fescue	surrounded by wheat. Site itslf appears to be grazed			grazing; competition from exotics, insufficient size
Hog Lake DNR		Columbia Plateau Scabland Shrubland	site walk thru					

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Comments	Restoration Comments	SITE IMPACTS
Hog Lake DNR		Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	site walk thru					
Hog Lake DNR		Northern Rocky Mountain Foothill Conifer Wooded Steppe	site walk thru					
Hog Lake DNR		Northern Rocky Mountain Ponderosa Pine Woodland and Savanna	site walk thru	this DNR section is within the channeled scabland topography composed of maybe third bunchgrass mounds and stiff sagebrush scabland and ponderosa pine woodlands in the draws and near wetlands and intermittant ponds of the remaiing area. Invasive annuals are common. the forest have been harvested to various degrees and the whole area is grazed to varing intensity based apparently on forage availability.				grazing; competition from exotics
Hog Lake DNR		North American Arid West Emergent Marsh	site walk thru					
Kahlotus Ridgetop	1	Columbia Basin Palouse Prairie	site walk thru					
Kahlotus Ridgetop	2	Columbia Basin Palouse Prairie	site walk thru					
Kamiak		Columbia Basin Palouse Prairie	binocs	Southly aspect of ridge moutian extending from N rockies into Palouse. Grasses dominated w/shrubs and/or trees or of which on east aspects and higher elevation. 'grassland' is patchy of different colors and texture. BROTEC down low. Blue-green taller and mid to high is probalby VENDUB. old fields below. binocs. older on-site invenotry in files	weeds and tree invasion	large grassland block on south side	re-introduce fire for wood invasion control; annual grass and rhizomtous grass control	past grazing; competition from exotics;
Kramer Palouse BSA		Columbia Basin Palouse Prairie	site walk thru					
Kramer Palouse BSA		Columbia Basin Palouse Prairie	site walk thru					
Kramer Palouse BSA		Northern Rocky Mountain-Montane-Foothill Deciduous	site walk thru					

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Shrubland								
N. Palouse River Rd	1	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	site walk thru	5% of area				
N. Palouse River Rd	2	Columbia Basin Foothill Riparian Woodland and Shrubland	site walk thru	5% of area				
Nisqually John HMU		Columbia Basin Foothill and Canyon Dry Grassland	binocs/walk	north northwest slopes have decent Fescue cover especially on upper slopes. Rabbitbrush is dense in some areas. Shrub garlands Celtis reticulata? Are found in a few areas on lower slopes	Grazed? Invasives patches & invasion of CHRNAU an issue			grazing; competition from exotics
Nisqually John HMU		Columbia Basin Foothill and Canyon Dry Grassland	binocs/walk	south facing slopes dominated by PSSP/POSE. BRTE abundant. Some large BRORIG patches at bottom of slope near trailhead. Seep emerges along trail at toe slope. Riparian area dominated by Alnus rhombifolia and Celtis reticulata understory covered with Rubus discolor. SPOCRY/POASEC lots of BROTEC POABUL is on lower slope and benches.	grazed at least in past. BROTEC and BRORIG are abundant			grazing; competition from exotics
Nisqually John HMU		Columbia Basin Foothill Riparian Woodland and Shrubland	binocs/walk					
North Wilcox		Columbia Basin Foothill Riparian Woodland and Shrubland	binocs					

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Comments	Restoration Comments	SITE IMPACTS
North Wilcox		Columbia Basin Palouse Prairie	binocs	Steep northerly slope w/knobs of loess hills extending from above. Complex topography w/complexity of Plaouse moist loess. Agriculture all around house on west side. Site grazed terracettes obvious. Parts are pasture grazed. Few Palouse dominant sppeces, shrubs w/brose lines. good diversity.	upper patches of exotics maybe oldfield for restoration. Site grazed has kept shrub cover open will need fire of some means to reduce shrubs. Riparian needs shrubs	easement small NA?		grazing; competition from exotics; agland slope failures
North Wilcox		Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	binocs					
Palouse River - Albion	1	Columbia Basin Palouse Prairie	roadside	mid tributary; best part is C				
Palouse River - Albion	2	Columbia Basin Palouse Prairie	roadside	middle				
Palouse River - Albion	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	roadside	mid tributary				
Palouse River - Albion	4	Columbia Basin Palouse Prairie	roadside	mid north				
Palouse River - Albion	5	Columbia Basin Palouse Prairie	site walk thru	mid north				
Palouse River - Albion	6	Columbia Basin Palouse Prairie	roadside	north end				
Palouse River - Albion	7	Columbia Basin Palouse Prairie	roadside	north end				
Palouse River - Albion	8	Columbia Basin Palouse Prairie	roadside	north end				

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Palouse River - Albion	9	Columbia Basin Palouse Prairie	roadside	north end				
Palouse River - Albion	10	Columbia Basin Palouse Prairie	site walk thru	north end				
Palouse River - Albion	11	Columbia Basin Palouse Prairie	roadside	mid tributary; good site				
Palouse River - Albion	12	Columbia Basin Palouse Prairie	roadside	mid tributary				
Palouse River - Albion	13	Columbia Basin Palouse Prairie	roadside	middle				
Palouse River - Albion	14	Columbia Basin Palouse Prairie	site walk thru	middle; good site				
Palouse River - Albion	15	Columbia Basin Palouse Prairie	binocs	middle				
Palouse River - Albion	16	Columbia Basin Palouse Prairie	binocs	mid south				
Palouse River - Albion	17	Columbia Basin Palouse Prairie	binocs	mid south				
Palouse River - Albion	18	Columbia Basin Palouse Prairie	binocs	south end				
Palouse River - Albion	19	Columbia Basin Palouse Prairie	roadside	south end				
Palouse River - Albion	20	Columbia Basin Palouse Prairie	binocs	mid south				

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Palouse River - Albion				20 POLYGONS RATED LISTED ONLY GRASSLAND LISTED. Slopes and canyon along Palouse R. w/ semi-natural grasslands and deciduous shrublands and a few PIPO woodlands below and in some places interspersed with agfields on the hills above. The valley bottom is pastures and ag fields. Pullman urban growth surrounds the southend of site, Albion development is on the north and scatterd houses and farm complexes along the intervening length. Palouse loess eyebrows are rare along length mostly on west side or in shrubpatches. shallow soil (w/coarse fragments or capping basalt) mostly eastside. Decid shrublands dominant native vegetation, those check have weedy undergrowth (past grazing effects?)	major issues w/exotic invasion and established populations; shrub invasion in to Palouse and Canyon grassland, edge effects. New view lot development along eastside of canyon			development agriculture grazing
Parker Butte		Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	binocs	westside seems to look nicer than east side. Pretty extensive grassland. Look fair, maybe good portions was well. Low shrubs present bunchgrass seems decent. Definitely worth a field visit.	grazed			grazing; competition from exotics, insufficient size
Rattlesnake Rd	Deciduous Shrubs	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	site walk thru					
Rattlesnake Rd	Palouse riparian	Columbia Basin Foothill Riparian Woodland and Shrubland	site walk thru		Probably grazed in past; entrenched			grazing; competition from exotics, altered flood regime, road trai/, erosion runoff grazing caused channelization
Rattlesnake Rd		Columbia Basin Foothill and Canyon Dry Grassland	site walk thru	Occurs on N-facing slope. Soils are lloess but no deep. Basalt is underlying. High forb diversity, Fescue cover is pretty good but there are some bare patches between FEID bunches; non native cover fairly high. Walked thru east of road and looked at piece acroos Palouse R. w/ Binocs	probably grazed in past, not recently, no cow pies, definitely grazed by deer			grazing; competition from exotics, insufficient size

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Comments	Restoration Comments	SITE IMPACTS
Rattlesnake Rd		Columbia Basin Foothill and Canyon Dry Grassland	site walk thru	association occurs on S-facing, shallow soiled slopes. Basalt outcrops are common. Basalt pavement present in many areas. Lots of BROTEC, CONMAC, and Vicia villosa. PSEPSI and POASEC are abundant in patches	probably grazed in past, not recently, no cow pies, cattle on adjacent land			grazing; competition from exotics
Ringo Butte		Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	binocs	looks fair condition. North side mostly PINPON. South side has most of grassland and to tell but didn't think I saw much bunchgrass. Of angel, porter, Ringo buttes, Porter would be probably priority to visit, followed by Angel then Ringo	grazed			grazing; competition from exotics, insufficient size
Rosalia		Columbia Basin Palouse Prairie	site walk thru	Eyebrow along Milwaukee RR trail with fields above and fields or town of Rosalia below. CRADOU atches along ditch on upslope; side casting of fields from above; end of trail eyebrow on north end smaller area less grassland less native.	shrub invasion in some areas could be mowed, quackgrass has invaded some high diversity Palouse patches. It and other weeds mostly from fields above, walked some of south end, binoc north end	easement?		
Rose Creek	1	Columbia Basin Palouse Prairie	site walk thru	south end				
Rose Creek	2	Columbia Basin Palouse Prairie	site walk thru	middle				
Rose Creek	3	Columbia Basin Palouse Prairie	site walk thru	north above field				
Rose Creek	4	Columbia Basin Palouse Prairie	binocs	middle above road				
Rose Creek		Columbia Basin Palouse Prairie	site walk thru	slopes below weed fields with shallow soil or steepness not good for farming and above narrow/flat valley . bottom with aspen and hawthorn riparian. Most of valley bottom is grazed or farmed. Survey on site for that in NAP road side and binocs on areas outside.	was TNC site now land Palouse Clearwater trust, weed control and woody invasion			some foot trampling, insufficient size, improper burning regime

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Seltice Butte		Columbia Basin Palouse Prairie	binocs	North side has extensive fescue grassland with low shrub patches. Deciduous shrublands occur insaddle to east. Southside of butte doesn't look as nice.definitely woth on-site visit though! Community types look similar as those on Steptoe and assume Kamiak Buttes. southside has may have more pasture grasses.	might be grazed but if so impacts don't look too bad on Nside more so on S side			grazing; competition from exotics, insufficient size
Silver Creek	1	Columbia Basin Palouse Prairie	binocs	east end				
Silver Creek	2	Columbia Basin Palouse Prairie	binocs	middle				
Silver Creek	3	Columbia Basin Palouse Prairie	binocs	mid west				
Silver Creek	4	Columbia Basin Palouse Prairie	binocs	west end				
Silver Creek		Columbia Basin Palouse Prairie		Tributary canyon to palouse river. Ponderosa pine woodland dominated canyon w/grassland rim. Plateau above is wheat and lentils. looked at 4 locations along site either form roadside or w/binocs did not look at tributary on north end of site. Rating is summary of what could be seenover 1/2 of mapped area..				grazing; competition from exotics; agland slope failures
Smoot Hill BSA		Columbia Basin Palouse Prairie	site walk thru					
Steptoe Butte	1	Columbia Basin Palouse Prairie		Butte with shallow loess soils. Typical pattern SW sides are weedier than north sides. Upper slopes near top also seems weedier due to shallower rocky soils?. In general within 10-20 m of roads weeds abundant. N, NW East slopes better condition but even they generally have lots of ventenata. if not for ventenata, these slopes would be A or AB quality	managed as state park-nonnative present especially on SW side			grazing past; competition from exotics
Steptoe Butte	2	Columbia Basin Palouse Prairie						
Steptoe Butte	3	Columbia Basin Palouse Prairie						

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Steptoe Canyon DNR		Columbia Basin Palouse Prairie	binocs	Decent stand of Palouse prairie probably shallow soil. low shrubs ROSNUT SYMALB are dense though and tall shrubs AMAL HODI are invading	Shrub cover is high. Looks like site might have been grazed in the past pruned shrus or deer browsing is intense			grazing; competition from exotics
Strattum Butte		Northern Rocky Mountain Lower Montane, Foothill, and Valley Grassland	binocs	Northern Rocky Mt Deciduous Shrubland w/ PIPON invading. NRM LM grassland patches as will looks grazed but still looks good/fair. Didn't see many forbs in flwr not sure about bunchgrass can't see individual bunches but color isn't too far off- mybe just dense. is grazed at leat heavily by deer as indicated by pruned/hedge AMAL ans CRDo shrubs. saw at least 10 cows in area. probably not great. can see terracettes- probably worth a site visit	grazed			grazing; competition from exotics, insufficient size
Thorn Creek	1	Columbia Basin Palouse Prairie		A cluster of eyebrows of semi-natural vegetaton N W and S aspects most are w/rock exposure or shallow bedrock. Loess mantle in a few areas. Less steep areas used as equipment dumpt or storage. Completely surrounded by farmed land. Farm building in some eyebrows.	isolation, weedy invasives, small narrow strips of native			development agriculture old grazing comp form exotics insufficient size biocides
Thorn Creek	2	Columbia Basin Palouse Prairie	roadside	south tributary				
Thorn Creek	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	site walk thru	center roadside				
Thorn Creek	4	Columbia Basin Palouse Prairie	roadside	center				
Thorn Creek	5	Columbia Basin Palouse Prairie	roadside	center				
Thorn Creek	6	Columbia Basin Palouse Prairie	roadside	north end				
Thorn Creek	7	Columbia Basin Palouse Prairie	roadside	north end				

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Union Center	1	Columbia Basin Palouse Prairie	roadside	south end				
Union Center	2	Columbia Basin Palouse Prairie	binocs	south end				
Union Center	3	Columbia Basin Palouse Prairie	roadside	south end				
Union Center	4	Columbia Basin Palouse Prairie	roadside	middle				
Union Center	5	Columbia Basin Palouse Prairie	roadside	north end				
Union Center	6	Columbia Basin Palouse Prairie	binocs	middle				
Union Center		Columbia Basin Palouse Prairie		This a section of the canyon along Wilber Creek. Canyon slopes with very few cliffs. looked at 6 locations along site either form roadside or w/binocs. Ratings are for grasslands deciduous shrublands are slightly better ranks	weeds and shrub invasion	did not see any outstanding sites		grazing; competition from exotics; agland slope failures
Wawawai Canyon		Columbia Basin Foothill and Canyon Dry Grassland	binocs	20% of area	past grazing. Farming orchards. Now a park has little if any recreation on slopes			grazing; competition from exotics
Wawawai Canyon		Columbia Basin Foothill and Canyon Dry Grassland	binocs	35% of area				
Wawawai Canyon		Columbia Basin Foothill and Canyon Dry Grassland	site walk thru	45% of area				
Wilcox & SE	1	Columbia Basin Palouse Prairie	binocs	Polygon 1 is a long eyebrow at top of ridge w/mostly shrubs and patches of ponderosapine, has fire exculsion and isolation effects.	shrub and perennial grass control	easement?		
Wilcox & SE	1	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	binocs	Polygon 1 is a long eyebrow at top of ridge w/mostly shrubs and patches of ponderosapine, has fire exculsion and isolation effects.	shrub and perennial grass control	easement?		

Survey SiteName	Polygon / Plot	NatureServe Ecological System	Survey Method	Site Description	Management Comments	Protection Commnets	Restoration Comments	SITE IMPACTS
Wilcox & SE	2	Columbia Basin Palouse Prairie	roadside	polygon 2a smaller eyebrow at mouth of tributary on loess covered basalt. Best condition.	fire and shrub control with spot weed control	NA potencial		
Wilcox & SE	2	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	roadside	polygon 2a smaller eyebrow at mouth of tributary on loess covered basalt. Best condition.	fire and shrub control with spot weed control	NA potencial		
Wilcox & SE	3	Columbia Basin Palouse Prairie	binocs	polygon 3 a squarish site with dense to open shrubs (CRADOU) on what looks like Palouse prairie n secondary ridges.	shrub and perennial grass control	easement?		
Wilcox & SE	3	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	binocs	polygon 3 a squarish site with dense to open shrubs (CRADOU) on what looks like Palouse prairie n secondary ridges.	shrub and perennial grass control	easement?		
Wilcox & SE		Columbia Basin Palouse Prairie		This is along northeast aspect of Union Flat ck "canyon" at a tributary for the Palouse. These are part of the Plaouse rolling topography. Site compose of three fragments (polygons) one in each section.	shrub and perennial grass control	easement small NA?		grazing; competition from exotics; agland slope failures
WKamiak	1	Columbia Basin Palouse Prairie	binocs					
WKamiak	2	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	binocs					
WKamiak	3	Columbia Basin Palouse Prairie	binocs					
WKamiak		Columbia Basin Palouse Prairie	binocs	this is the last large patch of natural vegetation extending west along the ridgeline of Kamiank Butte. The southerly side is grassy with weed patches particularly low and shrub invasion in the draws and along the ridgeline. The north site is open to closed ponderosa woodland. surrounded by ag fields. survery all by binocs.	fire suppression effects of woody invasion snowberry and rose, can see patches of weeds	weed control and shrub control		grazing; competition from exotics; agland slope failures