

Appendix D

SUPPORTING DATA FOR VEGETATION RESOURCES

D.1 NOXIOUS WEEDS

Noxious weeds are a subset of aggressive, non-native invasive plants that have been officially designated as detrimental to public health, agriculture, recreation, wildlife, or property. Noxious weeds include all species listed on state and county noxious weed lists. Table D-1 identifies the noxious weeds potentially occurring in the vegetation resources study corridor (0.5 mile on either side of the centerline for all alternative routes).

Table D-1. State- and County-Designated Noxious Weeds with Potential to Occur				
Scientific Name	Common Name	Idaho State List	Oregon	
			State List	County List
<i>Peganum harmala</i>	African rue	N/A	A, T	N/A
<i>Rubus armeniacus</i>	Armenian blackberry	N/A	B	N/A
<i>Hedera hibernica</i>	Atlantic Ivy	N/A	B	N/A
<i>Sphaerophysa salsula</i>	Austrian peaweed or swainsonpea	N/A	B	A (Malheur), B (Umatilla)
<i>Acaena novae-zelandiae</i>	Biddy-biddy	N/A	B	N/A
<i>Centaurea macrocephala</i>	Big-headed knapweed	N/A	N/A	A (Malheur)
<i>Hyoscyamus niger</i>	Black henbane	Control (confirmed in Owyhee County)	N/A	A (Baker)
<i>Polygonum x bohemicum</i>	Bohemian knotweed	Control (not known in Owyhee County)	N/A	A (Union)
<i>Egeria densa</i>	Brazilian Elodea	EDRR (not known in Owyhee County)	B, T	N/A
<i>Centaurea jacea</i>	Brownray knapweed	N/A	N/A	A (Umatilla)
<i>Solanum rostratum</i>	Buffalobur	Control (confirmed in Owyhee County)	B	A (Baker, Malheur, Union)
<i>Cirsium vulgare</i>	Bull thistle	N/A	B	B (Baker), C (Malheur)
<i>Ceratocephala testiculata</i> (<i>Ranunculus testiculatus</i>)	Bur buttercup	N/A	N/A	C (Baker)
<i>Buddleja davidii</i>	Butterfly bush	N/A	B	N/A
<i>Alhagi maurorum</i> (<i>A. pseudalhagi</i>)	Camelthorn	N/A	A	A (Malheur, Umatilla)
<i>Cirsium arvense</i>	Canada thistle	Containment (confirmed in Owyhee County)	B	B (Malheur, Morrow, Umatilla, Union)
<i>Delairea odorata</i>	Cape-ivy	N/A	A, T	N/A
<i>Galium aparine</i>	Catchweed bedstraw	N/A	N/A	B (Union)

Table D-1. State- and County-Designated Noxious Weeds with Potential to Occur				
Scientific Name	Common Name	Idaho State List	Oregon	
			State List	County List
<i>Secale cereale</i>	Cereal rye	N/A	N/A	B (Umatilla, Morrow), C (Union)
<i>Bromus tectorum</i>	Cheatgrass	N/A	N/A	C (Malheur)
<i>Cichorium intybus</i>	Chickory	N/A	N/A	B (Baker)
<i>Tussilago farfara</i>	Coltsfoot	N/A	A	N/A
<i>Anchusa officinalis</i>	Common bugloss	N/A	B, T	A (Union)
<i>Crupina vulgaris var. vulgaris</i>	Common crupina	Control (not known in Owyhee County)	B	A (Malheur, Morrow)
<i>Hydrocharis morsus-ranae</i>	Common frogbit	EDRR (not known in Owyhee County)	A	N/A
<i>Verbascum thapsus</i>	Common mullein	N/A	N/A	B (Baker)
<i>Phragmites australis (Phragmites australis ssp. australis)</i>	Common reed	Control (confirmed in Owyhee County)	B	N/A
<i>Tanacetum vulgare</i>	Common tansy	N/A	N/A	B (Baker)
<i>Spartina anglica</i>	Common cordgrass	N/A	A, T	N/A
<i>Rorippa sylvestris</i>	Creeping yellow cress	N/A	B	A (Umatilla)
<i>Potamogeton crispus</i>	Curlyleaf pondweed	Containment (confirmed in Owyhee County)	N/A	N/A
<i>Dipsacus laciniatus</i>	Cutleaf teasel	N/A	B	N/A
<i>Linaria dalmatica</i>	Dalmation toadflax	Containment (confirmed in Owyhee County)	B, T	A (Baker, Morrow, Union), B (Umatilla)
<i>Spartina densiflora</i>	Dense-flowered cordgrass	N/A	A, T	N/A
<i>Centaurea diffusa</i>	Diffuse knapweed	Containment (confirmed in Owyhee County)	B	A (Baker, Malheur), B (Morrow, Union [2], Umatilla), C (Union [2])
<i>Cuscuta pentagona var. pentagona (Cuscuta campestris)</i>	Dodder or field dodder	N/A	B	B (Baker, Morrow, Umatilla), C (Malheur)
<i>Isatis tinctoria</i>	Dyers woad	Control (confirmed in Owyhee County)	B	A (Malheur, Union)
<i>Hedera helix</i>	English ivy	N/A	B	N/A
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	Control (confirmed in Owyhee County)	B	N/A
<i>Brachypodium sylvaticum</i>	False brome	N/A	B	N/A
<i>Cabomba caroliniana</i>	Fanwort	EDRR (not known in Owyhee County)	N/A	N/A
<i>Azolla pinnata</i>	Feathered mosquito fern	EDRR (not known in Owyhee County)	N/A	N/A

Table D-1. State- and County-Designated Noxious Weeds with Potential to Occur				
Scientific Name	Common Name	Idaho State List	Oregon	
			State List	County List
<i>Centaurea trichocephala</i>	Featherheaded knapweed	N/A	N/A	A (Malheur)
<i>Convolvulus arvensis</i>	Field bindweed	Containment (confirmed in Owyhee County)	B, T	B (Morrow), C (Baker, Malheur)
<i>Ludwigia hexapetala</i>	Floating primrose willow	N/A	B, T	N/A
<i>Butomus umbellatus</i>	Flowering rush	Containment (not known in Owyhee County)	A, T	N/A
<i>Genista monspessulana</i>	French broom	N/A	B	N/A
<i>Lysimachia vulgaris</i>	Garden yellow loosestrife	N/A	A	N/A
<i>Alliaria petiolata</i>	Garlic mustard	N/A	B	N/A
<i>Heracleum mantegazzianum</i>	Giant hogweed	N/A	A, T	N/A
<i>Polygonum sachalinense</i> (<i>Fallopia sachalinensis</i>)	Giant knotweed	Control (not known in Owyhee County)	B	A (Union)
<i>Salvinia molesta</i>	Giant salvinia	EDRR (not known in Owyhee County)	N/A	N/A
<i>Aegilops triuncialis</i>	Goatgrass Barbed	N/A	A, T	N/A
<i>Galega officinalis</i>	Goatsrue	N/A	A, T	N/A
<i>Ulex europaeus</i>	Gorse*	N/A	B, T	N/A
<i>Lepidium strictum</i> (<i>Lepidium pubescens</i>)	Hairy whitetop or upright pepperweed	N/A	B	N/A
<i>Halogeton glomeratus</i>	Halogeton	N/A	B	C (Malheur)
<i>Geranium robertianum</i>	Herb Robert Geranium	N/A	B	N/A
<i>Polygonum polystachyum</i>	Himalayan knotweed	N/A	B	A (Union)
<i>Berteroa incana</i>	Hoary Alyssum	Containment (not known in Owyhee County)	A, T	N/A
<i>Cardaria draba</i> (<i>Lepidium draba</i>)	Hoary cress (whitetop)	Containment (confirmed in Owyhee County)	B	A (Baker [4], Union, Morrow), B (Malheur, Umatilla, Union [5])
<i>Conyza sp.</i>	Horse weed or mares tail	N/A	N/A	B (Union)
<i>Cynoglossum officinale</i>	Houndstongue	Containment (not known in Owyhee County)	B	A (Morrow), B (Malheur)
<i>Hydrilla verticillata</i>	Hydrilla	EDRR (confirmed in Owyhee County)	A	A (Malheur)
<i>Centaurea iberica</i>	Iberian starthistle	EDRR (not known in Owyhee County)	A, T	A (Malheur)

Table D-1. State- and County-Designated Noxious Weeds with Potential to Occur				
Scientific Name	Common Name	Idaho State List	Oregon	
			State List	County List
<i>Amorpha fruticosa</i>	Indigo bush	N/A	B	N/A
<i>Carduus pycnocephalus</i>	Italian thistle	N/A	B	A (Malheur)
<i>Cuscuta japonica</i>	Japanese dodder	N/A	A	N/A
<i>Polygonum cuspidatum (Fallopia japonica)</i>	Japanese knotweed	Control (confirmed in Owyhee County)	B	A (Baker)
<i>Datura stramonium</i>	Jimsonweed	N/A	N/A	A (Malheur)
<i>Sorghum halepense</i>	Johnsongrass	Control (not known in Owyhee County)	B	A (Malheur), B (Morrow, Umatilla)
<i>Aegilops cylindrica</i>	Jointed goatgrass	Containment (not known in Owyhee County)	B	A (Baker, Malheur), B (Morrow, Umatilla, Union)
<i>Cortaderia jubata</i>	Jubata grass	N/A	B	N/A
<i>Hypericum perforatum</i>	Klamathweed or St. Johnswort	N/A	B	B (Baker, Malheur, Morrow, Umatilla)
<i>Kochia scoparia</i>	Kochia	N/A	B	B (Morrow, Umatilla, Union), C (Baker, Malheur)
<i>Pueraria lobata</i>	Kudzu	N/A	A, T	N/A
<i>Ludwigia grandiflora</i>	Large-flowered primrose willow	N/A	B, T	N/A
<i>Euphorbia esula</i>	Leafy spurge	Containment (confirmed in Owyhee County)	B, T	A (Baker, Malheur, Morrow, Umatilla, Union)
<i>Cardaria chalapensis (Lepidium chalapensis)</i>	Lens-podded whitetop	N/A	B	N/A
<i>Ranunculus ficaria</i>	Lesser celandine	N/A	B	N/A
<i>Cannabis sativa</i>	Marijuana	N/A	N/A	A (Umatilla)
<i>Nardus stricta</i>	Matgrass	Control (not known in Owyhee County)	A, T	N/A
<i>Hieracium pratense</i>	Meadow hawkweed	N/A	B, T	N/A
<i>Centaurea nigrescens (Centaurea pratensis or C. debeauxii)</i>	Meadow knapweed or short-fringe knapweed	Control (not known in Owyhee County)	B	A (Malheur, Union)
<i>Salvia aethiopsis</i>	Mediterranean sage	Control (not known in Owyhee County)	B	A (Malheur, Morrow)
<i>Taeniatherum caput-medusae (Elymus caput-meduseae)</i>	Medusahead	N/A	B	B (Morrow), C (Baker, Malheur)
<i>Milium vernale</i>	Milium	Containment (not known in Owyhee County)	N/A	N/A
<i>Silybum marianum</i>	Milk thistle	N/A	B	A (Malheur)

Table D-1. State- and County-Designated Noxious Weeds with Potential to Occur				
Scientific Name	Common Name	Idaho State List	Oregon	
			State List	County List
<i>Calystegia sepium</i> (<i>Convolvulus sepium</i> and <i>C. sepium</i> var. <i>repens</i>)	Morning glory	N/A	N/A	A (Umatilla), B (Union)
<i>Verbascum blattaria</i>	Moth mullein	N/A	N/A	B (Baker)
<i>Hieracium pilosella</i>	Mouse-ear hawkweed	N/A	A, T	N/A
<i>Carduus nutans</i>	Musk thistle	Control (confirmed in Owyhee County)	B	A (Union, Morrow), B (Malheur, Umatilla)
<i>Euphorbia myrsinites</i>	Myrtle spurge	N/A	B	B (Baker)
<i>Euphorbia oblongata</i>	Oblong spurge	N/A	A, T	N/A
<i>Clematis vitalba</i>	Old man's beard	N/A	B	N/A
<i>Hieracium aurantiacum</i>	Orange hawkweed	Control (not known in Owyhee County)	A, T	N/A
<i>Aegilops ovata</i>	Ovate goatgrass	N/A	A	N/A
<i>Chrysanthemum leucanthemum</i>	Oxeye daisy	Containment (not known in Owyhee County)	N/A	N/A
<i>Myriophyllum aquaticum</i>	Parrotfeather milfoil	Control (not known in Owyhee County)	B	N/A
<i>Echium plantagineum</i>	Paterson's curse	N/A	A, T	N/A
<i>Lathyrus latifolius</i>	Perennial peavine	N/A	B	N/A
<i>Lepidium latifolium</i>	Perennial pepperweed	Containment (confirmed in Owyhee County)	B, T	A (Baker, Malheur [6], Union), B (Malheur [6], Umatilla)
<i>Sonchus arvensis</i>	Perennial sowthistle	Control (confirmed in Owyhee County)	N/A	B (Morrow)
<i>Adonis aestivalis</i>	Pheasant's eye	N/A	B	N/A
<i>Carduus acanthoides</i>	Plumeless thistle	Containment (not known in Owyhee County)	A, T	N/A
<i>Conium maculatum</i>	Poison hemlock	Containment (confirmed in Owyhee County)	B	B (Morrow), C (Baker, Malheur, Union)
<i>Impatiens glandulifera</i>	Policeman's helmet	EDRR (not known in Owyhee County)	B	N/A
<i>Cytisus striatus</i>	Portuguese broom	N/A	B, T	N/A
<i>Tribulus terrestris</i>	Puncturevine	Containment (confirmed in Owyhee County)	B	B (Baker, Malheur, Morrow, Umatilla, Union)
<i>Lyrum salicaria</i>	Purple loosestrife	Containment (confirmed in Owyhee County)	B	A (Baker, Umatilla, Union), Morrow), B (Malheur)
<i>Cyperus rotundus</i>	Purple nutsedge	N/A	A	N/A
<i>Centaurea calcitrapa</i>	Purple starthistle	EDRR (not known in Owyhee County)	A, T	A (Malheur, Umatilla)

Table D-1. State- and County-Designated Noxious Weeds with Potential to Occur				
Scientific Name	Common Name	Idaho State List	Oregon	
			State List	County List
<i>Elymus repens</i> (<i>Elytrigia repens</i> or <i>Agropyron repens</i>)	Quackgrass	N/A	B	B (Umatilla), C (Malheur, Union)
<i>Ambrosia artemisiifolia</i> var. <i>elatior</i>	Ragweed or common ragweed	N/A	B	B (Umatilla), C (Malheur)
<i>Saccharum ravennae</i>	Ravennagrass	N/A	A, T	N/A
<i>Phalaris arundinacea</i> var. <i>Picta</i>	Ribbongrass	N/A	B, T	N/A
<i>Chondrilla juncea</i>	Rush skeletonweed	Containment (confirmed in Owyhee County)	B, T	A (Baker, Malheur, Morrow, Umatilla, Union)
<i>Acroptilon repens</i> (<i>Centaurea repens</i>)	Russian knapweed	Control (confirmed in Owyhee County)	B	A (Union), B (Baker, Malheur [3], Morrow, Umatilla)
<i>Elaeagnus angustifolia</i>	Russian olive	N/A	N/A	N/A
<i>Salsola tragus</i> (<i>Salsola tenuifolia</i> var. <i>kali</i> , <i>S. kali</i> var. <i>tenuifolia</i> , <i>S. kali</i> ssp. <i>tragus</i> , <i>S. iberica</i>)	Russian thistle	N/A	N/A	C (Baker, Union)
<i>Tamarix ramosissima</i>	Saltcedar	N/A	B, T	N/A
<i>Spartina patens</i>	Saltmeadow cordgrass	N/A	A, T	N/A
<i>Cytisus scoparius</i>	Scotch broom	Control (confirmed in Owyhee County)	B	A (Union)
<i>Onopordum acanthium</i>	Scotch thistle	Containment (confirmed in Owyhee County)	B	A (Baker, Morrow), B (Malheur, Umatilla, Union)
<i>Geranium lucidum</i>	Shiny leaf geranium	N/A	B	N/A
<i>Solanum elaeagnifolium</i>	Silverleaf nightshade	Yes (but no further designation; not confirmed in Owyhee County)	A	A (Malheur)
<i>Ambrosia tomentosa</i>	Skeletonleaf bursage	N/A	N/A	A (Malheur)
<i>Carduus tenuiflorus</i>	Slender-flowered thistle	N/A	B	A (Malheur)
<i>Orbanche minor</i>	Small broomrape	N/A	B	N/A
<i>Anchusa arvensis</i>	Small bugloss	Control (not known in Owyhee County)	N/A	N/A
<i>Spartina alterniflora</i>	Smooth cordgrass	N/A	A, T	N/A
<i>Carthamus lanatus</i> ssp. <i>creticus</i> (<i>Carthamus baeticus</i>)	Smooth distaff thistle or wooly distaff thistle	N/A	A, T	A (Malheur)
<i>Spartium junceum</i>	Spanish broom	N/A	B	N/A
<i>Erica lusitanica</i>	Spanish heath	N/A	B	N/A
<i>Centromadia pungens</i> ssp. <i>septentrionalis</i> (<i>Hemizonia pungens</i>)	Spikeweed	N/A	B	A (Morrow)

Table D-1. State- and County-Designated Noxious Weeds with Potential to Occur				
Scientific Name	Common Name	Idaho State List	Oregon	
			State List	County List
<i>Xanthium spinosum</i>	Spiny cocklebur	N/A	B	A (Malheur)
<i>Centaurea stoebe</i> (<i>Centaurea maculosa</i> or <i>C. bierersteinii</i>)	Spotted knapweed	Containment (confirmed in Owyhee County)	B, T	A (Baker, Malheur, Morrow, Umatilla, Union)
<i>Daphne laureola</i>	Spurge laurel	N/A	B	N/A
<i>Centaurea virgata</i> (<i>Centaurea triumfetti</i>)	Squarrose knapweed	EDRR (not known in Owyhee County)	A, T	A (Malheur)
<i>Potentilla recta</i>	Sulphur cinquefoil	N/A	B	A (Malheur), B (Baker, Union)
<i>Melilotus officinalis</i>	Sweet clover	N/A	N/A	C (Malheur)
<i>Zygophyllum fabago</i>	Syrian beancaper	EDRR (not known in Owyhee County)	A, T	N/A
<i>Hieracium piloselloides</i>	Tall Hawkweed	EDRR (not known in Owyhee County)	A, T	N/A
<i>Senecio jacobaea</i>	Tansy ragwort	Containment (not known in Owyhee County)	B, T	A (Baker, Malheur, Morrow Umatilla, Union)
<i>Onopordum tauricum</i>	Taurian thistle	N/A	A, T	N/A
<i>Dipsacus fullonum</i>	Teasel	N/A	N/A	B (Baker)
<i>Ailanthus altissima</i>	Tree of heaven	N/A	B	N/A
<i>Myriophyllum heterophyllum</i>	Variable-leaf milfoil	EDRR (not known in Owyhee County)	N/A	N/A
<i>Abutilon theophrasti</i>	Velvetleaf	N/A	B	A (Union)
<i>Hibiscus trionum</i>	Venice mallow	N/A	N/A	B (Baker)
<i>Echium vulgare</i>	Viper's bugloss	Control (not known in Owyhee County)	N/A	B (Umatilla)
<i>Trapa natans</i>	Water chestnut	EDRR (not known in Owyhee County)	A, T	N/A
<i>Cicuta douglasii</i>	Water hemlock	N/A	N/A	B (Morrow), C (Baker, Union)
<i>Eichhornia crassipes</i>	Water hyacinth	EDRR (not known in Owyhee County)	N/A	N/A
<i>Ludwigia peploides</i>	Water primrose willow	N/A	B, T	N/A
<i>Stratiotes aloides</i>	Water soldiers	N/A	A	N/A
<i>Limnobium laevigatum</i>	West Indian spongeplant	N/A	A	N/A
<i>Equisetum arvense</i>	Western horsetail	N/A	N/A	C (Malheur, Union)
<i>Bryonia alba</i>	White bryony	Containment (not known in Owyhee County)	A	N/A
<i>Avena fatua</i>	Wild oat	N/A	N/A	B (Morrow), C (Union)
<i>Panicum miliaceum</i>	Wild proso millet	N/A	N/A	A (Malheur)
<i>Lamiastrum galeobdolon</i>	Yellow archangel	N/A	B	N/A

Table D-1. State- and County-Designated Noxious Weeds with Potential to Occur				
Scientific Name	Common Name	Idaho State List	Oregon	
			State List	County List
<i>Hieracium glomeratum</i>	Yellow devil hawkweed	EDRR (not known in Owyhee County)	N/A	N/A
<i>Iris pseudacorus</i>	Yellow flag iris	Containment (confirmed in Owyhee County)	B	A (Baker)
<i>Nymphoides peltata</i>	Yellow floating heart	EDRR (not known in Owyhee County)	A, T	N/A
<i>Hieracium floribundum</i>	Yellow hawkweed	N/A	A, T	N/A
<i>Cyperus esculentus</i> var. <i>leptostachyus</i> (<i>Cyperus esculentus</i> var. <i>esculentus</i>)	Yellow nutsedge	N/A	A	C (Malheur)
<i>Centaurea solstitialis</i>	Yellow starthistle	Containment (not known in Owyhee County)	B, T	A (Baker, Malheur, Morrow), B (Umatilla, Union)
<i>Linaria vulgaris</i>	Yellow toadflax	Containment (not known in Owyhee County)	B	B (Baker, Malheur, Morrow)
<i>Alyssum murale</i>	Yellowtuft	N/A	A, T	N/A
<p><i>Table Sources:</i> Oregon, http://www.oregon.gov/ODA/shared/Documents/Publications/Weeds/NoxiousWeedPolicyClassification.pdf; Idaho, http://www.agri.state.id.us/Categories/PlantsInsects/NoxiousWeeds/watchlist.php; Morrow County, http://morrowcountyoregon.com/public-works/weedcontrol/; Umatilla County, http://www.co.umatilla.or.us/road/weedlist.html; Union County, http://unioncountyweedcontrol.org/wp-content/uploads/2015/07/UCWMP.pdf; Baker County, http://www.bakercounty.org/weed/BCNoxiousweed.htm; Malheur County, http://www.malheurco.org/sites/malheurco.org/files/File/weeds/MalheurWeedList.pdf.</p> <p><i>Table Notes:</i> Oregon State A – a weed of known economic importance where containment or eradication is possible B – a regionally abundant weed of economic importance T – weed species targeted for prevention and control Oregon Counties A – a weed of known economic importance where low abundance make containment or eradication possible B – an abundant weed of economic importance subject to control where feasible C – weed of economic importance and wide distribution, subject to control as local conditions warrant Idaho State EDRR = early detection and rapid response All N/A = not applicable (meaning the noxious weed is not listed by the state or county agency)</p>				

D.2 VEGETATION COMMUNITY CLASSIFICATION

A multitude of vegetation communities ranging from Semi-desert Grasslands and Shrub-steppe to Montane and Subalpine Conifer Forests occur within the Boardman to Hemingway Transmission Line (B2H) Project area. The Regional Gap Analysis Program (GAP) dataset was used to identify vegetation communities in the B2H Project area by using the Ecological Systems classification. For the purposes of this analysis, these ecological systems were grouped into seven primary vegetation communities and 16 vegetation community subtypes. The primary vegetation communities identified from the reclassified

GAP dataset include: Agriculture; Bare Grounds, Cliffs, and Talus; Developed/Disturbed; Forest/Woodland; Grassland; Open Water; and Shrubland. Riparian Conservation Areas (RCAs) vegetation communities used in the analysis were not identified using the GAP dataset, and the methods used to identify RCAs are described in greater detail in Section 3.2.3.4. Table D-2 provides a crosswalk linking the reclassified primary and subtype vegetation communities to the source ecological system.

Table D-2. Crosswalk between Vegetation Community and Gap Analysis Program Ecological Systems		
Primary Vegetation Community	Community Subtype	Ecological System
Agriculture	Agriculture	Cultivated Cropland
Agriculture	Agriculture	Orchards, Vineyards, and Other High-structure Agriculture
Agriculture	Agriculture	Pasture/Hay
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	Columbia Plateau Ash and Tuff Badland
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	Intermountain Basins Active and Stabilized Dune
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	Intermountain Basins Cliff and Canyon
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	Intermountain Basins Playa
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	Intermountain Basins Volcanic Rock and Cinder Land
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	North American Alpine Ice Field
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	Rocky Mountain Alpine Bedrock and Scree
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	Rocky Mountain Alpine Fell-field
Bare Ground, Cliffs, and Talus	Bare Ground, Cliffs, and Talus	Rocky Mountain Cliff, Canyon, and Massive Bedrock
Developed/Disturbed	Developed/Disturbed	Developed, High Intensity
Developed/Disturbed	Developed/Disturbed	Developed, Low Intensity
Developed/Disturbed	Developed/Disturbed	Developed, Medium Intensity
Developed/Disturbed	Developed/Disturbed	Developed, Open Space
Developed/Disturbed	Developed/Disturbed	Quarries, Mines, Gravel Pits, and Oil Wells
Forest/Woodland	Aspen	Intermountain Basins Aspen-Mixed Conifer Forest and Woodland
Forest/Woodland	Aspen	Rocky Mountain Aspen Forest and Woodland
Forest/Woodland	Forest/Other	Harvested Forest - Grass/Forb Regeneration
Forest/Woodland	Forest/Other	Harvested Forest - Northwestern Conifer Regeneration
Forest/Woodland	Forest/Other	Harvested Forest-Shrub Regeneration
Forest/Woodland	Forest/Other	Introduced Upland Vegetation - Treed
Forest/Woodland	Forest/Other	Recently Burned Forest
Forest/Woodland	Juniper and Mahogany Woodland	Columbia Plateau Western Juniper Woodland and Savanna

Table D-2. Crosswalk between Vegetation Community and Gap Analysis Program Ecological Systems		
Primary Vegetation Community	Community Subtype	Ecological System
Forest/Woodland	Juniper and Mahogany Woodland	Intermountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland
Forest/Woodland	Mixed Conifer Forest	East Cascades Oak-Ponderosa Pine Forest and Woodland
Forest/Woodland	Mixed Conifer Forest	North Pacific Mountain Hemlock Forest
Forest/Woodland	Mixed Conifer Forest	Northern Rocky Mountain Conifer Swamp
Forest/Woodland	Mixed Conifer Forest	Northern Rocky Mountain Subalpine Woodland and Parkland
Forest/Woodland	Mixed Conifer Forest	Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
Forest/Woodland	Mixed Conifer Forest	Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland
Forest/Woodland	Mixed Conifer Forest	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest
Forest/Woodland	Mixed Conifer Forest	Northern Rocky Mountain Mesic Montane Mixed Conifer Forest
Forest/Woodland	Mixed Conifer Forest	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna
Forest/Woodland	Mixed Conifer Forest	Northern Rocky Mountain Western Larch Savanna
Forest/Woodland	Mixed Conifer Forest	Rocky Mountain Lodgepole Pine Forest
Forest/Woodland	Mixed Conifer Forest	Rocky Mountain Poor-site Lodgepole Pine Forest
Forest/Woodland	Mixed Conifer Forest	Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland
Forest/Woodland	Riparian Woodland	Columbia Basin Foothill Riparian Woodland and Shrubland
Forest/Woodland	Riparian Woodland	Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland
Forest/Woodland	Riparian Woodland	Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland
Forest/Woodland	Riparian Woodland	Rocky Mountain Lower Montane Riparian Woodland and Shrubland
Forest/Woodland	Riparian Woodland	Rocky Mountain Subalpine-Montane Riparian Shrubland
Forest/Woodland	Riparian Woodland	Rocky Mountain Subalpine-Montane Riparian Woodland
Grassland	Native Grassland	Columbia Basin Foothill and Canyon Dry Grassland
Grassland	Native Grassland	Columbia Basin Palouse Prairie
Grassland	Native Grassland	Columbia Plateau Steppe and Grassland
Grassland	Native Grassland	Columbia Plateau Vernal Pool
Grassland	Native Grassland	Intermountain Basins Alkaline Closed Depression

**Table D-2. Crosswalk between Vegetation Community
and Gap Analysis Program Ecological Systems**

Primary Vegetation Community	Community Subtype	Ecological System
Grassland	Native Grassland	Intermountain Basins Semi-desert Grassland
Grassland	Native Grassland	North American Arid West Emergent Marsh
Grassland	Native Grassland	Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland
Grassland	Native Grassland	Northern Rocky Mountain Subalpine-Upper Montane Grassland
Grassland	Native Grassland	Rocky Mountain Alpine-Montane Wet Meadow
Grassland	Native Grassland	Rocky Mountain Subalpine-Montane Fen
Grassland	Native Grassland	Rocky Mountain Subalpine-Montane Mesic Meadow
Grassland	Native Grassland	Temperate Pacific Montane Wet Meadow
Grassland	Non-native Grassland	Introduced Riparian and Wetland Vegetation
Grassland	Non-native Grassland	Introduced Upland Vegetation - Annual Grassland
Grassland	Non-native Grassland	Introduced Upland Vegetation - Perennial Grassland and Forbland
Grassland	Non-native Grassland	Recently Burned Grassland
Open Water	Open Water	Open Water (Fresh)
Shrubland	Desert Shrub	Intermountain Basins Greasewood Flat
Shrubland	Desert Shrub	Intermountain Basins Mixed Salt Desert Scrub
Shrubland	Dwarf Sagebrush Steppe	Columbia Plateau Low Sagebrush Steppe
Shrubland	Dwarf Sagebrush Steppe	Columbia Plateau Scabland Shrubland
Shrubland	Mountain Shrub	North Pacific Montane Shrubland
Shrubland	Mountain Shrub	North Pacific Shrub Swamp
Shrubland	Mountain Shrub	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland
Shrubland	Mountain Shrub	Northern Rocky Mountain Subalpine Deciduous Shrubland
Shrubland	Mountain Shrub	Rocky Mountain Lower Montane-Foothill Shrubland
Shrubland	Shrubland/Other	Introduced Upland Vegetation - Shrub
Shrubland	Shrubland/Other	Recently Burned Shrubland
Shrubland	Tall Sagebrush Steppe	Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub-Steppe
Shrubland	Tall Sagebrush Steppe	Great Basin Xeric Mixed Sagebrush Shrubland
Shrubland	Tall Sagebrush Steppe	Intermountain Basins Big Sagebrush Shrubland
Shrubland	Tall Sagebrush Steppe	Intermountain Basins Big Sagebrush Steppe
Shrubland	Tall Sagebrush Steppe	Intermountain Basins Montane Sagebrush Steppe
Shrubland	Tall Sagebrush Steppe	Intermountain Basins Semi-desert Shrub-steppe

D.2.1 VEGETATION COMMUNITY DESCRIPTIONS

The primary vegetation community, vegetation community subtype, and associated ecological systems are described below. The vegetation community and ecological system descriptions are adapted from the ODFW Conservation Strategy habitat types and from NatureServe's Ecological System classification descriptions, respectively (NatureServe 2012; ODFW 2006).

Agriculture

Agricultural areas within Oregon and Idaho vary annually in composition. Major crops produced in this area include wheat, barley, alfalfa, hay, potatoes, onions, sugar beets, carrots, and corn. Cultivated croplands and modified grasslands are plowed and harvested seasonally, while pastures are mowed, hayed, or grazed one or more times a year. The agricultural land cover within the B2H Project area includes irrigated agriculture, dryland farming, dairy operations, and grazing pastures on private lands.

Bare Ground, Cliffs, and Talus

Bare Ground, Cliffs, and Talus vegetation communities are sparsely vegetated areas where the predominant habitat features are more related to geologic substrates than vegetation components. These areas, especially cliffs and talus fields, are essential habitat features for many plant species that use them for nesting substrate or hiding cover. Cliffs provide rock crevices and ledges raised above the ground, away from predators and somewhat protected from the elements. Talus fields extend out from below cliff faces and steep slopes, providing hiding cover and microhabitat conditions. Many special status plant species present in the B2H Project area occur in these sparsely vegetated communities.

The Bare Ground, Cliffs, and Talus subtype is composed of several ecological systems. These include the Columbia Plateau Ash and Tuff Badland; Intermountain Basins Active and Stabilized Dune; Intermountain Basins Cliff and Canyon; and Rocky Mountain Cliff, Canyon, and Massive Bedrock ecological systems.

Intermountain Basins Active and Stabilized Dunes occur in basins, valleys, and plains. Often this ecological system is composed of a mosaic of migrating, bare dunes; anchored dunes with sparse to moderately dense vegetation (less than 10 to 30 percent canopy cover); and stabilized dunes. The system is defined by the presence of migrating dunes or, where the dunes are entirely anchored or stabilized, evidence that the substrate is eolian and not residual, that the vegetation is early to mid-seral, and that the substrate likely is to become actively migrating again with disturbance or increased aridity. Species occupying these environments are often adapted to shifting, coarse-textured substrates (usually quartz sand) and form patchy or open grasslands, shrublands or steppe, and, occasionally, woodlands. Shrubs can be dominant on mid- to late-seral stands, and rubber rabbitbrush can be found at any stage (NatureServe 2012).

Columbia Plateau Ash and Tuff Badlands are composed of barren and sparsely vegetated substrates (less than 10 percent plant cover) typically derived from highly eroded volcanic ash and tuff. Landforms typically are rounded hills and plains that form a rolling topography. The harsh soil properties and high rate of erosion and deposition are driving environmental variables supporting sparse dwarf-shrubs and forbs. Characteristic forbs are short-lived annuals, including beeplant (*Cleome* spp.), stickleaf

(*Mentzelia* spp.), four o'clocks (*Camissonia* spp.), and monkeyflower (*Mimulus* spp.) species, although these habitats often support endemic perennial forbs (NatureServe 2012).

Intermountain Basins Cliffs and Canyons are found from foothill to subalpine elevations and include barren and sparsely vegetated landscapes (generally less than 10 percent plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. Also included is the sparse vegetation found in unstable scree and talus slopes that typically occurs below cliff faces. Widely scattered trees and shrubs may occur, along with other species often common in adjacent plant communities (NatureServe 2012).

Developed/Disturbed

The Developed/Disturbed land cover typically results from the complete conversion of a site or an area from its natural condition. Developed areas typically contain non-native vegetation in the form of landscaping around buildings and homes, as well as weed lots with invasive plants that have become established in disturbed landscapes. Nevertheless, scattered and isolated blocks of native or non-native vegetation may remain in Developed/Disturbed areas, and wildlife species that are more tolerant of human activity may use these areas (e.g., greenbelts, parks, and backyards). Throughout the B2H Project area, Developed/Disturbed communities are primarily associated with rural residences and agricultural operations.

Forests/Woodlands

Forest/Woodland communities are found throughout the B2H Project area. Forests and woodlands are the most dominant vegetation communities found in the Blue Mountains ecoregion, with Juniper and Mahogany Woodlands occurring primarily in the Northern Basin and Range and the Snake River Plain ecoregions. The following community subtypes occur within the B2H Project vegetation resources analysis corridor:

Aspen

The Aspen subtype is found within montane and subalpine zones. This subtype is dominated by quaking aspen and lacks a significant conifer component (CNHP 2005). This subtype is an important wildlife habitat and occurs in portions of the B2H Project area in the Blue Mountains region.

The Aspen subtype comprises the Rocky Mountain Aspen Forest and Woodland and Intermountain Basins Aspen-Mixed Conifer Forest and Woodland ecological systems.

Rocky Mountain Aspen Forest and Woodlands occur across the Intermountain West. Elevations generally range from 5,000 to 10,000 feet, but occurrences can be found at lower elevations in some regions. Distribution of these ecological systems is primarily limited by adequate soil moisture required to meet its high evapotranspiration demand. Secondly, it is limited by the length of the growing season or low temperatures. These are upland forests and woodlands dominated by quaking aspen without a significant conifer component (less than 25 percent relative tree cover). The understory structure may be complex with multiple shrub and herbaceous layers or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse and dominated by graminoids or forbs.

Occurrences of Rocky Mountain Aspen Forest and Woodland originate and are maintained by stand-replacing disturbances, such as avalanches, crown fire, insect outbreak, disease and wind throw, or clearcutting by man or beaver within the matrix of conifer forests (NatureServe 2012).

The Intermountain Basins Aspen-Mixed Conifer Forest and Woodland ecological system is similar except that it is composed of a mix of deciduous and coniferous species and is codominated by quaking aspen and conifers, including Douglas-fir, white fir, subalpine fir, Engelmann spruce, white spruce (*Picea glauca X engelmannii*), blue spruce (*Picea pungens*), lodgepole pine, limber pine (*Pinus flexilis*), and ponderosa pine. Most occurrences at present represent a late-seral stage of aspen changing to a pure conifer occurrence. Nearly 100 years of fire suppression and livestock grazing have converted much of the pure aspen occurrences to the present-day Aspen-conifer Forest and Woodland ecological system (NatureServe 2012).

Forest/Other

The Forest/Other community subtype includes Harvested Forest, Introduced Upland Vegetation - Treed, and Recently Burned Forest ecological systems. In general, this subtype represents other forest and woodland vegetation communities that have been altered by fire or anthropogenic disturbance. The assemblage of species found in this subtype varies greatly depending on original vegetation community, extent of disturbance, and time since disturbance. In the vegetation resources study corridor, Forest/Other is a minor subtype occurring as small, discontinuous patches generally less than 20 acres in extent.

Juniper and Mahogany Woodland

The Juniper and Mahogany Woodland subtype includes western juniper and mountain mahogany woodland communities. Western juniper woodlands in the vegetation resources study corridor is composed of widely spaced western juniper trees, a discontinuous shrub layer, and an herbaceous layer dominated by grasses. These woodlands occur in a very dry zone located between the shrub-steppe and ponderosa pine forests. Western juniper is the dominant tree species and dominant shrubs may include big sagebrush, antelope bitterbrush, rubber rabbitbush, and wax currant (*Ribes cereum*). The herbaceous layer is dominated by bluebunch wheatgrass and Idaho fescue (Franklin and Dyrness 1988). The mountain mahogany community is described by Franklin and Dyrness (1988) as a transition zone between the lower edge of ponderosa pine communities and the upper edge of the sagebrush-dominated shrub-steppe communities. This community is dominated by Curl-leaf Mountain Mahogany with scattered ponderosa pine and western juniper as well. The understory is dominated by big sagebrush and yellow rabbitbush.

Juniper and Mahogany Woodlands are composed of several ecological systems, including: Columbia Plateau Western Juniper Woodland and Savanna and Intermountain Basins Curl-leaf Mountain Mahogany Woodland and Shrublands.

Columbia Plateau Western Juniper Woodland and Savanna comprise a woodland system containing soils that are medium textured with abundant coarse fragments and are derived from volcanic parent materials. In central Oregon, the center of distribution, all aspects and slope positions occur. Where this

system grades into relatively mesic forest or grassland habitats, these woodlands become restricted to rock outcrops or escarpments with excessively drained soils. Singleleaf pinyon (*Pinus monophylla*) is not present in this region, so western juniper is the only tree species, although ponderosa pine may be present in some stands. Mountain mahogany occasionally may codominate. Big sagebrush is the most common shrub. These woodlands are generally restricted to rocky areas where fire frequency is low. Throughout much of its range, fire exclusion and removal of fine fuels by grazing livestock have reduced fire frequency and allowed western juniper seedlings to colonize adjacent alluvial soils and expand into the shrub-steppe and grasslands. Western juniper savanna may occur on the drier edges of the woodland where trees are intermingling with or invading the surrounding grasslands and where local edaphic or climatic conditions favor grasslands over shrublands (NatureServe 2012).

Intermountain Basins Curl-leaf Mountain Mahogany Woodland and Shrublands occur in hills and mountain ranges of the Intermountain West basins. They typically occur from 6,400 feet to more than 8,700 feet in elevation on rocky outcrops or escarpments and form small- to large-patch stands in forested areas. Most stands occur as shrublands on ridges and steep rim rock slopes, but they may be composed of small trees in steppe areas. Scattered junipers or pines also may occur. This system includes both woodlands and shrublands dominated by Curl-leaf Mountain Mahogany. Mountain big sagebrush, antelope bitterbrush, and other mountain shrubs are often present. Undergrowth is often very sparse and dominated by bunch grasses. Curl-leaf Mountain Mahogany is a slow-growing, drought-tolerant species that generally does not resprout after burning and needs the protection from fire that rocky sites provide (NatureServe 2012). Because of the possibility of this ecological system to exist as woodlands composed of small trees, Intermountain Basins Curl-leaf Mountain Mahogany Woodland and Shrublands were included in the Juniper and Mahogany Woodlands community subtype.

Mixed Conifer Forest

The Mixed Conifer Forest subtype is very diverse, comprising several tree species in differing compositions, including, Grand fir (*Abies grandis*), Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*), subalpine fir (*Abies lasiocarpa*), ponderosa pine (*Pinus ponderosa*), and lodgepole pine (*Pinus contorta*) (Franklin and Dyrness 1988).

Typical compositions include mixed Grand fir/Douglas-fir (and mixed tamarack [*Larix spp.*]). Mixed Grand fir/Douglas-fir communities occur in the Blue Mountains and are the most common forest composition found within the B2H Project area. Douglas-fir typically dominates at middle elevations but is replaced by subalpine fir at higher elevations and ponderosa pine or big sagebrush at lower elevations (Franklin and Dyrness 1988). NatureServe (2013) describes this vegetation community subtype as a seral matrix of large patches dominated or codominated by one, or combinations, of the above species. Grand fir (a fire-sensitive, shade-tolerant species) has increased on many sites once dominated by Douglas-fir and ponderosa pine due to fire regime changes. Western larch can form homogenous stands consisting entirely of itself, especially after fires, but other tree species typically can be found co-occurring with western larch, including Douglas-fir, ponderosa pine, Grand fir, and lodgepole pine (Franklin and Dyrness 1988). At higher elevations, dominant tree species within the

Mixed Conifer Forest subtype include subalpine fir, Engelmann's spruce (*Picea engelmannii*), mountain hemlock (*Tsuga mertensiana*) and lodgepole pine. However, these species typically dominate at elevations higher than those found within the B2H Project area.

Sites dominated by a single species include those composed of ponderosa pine and lodgepole pine. Sites dominated by ponderosa pine typically occur as open woodland and contain a variety of common tree species that vary based on elevation and moisture regime, including Douglas-fir, Grand fir, lodgepole pine, western larch, western juniper, and quaking aspen (*Populus tremuloides*) (Franklin and Dyrness 1988). These sites are common in much of the Blue Mountains.

Recently disturbed sites are often dominated by lodgepole pine, but lodgepole pine dominates at other sites, typically broad level pumice flats. Where conditions allow, lodgepole pine is the dominant tree species at these sites and occurs in pure or near pure stands, regardless of the seral stage. Lodgepole pine is capable of growing throughout a wide range of moisture regimes from the edge of the shrub-steppe zone to seasonally flooded wetlands; thus, understory vegetation widely varies with the corresponding moisture regime (Franklin and Dyrness 1988).

The Mixed Conifer Forest community subtype is composed of several ecological systems. These systems include Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest, Northern Rocky Mountain Ponderosa Pine Woodland and Savanna, Northern Rocky Mountain Western Larch Savanna, Northern Rocky Mountain Mesic Montane Mixed Conifer Forest, Rocky Mountain Poor-Site Lodgepole Pine Forest, Rocky Mountain Lodgepole Pine Forest, and Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland.

Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest is composed of variable montane coniferous forests. Winter snow packs typically melt off in early spring at lower elevations. Elevations range from 1,500 to 6,300 feet. Most occurrences of this system are dominated by a mix of Douglas-fir and ponderosa pine. The nature of this forest system is a matrix of large patches dominated or codominated by one, or combinations, of the above species; Grand fir (a fire-sensitive, shade-tolerant species) has increased on many sites once dominated by Douglas-fir and ponderosa pine, which were formerly maintained by low-severity wildfire. Presettlement fire regimes may have been characterized by frequent, low-intensity ground fires that maintained relatively open stands of a mix of fire-resistant species. Under present conditions, the fire regime is mixed-severity and more variable, with stand-replacing fires more common, and the forests are more homogeneous. With vigorous fire suppression, longer fire-return intervals are now the rule, and multilayered stands of Douglas-fir, ponderosa pine, and/or Grand fir provide fuel "ladders," making these forests more susceptible to high-intensity, stand-replacing fires. They are very productive forests that have been priorities for timber production. They rarely form either upper or lower timberline forests (NatureServe 2012).

Northern Rocky Mountain Ponderosa Pine Woodland and Savanna occur at the lower treeline/ecotone between grasslands or shrublands and more mesic coniferous forests typically in warm, dry, exposed sites. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops are most common. This ecological system generally occurs on soils derived from

various parent materials that are well drained, neutral to slightly acidic, low in organic content, and dry during portions of the growing season. In the Oregon “pumice zone,” this system occurs as matrix-forming, extensive woodlands on rolling pumice plateaus and other volcanic deposits (NatureServe 2012). Ponderosa pine is the predominant conifer; Douglas-fir may be present in the tree canopy but is usually absent. The understory can be shrubby. Understory vegetation in the true savanna occurrences is predominantly fire-resistant grasses and forbs that resprout following surface fires; shrubs, understory trees, and downed logs are uncommon. Mixed fire regimes and ground fires of variable fire-return intervals maintain these woodlands typically with a shrub-dominated or patchy shrub layer, depending on climate, degree of soil development, and understory density. Historically, many of these woodlands and savannas lacked the shrub component as a result of 3- to 7-year fire-return intervals (NatureServe 2012).

The Northern Rocky Mountain Western Larch Savanna system is a large-patch type restricted to the interior montane zones of the Pacific Northwest in northern Idaho. Western larch dominates, although stands may be codominated by Douglas-fir or lodgepole pine. Many western larch stands and mixed conifer stands with larch are early to mid-seral components of the mixed- to high-severity fire systems (NatureServe 2012).

Northern Rocky Mountain Mesic Montane Mixed Conifer Forest is dominated by western hemlock (*Tsuga heterophylla*) and western red cedar (*Thuja plicata*). Occurrences generally are found on all slopes and aspects but grow best on sites with high soil moisture, such as toe slopes and bottomlands. At the periphery of its distribution, this system is confined to moist canyons and cooler, moister aspects. Generally these are moist, nonflooded or upland sites that are not saturated yearlong. The composition of the herbaceous layer reflects local climate and degree of canopy closure; it is typically highly diverse in all but closed-canopy conditions (NatureServe 2012).

Rocky Mountain Poor-Site Lodgepole Pine Forest and Rocky Mountain Lodgepole Pine Forest are similar upper montane to subalpine elevation mixed conifer forests. In general, these are mixed conifer forests where the dominance of lodgepole pine is related to fire history and topo-edaphic conditions. Following stand-replacing fires, lodgepole pine will rapidly colonize and develop into dense, even-aged stands and then persist on these sites that are too extreme for other conifers to establish. Most forests in these ecological systems occur as early to mid-successional forests that developed following fires. In some cases, stands are open to dense and may be multi-aged, not just even-aged. These forests are dominated by lodgepole pine with shrub, grass, or barren understories (NatureServe 2012).

The Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodlands are matrix forests of the subalpine zone, with elevations ranging from 4,200 feet in its northern distribution to 11,000 feet in the south. The Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodlands often represent the highest-elevation forests in an area. Sites within this system are cold year-round, and precipitation is predominantly in the form of snow, which may persist until late summer. Snowpacks are deep and late lying, and summers are cool. Frost is possible almost all summer and may be common in restricted topographic basins and benches. Despite their wide distribution, the tree canopy characteristics are remarkably similar, with Engelmann spruce and subalpine fir dominating, either mixed or alone.

Douglas-fir may persist in occurrences of this system for long periods without regeneration. Lodgepole pine is common in many occurrences, and patches of pure lodgepole pine are not uncommon, as well as mixed conifer/aspen stands. Upper elevation examples may have more woodland physiognomy, and whitebark pine (*Pinus albicaulis*) can be a seral component. Disturbance includes occasional blowdown, insect outbreaks and stand-replacing fire (NatureServe 2012).

Riparian Woodlands

The Riparian Woodland community includes vegetation communities dominated by trees and shrubs typical of riparian areas, but not contained within defined RCAs. These communities occur throughout the Project area, usually as small patches at upper elevations. Riparian Woodlands in the Project area are highly variable with varying cover amounts of tree, shrub and graminoid-dominated understories (NatureServe 2012). In addition to the varying covers, Riparian Woodlands species composition changes based on ecoregion and surrounding vegetation. Common tree species include cottonwoods (*Populus spp.*) and conifers like ponderosa pine or Douglas-fir. Common shrub species include willow (*Salix spp.*), alder (*Alnus spp.*) and red-osier dogwood (*Cornus sericea*). The understory is often dominated by a several species of sedges, grasses or rushes (NatureServe 2012).

Riparian Woodlands are composed of several ecological systems. These systems include: Columbia Basin Foothill Riparian Woodland and Shrubland, Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland, Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland, Rocky Mountain Lower Montane – Foothill Riparian Woodland and Shrubland.

Columbia Basin Foothill Riparian Woodland and Shrublands are found on the periphery of the mountains surrounding the Columbia River Basin, along major tributaries and the main stem of the Columbia at relatively low elevations. This is the riparian system associated with all streams at and below lower treeline, including permanent, intermittent, and ephemeral streams with woody riparian vegetation. These forests and woodlands require flooding and some gravel for reestablishment. They are found in low-elevation canyons and draws, on floodplains, or in steep-sided canyons, or narrow V-shaped valleys with rocky substrates. Sites are subject to temporary flooding during spring runoff. Underlying gravels may keep the water table just below the ground surface and are favored substrates for cottonwood. Large bottomlands may have large occurrences, but most have been cut over or cleared for agriculture. Rafted ice and logs in freshets may cause considerable damage to tree boles. Beavers crop younger cottonwood and willows and frequently dam side channels occurring in these stands. In steep-sided canyons, streams typically have perennial flow on mid to high gradients (NatureServe 2012).

Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland occurs in the mountain ranges of the Great Basin at elevations ranging from 4,000 to 7,000 feet. This ecological system often exists as a mosaic of multiple tree-dominated communities with diverse shrub components, with the composition of this ecological system reflecting several factors, including: elevation, stream gradient, floodplain width, and disturbance history. Disturbance is an important driving factor in this ecological

system, where flooding, scour, and deposition are required for germination and maintenance of vegetation (NatureServe 2012).

Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland consists of deciduous, coniferous, and mixed conifer-deciduous forests along streambanks and river floodplains of the northern Rocky Mountains and mountain slopes east of the Cascade Mountains throughout lower montane and foothill areas. This ecological system is often dominated by several tree species, including: balsam poplar (*Populus balsamifera*), aspen, water birch (*Betula occidentalis*), and Grand fir. Diverse shrub, forb, and grass species comprise the understory components (NatureServe 2012).

Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland occurs throughout the Rocky Mountain region at broad elevation ranging from 2,900 to 9,200 feet along river floodplains, islands, sand and cobble bars, and immediate stream banks subject annual or episodic flooding. This ecological system can occur as large, wide expanses on major rivers, narrow bands on small, rocky streams, tributaries, and well-drained benches, or small isolated patches along backwater channels, floodplain swales, and irrigation ditches. This ecological system is often dominated by several tree species, including box elder (*Acer negundo*), cottonwood species (*Populus* spp.), and Douglas-fir (NatureServe 2012).

Grasslands

Grassland communities occur throughout the B2H Project area and typically are upland areas dominated by annual or perennial grasses with low shrub or tree cover. Dominant species depend on elevation, soil type, and ecoregion. Agricultural conversion and non-native species have degraded native grasslands throughout the region. Periodic fire, soil disturbance by rodent species, and wind all play important roles in maintaining native grasslands (ODFW 2006). The following Grassland community subtypes occur within the B2H Project 1-mile-wide vegetation resources analysis corridor:

Native Grasslands

The Native Grassland subtype is no longer common (except near timberline) in eastern Oregon or southwestern Idaho (ODFW 2006). Extensive agricultural conversion and invasion by annual grass species has replaced much of the Native Grassland subtype in the B2H Project area. Degraded soil conditions and short fire-return intervals may prevent Native Grasslands from transitioning into a Shrub-dominated community, although they typically have some shrub component (Franklin and Dyrness 1988). Perennial bunchgrasses, such as Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*), usually dominate this subtype. The classification of Native Grasslands depends on composition of associated herbaceous species, making this a difficult community subtype to photo-interpret, classify, and map.

The Native Grassland subtype comprises several ecological systems that occur in the vegetation resources analysis corridor. These ecological systems include: Columbia Basin Foothill and Canyon Dry Grassland; Columbia Plateau Steppe and Grassland; Columbia Basin Palouse Prairie; Intermountain Basins Semi-desert Grassland; Northern Rocky Mountain Lower Montane, Foothill, and

Valley Grassland; Rocky Mountain Subalpine-Montane Mesic Meadow; and Rocky Mountain Sub-Alpine-Montane Wet Meadow.

Columbia Basin Foothill and Canyon Dry Grasslands occur in the canyons and valleys of the Columbia Basin, particularly along the Snake River Canyon, the lower foothill slopes of the Blue Mountains, and along the main stem of the Columbia River in eastern Washington. Occurrences are found on steep, open slopes of 3,000 to 5,000 feet elevation, where slope failures are a common process. Annual precipitation is low, ranging from 4 to 10 inches and fire-return intervals are presumed to be less than 20 years. The vegetation is dominated by patchy graminoid cover, cacti, and some forbs (NatureServe 2012).

Columbia Plateau Steppe and Grasslands are similar floristically to some shrub-steppe ecological systems like the Intermountain Basins Big Sagebrush Steppe, but are defined by a more frequent fire regime and the absence or low cover of shrubs over large areas, occasionally entire landforms. These are extensive Native Grasslands, not grass-dominated patches within a Sagebrush Shrub-steppe ecological system. These Native Grasslands occur throughout much of the Columbia Plateau. Soils are variable, ranging from (1) relatively deep, fine-textured with coarse fragments, nonsaline, with a microphytic crust, to (2) stony, volcanic-derived clays to (3) alluvial sands. This Grassland is dominated by perennial bunch grasses and forbs (greater than 25 percent cover), sometimes with a sparse (less than 10 percent cover) shrub layer. Areas with deeper soils are rare because of conversion to other land uses. The rapid fire-return regime of this ecological system maintains these grasslands by retarding shrub invasion, and landscape isolation and fragmentation limit seed dispersal of native shrub species. Fire-return interval is presumed to be less than every 20 years. Through isolation from a seed source, combined with repeated burning, these are "permanently" (more than 50 years) converted to grassland (NatureServe 2012).

Columbia Basin Palouse Prairie was a once-extensive Native Grassland system occurring in eastern Washington and Oregon and west-central Idaho. It is characterized by rolling topography composed of loess hills and plains over basalt plains. The soils are typically deep, well-developed, and old. The cool-season bunch grasses that dominate the vegetation are adapted to winter precipitation. Historic grazing, past land use, and invasion by introduced annual species have resulted in a massive conversion of this ecological system to Agriculture or Shrub-steppe and Annual Grasslands dominated by cheatgrass or Kentucky bluegrass (*Poa pratensis*). Current distribution of Columbia Basin Palouse Prairie ecological systems are usually remnants typically associated with steep and rocky sites or small and isolated sites within an agricultural landscape (NatureServe 2012).

Intermountain Basins Semi-desert Grassland is a widespread ecological system within the Native Grassland subtype and includes the driest grasslands throughout the Intermountain western U.S. It occurs on xeric sites over an elevation range of approximately 4,750 to 7,600 feet on a variety of landforms, including swales, playas, mesas, alluvial flats, and plains. This system may constitute the matrix over large areas of intermountain basins and also may occur as large patches in mosaics with shrubland communities. Grasslands in areas of higher precipitation, at higher elevation, typically belong to other systems. Substrates are often well-drained sandy or loam soils derived from sedimentary

parent materials but are quite variable and may include fine-textured soils derived from igneous and metamorphic rocks. The dominant perennial bunch grasses and shrubs within this system are all drought-resistant plants (NatureServe 2012).

Northern Rocky Mountain Lower Montane, Foothill, and Valley Grasslands are found at elevations ranging from lower montane to foothill. These Native Grasslands are floristically similar to Intermountain Basins Big Sagebrush Steppe, Columbia Basin Foothill and Canyon Dry Grassland, and Columbia Basin Palouse Prairie but are defined by shorter summers, colder winters, and young soils derived from recent glacial and alluvial material. Northern Rocky Mountain Lower Montane, Foothill, and Valley Grasslands are found at elevations from 1,000 to 5,400 feet, ranging from small meadows to large open parks surrounded by conifers in the lower montane, to extensive foothill and valley grasslands below the lower tree line. Many of these valleys may have been primarily sage-steppe with patches of grassland in the past; but because of land-use history after settlement (herbicide, grazing, fire suppression, pasturing, etc.), they have been converted to grassland-dominated areas. Soils in this ecological system are relatively deep and fine-textured, often with coarse fragments, and are nonsaline, often with a microphytic crust. The most important species are cool-season perennial bunch grasses and forbs (greater than 25 percent cover), sometimes with a sparse (less than 10 percent cover) shrub layer. A soil crust of lichen covers almost all open soil between clumps of grasses. Unvegetated mineral soil commonly is found between clumps of grass and the lichen cover. The fire regime of this ecological system maintains Grassland conditions due to rapid fire-return that retards shrub invasion or landscape isolation and fragmentation that limits seed dispersal of native shrub species. Fire-return interval is presumed to be less than 20 years. These are extensive Grasslands, not grass-dominated patches within the sagebrush shrub-steppe ecological system (NatureServe 2012).

Rocky Mountain Subalpine-Montane Mesic Meadows are subalpine-montane herbaceous meadows typically dominated or codominated by perennial forbs. This is a small to large-patch system that occurs throughout the Rocky Mountains and is restricted to lower montane to subalpine sites where finely textured soils, snow deposition, or windswept dry conditions limit tree establishment. Sites are gentle- to moderate-gradient slopes and are relatively moist. Soils are typically seasonally moist to saturated in early spring but dry later during the growing season. At subalpine elevations, soils are derived from a variety of parent materials and are usually rocky or gravelly with good aeration and drainage but with a well-developed organic layer. Many occurrences are small patches found in a mosaic pattern with woodlands, dense shrublands, or alpine communities.

Rocky Mountain Alpine-Montane Wet Meadows include high-elevation herbaceous communities found throughout the Intermountain region. These communities occur as large meadows in montane or subalpine valleys; as narrow strips bordering ponds, lakes, and streams; and along toe slope seeps. They are typically found on flat areas or gentle slopes but also may occur on subirrigated sites with slopes of up to 10 percent. Alpine dwarf-shrublands, especially those dominated by willow species (*Salix spp.*), often are immediately adjacent to the wet meadows. Wet meadows provide important water filtration and wildlife habitat (NatureServe 2012).

Non-Native Grasslands

The Non-native Grassland subtype usually is dominated by cheatgrass, an invasive annual. Other invasive grasses include the annuals medusahead and wire grass (*Ventenata dubia*) and the invasive perennials bulbous bluegrass (*Poa bulbosa*), Kentucky bluegrass (*Poa pratensis*), and intermediate wheatgrass (*Thinopyrum intermedium*) (Harrison et al. 1996; Miller et al. 2013). Non-native grasslands have extensively replaced native plant communities throughout the region and the B2H Project area.

Non-native Grasslands typically are represented by the Introduced Upland Vegetation - Annual Grassland ecological system and occur in areas that have experienced past disturbance. Typically, cheatgrass dominates this ecological system, with more than 80 to 90 percent of the total vegetation cover, and has the ability to form a persistent vegetation community in arid landscapes (Miller et al. 2013).

Open Water

The Open Water community subtype includes areas classified as an Open Water (Fresh) ecological system that are not included as RCAs. In general, this community subtype is associated with Agricultural and Developed/Disturbed vegetation communities where irrigation and runoff result in temporary ponding. In the vegetation resources study corridor, Open Water is a minor subtype occurring adjacent to Agricultural or Developed/Disturbed vegetation communities.

Shrublands

Shrubland communities dominate much of the landscape within the vegetation resources study corridor. These communities differ in structure and species composition depending on the ecoregion, elevation, soil conditions, moisture regimes, and fire history of the area. However, they typically occur on dry flats and plains, rolling hills, saddles, and ridges where precipitation is low. They are dominated by shrub species with components of forbs and grasses. Historically, fire has played an important role in maintaining these communities and has served as a cyclical disturbance regime (ODFW 2006). The following Shrubland community subtypes occur within the B2H Project vegetation resources study corridor:

Desert Shrub

Desert Shrub communities in the B2H Project area are characterized by saline soils that support desert shrubs, including shadscale (*Atriplex confertifolia*), greasewood (*Sarcobatus vermiculatus*), bud sage (*Picrothamnus desertorum*), winterfat (*Krascheninnikovia lanata*), and hop sage (*Grayia spinosa*), as well as grasses such as inland salt grass (*Distichlis spicata*) and basin wildrye (*Leymus cinereus*) (Franklin and Dyrness 1988). The Desert Shrub subtype typically occurs at relatively low elevations with limited precipitation.

The Desert Shrub community subtype is composed of several ecological systems in the B2H Project area. These ecological systems include Intermountain Basins Mixed Salt Desert Scrub and Intermountain Basins Greasewood Flat.

Intermountain Basins Mixed Salt Desert Scrub is an extensive ecological system that includes open-canopied shrublands of typically saline basins, alluvial slopes, and plains across the Intermountain western U.S. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more saltbush (*Atriplex spp.*) species. Hop sage tends to occur on coppice dunes that may have a silty component to them. Northern occurrences lack saltbush species and typically are dominated by hop sage, winterfat, and/or big sagebrush (*Artemisia tridentata*). In the Great Basin, greasewood is generally absent but, if present, does not codominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids. Various forbs also are present (NatureServe 2012).

Intermountain Basins Greasewood Flats typically occur near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils and a shallow water table and flood intermittently, but they remain dry for most growing seasons. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by greasewood. Other shrubs may be present or even codominant in some occurrences. Occurrences are often surrounded by Intermountain Basins Mixed Salt Desert Scrub or Big Sagebrush Shrublands. The herbaceous layer, if present, is usually dominated by graminoids (NatureServe 2012).

Dwarf Sagebrush Steppe

Dwarf Sagebrush Steppe communities occur on a variety of shallow-soil habitats and typically constitute one of the major matrix vegetation community subtypes throughout eastern Oregon and southern Idaho. Dwarf or low sagebrush species, including low sagebrush (*Artemisia arbuscula*) and close relatives, typically occur on mountain ridges, flanks, and broad terraces. Soils are characteristically very stony and derived from volcanic parent material. The herbaceous component found in this subtype normally includes various species of bunchgrasses and can be dominated by low-statured or mat-forming forbs.

The Dwarf Sagebrush Steppe comprises the following ecological systems: Columbia Plateau Low Sagebrush Steppe and Columbia Plateau Scabland Shrubland.

Columbia Plateau Low Sagebrush Steppe occurs in a variety of shallow-soil habitats throughout eastern Oregon, northern Nevada, and southern Idaho. Low sagebrush and close relatives form stands that typically occur on mountain ridges and flanks and broad terraces, ranging from 3,300 to 9,850 feet in elevation. Substrates are shallow, fine-textured soils, poorly drained clays, and shallow-soiled areas, almost always very stony, characterized by recent rhyolite or basalt. Many forbs also occur and may dominate the herbaceous vegetation, especially at the higher elevations. Isolated individuals of western juniper (*Juniperus occidentalis*) and mountain mahogany (*Cercocarpus ledifolius*) often can be found in this system (NatureServe 2012).

Columbia Plateau Scabland Shrubland is found in the Columbia Plateau region and forms extensive low shrublands. These xeric shrublands occur under relatively extreme soil-moisture conditions. Substrates

are typically shallow lithic soils with limited water-holding capacity over fractured basalt. Because of poor drainage through basalt, these soils often are saturated by winter precipitation from fall to spring but typically dry out completely to bedrock by midsummer. Total vegetation cover typically is low, generally less than 50 percent and often much less than that. Vegetation is characterized by an open dwarf-shrub canopy dominated by scabland sagebrush (*Artemisia rigida*) along with other shrub and dwarf-shrub species, particularly buckwheat (*Eriogonum* spp.). Other shrubs are uncommon in this system; mixes of scabland sagebrush and other sagebrush species typically belong to different ecological systems than this. Low cover of perennial bunch grasses, as well as scattered forbs, characterizes these sites. Individual sites can be dominated by grasses and semiwoody forbs. Annuals may be seasonally abundant, and cover of moss and lichen is often high in undisturbed areas (1 to 60 percent cover) (NatureServe 2012).

Mountain Shrub

This Shrub community subtype occurs at higher elevations and differs from other Sagebrush Steppe subtypes by being typically dominated by other shrub species, due primarily to elevation and precipitation, such as antelope bitterbrush, chokecherry (*Prunus* spp.), snowberry, serviceberry (*Amelanchier alnifolia*), and soapberry (*Ceanothus* spp.). Due to the higher moisture availability at sites where these communities occur, the herbaceous understory is typically robust with a variety of bunchgrasses and forbs.

The Mountain Shrub community subtype is composed of several ecological systems. These ecological systems include the Northern Rocky Mountain Montane-Foothill Deciduous Shrubland.

Northern Rocky Mountain Montane-Foothill Deciduous Shrublands occur in the lower montane and foothill regions around the Columbia Basin. These Shrublands typically occur below tree line, within the matrix of surrounding low-elevation Grasslands and Sagebrush Shrublands. They also occur in the ponderosa pine and Douglas-fir zones but rarely up into the subalpine zone (on dry sites). These shrublands usually are found on steep slopes of canyons and in areas with some soil development, either loess deposits or volcanic clays; they occur on all aspects. Fire, flooding, and erosion all affect these shrublands, but they typically will persist on sites for long periods. These communities develop near talus slopes as garlands, at the heads of dry drainages, and toe slopes in the moist shrub-steppe and steppe zones (NatureServe 2012).

Shrubland/Other

This shrub community occurs throughout the Project area and includes shrub communities undergoing invasion from non-native shrub species like Scotch broom (*Cytisus scoparius*) or shrub communities recovering from fire disturbance. The composition of post-fire successional shrub communities depends on several factors: existing state prior to disturbance, time elapsed since disturbance, and various abiotic conditions, including rainfall, post-fire management, and fire severity and return interval (Miller et al. 2013). The typical successional pattern shows an initial dominance by grass and forb species followed by a resurgence of resprouting shrub species like Douglas rabbitbrush and horsebrush (*Tetradymia* spp.) (Miller et al. 2013). Non-sprouting shrub species like big sagebrush or bitterbrush re-

establish via seed and may take decades to fully mature (Miller et al. 2013). Recently Burned Shrublands have a strong possibility of conversion to Non-native Grasslands dominated by cheatgrass, especially if pre-existing condition at the site was poor.

Tall Sagebrush Steppe

Tall Sagebrush Steppe communities are widespread and dominant in eastern Oregon and southwestern Idaho, with the dominant shrub species comprising various subspecies of big sagebrush. This Shrubland community subtype is codominated by bunchgrasses, such as bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass, as well as other primary shrub species (Franklin and Dyrness 1988). While the commonly occurring Intermountain Basins Semi-desert Shrub-Steppe ecological system also is included here, Wyoming big sage (*A. tridentata* ssp. *wyomingensis*) is characteristically replaced in this ecological system by Greene's rabbitbrush (*Chrysothamnus greenei*), Douglas rabbitbrush (*C. viscidiflorus*), ephedra (*Ephedra viridis*), rubber rabbitbrush (*Ericameria nauseosa*), broom snakeweed (*Gutierrezia sarothrae*), and winterfat.

The big sagebrush community subtype is composed of several ecological systems. These include: Intermountain Basins Big Sagebrush Steppe, Intermountain Basins Big Sagebrush Shrubland, Intermountain Basins Montane Sagebrush Steppe, Great Basin Xeric Mixed Sagebrush Shrubland, and Intermountain Basins Semi-desert Shrub-Steppe.

Intermountain Basins Big Sagebrush Steppe occurs throughout much of the Columbia Plateau and northern Great Basin. Soils are typically deep and nonsaline, often with a microphytic crust. This Shrubland is dominated by perennial grasses and forbs (greater than 25 percent cover) with basin big sagebrush (*A. tridentata* ssp. *tridentata*), big sagebrush (*A. tridentata* ssp. *xericensis*), Wyoming big sagebrush, silver sagebrush (*Artemisia cana* ssp. *cana*), and/or antelope bitterbrush (*Purshia tridentata*) dominating or codominating the open to moderately dense (10 to 40 percent cover) shrub layer. Cheatgrass is a common weed species that increases in this ecological system following disturbance. Idaho fescue is uncommon in this system, although it does occur in areas of higher elevations/precipitation. Areas with deeper soils more commonly support basin big sagebrush but have largely been converted for other land uses. The natural fire regime of this ecological system likely maintains a patchy distribution of shrubs, so the general aspect of the vegetation is Grassland. Shrubs may increase following heavy grazing or with fire suppression, or both, particularly in moist portions of the northern Columbia Plateau where it forms a landscape mosaic pattern with shallow-soil scabland shrublands. Where fire frequency has allowed for shifts to a native grassland condition, maintained without significant shrub invasion over a 50- to 70-year interval, the area likely would transition to a Columbia Basin Foothill and Canyon Dry Grassland ecological system within the Grassland vegetation community type (NatureServe 2012).

Intermountain Basins Big Sagebrush Shrubland occurs throughout much of the western U.S., typically in broad basins between mountain ranges, plains, and foothills between 4,900 and 7,550 feet elevation. Soils typically are deep, well drained, and nonsaline. These Shrublands are dominated by basin big sagebrush and/or Wyoming big sagebrush. Scattered juniper (*Juniperus* spp.), greasewood, and saltbush may be present in some stands. Rubber rabbitbrush, Douglas rabbitbrush, antelope

bitterbrush, or snowberry (*Symphoricarpos* spp.) may codominate disturbed stands (e.g., in burned stands, these may become more predominant). Perennial herbaceous components typically contribute less than 25 percent vegetative cover. Some seminatural communities are included that often originate on abandoned agricultural land or on other disturbed sites. In these locations, cheatgrass or other annual bromes and invasive weeds can be abundant. This ecological system is more restricted in environmental setting than the steppe (NatureServe 2012).

Intermountain Basins Montane Sagebrush Steppe includes sagebrush communities occurring at foothills to montane and subalpine elevations. This system primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridge tops, and mountain slopes. In general, this system shows an affinity for mild topography, fine soils, and some source of subsurface moisture or more mesic sites, zones of higher precipitation, and areas of snow accumulation. Across its range of distribution, this is a compositionally diverse system. It is composed primarily of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), silver sagebrush (*A. cana* ssp. *viscidula*), and related taxa, such as big sagebrush (*Artemisia tridentata* ssp. *spiciformis*). Antelope bitterbrush may codominate or even dominate some stands. Low sagebrush-dominated shrublands commonly occur within this system on rocky or windblown sites. Wyoming big sagebrush may be present to codominant if the stand is clearly montane as indicated by montane indicator species, such as Idaho fescue, spike fescue (*Leucopoa kingii*), or timber oatgrass (*Danthonia intermedia*). Most stands have an abundant perennial herbaceous layer (more than 25 percent cover or, in many cases, more than 50 percent cover), but this system also includes Mountain Big Sagebrush Shrublands. In many areas, wildfires can maintain an open herbaceous-rich steppe condition, although at most sites, shrub cover can be unusually high for a steppe system (greater than 40 percent), with the moisture providing equally high grass and forb cover (NatureServe 2012).

Great Basin Xeric Mixed Sagebrush Shrubland occurs in the Great Basin on dry flats and plains, alluvial fans, rolling hills, rocky hillslopes, saddles, and ridges at elevations between 3,300 and 8,550 feet. Sites are dry, often exposed to desiccating winds, with typically shallow, rocky, nonsaline soils. Shrublands are dominated by black sagebrush (mid and low elevations) and little sagebrush (*Artemisia arbuscula* ssp. *longicaulis*, or *Artemisia arbuscula* ssp. *longiloba*) (higher elevation) and may be codominated by Wyoming big sagebrush. The herbaceous layer is likely sparse and composed of perennial bunch grasses (NatureServe 2012).

Intermountain Basins Semi-desert Shrub-steppe occurs throughout the Intermountain western U.S., typically at lower elevations on alluvial fans and flats with moderate to deep soils. This semi-arid shrub-steppe is typically dominated by bunchgrasses (greater than 25 percent cover) with an open shrub to moderately dense woody layer with a typically strong graminoid layer. The woody layer is often a mixture of shrubs and dwarf-shrubs, although it may be dominated by a single species. Shadscale and big sagebrush are commonly found in this ecological system, but are not usually the dominant vegetation. Annual grasses, especially cheatgrass, may be present to abundant. A wide variety of forb species may be found throughout the range of this ecological system, but individual sites typically have low diversity and abundance of forb species. This ecological system typically exists as shrubland with patchy

grasses or patchy open herbaceous layers. Disturbance may be important in maintaining the woody component. Microphytic crust is very important in some stands (NatureServe 2012).

D.3 SPECIAL STATUS PLANTS

Special status plant species include the following: (1) species listed under the Endangered Species Act of 1973 as endangered, threatened, proposed, or candidate; (2) Bureau of Land Management (BLM) and U.S. Forest Service (USFS) sensitive species; and (3) State of Oregon-listed threatened or endangered. Both the USFS and the BLM have established lists of species they consider “at risk” on lands they manage: the USFS Regional Forester’s sensitive species list and the BLM State Director’s special status species list. The Regional Forester’s sensitive species list includes animal species for which population viability is a concern within lands managed by the USFS. BLM special status species, per BLM Manual 6840 (BLM 2008), are managed under the Special Status Species Policy, whose purpose is to conserve listed species and their ecosystems and to ensure that actions taken by the BLM are consistent with the conservation of special status species and do not contribute to the listing of any species under the Endangered Species Act of 1973.

A 10-mile wide study corridor centered on the B2H Project centerline was used to identify special status plants potentially occurring in the B2H Project area, refer to Section 3.2.3 for a more detailed discussion of the methods used to identify special status plant species. The 43 species identified in the 10-mile study corridor are listed below, along with regulatory status, distribution, and life histories. The global ranking status for each species is also discussed to provide an assessment of the species’ vulnerability and extent of threats facing the species. Refer to Section 3.2.3 for a detailed analysis of potential B2H Project impacts on special status plant species.

D.4 FEDERALLY LISTED PLANTS

D.4.1 HOWELL’S SPECTACULAR THELYPODY (USFWS THREATENED, OREGON STATE ENDANGERED)

Howell’s spectacular thelypody (*Thelypodium howellii* ssp. *spectabilis*), also known as Howell’s thelypody, was included as a federally threatened species on June 25, 1999 (64 *Federal Register* [FR] 28393). A recovery plan for the species was published in June 2002 that establishes priorities, objectives, and recovery criteria, including population protections, stable or increasing population trends, and monitoring. It is known from only Union, Baker, and Malheur Counties, Oregon, with presently documented populations restricted to the Baker and North Powder valleys. Howell’s spectacular thelypody is found in alkali meadows that are seasonally wet in the spring; between 3,000 and 3,500 feet elevation. Thelypody habitat typically has not been disturbed by agriculture and is dominated by basin wildrye (*Leymus cinereus*) with greasewood (*Sarcobatus vermiculatus*) and alkali saltgrass (*Distichlis spicata*) (U.S. Fish and Wildlife Service [USFWS] 2002). It has a Global Status of G2T1 (critically imperiled) because of being a narrow endemic with much of the habitat having been destroyed and only a few historical populations remaining. These populations comprise several occurrences that can be grouped into five populations: Clover Creek Valley, North Powder, Haines, North Baker, and Pocahontas Road (USFWS 2010). Of these populations, only North Powder and

Haines have occurrences located on lands with a permanent conservation easement (USFWS 2010). All other occurrences are located on private land that is intensively grazed by livestock. The habitat of Howell's spectacular thelypody has been disturbed primarily for agriculture uses although grazing, invasive species, and other human activities also threaten the species. This biennial species is short-lived and depends on frequent seed production for its continued survival. Howell's spectacular thelypody requires a specific water regime-requiring enough moisture to thrive, but not allow the establishment of more competitive sedge and rush species (USFWS 2010).

D.5 SENSITIVE PLANT SPECIES

The sensitive plant species occurring in the B2H Project area are identified in Table D-3 along with their listing status, potential occurrence by segment, and primary vegetation communities likely to contain habitat. Species accounts, including habitat requirements, known distribution, recent and historical observations, and the likelihood of occurrence in the special status plant species analysis corridor, were prepared for sensitive plant species and are presented below. Potential occurrence by segment for each species occurring in the B2H Project area was determined through review of herbarium records and species distribution. The primary communities likely to contain habitat for each species was determined through review of herbarium records, associated species at known occurrences, and species descriptions.

Table D-3. Sensitive Plant Species Occurring in the B2H Project Area				
Common Name ¹	Scientific Name ¹	Agency Listing Status	Segments with Potential Occurrences	Vegetation Community
Aloina Moss	<i>Aloina bifrons</i>	Oregon BLM	1, 2, 3, 4, 5, 6	Shrubland Grassland
Bank Monkeyflower	<i>Mimulus clivicola</i>	Idaho BLM	1, 2, 3, 4, 5, 6	Forest/Woodland Shrubland Grassland Bare Ground, Cliffs, and Talus
Barren Milkvetch	<i>Astragalus cusickii</i> var. <i>sterilis</i>	Oregon BLM, Idaho BLM, Oregon State Threatened	5, 6	Shrubland Grassland
Carveseed	<i>Glyptopleura marginata</i>	Idaho BLM	4, 5, 6	Shrubland Grassland
Columbian Carpet Moss	<i>Bryoerythrophyllu m columbianum</i>	Oregon BLM	1, 2, 3, 4, 5, 6	Shrubland Grassland
Cordilleran Sedge	<i>Carex cordillerana</i>	Oregon BLM, USFS	1, 2, 3	Forest/Woodland Riparian Conservation Area (RCA)
Cronquist's Stickseed	<i>Hackelia cronquistii</i>	Oregon BLM, Idaho BLM, Oregon State Threatened	4, 5, 6	Shrubland
Cusick's Pincushion	<i>Chaenactis cusickii</i>	Idaho BLM	5, 6	Bare Ground, Cliffs, and Talus

Table D-3. Sensitive Plant Species Occurring in the B2H Project Area				
Common Name ¹	Scientific Name ¹	Agency Listing Status	Segments with Potential Occurrences	Vegetation Community
Doublet	<i>Dimeresia howellii</i>	Idaho BLM	3, 4, 5, 6	Bare Ground, Cliffs, and Talus Shrubland Grassland
Douglas' Clover	<i>Trifolium douglasii</i>	Oregon BLM, Idaho BLM, USFS	1, 2, 3	Grassland RCA
Esteve's Pincushion	<i>Chaenactis stevioides</i>	Idaho BLM	5, 6	Shrubland Bare Ground, Cliffs, and Talus
False Naked Buckwheat	<i>Eriogonum novonudum</i>	Idaho BLM	4, 5, 6	Shrubland Bare Ground, Cliffs, and Talus
Flowery Phlox	<i>Phlox multiflora</i>	Oregon BLM, USFS	1, 2, 3	Shrubland Grassland Forest/Woodland
Greeley's Springparsely	<i>Cymopterus acaulis var. greeleyorum</i>	Oregon BLM, Idaho BLM	4, 5, 6	Shrubland Grassland
Hairy Wild Cabbage	<i>Caulanthus pilosus</i>	Oregon BLM	4, 5, 6	Shrubland Grassland
Idaho Milkvetch	<i>Astragalus conjunctus</i>	Idaho BLM	1, 2, 3, 4, 5, 6	Shrubland Grassland
Janish's Penstemon	<i>Penstemon janishiae</i>	Idaho BLM	4, 5, 6	Shrubland Forest/Woodland
King's Snapdragon	<i>Sairocarpus kingii</i>	Idaho BLM	4, 5, 6	Shrubland Grassland
Laurent's Milkvetch	<i>Astragalus collinus var. laurentii</i>	Oregon BLM, Oregon State Threatened	1	Shrubland Grassland
Malheur Cryptantha	<i>Cryptantha propria</i>	Idaho BLM	3, 4, 5, 6	Shrubland Grassland
Mingan Moonwort	<i>Botrychium minganense</i>	Oregon BLM	1, 2, 3	Forest/Woodland RCA
Mountain Moonwort	<i>Botrychium montanum</i>	Oregon BLM, USFS	1, 2, 3	Forest/Woodland RCA
Mulford's Milkvetch	<i>Astragalus mulfordiae</i>	Oregon BLM, Idaho BLM, Oregon State Endangered	5, 6	Shrubland RCA
Oregon Princesplume	<i>Stanleya confertiflora</i>	Oregon BLM, Idaho BLM	2, 3, 4, 5, 6	Shrubland Grassland Bare Ground, Cliffs, and Talus

Table D-3. Sensitive Plant Species Occurring in the B2H Project Area				
Common Name ¹	Scientific Name ¹	Agency Listing Status	Segments with Potential Occurrences	Vegetation Community
Oregon Semaphore Grass	<i>Pleuropogon oregonus</i>	Oregon BLM, USFS, Oregon State Threatened	1, 2, 3	RCA
Owyhee Yellow Phacelia	<i>Phacelia lutea var. calva</i>	Idaho BLM	5, 6	Shrubland Bare Ground, Cliffs, and Talus
Retorse Sedge	<i>Carex retrorsa</i>	Oregon BLM, USFS	1, 2, 3	RCA
Rigid Threadplant	<i>Nemacladus rigidus</i>	Idaho BLM	4, 5, 6	Shrubland Grassland
Salt Heliotrope	<i>Heliotropium curassavicum</i>	Oregon BLM, USFS	1, 2, 3, 4, 5, 6	RCA Developed/Disturbed
Saltwort Buckwheat	<i>Eriogonum salicornioides</i>	Oregon BLM	4, 5, 6	Shrubland Grassland Bare Ground, Cliffs, and Talus
Scabland Penstemon	<i>Penstemon deustus var. variabilis</i>	Oregon BLM, USFS	1, 2, 3, 4	Grassland Bare Ground, Cliffs, and Talus
Seaside Heliotrope	<i>Heliotropium curassavicum var. obovatum</i>	Oregon BLM, USFS	1, 2, 3, 4, 5, 6	RCA Developed/Disturbed
Shining Flatsedge	<i>Cyperus bipartitus</i>	Idaho BLM	1, 2, 3, 4, 5, 6	RCA
Simpson Hedgehog Cactus	<i>Pediocactus simpsonii</i>	Idaho BLM	5, 6	Shrubland Grassland
Small Phacelia	<i>Phacelia minutissima</i>	Oregon BLM, USFS, Idaho BLM	3, 4, 5, 6	RCA
Smooth Stickleaf	<i>Mentzelia mollis</i>	Oregon BLM, Idaho BLM, Oregon State Endangered	5, 6	Bare Ground, Cliffs, and Talus
Snake River Goldenweed	<i>Pyrrocoma radiata</i>	Oregon BLM, Idaho BLM, Oregon State Endangered	3, 4, 5, 6	Shrubland Grassland
Tolmie's Onion	<i>Allium tolmiei var. persimile</i>	Idaho BLM	4, 5, 6	Shrubland Grassland
Water-Thread Pondweed	<i>Potamogeton diversifolius</i>	Oregon BLM, Idaho BLM, USFS	1, 2, 3, 4, 5, 6	RCA
White Woolly Buckwheat	<i>Eriogonum ochrocephalum var. calcareum</i>	Idaho BLM	3, 4, 5, 6	Shrubland Bare Ground, Cliffs, and Talus
Wishbone Bush	<i>Mirabilis laevis var. retrorsa</i>	None	5, 6	Shrubland

Table D-3. Sensitive Plant Species Occurring in the B2H Project Area				
Common Name ¹	Scientific Name ¹	Agency Listing Status	Segments with Potential Occurrences	Vegetation Community
Woollyfruit Sedge	<i>Carex lasiocarpa</i> <i>var. americana</i>	Oregon BLM, USFS	1, 2, 3	RCA Forest/Woodland Grassland
<i>Table Note:</i> ¹ Nomenclature follows Integrated Taxonomic Information Systems				

D.5.1 ALOINA MOSS (OREGON BLM SENSITIVE)

Aloina moss (*Aloina bifrons*) is a rare species of moss typically associated with early seral biological soil crusts (Kofranek 2014). It has a cosmopolitan range and has been documented from several locations around the world, including British Columbia south to Mexico, western Eurasia, northern and southern Africa, and New Zealand (NatureServe 2012). Aloina moss has an assigned ranking of G3G4S1 (Vulnerable/Critically Imperiled) based on the few documented locations of occurrence (NatureServe 2012, ORBIC 2013). Threats to Aloina moss include those typical to biological soil crusts: damage from off-highway vehicle traffic, grazing, annual grass invasion, and conversion of shrub-steppe habitats (NatureServe 2012). Recent surveys on the Vale BLM district for Aloina moss found it at several locations and suspect it to occur at other locations as well (Kofranek 2014). Fifteen occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.2 BANK MONKEYFLOWER (IDAHO BLM SENSITIVE)

Bank monkeyflower (*Mimulus clivicola*), also known as hill monkeyflower, is a regionally endemic annual forb occurring in Idaho, Montana, Oregon, and historically in Washington (NatureServe 2012). It is an annual species restricted to seeps and wetter areas along steep walls, embankments, and roadcuts in eastern Oregon and west-central Idaho (Lorain 1993). Bank monkeyflower has been assigned a G4S3 ranking in both Oregon and Idaho (Secure/Vulnerable) (IFWIS 2016; ORBIC 2013). A vulnerable ranking in Idaho merits listing as a Type 4 BLM special status species. Thirty-seven occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.3 BARREN MILKVETCH (OREGON AND IDAHO BLM SENSITIVE, OREGON STATE THREATENED)

Barren milkvetch (*Astragalus cusickii* var. *sterilis*), also known as stiff milkvetch, sterile milkvetch or Cusick's milkvetch, is a perennial forb known only from Idaho and Oregon. It is found on a variety of habitats, including: below rhyolite cliffs, bottom of a talus slope, slopes and hillsides, roadcuts through rhyolite and ash, roadsides, river gravel bars, banks of dry creek beds, dry washes, dry hillsides, sandstone and ash deposits; in soft yellow-pink ash, whitish-gray volcanic ash, brown clay, sand white volcanic ash, ash and clay conglomerate, orange sands and gravels, brownish and yellow-green ash-tuft and rocky ash soils; reported from 2,700 to 4,800 feet elevation (Consortium of Pacific Northwest Herbaria [CPNH] 2013; Intermountain Regional Herbarium Network [IRHN] 2013; NatureServe 2013; Oregon Flora Project [OFF] 2012). Barren milkvetch has been assigned a G5T2S2 (Imperiled

Trinomial/Imperiled), ranking in Oregon and a G5T2S1 ranking in Idaho due the restricted range and threats posed by mining at many occurrences (IFWIS 2016; ORBIC 2013). A critically imperiled state ranking in Idaho merits listing as a Type 3 BLM special status species. Even if populations are found within protected areas or protected areas are drawn around populations, mining may still be an allowable activity (NatureServe 2013). From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 186 occurrences were identified.

D.5.4 CARVESEED (IDAHO BLM SENSITIVE)

Carveseed (*Glyptopleura marginata*), also known as white-margined wax plant, is an annual forb known in six states, including Idaho and Oregon. It is found near the B2H Project area from sandy flats and rocky windswept lava bluffs; in sandy flats and alkaline rock soils; reported from approximately 2,400 to 3,000 feet elevation (CPNH 2012; IRHN 2013; NatureServe 2013). Carveseed has been assigned a G4G5S3 ranking (Apparently Secure/Vulnerable) and, thus, has not been analyzed by NatureServe to determine detailed threats and extent of known occurrences. A vulnerable ranking in Idaho merits listing as a Type 4 BLM special status species. Eighteen occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.5 COLUMBIAN CARPET MOSS (OREGON BLM SENSITIVE)

Columbian carpet moss (*Bryoerythrophyllum columbianum*) is moss species endemic to western North America, occurring from British Columbia south to California (NatureServe 2012). Although apparently abundant in suitable habitat, Columbian carpet moss has been assigned G3G4S2 (Uncommon/Imperiled) based on its relatively narrow range (ORBIC 2013). Columbian carpet moss often forms a significant portion of biological soil crusts in central Oregon and presumably does in Idaho as well (NatureServe 2012). Threats to Columbian carpet moss include those typical to biological soil crusts: damage from off-highway vehicle traffic, grazing, annual grass invasion, and conversion of shrub-steppe habitats (NatureServe 2012). Recent surveys on the Vale BLM district for Columbian carpet moss found it at all survey locations (Kofranek 2014). Thirty-one occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.6 CORDILLERAN SEDGE (OREGON BLM SENSITIVE, USFS SENSITIVE)

Cordilleran sedge (*Carex cordillerana*) is a perennial graminoid in five states and Canada; found (in northeastern Oregon) in roadcuts, river banks and floodplains extending onto lower slopes, deep shade near creeks; in duff over deep brown loamy soil, dark silt loam soil, large rocky dark mud, small to coarse gravels, basalt derived soils and dry to moist soils; reported from 1,720 to 5,750 feet elevation; associated with wet forests and Mountain Shrub communities (CPNH 2013; NatureServe 2013). It has been assigned a G3G4S2 (Uncommon/Imperiled) ranking, but lacks analysis by NatureServe to determine detailed threats and extent of known occurrences (ORBIC 2013). From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 213 occurrences were identified.

D.5.7 CRONQUIST'S STICKSEED (OREGON AND IDAHO BLM SENSITIVE, OREGON STATE THREATENED)

Cronquist's stickseed (*Hackelia cronquistii*), also known as Cronquist's forget-me-not, is perennial forb known only from Oregon and Idaho, limited to within a twenty-mile radius of Vale, Malheur County, Oregon. Found on low and rolling sandy (dry) hills and at the base of sand dunes from north, and east north-east aspects, with the majority of plants and mid or lower slopes; in sandy loam, sand, light clay soils; reported from 2,200 to 3,640 feet elevation (NatureServe 2013; OFP 2012). It has been assigned a G3S3 (Vulnerable/Vulnerable) ranking in Oregon and a G3S1 (Vulnerable/Critically Imperiled) ranking in Idaho, due to being a regional endemic with about 52 known occurrences with a total of 28,000 to 61,000 plants (IFWIS 2016; ORBIC 2013). It has been identified as a BLM Type 3 species in Idaho. This species is found mainly near the eastern border of Oregon in Malheur and Baker Counties, and adjacent Idaho. Threats are from cattle grazing/trampling, herbicide use, competition from weedy species, and agricultural expansion, although it is fairly resistant to casual disturbance (NatureServe 2013). From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 294 occurrences were identified.

D.5.8 CUSICK'S PINCUSHION (IDAHO BLM SENSITIVE)

Cusick's pincushion (*Chaenactis cusickii*) is an annual forb known only from the Owyhee River drainage of Malheur County, Oregon and adjacent Owyhee County, Idaho. It is found in dry shrublands, on cliffs and on barren knolls; in dry lithosol soils, chalk, diatomite, and pale, dark brown clay, brown ash, whitish to yellowish to gray volcanic ash-clay soils, especially those of the Poison Creek and Sucker Creek Formations (CPNH 2013; IRHN 2013; NatureServe 2013). It has been assigned a G3S2 (Vulnerable/Imperiled) ranking, because it is a regional endemic that is locally abundant on suitable habitats (IFWIS 2016). It has been identified as a Type 4 BLM species in Idaho. However, Idaho plant numbers total about 2,500-3,500 and Oregon totals 3,500-13,500, represented in only 15 occurrences in Malheur County and seven in Owyhee County. Mining claims and off-road vehicles are potential threats at many sites, with plants not found in soils compacted by off-road vehicle activity (NatureServe 2013). Fifty-six occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.9 DOUBLET (IDAHO BLM SENSITIVE)

Doublet (*Dimeresia howellii*), also known as dimeresia, is an annual forb found in four states, from broad flat summits and broad ridges; in alkaline soil, gravelly, dark gray volcanic ash, ash-tuff rubble, rocky gravelly soils and barren basalt gravels and cobbles; reported from 4,528 to 7,250 feet elevation (CPNH 2013; IRHN 2013; NatureServe 2013; OFP 2012). It has been assigned a G4?S2 (Apparently Secure/Imperiled) ranking due to being common in the center of its range (Oregon and Nevada) (IFWIS 2016). It has been identified as a Type 3 BLM species in Idaho. In Idaho, it is known from only six occurrences. Seven occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.10 DOUGLAS' CLOVER (OREGON AND IDAHO BLM SENSITIVE, USFS SENSITIVE)

Douglas' clover (*Trifolium douglasii*) is a perennial forb occurring in three states and is known from wet meadows or other seasonally moist, open vegetation communities; often in association with bluebunch wheatgrass or Idaho fescue (CPNH 2013; INPS 2000; IRHN 2013; NatureServe 2013; OFP 2012). It has been assigned a G2S1 (Imperiled/Critically Imperiled) ranking in Oregon and Idaho due to being restricted to a small area in northeast Oregon, southeast Washington, and adjacent Idaho (IFWIS 2016; ORBIC 2013). It has been identified as a Type 2 BLM species in Idaho. It is rare throughout its range and threatened by grazing and by agricultural conversion (NatureServe 2013). Livestock grazing is a threat to the Oregon populations, but populations can withstand lessened grazing pressure. Rotation of livestock which allow cattle on only after mid-September appears to maintain populations through increased seed recruitment (INPS 2000). When heavily grazed heavily, only a few plants may exist and few other native species can be found. From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 124 occurrences were identified.

D.5.11 ESTEVE'S PINCUSHION (IDAHO BLM SENSITIVE)

Esteve's pincushion (*Chaenactis stevioides*), also known as desert pincushion or broad-flower pincushion, is annual forb native to nine states. It is found in cliffs and edges of plateaus in sparse desert scrub-shrub and salt desert scrub communities, on slopes of river canyons; in white ash, gravelly and sandy soils; reported from approximately 2,400 to 4,600 feet elevation (CPNH 2013; IRHN 2013; NatureServe 2013). It has been assigned a G5S2 (Secure/Imperiled) ranking due to being common in Nevada and California (IFWIS 2016). It has been identified as Type 4 BLM species in Idaho.

D.5.12 FALSE NAKED BUCKWHEAT (IDAHO BLM SENSITIVE)

False naked buckwheat (*Eriogonum novonudum*) is a perennial forb restricted to volcanic ash and clay slopes of eastern Oregon and western Idaho (Wigglesworth 2012). It has been assigned a G4S1 (Apparently Secure/Critically Imperiled) ranking in Idaho based on its restriction to one occurrence in Idaho near Elephant Butte in Owyhee County (Wigglesworth 2012). It has been identified as Type 3 BLM species in Idaho. Thirty occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.13 FLOWERY PHLOX (OREGON BLM SENSITIVE, USFS SENSITIVE)

Flowery phlox (*Phlox multiflora*), also known as multi-flowered phlox, is a perennial forb occurring in eight states. It is found (in Oregon) in coniferous forests, rocky meadow edges, roadsides, rocky slopes, ridge tops, rock outcrops and cliffs; in residual soils; reported from 3,200 to 4,600 feet elevation; associated with open and treed plant communities dominated by ponderosa pine (*Pinus ponderosa*) and Douglas' fir (*Pseudotsuga menzeisii*) (CPNH 2013; NatureServe 2013; OFP 2012). It has been assigned a G4S1 (Apparently Secure/Critically Imperiled) ranking in Oregon, but lacks analysis by NatureServe to determine detailed threats and extent of known occurrences (IFWIS 2016). Seventy-

four occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.14 GREELEY'S SPRINGPARSELY (OREGON AND IDAHO BLM SENSITIVE)

Greeley's springparsely (*Cymopterus acaulis* var. *greeleyorum* syn. *Cymopterus glomeratus* var. *greeleyorum*), also known as Greely's wavewing, is a perennial forb only known from three Idaho and Oregon counties. Found on sparsely vegetated slopes and hillsides, tops of hills; in deep sand, unconsolidated white to brown ash, heavy bentonite ash-clay and clay soils; reported from 2,800 to 4,000 feet elevation (CPNH 2013; IRHN 2013; NatureServe 2013). It has been assigned a G5T2S1 (Trinomial Imperiled/Critically Imperiled) ranking in Oregon and a G5T2S2 (Trinomial Imperiled/Imperiled) ranking in Idaho, and NatureServe has not completed a detailed analysis to determine detailed threats and extent of known occurrences (IFWIS 2016; ORBIC 2013). It has been identified as a Type 3 BLM species in Idaho. Twenty-five occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.15 HAIRY WILD CABBAGE (OREGON BLM SENSITIVE)

Hairy wild cabbage (*Caulanthus pilosus*) is a biennial forb occurring in the Great Basin along dry, open slopes associated with cool Desert Shrub and Grassland communities (Welsh et al. 2008). It has been assigned a G4S2 (Apparently Secure/Imperiled) ranking in Oregon, which merits inclusion on the Oregon BLM and USFS sensitive species lists (ORBIC 2013). Ten occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.16 IDAHO MILKVETCH (IDAHO BLM SENSITIVE)

Idaho milkvetch (*Astragalus conjunctus* var. *conjunctus*), also known as stiff milkvetch, is a perennial species occurring in Oregon, Idaho and Wyoming. It is found (in B2H Project area counties) on grassy roadsides, dry woods in fine and deep soils, rocky rhyolite slopes, steep banks in badlands along creeks, loose stony soil of canyon sides, meadows above lakes and slopes above stock ponds, and gravelly scab rock or windswept flats; reported in loamy clay and loam soil; from 2,540 to 7,598 feet elevation (CPNH 2013; IRHN 2013; NatureServe 2013). NatureServe has not assigned a Global Status to this variety, nor done an analysis to determine detailed threats and extent of known occurrences. It has been assigned a G4S2 (Apparently Secure/Imperiled) ranking in Idaho (IFWIS 2016). It has been identified as a Type 4 BLM species in Idaho. Thirty-eight occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.17 JANISH'S PENSTEMON (IDAHO BLM SENSITIVE)

Janish's penstemon (*Penstemon janishiae*) is a perennial forb occurring in four states on sandy bluffs, shale slopes, layered and north-facing hillsides, in deep soil on north slopes and in open, grassy prairies; reported from 2,798 to 2,916 feet elevation (CPNH 2013; IRHN 2013; NatureServe 2013). It has been assigned a G4S2 (Apparently Secure/) ranking in Idaho (IFWIS 2016). It has been

identified as a Type 4 BLM species in Idaho. Seventeen occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.18 KING'S SNAPDRAGON (IDAHO BLM SENSITIVE)

King's snapdragon (*Sairocarpus kingii* syn. *Antirrhinum kingii*), also known as least snapdragon, is an annual forb occurring in six states and Mexico, with Idaho as a geographic outlier. This species is rarely collected from B2H Project area counties (CPNH 2013; IRHN 2013; NatureServe 2013). It has been assigned a G4S1 (Apparently Secure/Critically Imperiled) ranking, but lacks analysis by NatureServe to determine detailed threats and extent of known occurrences (IFWIS 2016). It has been identified as a Type 3 BLM species in Idaho. Four occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.19 LAURENT'S MILKVETCH (OREGON BLM SENSITIVE, OREGON STATE THREATENED)

Laurent's milkvetch (*Astragalus collinus* var. *laurentii*), also known as Laurence's milkvetch, is a perennial forb endemic to Oregon found in four counties in Oregon. It grows on barren grassy hillsides and scablands on basalt tablelands with northwest to south 10–30+ percent slopes, adjacent to cultivated land and on roadsides; in white-clay loam, silty white-clay, loess deposits and (in disturbed sites) dry cobbly soil, reportedly also on sand dunes; reported from 2,000 to 3,400 feet elevation; associated with various grass species or open juniper woodlands (CPNH 2013; NatureServe 2013; OFP 2012; ORBIC 2010a; Tetra Tech 2011). It has been assigned a G5T1S1 (Trinomial Critically Imperiled/Critically Imperiled) ranking in Oregon, due to being endemic to Oregon with a relatively narrow range (ORBIC 2013). About 18 occurrences were known throughout Oregon in 1983, with plant numbers estimated at 1,200 to 1,800. The current extent and abundance of Laurent's milkvetch is unknown (NatureServe 2013). Populations are threatened by farming, grazing, and roadside spraying (NatureServe 2013). As this species is dependent on pollinators to produce seed and cannot self-fertilize, it is sensitive to impacts/losses that occur to its pollinators. Furthermore, this species is sensitive to habitat loss and degradation resulting from agricultural development, grazing, road maintenance activities, and invasions by exotic weeds, as well as seed predation by insects (Oregon Department of Agriculture [ODA] 2011). Forty-one occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.20 MALHEUR CRYPTANHA (IDAHO BLM SENSITIVE)

Malheur cryptantha (*Cryptantha propria*), is perennial forb only occurring in Oregon and Idaho. It is found on cliffs, ledges, bluffs, dry slopes, ridges, buttes, rocky outcrops, roadcuts and open flats of any exposure; in sandy, clay, oolitic limestone or dolomite and ash/rhyolite (volcanic) soils, as well as loose rock and stony or gravelly thin soils; reported from 2,100 to 4,800 feet in elevation (CPNH 2013; IRHN 2013; NatureServe 2013). It has been assigned a G4S2 (Apparently Secure/Imperiled) ranking in Idaho, due to a small to moderate number of occurrences, abundance and range, with moderate threats from mining and grazing, but apparently healthy populations (IFWIS 2016; NatureServe 2013). It has

been identified as a Type 4 BLM species in Idaho. Fifty-one occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.21 MINGAN MOONWORT (OREGON BLM SENSITIVE)

Mingan moonwort (*Botrychium minganense*) is a long-lived fern species occurring in 20 states and Canada, including eight northern Idaho counties (U.S. Department of Agriculture [USDA] 2012). It is also found in 13 counties in Oregon, including in Baker, Morrow, Umatilla, and Union Counties (ORBIC 2010b). Mingan moonwort has been known to grow in a range of habitats, including forests, shrublands, and nearly unvegetated slopes. It may grow on soils that are wet in the spring, but typically occurs on soils that dry out as the growing season progresses. For herbarium specimens and documented occurrences in and adjacent to Union and Baker County, it ranges in elevation from 3,800 to 7,200 feet. It has been assigned a G4G5S3 (Apparently Secure to Secure/Vulnerable) ranking in Oregon, due to being scattered or widespread, although considered rare or uncommon where found, often with very few individuals per site. Some of the locations are protected in special management areas (ORBIC 2013, NatureServe 2013). Oregon populations were reported in the 1990s, and contemporary population density and viability is not known (OFP 2012). In Oregon, total plant numbers were reported to be about 3,000. However, many occurrences have very few individuals; for example, most of the occurrences in Oregon were reported to have ten plants or fewer (NatureServe 2012). From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 314 occurrences were identified.

D.5.22 MOUNTAIN MOONWORT (OREGON BLM SENSITIVE, USFS SENSITIVE)

Mountain moonwort (*Botrychium montanum*), also known as mountain grape-fern, is a long-lived fern species known from six states and Canada. This species is known to occur in 10 counties in Oregon, including Union and Baker Counties (ORBIC 2010b). It is found (in northeastern Oregon) in grassy alpine ridgetops, riparian meadows along perennial streams, seeps and springs; reported from 3,800 to 8,112 feet elevation; associated (in Union County) with seasonally flooded conifer forest and herbaceous communities (CPNH 2013; NatureServe 2013; OFP 2012; ORBIC 2010b). In Idaho and Montana parts of its range, it has been reported to be closely associated with mature to old-growth western red cedar (NatureServe 2013). It has been assigned a G3S2 (Vulnerable/Imperiled) ranking in Oregon, due to the number of occurrences being high (about 100-200), but the total number of plants is rather low, from 2,500 to 10,000 individuals (NatureServe 2013; ORBIC 2013). Many of the populations may be protected from logging because they are located within riparian buffer zones although grazing would still be a threat (NatureServe 2013). From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 182 occurrences were identified.

D.5.23 MULFORD'S MILKVETCH (OREGON AND IDAHO BLM SENSITIVE, OREGON STATE ENDANGERED)

Mulford's milkvetch (*Astragalus mulfordiae*) is a perennial forb known only from Idaho and Oregon. Typical habitat includes deep sandy first river terraces, sandy beaches, gravel bars, flat to gently rolling south-east exposures, sand bowls at the crest of hills, old river deposits, sandy places near rivers,

sandy bluffs and dune-like talus in foothills; in decomposed sandstone, decomposed oolitic limestone, deep sand derived from lake deposits, lacustrine ash and sand to sandy loam; reported from 2,100 to 3,200 feet elevation; associated with Shrub-steppe and Desert Shrub communities (CPNH 2013; IRHN 2013; NatureServe 2013; OFP 2012). It has been assigned a G2S1 (Imperiled/Critically Imperiled) ranking in Oregon and Idaho, due to being a narrow endemic with the majority of known populations are small in number of plants and in extent (IFWIS 2016; NatureServe 2013; ORBIC 2013). It has been identified as Type 2 BLM species in Idaho. Threats include habitat destruction and degradation due to residential and agricultural development, sand mining, off-road vehicle activity, and livestock grazing, which have taken place in nearly all known populations (NatureServe 2013). From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 145 occurrences were identified.

D.5.24 OREGON PRINCESPLUME (OREGON AND IDAHO BLM SENSITIVE)

Oregon princesplume (*Stanleya confertiflora*), also known as Malheur prince's plume or biennial stanleya, is a biennial forb occurring in three counties in Oregon, including Baker and Malheur Counties, as well as in Owyhee County, Idaho where it is known from scattered populations that tend to be small and local. Found on barren clay hills and slopes, open nearly barren soft loamy (dunelike) hills, somewhat barren west-facing slopes, dry sandy ground and dry banks; in adobe clay, red sandy soil and soils covered with pale gray chips of diatomite; reported from 2,200 to 7,300 feet elevation; associated with sagebrush, sagebrush steppe, or buckwheat dominated habitats (CPNH 2013; IRHN 2013; NatureServe 2013; OFP 2012). It has been assigned a G2S2 (Imperiled/Imperiled) ranking in Oregon, and a G2S1 (Imperiled/Critically Imperiled) ranking in Idaho. It has been identified as Type 2 BLM species in Idaho. There are 44 occurrences total, with eight occurrences known for Idaho and 36 presumed extant occurrences in Oregon. Total plants number about 8,000 plants, with 7,000 in Oregon and another 1,000 in Idaho. Threats are weed invasion, seeding projects, motorized off-road-vehicle riding through populations, mining claims at or near several populations, road repair projects, and livestock grazing and trampling (NatureServe 2013). From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 186 occurrences were identified.

D.5.25 OREGON SEMAPHORE GRASS (OREGON BLM SENSITIVE, USFS SENSITIVE, OREGON STATE THREATENED)

Oregon semaphore grass (*Pleuropogon oregonus*), also known by the scientific name *Lophochlaena oregona*, is a perennial graminoid found in two disjunct regions in Oregon (one in Union County and the other in southern Lake County), separated by about 230 mile (370 kilometer). It occupies dry meadows, wet seeps, wet sedge meadows, valley bottoms, slow moving creek channels and sloughs usually in standing water; in silt loam, clay, muck and residual soils from basalt substrate; reported from 3,600 to 5,600 feet elevation; associated with plant communities dominated by tufted hairgrass (*Deschampsia caespitosa*) (CPNH 2013, IRHN 2013; NatureServe 2013; ODA 2012a). It has been assigned a G1S1 (Critically Imperiled/Critically Imperiled) ranking in Oregon and is known from only eight occurrences (ORBIC 2013). The total number of plants is unknown due to the difficulty in identifying an individual, and plant numbers may be very low. A portion of one population is protected through an easement held

by The Nature Conservancy. Otherwise all sites are on private land with no protections. Changes in hydrology or grazing regime, thus, threaten all natural populations. Climate change may further reduce suitable habitat (NatureServe 2013). Twelve occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.26 OWYHEE YELLOW PHACELIA (IDAHO BLM SENSITIVE)

Owyhee yellow phacelia (*Phacelia lutea* var. *calva*), also known as Malheur yellow phacelia, is an annual forb occurring only in Malheur County, Oregon and Owyhee County, Idaho. Found on hillsides, denuded chalky or open white clayey scabland, moist highway cuts and loose, friable, alkaline clay banks; in lacustrine ash, dry ash-clay deposits, volcanic tuft; barren white ash, montmorillonite clay and lithosol soils; reported from 3,740 to 4,300 feet elevation (CPNH 2013; IRHN 2013; NatureServe 2013; OFP 2012). It has been assigned a G4T3S3 (Trinomial Vulnerable/Vulnerable) ranking in Idaho, due to being a regional endemic with only 15–30 occurrences and locally abundant in years of average rainfall (IFWIS 2016; NatureServe 2013). It has been identified as Type 3 BLM species in Idaho. Threats are from mining and its habitat being used by off-road vehicle recreationists. Plants have more difficulty germination on clay compacted by off-road vehicle users (NatureServe 2013). Twenty-three occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.27 RETRORSE SEDGE (OREGON BLM SENSITIVE, USFS SENSITIVE)

Retorse sedge (*Carex retrorsa*), also known as knotsheath sedge, is a perennial graminoid found in 26 states and Canada. It is found (in B2H Project area counties) along creeks and riparian zones; reported from 640 to 3,000 feet elevation (CPNH 2013; NatureServe 2013; OFP 2012; ORBIC 2010b). It has been assigned a G5S1 (Secure/Critically Imperiled) ranking in Oregon, but has not been analyzed by NatureServe to determine detailed threats and extent of known occurrences (ORBIC 2013). Ten occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.28 RIGID THREADPLANT (IDAHO BLM SENSITIVE)

Rigid threadplant (*Nemacladus rigidus*), also known as rigid threadbush, is a diminutive annual forb occurring in four states and is found (in B2H Project area counties) in dry washes, sandstone scree, barren ridgetops, hillsides and slopes of volcanic mesas; in barren brown sands, rhyolitic gravel, loose/soft brown volcanic ash, light brown sand, fine-textured soil derived from basalt, dark sandy gravelly soils and white chalky ash; reported from 2,950 to 5,300 feet elevation (CPNH 2013; IRHN 2013; NatureServe 2013). It has been assigned a G4S2 (Apparently Secure/Imperiled) ranking in Idaho, due to a moderate number of occurrences, moderate abundance and moderate range; with a low level of threats from grazing, range improvement projects, and off-road vehicles (IFWIS 2016; NatureServe 2013). It has been identified as Type 4 BLM species in Idaho.

D.5.29 SALT HELIOTROPE (OREGON BLM SENSITIVE, USFS SENSITIVE)

Salt heliotrope (*Heliotropium curassavicum*), sometimes known as seaside heliotrope, is a perennial forb occurring in 14 states and Canada. Found in salty ground, disturbed or dry roadsides; in sand, damp ground and moist alkaline soil; reported from 2,070 to 5,000 feet elevation (CPNH 2013; NatureServe 2013; OFP 2012). It has been assigned a G5S2 (Secure/Imperiled) ranking in Oregon, but lacks analysis by NatureServe to determine detailed threats and extent of known occurrences (ORBIC 2013). Forty-seven occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.30 SALTWORT BUCKWHEAT (OREGON BLM SENSITIVE)

Saltwort buckwheat (*Eriogonum salicornioides*), also known as saltwort wild buckwheat and playa buckwheat, is an annual forb known from Idaho and Oregon. It is found on any aspect and slope position, banks above a draw and chalky scablands; on white to gray ash outcrops, clay and sandy loam soils; reported from 2,500 to 4,300 feet elevation (CPNH 2013; NatureServe 2013). It has been assigned a G3G4S2 (Vulnerable to Apparently Secure/Imperiled) ranking in Oregon, because there are 30 reported occurrences with more occurrences likely in Idaho and Nevada (ORBIC 2013; NatureServe 2013). Plant numbers for some of the sites are noted as very large; threats appear to be minimal. Some of the sites are disturbed, but are assumed to be fairly resistant to mild disturbances (NatureServe 2013). Nine occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.31 SCABLAND PENSTEMON (OREGON BLM SENSITIVE, USFS SENSITIVE)

Scabland penstemon (*Penstemon deustus* var. *variabilis*), also known as hot-rock penstemon, is a regionally endemic perennial forb occurring in both Washington and Oregon. Found in xeric conditions, usually in thin soils overlaying basalt, it is commonly associated with bluebunch wheatgrass, Idaho fescue, and various milkvetch species (Camp and Gamon 2011). It has been assigned a G5T1T2S1S2 (Trinomial Critically Imperiled to Imperiled/Critically Imperiled to Imperiled) ranking in Oregon (ORBIC 2013). Twenty-seven occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.32 SEASIDE HELIOTROPE (OREGON BLM SENSITIVE, USFS SENSITIVE)

Seaside heliotrope (*Heliotropium curassavicum* var. *obovatum*), also known as salt heliotrope, is a perennial forb occurring in 14 states and Canada. Found in salty ground, disturbed or dry roadsides; in sand, damp ground and moist alkaline soil; reported from 2,070 to 5,000 feet elevation; in seminatural habitats associated with weeds such as *Xanthium strumarium*, *Toxicodendron rydbergii*, *Juncus torreyi*, *Rorippa nasturtium-aquaticum*, *Sesuvium verrucosum* and *Veronica anagallis-aquitica* (CPNH 2013; NatureServe 2013; OFP 2012). It has been assigned a G5T5SNR (Trinomial Secure/Not Ranked)

ranking in Oregon (NatureServe 2013). Thirty-nine occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.33 SHINING FLATSEDGE (IDAHO BLM SENSITIVE)

Shining flatsedge (*Cyperus bipartitus*), also known as shining cyperus, is an annual graminoid is a widely distributed species ranging from Washington east to Maine and south to Mexico (NatureServe 2012). Like most cyperales, shining cyperus is commonly found in wet environments like stream margins, bogs, or ditches. It has been assigned a G5S2 (Secure/Imperiled) ranking in Idaho (IFWIS 2016). It has been identified as Type 4 BLM species in Idaho. Twenty-four occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.34 SIMPSON HEDGEHOG CACTUS (IDAHO BLM SENSITIVE)

Simpson hedgehog cactus (*Pediocactus simpsonii*), also known as mountain ball cactus, occurs in 12 states (USDA 2013). It is found (in Idaho) in open plains, at top of limestone cliffs, open gravelly knolls and windswept ridges; reported from 5,905 to 8,200 feet elevation. Simpson hedgehog cactus is known from Oregon in the eastern portions of the Columbia River Gorge in Hood, Multnomah, and Wasco Counties, as well as Owyhee County, Idaho (Davis 2003; ORBIC 2010b). It has been assigned a G4S3 (Apparently Secure/Vulnerable) ranking in Idaho (IFWIS 2016). It has been identified as Type 4 BLM species in Idaho. Fifty-seven occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.35 SMALL PHACELIA (OREGON AND IDAHO BLM SENSITIVE, USFS SENSITIVE)

Small phacelia (*Phacelia minutissima*), also known as least phacelia, is a small annual forb known from three counties in Oregon (including Union), three counties in Idaho (including Owyhee), as well as Washington and Nevada (USDA 2012). This phacelia is uniquely found in springs, wet areas, open, semi-wet forb/grass meadows, moist flats and on rocky outcrops (Atwood 1997; CPNH 2013; IRHN 2013; NatureServe 2013; OFP 2012; ORBIC 2010a). It has been assigned a G3S1 (Vulnerable/Critically Imperiled) ranking in Oregon (ORBIC 2013.) It has been identified as a Type 2 BLM species in Idaho. Surveys from 1995 in adjacent southwestern Idaho and northern Nevada found 30 new populations, many of which are very large (NatureServe 2013). Thirty-six occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.36 SMOOTH STICKLEAF (OREGON AND IDAHO BLM SENSITIVE, OREGON STATE ENDANGERED)

Smooth stickleaf (*Mentzelia mollis*), also known as soft blazingstar or smooth mentzelia, is a small annual species occurring in Idaho, Oregon, and Nevada. In Oregon and Idaho, it typically occurs in ash soils derived from the Sucker Creek Formation, but can also occur in a variety of habitats, including along stream paths or on outcrops and knobs or slopes of hillsides (CPNH 2013; IRHN 2013; NatureServe 2013; ODA 2012b; OFP 2012). It has been assigned a G2S2 (Imperiled/Imperiled) ranking

in Oregon and Idaho due to being endemic to Sucker Creek Formation ash/claybed outcrops of the Owyhee Desert, with disjunct populations in the Black Rock Desert area of northern Nevada. It has been identified as Type 2 BLM species in Idaho. It is locally abundant on suitable substrate, when the substrate is available and not compacted. Oregon populations total at least 37,000 plants. Many occurrences are located in areas with mining claims and disturbance associated with mineral exploration is the primary threat to this species. Other threats include off-road vehicle recreational activity and livestock grazing. Smooth mentzelia does not germinate easily on compacted soil (e.g., by off-road vehicles). It does recolonize after disturbance if soil is permeable (NatureServe 2013). Seventy-one occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.37 SNAKE RIVER GOLDENWEED (OREGON AND IDAHO BLM SENSITIVE, OREGON STATE ENDANGERED)

Snake River goldenweed (*Pyrocoma radiata* syn. *Haplopappus radiata*), also known as ray goldenweed, is a perennial forb endemic to Idaho and Oregon on the lower confines of the Snake River Canyon and adjacent slopes. Found on xeric scablands with scant vegetation, ridges, a cemetery (disturbed and undisturbed areas), moderately steep, mostly south-facing slopes, moist slopes; in gray shale, shallow coarse stony or rocky basalt derived soils; reported from 2,320 to 5,400 feet elevation (IRHN 2013; NatureServe 2013; OFP 2012). It has been assigned a G3S3 (Vulnerable/Vulnerable) ranking in Oregon and Idaho, due to being known from a limited number of occurrences in a restricted range. It has been identified as a Type 3 BLM species in Idaho. The greatest threat to the species is from overgrazing and the associated mass introduction of annual grasses. Other threats include: conversion of land to agriculture, road construction and maintenance, and mining operations. Most of the known populations occur on federal lands (NatureServe 2013). From the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6, 308 occurrences were identified.

D.5.38 TOLMIE'S ONION (IDAHO BLM SENSITIVE)

Tolmie's onion (*Allium tolmiei* var. *persimile*) is an Idaho endemic restricted to three counties, Adams, Gem, and Washington, in the area surrounding the Seven Devils Mountains (NatureServe 2012). It usually grows in seasonally wet soils that dry during the course of the summer occurring at hillside seeps, seasonal watercourses, swales and roadcuts (Moseley and Mancuso 1990). Like most *Allium* spp, Tolmie's onion is a perennial species resprouting each season from an underground bulb. It has been assigned a G4G5T3S3 (Trinomial Vulnerable/Vulnerable) ranking in Idaho, due to being an endemic species with a narrow range, however individuals are numerous in suitable habitat and most occurrences are located on USFS protected lands (IFWIS 2016; Moseley and Mancuso 1990; NatureServe 2012). It has been identified as a Type 4 BLM species in Idaho. Currently, there are 35 known occurrences with the strong likelihood of undocumented populations existing (NatureServe 2012). Two occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.39 WATER-THREAD PONDWEED (OREGON AND IDAHO BLM SENSITIVE, USFS SENSITIVE)

Water-thread pondweed (*Potamogeton diversifolius*), an aquatic vascular plant, also known as Rafinesque's pondweed or diverse-leaved pondweed, is a nationwide species which occurs as geographical outliers in Oregon and Idaho; found primarily in man-made reservoirs, or rarely impounded wetland depressions (CPNH 2013; IRHN 2013; NatureServe 2013). It has been assigned a G5S1 (Secure/Critically Imperiled) ranking in Oregon and Idaho, but has not been analyzed by NatureServe to determine detailed threats and extent of known occurrences (IFWIS 2016; ORBIC 2013). It has been identified as a Type 4 BLM species in Idaho. Thirty occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.40 WHITE WOOLY BUCKWHEAT (IDAHO BLM SENSITIVE)

White wooly buckwheat (*Eriogonum ochrocephalum* var. *calcareum*) is a perennial forb also known as calcareous buckwheat and as Harper wild buckwheat. White wooly buckwheat is known from Nevada, southern Baker and northern Malheur Counties, Oregon, and from Elmore, Owyhee, Payette, Twin Falls and southern Washington Counties, Idaho. Associated species include sagebrush and shadescale (*Atriplex confertifolia*) (CPNH 2012). It has been reported as locally abundant on barren white volcanic ash-clay, diatomaceous or gumbo flats, washes and slopes (NatureServe 2013) in saltbush and sagebrush communities, and in juniper woodlands; between 1,900 and 5,900 feet elevation (Eriogonum Society 2010). It has been assigned a G5T3S2 (Trinomial Vulnerable/Imperiled) ranking in Idaho, due to moderate numbers, abundance and range, with threats but the ability to recolonize disturbed sites, including diatomaceous mine tailings (IFWIS 2016; NatureServe 2013). It has been identified as a Type 3 BLM species in Idaho. Thirty-five occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.41 WISHBONE BUSH (NONE)

Wishbone bush (*Mirabilis laevis* var. *retorsa*) is also known as Bigelow's four-o'clock, and is a perennial forb known from California, Nevada, Utah and Arizona, with Oregon on the edge of its range (NatureServe 2013). In Oregon it is only known from Malheur and Harney Counties (USDA 2013). Specimens and observation records of Bigelow's four-o'clock have been made at approximately 2,400 feet elevation, in the following habitats: soft, yellow-pink ash; red cinder slope; rocky wall of Owyhee Canyon; and the base of rhyolite cliffs (OFP 2012). It has been assigned a G4G5T4S3 (Trinomial Apparently Secure/Vulnerable) ranking in Oregon, but has not been analyzed by NatureServe to determine detailed threats and extent of known occurrences (ORBIC 2013). Ten occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.

D.5.42 WOOLYFRUIT SEDGE (OREGON BLM SENSITIVE, USFS SENSITIVE)

Woolyfruit sedge (*Carex lasiocarpa* var. *americana*), also known as slender sedge, is a perennial graminoid widely distributed across northern North America occurring in every Canadian province and

30 states, including Oregon and Idaho (NatureServe 2012). Due to its large range, it has been assigned a G5T5S2 (Trinomial Secure/Imperiled) ranking in Oregon (ORBIC 2013). However, the montane fen habitats it occupies are uncommon landscape features and only two occurrences are known in Oregon east of the Cascades (Yates 2010). Twenty-four occurrences were identified from the compiled occurrence data used in Sections 3.2.3.5 and 3.2.3.6.