Draft Biogeoclimatic Zones and Subzones of the Western United States

Del Meidinger & Will MacKenzie

[October 2021]

Revised April 2024

Del Meidinger
Meidinger Ecological Consultants Ltd.
Victoria BC

Will MacKenzie
Provincial Research Ecologist
BC Ministry of Forests

CONTENTS

1. INTRODUCTION

Biogeoclimatic Ecosystem Classification (Pojar, Klinka, and Meidinger 1987; MacKenzie and Meidinger 2018) is used in British Columbia to make site specific tree species reforestation decisions (as well as other applications). Due to climate change, it is necessary to consider possibly future climates in tree species selection decisions. Mackenzie and Mahony (2021) describe the ecological approach being taken to make climate-change informed reforestation decisions in British Columbia. To develop their approach (MacKenzie and Mahony 2021), equivalent biogeoclimatic units were required for the western United States. As such, biogeoclimatic principles were applied to the western United States, utilizing existing data from various sources, including Forest Inventory and Analysis (FIA)[1], VegBank[2], and USDA Forest Service.

The biogeoclimatic zones and subzones were mapped using a modelling approach that uses a Random Forests[3] algorithm, along with ~37,000 training points assigned to biogeoclimatic units, and a downscaled climate surface model[4], to approximate the mapping of the units. The training points were assigned to biogeoclimatic units by D. Meidinger and W. MacKenzie by reviewing US vegetation and habitat classification reports (see Literature Cited) and the data associated with each plot/point.

Thirty-one biogeoclimatic zones were mapped in the US west – eleven of which also occur in British Columbia (Meidinger and Pojar 1991) and two of which occur in Alberta (Natural Regions Committee 2006). The 18 new biogeoclimatic zones were proposed based on a review of vegetation description reports and data.

Most zones have multiple subzones and about 150 biogeoclimatic subzones were mapped. A subzone is a regional climate where the potential natural vegetation on zonal sites is of one plant association (Pojar, Klinka, and Meidinger 1987; Meidinger and Pojar 1991).

This report contains brief descriptions of the zones and subzones of the area of interest in the western United States.

[1] https://www.fia.fs.fed.us/
[2] http://vegbank.org/vegbank/index.jsp
[3] https://en.wikipedia.org/wiki/Random_forest
[4] http://www.climatewna.com/

2. COASTAL FORESTED ZONES

2.1. Coastal Douglas-fir [CDF]

The Coastal Douglas-fir (CDF) Zone is a lowland zone with a maritime climate, extending from northern California, north through the Willamette Valley and Puget Trough (Franklin and Dyrness 1988), into southwestern British Columbia, primarily on south-east Vancouver Island (Meidinger and Pojar 1991).

The zone is characterized by forests dominated by Douglas-fir (*Pseudotsuga menziesii*), which also regenerates in the shade of the canopy (Table 1). Garry oak (*Quercus garryana*) and arbutus (*Arbutus menziesii*) are common on dry sites. Western redcedar dominates on wetter sites. Grand fir (*Abies grandis*) is a generally component of mesic Douglas-fir forests. Common early seral deciduous trees are red alder (*Alnus rubra*) and bigleaf maple (*Acer macrophyllum*). The understorey of Douglas-fir forests is usually dominated by salal (*Gaultheria shallon*) and dull Oregon-grape (*Mahonia nervosa*). Other understorey species include oceanspray (*Holodiscus discolor*), sword fern (*Polystichum munitum*), vanilla-leaf (*Achlys triphylla*), trailing blackberry (*Rubus ursinus*), and in southern portions, poison oak (*Toxicodendron diversilobum*)

Western hemlock (*Tsuga heterphylla*) increases with elevation and climatic moisture, and the Coastal Western Hemlock (CWH) zone abuts the CDF over its range.

USNVC: Zonal forests are included in Macrogroup M886: Southern Vancouverian Dry Foothill Forest & Woodland

2.1.1. CDF Subzones

Three subzones (Table 2) are recognized, mostly characterizing a latitudinal climatic moisture gradient.

Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types used for the data summaries are listed.

Table 1. Tree species of Forested Coastal Biogeoclimatic Zones

Scientific Name	CDF*	CMX	CWF	CRF	CWH	MH	MHRF	Common Name
Pseudotsuga menziesii	**C****	**C**	**C**	**C/S**	**C/S**		s	Douglas-fir
Arbutus menziesii	c	**C**		c				arbutus
Thuja plicata	c			c	**C**			western redcedar
Abies grandis	c			c				grand fir
Calocedrus decurrens	c	c	**C**					incense-cedar
Notholithocarpus densiflorus		**C/S**		**C**				tanoak
Quercus chrysolepis		**C**						canyon live oak
Abies concolor		c	**C**				c	white fir
Chrysolepis chrysophylla		c	c		c		c	giant chinkapin
Chamaecyparis lawsoniana		c						Port Orford-cedar
Sequoia sempervirens				**C**				coast redwood
Tsuga heterophylla				**C**	**C**	c		western hemlock
Abies amabilis					**C**	**C**		amabilis fir
Chamaecyparis nootkatensis					c	c		yellow-cedar
Abies procera					c			noble fir
Picea sitchensis					c			Sitka spruce
Tsuga mertensiana						**C**	**C**	mountain hemlock
Abies lasiocarpa						c		subalpine fir
Abies magnifica							**C**	California red fir
Pinus contorta							s	lodgepole pine
Acer macrophyllum	**S**	**S**		s	**S**			bigleaf maple
Quercus garryana	**S**							Garry oak
Pinus ponderosa	s	s	s					ponderosa pine
Fraxinus latifolia	s							Oregon ash
Alnus rubra	s			s	**S**			red alder
Cornus nuttallii	s	s			s			western flowering dogwood
Quercus kelloggii	s	s						California black oak
Umbellularia californica		s		s				California laurel
Pinus lambertiana		s	s					sugar pine
Pinus monticola			s		s	s	s	western white pine

* Zone names: CDF: Coastal Douglas-fir; CMX: Coastal Mixed Conifer; CWF: Coastal White Fir; CRF: Coastal Redwood Forest; CWH: Coastal Western Hemlock; MH: Mountain Hemlock; MHRF: Mountain Hemlock – Red Fir.

** **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

Table 2. CDF Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	CDFmm_OR	CDFmm_WA	CDFxm_CA	Common Name
Pseudotsuga menziesii	**C***	**C**	**C**	Douglas-fir
Abies grandis	c	c		grand fir
Thuja plicata	c	c		western redcedar
Quercus chrysolepis			c	canyon live oak
Calocedrus decurrens			c	incense-cedar
Acer macrophyllum	**S**	**S**		bigleaf maple
Quercus garryana	**S**		**S**	Garry oak
Alnus rubra	s	**S**		red alder
Arbutus menziesii	s	s	s	arbutus
Pinus ponderosa			s	Ponderosa pine
Quercus kelloggii			**S**	black oak
Pinus lambertiana			s	sugar pine

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

2.1.2. CDFmm_WA – Moist Maritime Washington CDF

This subzone occurs mostly in land areas adjacent to the straits of Juan de Fuca and Georgia, including the San Juan Islands, and in the drier climatic areas of the Puget Trough. These areas are in a strong rain shadow of the Olympic Mountains (Franklin and Dyrness 1988) (see p. 88-89). Zonal sites are characterized by forests of Douglas-fir, often with some grand fir (Table 2) understorey of these stands. Garry oak woodlands occur on dry sites and those with a history of indigenous peoples burning.

The CWHxm_WA occurs at elevations above this subzone, or adjacent where the climate is slightly moister. The CDFmm (Green and Klinka 1994) is an equivalent subzone that occurs northward in Canada.

Zonal association: PSME/GASH, PSME/MANE2 (Hall 1998)

CDFmm_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Qg** [FdRa]			102			
2	**Fd** [QgRa]			103			PSME-ARME/GASH
3		**Fd** [BgDrMb]		101			PSME/HODI-ROGY
4		(CwQgRa)					PSME/GASH, PSME/BENE
5	110	**Fd**[DrMb](CwBg)		**FdCwDr**[MbSs](A		112	
6	111	**FdCw**[DrMbBg](H		**FdCwDr**[ActMbB		113	TSHE/LYAM3
7							

110	**Fd** [DrMb] (CwBg)
111	**FdCw** [DrMbBg] (Hw)
112	**FdCwDr** [MbSs] (Act)
113	**FdCwDr** [ActMbBg] (Ss)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 1. CDFmm_WA tree species suitability and plant associations displayed on edatopic grid.

2.1.3. CDFmm_OR – Moist Maritime Oregon CDF

This subzone occurs primarily in the Willamette Valley in Oregon. It also occurs in the Umpqua Valley. Zonal sites are characterized by forests of Douglas-fir, usually with some grand fir (Table 2). Salal and dull Oregon-grape dominate the understorey of these stands, often with some oceanspray. Other common understorey species are beaked hazelnut (*Corylus cornuta*), common snowberry (*Symphoricarpos albus*), mountain sweet-cicely (*Osmorhiza berteroi*), trailing blackberry (*Rubus ursinus*), white insideout flower (*Vancouveria hexandra*), and broad-leaved starflower (*Trientalis borealis* ssp. *latifolia*).

Before settlement, much of the subzone was prairie and oak savanna—the oak in the Willamette is mostly Garry oak (also called Oregon white oak), although California black oak (*Quercus kelloggii*) is present in the southern Willamette and into the Umpqua valley. Aboriginal communities were probably responsible for most of the fires that created and maintained these open oak conditions. Since settlement, there has been a replacement of prairies and savannas by closed oak forest.

Conceptually, the CWHxm_OR occurs at elevations above this subzone, however, in the mapping, CWHdm_OR also abuts the CDFmm_OR at higher elevations.

Zonal associations: ABGR/MANE2-GASH, PSME/MANE2-GASH, PSME/HODI-SYMPH, PSME/GASH-BENE2, PSME/HODI-MANE2, PSME/MANE2 (C McCain and Diaz 2002).

CDFmm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Qg** [RaQbFd]			102			
2	**FdQg**[QbRaPy](BgMb)			103			ABGR/TODI, PSME/TODI
3		**Fd** [MbPy]		101			ABGR/MANE2-GASH, PSME/MANE2-GASH, PSME/HODI-SYMPH
4		(BgRaOaDr)					PSME/GASH-BENE2, PSME/HODI-MANE2, PSME/MANE2
5	110	**Fd**[DrMb](CwBg)		**FdDr**[CwMb](Act		112	ABGR/COCO6/VAHE, PSME/COCO6/SYMO/POMU, ABGR/HODI/POMU
6	111	**FdCw**[DrMbBg](H		**FdCwDrAct**[MbE		113	THPL/BENE2/POMU
7							

110	**Fd** [DrMb] (CwBg)
111	**FdCw** [DrMbBg] (Hw)
112	**FdDr** [CwMb] (ActGp)
113	**FdCwDrAct** [MbBgOg]

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 2. CDFmm_OR tree species suitability and plant associations displayed on edatopic grid.

2.1.4. CDFxm_CA – Very Dry Maritime California CDF

This subzone is in southwest Oregon (Medford, Rogue Valley) and northern California. Data is limited for this subzone, however, along a gradient from the central portion to the peripheries of the subzone around Medford, OR the gradient is from ponderosa pine to Douglas-fir to grand fir. Arbutus occurs. Sugar pine (*Pinus lambertiana*), and Jeffrey's pine (*P. jeffreyi*) (on serpentine soils) are characteristic of the valley. Cottonwood (*Populus trichocarpa*) riparian forest occurs along river. Garry oak and California black oak both occur on mesic sites (see Table 2).

Some 'southern Oregon' chaparral—*Ceanothus cuneatus, Arctostaphylos viscida* and *A. canescens*, with *Ceaonthus* on the driest sites and may actually be climax in the valley bottom.

At elevations above this subzone is the CMXdm_OR.

Zonal association: PSME-PIPO/RHDI6, QUGA4/PSME/RHDI6, QUGA4-PSME/TODI (Atzet, White, McCrimmon, et al. 1996)

CDFxm_CA

	A	B	C	D	E		Habitat Types/Associations
0							
1	**QgJw**[PcRa](PzQc)			102			
2	**Qg**[PyRaJw](FdPzQ			103			QUGA4/CYEC, PIPO/QUKE, PIPO-QUKE/PUTR2/ACOCO
3		**FdQg**		101			
4		[PyQbRa](PsOa)					PSME-PIPO/RHDI6, QUGA4/PSME/RHDI6, QUGA4-PSME/TODI
5	110	**Fd**[PyQbQg](M		**Fd**[Mb](QbOa)		112	
6	111	**Fd**[MbOa](Qb)		**FdAct**[MbOa]		113	PSME/DRY SHRUB, PSME-PIPO/TODI, PSME-QUCH2/POMU
7							
						103	**Qg** [PyRaJw] (FdPzQbQc)
						110	**Fd** [PyQb] (MbOa)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 3. CDFxm_CA tree species suitability and plant associations displayed on edatopic grid.

2.2. Coastal Mixed Evergreen [CMX]

The Coastal Mixed Evergreen (CMX) Zone is a lowland to montane zone of southwest Oregon and northern California (Sawyer 2007; Atzet, White, Mccrimmon, et al. 1996). The zone is characterized by forests dominated by Douglas-fir (*Pseudotsuga menziesii*), with a lower canopy of broad-leaved evergreen trees, usually dominated by tanoak (*Notholithocarpus densiflorus*), arbutus (*Arbutus menziesii*), and/or giant chinkapin (*Chrysolepis chrysophylla*) (Table 1).

Other hardwoods include California laurel (*Umbellularia californica*), canyon live oak (*Quercus chrysolepis*), California black oak (*Quercus kelloggii*), Garry oak (*Quercus garryana*), and bigleaf maple (*Acer macrophyllum*). Other common conifers are grand fir (*Abies grandis*), white fir (*Abies concolor*), Port Orford-cedar (*Chamaecyparis lawsoniana*), incense-cedar (*Calocedrus decurrens*), sugar pine (*Pinus lambertiana*), and ponderosa pine (*Pinus ponderosa*).

The understorey is often sparse, but common species can include baldhip rose (*Rosa gymnocarpa*), evergreen huckleberry (*Vaccinium ovatum*), dull Oregon-grape (*Mahonia nervosa*), sword fern (*Polystichum munitum*), and poison oak (*Toxicodendron diversilobum*).

White fir increases with elevation and the Coastal White Fir (CWF) zone occurs at elevation above the CMX. In Oregon, the CMX occurs almost to the coast, where a "hypermaritime" Coastal Western Hemlock subzone (CWHmh_OR) occurs. In California, the hypermaritime band along the coast is replaced by the Coastal Redwood Forest (CRF) zone.

USNVC: Zonal forests are included in Macrogroup M009: Californian Forest & Woodland [*Quercus agrifolia – Umbellularia californica – Hesperocyparis* spp. Forest & Woodland], specifically, G208 Californian Moist Coastal Mixed Evergreen Forest Group.

2.2.1. CMX Subzones

Four subzones (Table 3) are recognized over a combined west to east and north to south moisture gradient.

Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types used for the data summaries are listed.

Table 3. CMX Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	CMXxm_CA	CMXdm_OR	CMXmm_OR	CMXwm_OR	Common Name
Pseudotsuga menziesii	**C***	**C**	**C**	**C**	Douglas-fir
Quercus chrysolepis	**C**	**C**	c	**C**	canyon live oak
Calocedrus decurrens	c	c		c	incense-cedar
Abies concolor	c	c		c	white fir
Arbutus menziesii		**C**	c	c	arbutus
Chrysolepis chrysophylla		c		c	giant chinkapin
Notholithocarpus densifolius	c		**C**	**C**	tanoak
Tsuga heterophylla			c		western hemlock
Chamaecyparis lawsoniana			c	c	Port Orford-cedar
Pinus lambertiana	s	**S**	s	**S**	sugar pine
Acer macrophyllum	s	s	**S**	s	bigleaf maple
Quercus kelloggii	**S**	**S**			California black oak
Pinus ponderosa	**S**	**S**			ponderosa pine
Quercus wislizeni	**S**				interior live oak
Umbellularia californica	s		s		California laurel
Cornus nuttallii		s	s	s	western flowering dogwood
Alnus rubra			s		red alder

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

2.2.2. CMXwm_OR – Wet Maritime Oregon CMX

This subzone occurs in the western distribution of the zone, in southern Oregon and northern California. Characteristic trees are Douglas-fir, tanoak, arbutus, and canyon live oak (Table 3). Other common trees include white fir, incense cedar, giant chinkapin, and sugar pine. The understorey includes dull Oregon-grape, baldhip rose, salal (*Gaultheria shallon*), evergreen huckleberry, beargrass (*Xerophyllum tenax*), prince's pine (*Chimaphilla umbellata*), Pacific rhododendron (*Rhododendron macrophyllum*), vanilla-leaf (*Achlys triphylla*), and rattle-snake plantain (*Goodyera oblongifolia*),

At lower elevations is either the CMXmm_OR or CMXxm_CA. The CWF zone occurs at elevations above this subzone. In California, it is the CWFds_CA, whereas in Oregon it is the CWFwm_OR. It abuts the CWHdm_OR in the northwest of its range and the CMXdm_OR occurs at equivalent elevations to the east, where the climate is slightly less maritime.

Zonal Habitat types: LIDE3-PSME/GASH-RHMA3, LIDE3-PSME/GASH-BENE2, LIDE3-PSME/GASH-VAOV2, CHAL/RHMA3/GASH (Atzet, White, McCrimmon, et al. 1996).

CMXwm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**FdRaQc** [QkOtOyPs](OaPy)				102		PSME-QUKE/RHDI6, LIDE3-PSME-QUCH2/RHDI6, LIDE3-PSME-QUCH2/BENE2
2	**FdRaOtQc** [OyPsOaGp](PzPyQg)				103		PSME/DRY SHRUB, PSME-QUCH2-LIDE3, PSME-QUCH2/RHDI6
3		**FdOt** [BcPs]		101			LIDE3-PSME/GASH-RHMA3, LIDE3-PSME/GASH-BENE2, PSME/GASH/RHMA3
4		(RaOyPwQcYpOaMbPkGp)					LIDE3-PSME/GASH-VAOV2, CHLA/RHMA3/GASH, ABCO-LIDE3/CHUM
5	110	**FdOt**[Yp](BcPwH		**Yp**[FdMbOt](BcP		112	LIDE3/VAOV2-RHMA3-GASH, LIDE3-ACMA3-QUCH2-POMU, CHLA-ABCO/BENE2
6	111	**Fd**[OtYp](BcPwH		**Yp**[FdMbOt](BcP		113	LIDE3-CHLA/GASH, ABCO-CADE27/TRLA6
7							

110	**FdOt** [Yp] (BcPwHwMb)
111	**Fd** [OtYp] (BcPwHw)
112	**Yp** [FdMbOt] (BcPw)
113	**Yp** [FdMbOt] (BcPw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 4. CMXwm_OR tree species suitability and plant associations displayed on edatopic grid.

2.2.3. CMXmm_OR – Moist Maritime Oregon CMX

This subzone is the westernmost of the four subzones and occurs in the moister, mostly windward slopes, closest to the coast, in southern Oregon and northern California. Characteristic trees are Douglas-fir, tanoak, and arbutus, and (Table 3**Error! Reference source not found.**). Other common trees include canyon live oak, bigleaf maple, red alder, and California laurel. Port Orford-cedar and western hemlock are locally common in the northern part of the range. The understorey includes dull Oregon-grape, evergreen huckleberry, sword fern, baldhip rose, salal (*Gaultheria shallon*), Pacific rhododendron (*Rhododendron macrophyllum*), and poison-oak (*Toxicodendron diversilobum*).

The CMXwm_OR occurs at elevations above this subzone. At lower elevations to the west, the CWHmh_OR abuts in the northern range, and the CRFdh_CA in the southern range. The CMXdm_OR occurs at equivalent elevations to the east, where the climate is slightly less maritime.

Zonal Habitat types: LIDE3-PSME/GASH-RHMA3, LIDE3-PSME/GASH-BENE2, LIDE3-PSME/GASH-VAOV2, LIDE3-PSME-QUCH2/RHDI6, LIDE3/VAOV2-RHMA3-GASH (Atzet, White, McCrimmon, et al. 1996).

CMXmm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**QcRa**[PyFdPsQbOtGp](OlOyQg)				102		PSME-QUKE/RHDI6, LIDE3-PSME-QUCH2/BENE2, PSME-QUKE/RHDI6
2	**FdRaPs** [QcOt](OlOyPyOaGpQb)				103		PSME/DRY SHRUB, PSME-QUCH2-LIDE3
3		**FdOt**		101			LIDE3-PSME/GASH-RHMA3, LIDE2-PSME-QUCH2/RHDI6
4		[OlRa] (PsOyQcMb)					LIDE3-PSME/GASH-VAOV2, LIDE3-PSME/GASH-BENE2, LIDE3/VAOV2-RHMA3-GASH
5	110	**Fd**[YpMbDrOtOl]		**FdMb**[YpDrOtOl]		112	LIDE3-TSHE/VAOV2/POMU, TSHE/POMU, LIDE3-TSHE/VAOV2/POMU-RIP
6	111	**FdDr**[YpMbOtOl		**FdMb**[YpDrOtOl]		113	TSHE-LIDE3-UMCA, CHLA/VAOV2POMUM, TSHE/RUSP, CHLA-TSHE/POMU
7							

110	**Fd** [YpMbDrOtOl] (HwBc)
111	**FdDr** [YpMbOtOl (HwBc)
112	**FdMb** [YpDrOtOl] (HwBc)
113	**FdMb** [YpDrOtOl] (HwBc)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 5. CMXwm_OR tree species suitability and plant associations displayed on edatopic grid.

2.2.4. CMXdm_OR – Dry Maritime Oregon CMX

This subzone occurs on the leeward slopes along the coast of southern Oregon and into California.

Characteristic trees are Douglas-fir, arbutus, and canyon live oak (Table 3). Other common trees include sugar pine, ponderosa pine, incense-cedar, white fir, giant chinkapin, and California black oak. The understorey includes poison oak, dull Oregon-grape, sword fern, baldhip rose, oceanspray (*Holodiscus discolor*), trailing snowberry (*Symphoricarpos hesperius*) pink honeysuckle (*Lonicera hispidula*), and rattle-snake plantain.

The CWFmm_OR occurs at elevations above this subzone; the CDFxm_CA below. The CMXwm_OR occurs at similar elevations to the west, and the CMXxm_CA to the south.

Zonal Habitat types: ABCO-PSME/ROGY, PSME-ABCO, ABCO/BENE2, ABCO-CADE27/TRLA6, PSME/GASH-BENE2, PSME/HODI/WHMO, PSME-QUCH2/BENE2 (Atzet, White, McCrimmon, et al. 1996).

CMXdm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**PyQb**[QgPz](FdQcRa)				102		PIJE-CADE27/ARVI4, PIPO-QUKE, PIPO-PSME, QUGA4-PSME/RHDI6
2	**FdPyQb**[RaQgQc](PsPz)				103		PSME-QUCH2/RHDI6, PSME-PIPO/RHDI6, PSME-QUKE/RHDI6, PSME/DRY SHR
3		**Fd**		101			PSME/GASH-BENE2, PSME/HODI/WHMO, PSME-QUCH2/BENE2
4		[QbPyOaBcRa](QcOt)					ABCO-PSME/ROGY, PSME-ABCO, ABCO/BENE2, ABCO-CADE27/TRLA6
5	110	**Fd**[Bc](PyRaM		**Bc**[FdMbOa](C		112	PSME/ACCI-BENE2, PSME/BENE2/POMU, ABCO/GASH-BENE2
	111	**Fd**[Bc](MbOa)		**Bc**[MbDrFdOa		113	ABCO/BENE2/LIBOL, LIDE3-ACMA3-QUCH2/POMU
7							
						110	**Fd [**Bc] (PyRaMbOy)
						111	**Fd** [Bc] (MbOa)
						112	**Bc** [FdMbOa] (Oy)
						113	**Bc** [MbDrFdOaOg]

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

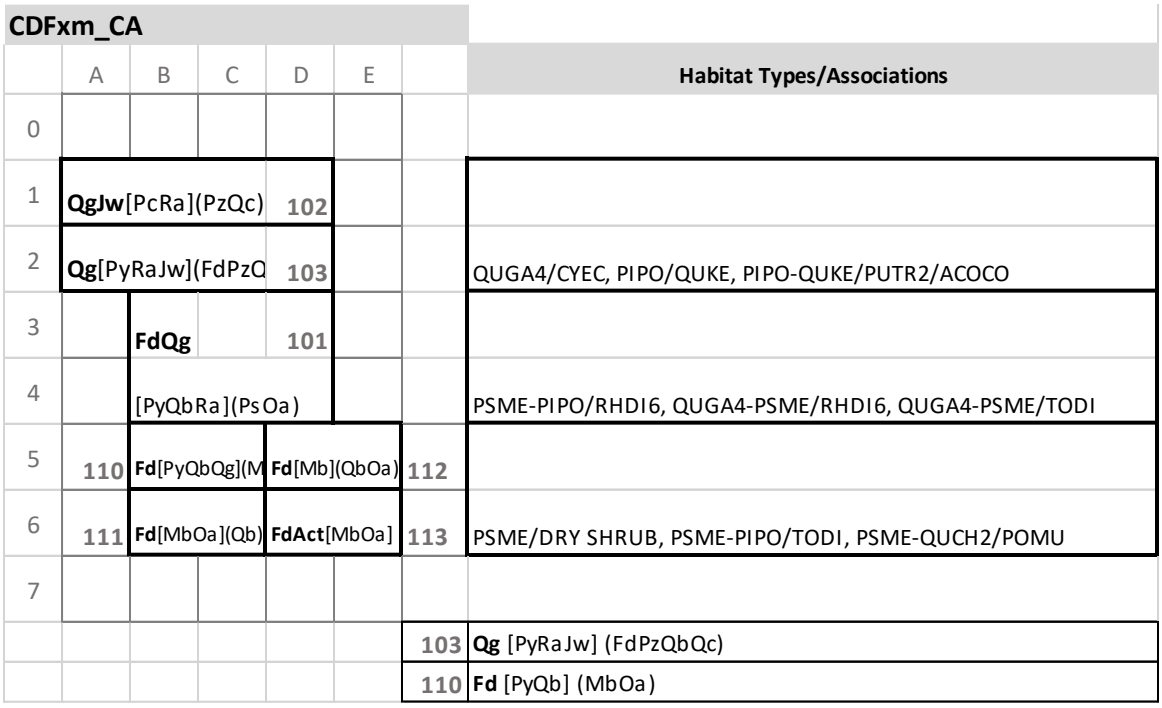
Figure 6. CMXdm_OR tree species suitability and plant associations displayed on edatopic grid.

2.2.5. CMXxm_CA – Very Dry Maritime California CMX

This subzone occurs on forested slopes at elevations above the California Central Valley. To the west of the Valley, it occurs east of the CMXwm_OR where climates are drier. Above the east side of the valley, it occurs above Oak Woodland and chaparral.

Characteristic trees are Douglas-fir, canyon live oak, California black oak, ponderosa pine, and interior live oak, along with some tanoak, sugar pine and California laurel (Table 3). Common species in the understorey are poison oak, sticky whiteleaf manzanita (*Arctostaphylos viscida*), California yerba santa (*Eriodictyon californicum*), and many introduced grasses.

Zonal Associations: Douglas-fir – Canyon live oak (Sawyer 2007).



Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 7. CMXxm_CA tree species suitability and plant associations displayed on edatopic grid.

2.3. Coastal Redwood Forest [CRF]

The Coastal Redwood Forest (CRF) Zone occurs along the coast of northern California in an area that is influenced by frequent summer fog. Coast redwood (*Sequoia sempervirens*) characterizes the zone (Table 1) and occurs on a range of sites.

The Coastal Mixed Evergreen (CMX) zone is located inland from the CRF, where there is little to no fog influence.

USNVC: Zonal forests are included in Macrogroup M024: Vancouverian Coastal Rainforest [*M024 Tsuga heterophylla – Picea sitchensis – Sequoia sempervirens* Rainforest], specifically G235: Californian Coastal Redwood Forest.

2.3.1. CRF Subzones

Only one subzone is recognized at present. Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types used for the data summaries are listed.

2.3.2. CRFdh_CA – Dry Hypermaritime California CRF

The subzone is known for its coast redwood forests. Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterphylla*) and grand fir (*Abies grandis*) are common associated tree species. Other trees include Port Orford-cedar (*Chamaecyparis lawsoniana*), western redcedar (*Thuja plicata*), tanoak (*Notholithocarpus densiflorus*), California laurel (*Umbellularia californica*) and, in the northern range, Sitka spruce (*Picea sitchensis*). Understory species include evergreen huckleberry (*Vaccinium ovatum*), swordfern (*Polystichum munitum*), and western trillium (*Trillium ovatum*).

Zonal Association: Coast redwood/Sword fern – Western trillium

CRFdh_CA

	A	B	C	D	E	Habitat Types/Associations
0						
1	**QbRa**[FdQxQc]			102		
2	**FdRa** [OcOtQb] (QxQc)			103		SESE2-MAFA-VIAN
3		**OcFdOtOl**		101		
4		[HwBgDr] (RaMb)				SESE2/POMU1-TROV
5	110	**OcOlMb**[FdOtSsHwDr](Bg)				SESE2/PTAQL-WOFP//Streamsides
6	111	**OcOlSsDrMb**[Hw](FdBg)				
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 8. CRFdh_CA tree species suitability and plant associations displayed on edatopic grid.

2.4. Coastal Western Hemlock [CWH]

The Coastal Western Hemlock (CWH) Zone is a lowland to montane zone of western Washington and Oregon, and north along the coast of British Columbia to southeast Alaska (Franklin and Dyrness 1988; Meidinger and Pojar 1991). The diagnostic climax tree species is western hemlock (*Tsuga heterophylla*) (Table 1). Western redcedar (*Thuja plicata*) is a common climax tree species over much of the zone. Amabilis (or silver) fir (*Abies amabilis*) and yellow-cedar (*Chamaecyparis nootkatensis*) are important climax species of higher elevation or more northern portions of the zone (although amabilis fir only occurs in extreme SE Alaska). Douglas-fir (*Pseudotsuga menziesii*) is a long-lived successional species that is common in the conterminous U.S. portion of zone and could be considered a 'climax' species on some sites. Other important late seral to climax species vary with geographic area and site and include Sitka spruce (*Picea sitchensis*), noble fir (*Abies procera*) and giant chinkapin (*Chrysolepis chrysophylla*). Red alder (*Alnus rubra*) is the most wide-ranging successional species. Bigleaf maple (*Acer macrophyllum*) is a major successional species in the conterminous US. Western white pine (*Pinus monticola*) is a successional species in much of the zone.

Salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), vanilla-leaf (*Achlys triphylla*) and sword fern (*Polystichum munitum*) are common understory species in drier climatic areas with a maritime climate. Oval-leaved and Alaskan blueberry (*Vaccinium ovalifolium, V. alaskaense*), and deer fern (*Blechnum spicatum*) are key understory species in moist and maritime climates.

The Mountain Hemlock (MH) zone occurs at elevations above the CWH.

USNVC: Zonal forests are included in Macrogroup M024: Vancouverian Coastal Rainforest [*M024 Tsuga heterophylla – Picea sitchensis – Sequoia sempervirens* Rainforest]

2.4.1. CWH Subzones

Twelve subzones (Table 4) are recognized over three major climatic belts that are parallel to the coast and the mountain ranges: hypermaritime, maritime and submaritime, as well as a latitudinal gradient.

Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types used for the data summaries are listed.

Table 4. CWH Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	CWHxm_WA	CWHxm_OR	CWHdm_WA	CWHdm_OR	CWHdm_WC	CWHdm_OC	CWHds_WA	CWHms_WA	CWHms_OR	CWHvm_WA	CWHvm_OR	CWHmh_OR	CWHwh_WA	CWHvh_WA	Common Name
Tsuga heterophylla	**C***	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	western hemlock
Thuja plicata	c	c	c	c	c	c	c	c	c	c	c	c	c	c	western redcedar
Abies grandis	c	c					c	c	c						grand fir
Calocedrus decurrens		c		c											incense-cedar
Abies amabilis							c	**C**	**C**	**C**	**C**				amabilis fir
Abies procera								c	c	c	c				noble fir
Abies lasiocarpa								c							subalpine fir
Chamaecyparis nootkatensis										c					yellow-cedar
Chamaecyparis lawsoniana												c			Port Orford-cedar
Picea sitchensis					c	c						**C**	**C**	**C**	Sitka spruce
Pseudotsuga menziesii	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	Douglas-fir
Alnus rubra	**S**	s	**S**	**S**	**S**	**S**				s	s	**S**	**S**	**S**	red alder
Acer macrophyllum	**S**	**S**	**S**	**S**	s	s							s		bigleaf maple
Cornus nuttallii	s	s	s	s											western flowering dogwood
Chrysolepis chrysophylla		s		s		s			s		s				giant chinquapin
Arbutus menziesii		s													arbutus
Pinus monticola							s	s	s	s	s				western white pine
Betula papyrifera							s								paper birch
Malus fusca														s	Pacific crab apple

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

2.4.2. CWHxm_WA – Very Dry Maritime Washington CWH

This subzone is primarily of the lowlands and submontane slopes of the Puget Trough Mountains of Washington. Although western hemlock is the ultimate climax species, and occurs in many stands, Douglas-fir dominates the forest cover due to past disturbance history. Common associated tree species (Table 4) are western redcedar, grand fir (*Abies grandis*), red alder and bigleaf maple, the latter two being strongly associated with successionally developing stands. The main understory species are salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), trailing blackberry (*Rubus ursinus*), oceanspray (*Holodiscus discolor*), vine maple (*Acer circinatum*) and sword fern (*Polystichum munitum*).

In areas with a dry enough climate for the CWHxm_WA, it occurs at elevations below the CWHdm_WA. This subzone is a southern variation of the CWHxm in British Columbia (Green and Klinka 1994).

Zonal Habitat types: TSHE/GASH/POMU, TSHE/GASH-MANE2, TSHE/GASH, PSME/MANE2-GASH (Jan A. Henderson et al. 1989; Topik, Halverson, and Brockway 1986)

CWHxm_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd** [Plc] (Ra)			102			
2	**Fd** (CwHwDrMb)			103			TSHE/GASH, PSME/GASH, TSHE/MANE2-DRY
3				101			TSHE/MANE2-GASH, TSHE/GASH-MANE2,
4		**Fd** [HwCwMbDr](Bg)					TSHE/ACTR, TSHE/GASH-VAOV2, PSME/MANE2-GASH
5	110	**HwCw**[FdDr](N		**FdCw**[HwDrMb		112	TSHE/POMU-TITR, TSHE/POMU, TSHE/GASH/POMU, TSHE/MANE2/POMU
6	111	**HwCw**[FdDrMb		**FdCw**[HwDrMb		113	TSHE/OPHO/MAST4, TSHE/ATFI, TSHE/LYAM3
7							
						110	**HwCw** [FdDr] (Mb)
						111	**HwCw** [FdDrMb] (Bg)
						112	**FdCw** [HwDrMbOgActBg]
						113	**FdCw** [HwDrMbOgAct] (Bg)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 9. CWHxm_WA tree species suitability and plant associations displayed on edatopic grid.

2.4.3. CWHxm_OR – Very Dry Maritime Oregon CWH

This subzone occurs mostly on submontane slopes of the western Cascade Mountains of Oregon and into southern Washington, in areas that are climatically drier than the CWHdm_OR. There are some occurrences in the Coast Range southwest of Eugene, and in the Willamette Valley south of Eugene, Oregon. Although Douglas-fir dominates the forest cover, western hemlock is prominent in most stands (Table 4). Western redcedar often occurs in these stands—incense-cedar (*Calocedrus decurrens*) sometimes occurs. Common deciduous species are red alder, bigleaf maple, and giant chinkapin. Giant chinkapin and Douglas-fir are long-lived seral species and can persist in stands for long time periods. The main understory species are salal, dull Oregon-grape, vine maple, Pacific rhododendron (*Rhododendron macrophyllum*) and trailing blackberry.

The CWHxm_OR typically occurs at elevations between the CDFmm_OR and the CWHdm_OR.

Zonal Habitat types: TSHE/RHMA3-GASH-NWO Cascades, TSHE/MANE2/GASH-NWO Cascades, TSHE/MANE2-NWO Cascades, TSHE/RHMA3/MANE2-NWO Cascades (Cindy McCain and Diaz 2002; C McCain and Diaz 2002)

CWHxm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd** [Ra] (Qg)			102			PSME-TSHE/RHMA3, TSHE/RHMA3-GASH
2	**Fd**[Hw](QgCwRaOy)			103			TSHE/GASH, PSME/HODI-MANE2, PSME/HODI/WHMO, TSHE/GASH
3		**FdHw**		101			TSHE/MANE2-GASH, ABGR/MANE2, PSME/MANE2
4		[CwMbOa](BgRaOyDr)					TSHE/MANE2, PSME-TSHE/MANE2, PSME/MANE2-GASH
5	110	**HwCw**[FdDrOa		**FdCw**[HwDrMb		112	TSHE/POMU, TSHE/MANE2/POMU, TSHE/ACCI/POMU, TSHE/GASH/POMU
6	111	**HwCw**[FdDrMb		**FdCw**[HwDrMb		113	TSHE/OPHO, TSHE/RUSP, TSHE/LYAM3
7							
						110	**HwCw** [FdDrOa] (MbBg)
						111	**HwCw** [FdDrMb] (Bg)
						112	**FdCw** [HwDrMbOgActBg] (Oa)
						113	**FdCw** [HwDrMbOgActBg]

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 10. CWHxm_OR tree species suitability and plant associations displayed on edatopic grid.

2.4.4. CWHdm_WA – Dry Maritime Washington CWH

This subzone occurs on submontane slopes of the lee side of the Olympic Mountains and Coast Range of Washington, and in the western Cascade mountains of Washington. Douglas-fir and western hemlock are the dominant species in the overstory of most forest stands (Table 4). Western redcedar often occurs as well. Red alder and bigleaf maple are common in successional stands. The main understory species are salal, dull Oregon-grape, vine maple, sword fern, and red huckleberry (*Vaccinium parviflorum*).

Mostly occurs at elevations between the CWHxm_WA and CWHvm_WA; however, in the western part of its range, it abuts the CWHdm_OC, a hypermaritime influenced CWHdm. The CWHdm_WA subzone is a southern variation of the CWHdm in British Columbia (Green and Klinka 1994).

Habitat types: TSHE/GASH-BENE, TSHE/RHMA-GASH, TSHE/BENE, TSHE/BENE-GASH, TSHE/ACCI-BENE, TSHE/GASH, TSHE/ACTR (Jan A. Henderson et al. 1989; Topik, Halverson, and Brockway 1986; J A Henderson et al. 1992).

CWHdm_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	[Fd] (HwRaPlc)			102			PSME/HODI-ROGY, TSHE/RHMA3/GASH; TSHE/GASH-VAOV2
2	**Fd** [Hw] (CwDr)			103			TSHE/GASH, PSME/GASH, PSME/GASH-HODI
3		**FdHw**		101			TSHE/MANE2-GASH, TSHE/GASH-MANE2, TSHE/MANE2
4		[CwDrMb]					TSHE/ACTR, TSHE/ACCI-MANE2, TSHE/MANE2
5	110	**HwCw**[FdMbDr]		**FdCw**[ActMbDr]		112	TSHE/TITR, TSHE/MANE2/POMU, TSHE/GASH/POMU, TSHE/POMU, ETC
6	111	**HwCw**[FdMbDr]		**Cw**[SsActFdMbD		113	TSHE/OPHO-ATFI, TSHE/RUSP, TSHE/OPHO, TSHE/LYAM3
7							

110	**HwCw** [FdMbDr]
111	**HwCw** [FdMbDr]
112	**FdCw** [ActMbDr] (BgHw)
113	**Cw** [SsActFdMbDrBg] (Hw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 11. CWHdm_WA tree species suitability and plant associations displayed on edatopic grid.

2.4.5. CWHdm_WC – Dry Maritime Washington Coast CWH

This subzone occurs on submontane slopes of the windward side of the Olympic Mountains and Coast Range of Washington, just inland from the "hypermaritime" climate of the coast.

Douglas-fir and western hemlock are the dominant species in the overstory of most forest stands (Table 4), however Sitka spruce occurs frequently. Western redcedar often occurs as well. Red alder is a common seral species. The main understory species are red wood-sorrel (*Oxalis oregana*), salal, salal, Alaskan blueberry, deer fern, sword fern, red huckleberry (*Vaccinium parviflorum*), and salmonberry (*Rubus spectabilis*).

The CWHdm_WC mostly occurs at elevations between the CWHwh_WA and the CWHvm_WA, but where the Coast Range is low, it can abut the CWHdm_WA.

Habitat types: TSHE/VAAL, TSHE/VAAL-GASH, and TSHE/POMU-GASH (Jan A. Henderson et al. 1989).

CWHdm_WC

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd** [Hw]			102			TSHE/Dep.
2	**FdHw** (CwDr)			103			TSHE/GASH
3		**FdHw**		101			
4		[CwSsDr]					TSHE/VALL, TSHE-VAAL-GASH, TSHE/POMU-GASH
5	110	**Hw** [CwFdSsDr] (		**FdCw** [HwSsMbD		112	TSHE/OXOR, TSHE/VALL-OXOR, TSHE/POMU-OXOR, TSHE/POMU-TITR
6	111	**HwCw** [SsMbDr]		**CwHw** [FdSsMbD		113	PISI/OXOR, TSHE/GASH-OXOR, TSHE/LYAM
7							

110	**Hw** [CwFdSsDr] (Mb)
111	**HwCw** [SsMbDr] (Fd)
112	**FdCw** [HwSsMbDr] (Act)
113	**CwHw** [FdSsMbDr] (Act)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 12. CWHdm_WC tree species suitability and plant associations displayed on edatopic grid.

2.4.6. CWHdm_OR – Dry Maritime Oregon CWH

This subzone occurs primarily on the submontane slopes of the Coast Range and Cascade Mountains of Oregon and southern Washington, inland from the moister climate along the coast. Douglas-fir and western hemlock dominate the forest cover, although western redcedar and giant chinkapin often occur (Table 4). Common successional species are red alder and bigleaf maple. The main understory species are salal, dull Oregon-grape, Pacific rhododendron, vine maple, red huckleberry and sword fern.

The CWHdm_OR mostly occurs at elevations between the CWHxm_OR and the CWHvm_OR. However, towards the west coast, it abuts two hypermaritime subzones: the CWHwh_WA and CWHmh_OR.

Zonal Habitat types: TSHE/RHMA3-GASH, TSHE/MANE2-GASH, TSHE/RHMA3-MANE2, TSHE/MANE2; used NWO Cascades, NWO Coast, and SWO where applicable (Cindy McCain and Diaz 2002; C McCain and Diaz 2002; Topik, Halverson, and Brockway 1986).

CWHdm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	[Fd] (HwRaOy)			102			TSHE/RHMA3/XETE, TSHE/GASH
2	**Fd** [HwOy] (RaOaGp)			103			TSHE/GASH-RHMA3, TSHE/RHMA3-GASH, PSME/HODI/WHMO
3		**FdHw**		101			TSHE/MANE2-GASH, TSHE/GASH-BENE2, PSME/MANE2
4		[CwMbDrOy](OaGp)					TSHE/ACCI-GASH, TSHE/RHMA3-MANE2, TSHE/MANE2, TSHE/ACTR
5	110	**HwFd**[CwMbD		**FdCw**[HwDrMb]		112	TSHE/MANE2/POMU, TSHE/GASH/POMU, TSHE/POMU, TSHE/POMU-OXOR
6	111	**HwCw**[FdDrMb]		**Cw**[HwDrMbAct		113	TSHE/OXOR, TSHE/RUSP-ACCI, TSHE/RUSP, TSHE/LYAM
7							

110	**HwFd**[CwMbDr](BgOa)
111	**Hw** [FdCwDrMb] (Bg)
112	**FdCw**[HwDrMb](OaBg)
113	**Cw** [HwDrFdMbActBg] (Ss)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 13. CWHdm_OR tree species suitability and plant associations displayed on edatopic grid.

2.4.7.CWHdm_OC – Dry Maritime Oregon Coast CWH

This subzone occurs on the windward, submontane slopes of the Coast Range of Oregon, inland from the "hypermaritime" climate along the coast.

Douglas-fir and western hemlock dominate the forest cover, although Sitka spruce occurs frequently (Table 4). Western redcedar is common. Common successional species are red alder and bigleaf maple. The main understory species are salal, red huckleberry, Pacific rhododendron (*Rhododendron macrophyllum*), evergreen huckleberry (*Vaccinium ovatum*), salmonberry (*Rubus spectabilis*), red wood-sorrel (Oxalis oregana), Siberian springbeauty (*Claytonia siberica*), and sword fern.

The CWHdm_OC mostly occurs at elevations between the CWHwh_OR and the CWHdm_OR.

Zonal Habitat types: PISI/MEFE-VAPA, TSHE/GASH-NWO Coast, TSHE/RHMA3-VAOV2, TSHE/VAOV2, TSHE/MANE2-GASH-NWO Coast, TSHE/RHMA3-GASH-NWO Coast (Cindy McCain and Diaz 2002).

CWHdm_OC

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd** (Hw)			102			TSHE/RHMA3/XETE, TSHE/GASH
2	**Fd** [Hw] (Dr)			103			TSHE/GASH-RHMA3, TSHE/RHMA3-GASH, PSME/HODI/WHMO
3		**FdHw**		101			TSHE/MANE2-GASH-NWO, TSHE/GASH-NWO, TSHE/RHMA3-GASH-NOW
4		[SsDr](CwMb)					PISI/MEFE-VAPA, TSHE/RHMA3-VAOV2, TSHE/VAOV2
5	110	**Hw**[FdCwSsDr](N		**FdCwSs**[HwDrM		112	TSHE/RHMA3/POMU, PISI/OXOR, TSHE/POMU-NWO, TSHE/OXOR-NOW
6	111	**HwDr**[FdCwSs](N		**FdCwSs**[HwDrM		113	TSHE/RUSP, TSHE/RUSP-ACCI, PISI/RUSP, PISO/OPHO, TSHE/OPHO-NOW
7							

110	**Hw** [FdCwSsDr] (Mb)
111	**HwDr** [FdCwSs] (Mb)
112	**FdCwSs** [HwDrMb]
113	**FdCwSs** [HwDrMb]

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 14. CWHdm_OC tree species suitability and plant associations displayed on edatopic grid.

2.4.8. CWHds_WA – Dry Submaritime Washington CWH

This subzone occurs in the eastern Cascade Mountains of northern Washington, south to the central Oregon Cascades. Douglas-fir, western hemlock and western redcedar are the dominant forest overstory species, however, grand fir is also common (Table 4). Western white pine and bigleaf maple can occur in successional stands. The main understory species are dull Oregon-grape, vine maple, falsebox (*Paxistima myrsinites*), and twinflower (*Linnaea borealis*). Black huckleberry (*Vaccinium membranaceum*) and queen's cup (*Clintonia uniflora*) are often present.

The CWHds_WA occurs at elevations below the CWHms_WA, in its northern distribution, or the CWHms_OR in the south. This subzone is a southern variation of the CWHds in British Columbia (Green and Klinka 1994).

Zonal Habitat types: TSHE/BENE (WEN), TSHE/ACCI/CLUN, TSHE/MANE2, TSHE/PAMY/CLUN2 (Lillybridge et al. 1995).

CWHds_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	[FdPl](Py)			102			TSHE/BENE, ABGR/SPBEL/PTAQ, PSME/PAMY, PSME/ARUV
2	**Fd**[BgPl](HwCwPyEp)			103			
3		**Fd**		101			Bg alliance, TSHE/ACCI/CLUN, TSHE/ACTR, TSHE/PAMY,
4		[BgCwHwPw](BaEpMb)					ABGR/ACTR, ABGR/HODI
5	110					112	
6	111					113	THPL/OPHO, TSHE/ASCA3, ALSI-OPHO
7							
						110	**Hw** [CwFdPw](Ep)
						111	**Hw** [CwFd](DrSx)
						112	**BgCw** [FdPwAct](BaHw)
						113	**BgCw** [ActSx](FdDrHw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 15. CWHds_WA tree species suitability and plant associations displayed on edatopic grid.

2.4.9. CWHms_WA – Moist Submaritime Washington CWH

This subzone occurs in the eastern Cascade Mountains of Washington, where the climate is still influenced somewhat by the Pacific. Amabilis fir, western hemlock and Douglas-fir are the main canopy tree species (Table 4). Western redcedar or subalpine fir (*Abies lasiocarpa*) can be a component. Western white pine occurs in younger stands. The main understory species are black huckleberry, twinflower and queen's cup.

The CWHms_WA typically occurs at elevations above the CWHds_WA and below the MHms_WA, however, it also occurs below the ESSFmw_WA in the northeastern part of its range. To the east, it abuts the IGFdk_WA, as the climate transitions into a more typical continental climate. This subzone is a southern variation of the CWHms in British Columbia (Green and Klinka 1994).

Zonal Habitat types: ABAM/VAME-PYSE, ABAM/VAME-ORSE, ABAM/VAME/CLUN (WEN), ABAM/VAME/CLUN2 & ABAM/ACCI (Brockway et al. 1983; Lillybridge et al. 1995).

CWHms_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Pl** [FdLwPy](Hw)			102			PSME/PAMY
2	**Fd** [HwLw](BaBgCwPw)				103		Ba, Fd and Hw alliances
3		**FdHwBa**		101			ABAM/VAME/CLUN, ABAM/VAME-PYSE, TSHE/BENE
4		[BlBgPwCw] (Bp)					ABAM/XETE, ABAM/MEFE
5	110	**HwCw**[BaBl]		**CwFd**[HwBgBa		112	ABAM/GYDR
6	111	**HwCw**[BaBl]		**Cw**[FdHwBaAc		113	ABAM/OPHO
7							
						112	**CwFd** [HwBgBaActSx](BlBpPw)
						113	**Cw** [FdHwBaActSx](BlBpDr)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 16. CWHms_WA tree species suitability and plant associations displayed on edatopic grid.

2.4.10. CWHms_OR – Moist Submaritime Oregon CWH

This is the easternmost subzone of the CWH zone in Oregon and southern Washington, occurring at mid elevations of the Cascade Mountains where the climate is becoming less maritime. Amabilis fir, western hemlock and Douglas-fir are the main canopy tree species (Table 4). Black huckleberry and bear-grass (*Xerophyllum tenax*) are key understory species; others include Pacific rhododendron, prince's pine (*Chimaphila umbellata*), queen's cup, bunchberry (*Cornus canadensis*) and twinflower.

The CWHms_OR typically occurs at elevations below the MHdm_OR. It abuts the CWHdm_OR to the east.

Zonal Habitat types: ABAM/VAME/XETE, ABAM/RHMA/XETE, ABAM/VAME/CLUN (Brockway et al. 1983; C McCain and Diaz 2002; M. a Hemstrom et al. 1982).

CWHms_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Pl** [Fd](Hw)			102			ABGR/ARUV
2	**Fd**[Hw](Ba BgCwPw)				103		ABAM/MANE, ABAM/VAME/XETE, ABAM/RHMA3/XETE, ABAM/RHMA3-MANE
3		**BaHwFd**		101			ABAM/RHMA3-VAAL/COCA13, ABAM/VAAL/COCA13
4		[PwBpCw](BgOy)					ABAM/VAME/CLUN, ABAM/MEFE, ABAM/VAAL, ABCO/BENE/ACTR
5	110	**HwCw**[Ba](Fd)		**CwFd**[HwBaBp		112	ABAM/TITR, ABAM/TIUN, TSHE/ACTR, ABAM-TSHE/VAME/ACTR
6	111	**HwCw** [Ba]		**Cw**[FdHwBaBp		113	ABAM/OPHO
7							
						112	**CwFd** [HwBa BpActDr] (BgPw)
						113	**Cw** [FdHwBa BpActSx] (Dr)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 17. CWHms_OR tree species suitability and plant associations displayed on edatopic grid.

2.4.11. CWHvm_WA – Very Wet Maritime Washington CWH

This subzone occurs on the submontane and montane slopes of Olympic Mountains and the western Cascade Mountains of Washington. Amabilis fir and western hemlock are the characteristic dominant tree species (Table 4). Western redcedar often occurs; Douglas-fir is infrequent. The key understory species are Alaskan blueberry (*Vaccinium alaskaense*) and oval-leaved blueberry (*Vaccinium ovalifolium*); others include five-leaved bramble (*Rubus pedatus*), deer fern (*Blechnum spicant*), bunchberry and queen's cup.

The CWHvm_WA typically occurs at elevations above the CWHdm_WA and below the MHmm_WA. This subzone is a southern variation of the CWHvm in British Columbia (Green and Klinka 1994).

Zonal Habitat types: ABAM/VAAL/CLUN, ABAM/VAOV/CLUN2, ABAM/VAOV, ABAM/VAAL (Brockway et al. 1983; M. a Hemstrom et al. 1982; Franklin et al. 1988).

CWHvm_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	**HwCwFd** (Ba)			102			TSHE/GASH-BENE, TSHE/GASH, TSHE/BENE, TSHE/GASH-XETE
2	**HwCwFd**[Ba](DrPw)			103			TSHE/BENE-CHME, ABAM/BENE
3		**HwCwBa**		101			ABAM/VAAL-CLUN, ABAM/VAAL, ABAM/VAAL-GASH,
4		[PwFdDr] (BpYc)					ABAM/VAAL-BENE, TSHE/VAAL
5	110	**HwCwBa**[Dr](Y		**CwBa**[HwDrM		112	TSHE/POMU-TITR, ABAM/VAAL-TIUN, ABAM/VAAL-MADI2, ABAM/TIUN-STRO
6	111	**HwCwBa**[Dr](S		**CwBaSs**[HwDr		113	ABAM/OPHO-VAAL, TSHE/OPHO-ATFI, ABAM/RUSP-BLSP, ABAM/LYAM
7							

110	**HwCwBa** [Dr] (Yc)
111	**HwCwBa** [Dr] (SsYc)
112	**CwBa** [HwDrMbSsAct] (BpFd)
113	**CwBaSs** [HwDrMbAct]

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 18. CWHvm_WA tree species suitability and plant associations displayed on edatopic grid.

2.4.12. CWHvm_OR – Very Wet Maritime Oregon CWH

This subzone occurs at mid elevations of the western Cascade Mountains of Oregon. Amabilis fir and western hemlock are the characteristic dominant tree species (Table 4). Douglas-fir often occurs; noble fir (*Abies procera*) is infrequent. The key understory species are Alaskan blueberry, oval-leaved blueberry and vine maple. Black huckleberry is often present; other species include bunchberry, queen's cup, dwarf bramble (*Rubus lasiococcus*) and bear-grass.

This subzone occurs at elevations above the CWHdm_OR. Where mountains are high enough, the CWHvm_OR occurs below the MHdm_OR.

Zonal Habitat types: ABAM/VAOV, ABAM/VAAL, ABAM/VAAL/COCA & /COCA13, ABAM/MEFE (C McCain and Diaz 2002).

CWHvm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**HwFd** (CwBa)			102			TSHE/RHMA3-GASH, TSHE/RHMA3-MANE2, TSHE/MANE2-DRY
2	**HwFd**[CwBa](DrPw)			103			TSHE/GASH, ABAM/GASH
3		**FdHwBa**		101			TSHE/ACTR, ABAM/VAAL-GASH, ABAM/VAAL/COCA13, ABAM/VAAL
4		[CwBpPwDr] (Oy)					TSHE/BENE, TSHE/MANE2-GASH, ABAM/RHMA3-VAAL/COCA13
5	110	**HwCwBa**[Dr](F		**CwBa**[HwDrBp		112	ABAM/TITR, ABAM/TIUN, ABAM/OXOR, ABAM/ACCI/TITR, TSHE/POMU
6	111	**HwCwBa**[Dr]		**CwBa**[HwDrAc		113	ABAM/OPHO, TSHE/OPHO/MAST4, TSHE/VAAL-OPHO, TSHE/LYAM
7							

110	**HwCwBa** [Dr](Fd)
111	**HwCwBa** [Dr]
112	**CwBa** [HwDrBpFd] (Mb]
113	**CwBa** [HwDrAct] (Fd)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 19. CWHvm_OR tree species suitability and plant associations displayed on edatopic grid.

2.4.13. CWHmh_OR – Moist Hypermaritime Oregon CWH

This subzone occurs as a narrow strip along the outer coast of southern Oregon. Sitka spruce, western hemlock, and Douglas-fir are the main trees. Port Orford-cedar (*Chamaecyparis lawsoniana*), shore pine (*Pinus contorta* var. *contorta*), California laurel (*Umbellularia californica*), and red alder often occur (Table 4). The understory is dominated by shrubs such as evergreen huckleberry (*Vaccinium ovatum*), red huckleberry, salal, Pacific rhododendron, cascara (*Frangula purshiana*), and California wax-myrtle (*Morella californica*).

The CWHmh_OR occurs in the "fog belt" along the coast. To the south is the CRFdm_CA and to the north is the CWHwh_OR. The CMXmm_OR abuts this subzone on its eastern edge.

Zonal Habitat types: CHLA/VAOV2, TSHE/VAOV2, PISI/GASH-VAOV2 (Cindy McCain and Diaz 2002; M. A. Hemstrom and Logan 1986; Christy, Kagan, and Wiedemann 1998).

CWHmh_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Pl** (FdHwSsDr)			102			PICOC-PISI/VAOV2, PICOC-PSME/MYCA-VAOV2
2	**Fd** [SsPlcHw](Dr)			103			
3		**HwFdSs**		101			
4		[DrYpKc](Cw)					CHLA/VAOV2, PISI/GASH-VAOV2, TSHE-VAOV2
5	110	**Hw**[SsCwYpDr](F		**HwSs**[FdCwDrYp		112	PSME/RUSP/POMU, PISI-ABCO/RUSP, TSHE-RUSP, TSHE/RUSP-ACCI
6	111	**Hw**[CwDrYp](SsF		**HwSs**[FdCwDrYp		113	
7							
						110	**Hw**[SsCwYpDr](FdKc)
						111	**Hw**[CwDrYp](SsFdPlc)
						112	**HwSs** [FdCwDrYp] (MbKcOl)
						113	**HwSs** [FdCwDrYp] (Mb)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 20. CWHmh_OR tree species suitability and plant associations displayed on edatopic grid.

2.4.14. CWHwh_WA – Wet Hypermaritime Washington CWH

This subzone occurs on the windward slopes of the Coast Range in Washington and south to central Oregon, at elevations above the CWHvh_WA and CWHmh_OR. Characteristic trees are western hemlock, Sitka spruce, and Douglas-fir. Western redcedar is often present (Table 4). Red alder is the main deciduous tree species. The understory is characterized by Cascara buckthorn (*Frangula purshiana*), salal, salmonberry (*Rubus spectabilis*), sword fern and redwood sorrel (*Oxalis oregana*).

Zonal Habitat types: TSHE/POMU-OXOR, TSHE/GASH/POMU, TSHE/POMU/NWO Coast, TSHE/OXOR-NWO Coast, PISI/POMU (Jan A. Henderson et al. 1989; Cindy McCain and Diaz 2002).

CWHwh_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	[FdHw](CwDr)			102			TSHE/GASH, TSHE/VAOV2
2	**FdHwCw** [Ss](Dr)			103			TSHE/MANE2, PSME/MANE2
3		**FdHwCw**		101			TSHE/VAOV-GASH, TSHE/GASH/OXOR, TSHE/VAOV
4		[SsDr](Mb)					TSHE/VAAL/OXOR
5	110	**CwHw**[Dr](Fd)		**HwSs**[FdCwDr]		112	TSHE/POMU-OXOR, TSHE/ACCI/POMU, TSHE/POMU, PISI/POMU
6	111	**CwHw**[Dr](Fd)		**HwSs**[FdCwDr]		113	TSHE/RUSP, PISI/RUSP, TSHE/RUSP-ACCI, TSHE/RUSP-GASH
7							
						112	**HwSs** [FdCwDr] (Mb)
						113	**HwSs** [FdCwDr] (Mb)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 21. CWHwh_WA tree species suitability and plant associations displayed on edatopic grid.

2.4.15. CWHwh_OR – Wet Hypermaritime Oregon CWH

This subzone occurs as a narrow strip along the outer coast of mid to north coast Oregon. Sitka spruce and Douglas-fir are the characteristic trees, although western hemlock, shore pine (*Pinus contorta* var. *contorta*), and red alder are common (Table 4). The understorey is dominated by shrubs such as evergreen huckleberry (*Vaccinium ovatum*) and salal. Pacific rhododendron often occurs.

The CWHwh_OR occurs in the "fog belt" along the coast. To the south is the CWHmh_OR and to the north is the CWHvh_WA. The CWHdm_OC abuts this subzone to the east.

Zonal Habitat types: PICOC-PSME/MYCA-VAOV2, PICOC-PISI/VAOV2, TSHE/RHMA3-VAOV2, PISI/GASH, PISI/VAOV2 (Cindy McCain and Diaz 2002; M. A. Hemstrom and Logan 1986; Christy, Kagan, and Wiedemann 1998)

CWHwh_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Plc** [FdHw]			102			PICOC/CYSC4/AMAR4, PICOC/ARUV, PICOC/ARCO3
2	**FdPlc** [SsHw](Dr)			103			
3		**FdHwSs**		101			PICOC-PISI/VAOV2, PICOC-PSME/MYCA-VAOV2, PSME/PHMA3-VAOV2
4		[PlcDr](Cw)					TSHE/RHMA3-VAOV2, PISI/VAOV2, PISI/GASH
5	110	**Hw**[SsDr](FdCw)		**HwSs**[FdDr](Cw)		112	PISI/POMU, PISI/OXOR, PISI/MEFE-VAPA
6	111	**Hw**[SsDr](FdCw)		**HwSs**[FdDr](Cw)		113	PISI/RUSP, PISI/RUSP-GASH, TSHE/RUSP
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 22. CWHwh_OR tree species suitability and plant associations displayed on edatopic grid.

2.4.16. CWHvh_WA – Very Wet Hypermaritime Washington CWH

This subzone occurs as a narrow strip along the outer coast of Washington, from the NW tip of the Olympic Peninsula south to extreme NW Oregon. Western hemlock, Sitka spruce, Douglas-fir and western redcedar are the primary canopy trees (Table 4). Red alder is a common deciduous tree. The understory is characterized by the shrubs salal, salmonberry, Cascara buckthorn and evergreen huckleberry, and the ferns deer fern and sword fern.

The CWHvh_WA is a variation of the CWHvh in British Columbia (Green and Klinka 1994). The CWHwh_WA occurs inland from this subzone.

Zonal Habitat types: TSHE/GASH/POMU, PISI/POMU-OXOR, TSHE/GASH-VAOV2, TSHE/POMU-OXOR & TSHE/VAOV-GASH (Jan A. Henderson et al. 1989).

CWHvh_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	[Plc](HwCwDr)			102			PSME/GASH, TSHE/GASH-VAOV2
2	**HwCw**[FdSs](DrUp)			103			
3		**HwCw**		101			
4		[FdSsDr](Up)					PISI/GASH, TSHE/GASH, TSHE/VAOV-GASH
5	110	**CwHw**[Dr]		**HwSs**[CwDr](U		112	TSHE/GASH/POMU, TSHE/POMU, PISI/POMU
6	111	**CwHw**[Dr]		**HwSs**[CwDr](U		113	TSHE/RUSP, TSHE/RUSP-ACCI, TSHE/RUSP-GASH, TSHE/LYAM3
7							
						112	**HwSs** [CwDr] (Up)
						113	**HwSs** [CwDr] (Up)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 23. CWHvh_WA tree species suitability and plant associations displayed on edatopic grid.

2.5. Coastal White Fir [CWF]

The Coastal White Fir (CWF) Zone is a mid-elevation (lower montane) zone of southwestern Oregon and northern California. It is characterized by white fir (*Abies concolor*) as a climax tree species (Franklin and Dyrness 1988; Sawyer 2007) (Table 1). Other common trees are Douglas-fir (*Pseudotsuga menziesii*), incense-cedar (*Calocedrus decurrens*), sugar pine (*Pinus lambertiana*), and at upper elevations, Shasta red fir (*Abies magnifica* var. *shastensis*) or California red fir (*Abies magnifica*). In the Oregon range of the zone, western white pine (*Pinus monticola*) and giant chinquapin (*Chrysolepis chrysophylla*) are more frequent.

The forest understorey is quite diverse and dominated by the shrubs dull Oregon-grape (*Mahonia nervosa*), trailing snowberry (*Symphoricarpos hesperius*), and oceanspray (*Holodiscus discolor*), and herbs such as vanilla-leaf (*Achlys triphylla*), twinflower (*Linnaea borealis*), prince's pine (*Chimaphila umbellata*), and sword fern (*Polystichum munitum*).

Historically, the CWF was included in the Mixed Conifer vegetation zone (Allen 2005).

Shasta red fir increases with elevation, and the Mountain Hemlock – Shasta Fir (MHRF) zone occurs above the CWF. At elevations below the CWF, the Coastal Mixed Evergreen (CMX) zone is generally found. Western hemlock (*Tsuga heterophylla*) increases in the moister, northern portions of the CWF—the Coastal Western Hemlock (CWH) abuts this zone to the north.

USNVC: Zonal forests are included in Macrogroup M023: Southern Vancouverian Montane-Foothill Forest [*Calocedrus decurrens – Pinus jeffreyi – Abies lowiana* Forest], specifically G344: Californian Montane Conifer Forest & Woodland.

2.5.1. CWF Subzones

Four subzones (Table 5) are recognized over a climatic moisture and continentality gradient.

Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types used for the data summaries are listed.

Table 5. CWF Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	CWFds_CA	CWFdm_OR	CWFmm_OR	CWFwm_OR	Common Name
Abies concolor	**C***	**C**	**C**	**C**	white fir
Calocedrus decurrens	c	c	c	c	incense-cedar
Abies magnifica	c			c	California red fir
Chrysolepis chrysophylla		c	c	c	giant chinkapin
Tsuga heterophylla			c		western hemlock
Quercus chrysolepis				c	canyon live oak
Pseudotsuga menziesii	s	**S**	**S**	**S**	Douglas-fir
Pinus lambertiana	s	s	s	s	sugar pine
Pinus ponderosa	s	**S**	s		ponderosa pine
Pinus jeffreyi	s				Jeffrey pine
Quercus kelloggii	s				California black oak
Pinus contorta	s				lodgepole pine
Pinus monticola		s	s	s	western white pine
Acer macrophyllum			s	s	bigleaf maple

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

2.5.2. CWFwm_OR – Wet Maritime Oregon CWF

The CWHwm_OR occurs in SW Oregon and NW California on mid- to high-elevation land areas along the Coast Range. Zonal forests are dominated by white fir and Douglas-fir (Table 5). Other frequent trees are incense-cedar, sugar pine, giant chinquapin, and arbutus. Shasta red fir increases in abundance with elevation. This subzone also has some tanoak (*Lithocarpus densiflorus*) and Port Orford-cedar (*Chamaecyparis lawsoniana*), reflecting a more maritime climate.

The forest understorey is quite diverse, comprised of dull Oregon-grape, baldhip rose (*Rosa gymnocarpa*), beaked hazelnut, trailing snowberry, oceanspray, red huckleberry (*Vaccinium parviflorum*), common whipplea (*Whipplea modesta*), vanilla-leaf, twinflower, prince's pine, and sword fern.

This subzone mostly occurs at elevations above the CMXwm_OR.

Zonal Habitat types: TSHE/GASH-BENE2, PSME/MANE2-GASH, CHLA-ABCO/BENE2, ABCO/GASH-BENE2, ABCO/BENE2, ABCO-CADE27/TRLA6 (Atzet, White, Mccrimmon, et al. 1996)

CWFwm_OR

	A	B	C	D	E		Associations
0							
1	**FdQcRaOaOy**[QbPsPy](Ot)				102		PSME-QUCH2/BENE2, PSME-QUCH2/RHDI6,LIDE3-PSME-QUCH2/BENE2,
2	**FdOa**[RaQcPsBcOyPy](Pz)				103		PSME-ABCO, ABCO-PSME/ROGY, ABCO/BENE2ACTR, PSME/DRY SHRUB
3		**FdBc**		101			TSHE/GASH-BENE2, PSME/MANE2-GASH, CHLA-ABCO/BENE2
4		[PsOaOy](PzBmPw)					ABCO/GASH-BENE2, ABCO/BENE2, ABCO-CADE27/TRLA6
5		**FdBc** (OaBm)			110		PSME/BENE2/POMU, TSHE/RHMA3-VAOV2, TSHE/RHMA3-GASH
6	111	**Fd**[Bc](Hw)		**Fd**[MbBc](Dr)		113	ABGR/HODI/POMU, TSHE/GASH/POMU, TSHE/OXOR, TSHE/POMU
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 24. CWFwm_OR tree species suitability and plant associations displayed on edatopic grid.

2.5.3. CWFmm_OR – Moist Maritime Oregon CWF

The CWFmm_OR occurs in SW Oregon, on mid- to high-elevation land areas along the Cascade Range, inland from the CWFwm_OR. Forests are similar to the CWFwm_OR but lack tanoak or Port Orford-cedar and have a moderate amount of western hemlock (Table 5). Zonal forests are dominated by white fir and Douglas-fir. Other frequent trees are incense-cedar, sugar pine, and giant chinquapin. Shasta red fir increases in abundance with elevation. This subzone also has some arbutus on dry sites.

The forest understorey is diverse, comprised of dull Oregon-grape, baldhip rose (*Rosa gymnocarpa*), trailing snowberry, rattlesnake plantain, common whipplea (*Whipplea modesta*), vanilla-leaf, twinflower, prince's pine, pathfinder (*Adenocaulon bicolor*), and trailing blackberry (*Rubus ursinus*).

This subzone mostly occurs above the CWHdm_OR, although in its southern range it occurs above the CMXdm_OR. The MHRFmm_OR occurs above.

Zonal Habitat types:: ABCO-CADE25/TRLA6, ABCO/BENE2/LIBOL, ABCO/BENE2/ACTR, TSHE-ABCO/BENE2 (Atzet, White, Mccrimmon, et al. 1996).

CWFmm_OR

	A	B	C	D	E		Associations
0							
1	**FdOaPyRa**[Ps](BcOyQcGp)				102		APSME-PIPO/RHDI6, PSME-QUCH2/BENE2
2	**FdOaRa**[PsBcOy](GpPy)				103		PSME-CACHE6/BENE2, PSME/DRY SHRUB, PSME-CADE27/BEPI2, PSME/HODI/WHMO
3		**FdBc**		101			ABCO-PSME/ROGY, ABCO/BENE2, ABCO-CADE27/TRLA6, PSME-ABCO
4		[OyOzPsHw](PwGpPy)					ABCO/BENE2/ACTR, ABCO-BENE2/LIBOL, TSHE-ABCO/BENE2
5	110	**FdBc**[Hw](Oa)		**Fd** [MbOaBcPsH		112	ABCO/GASH-BENE2, ABCO/RHMA3-BENE2, PSME/GASH-RHMA3
6	111	**FdBcHw**		**Fd**[MbBcHw](Cw		113	TSHE/ACCI-RHMA3, TSHE/RHMA3-GASH, TSHE/GASH-RHMA3,
7							
						112	**Fd** [MbOaBcPsHw] (GpPy)
						113	**Fd** [MbBcHw] (CwPsGp)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 25. CWFmm_OR tree species suitability and plant associations displayed on edatopic grid.

2.5.4. CWFdm_OR – Dry Maritime Oregon CWF

The CWFdm_OR occurs in SW Oregon and NW California, on mid- to high-elevation land areas along the Coast and Cascade ranges, inland from the CWFwm_OR. Forests are similar to the CWFwm_OR but lack tanoak or Port Orford-cedar and have more Ponderosa pine (Table 5). Zonal forests are dominated by white fir and Douglas-fir. Other frequent trees are incense-cedar, sugar pine, and giant chinquapin. Shasta red fir increases in abundance with elevation. This subzone also has some arbutus on dry sites.

The forest understorey is diverse, comprised of dull Oregon-grape, baldhip rose (*Rosa gymnocarpa*), trailing snowberry, rattlesnake plantain, common whipplea (*Whipplea modesta*), vanilla-leaf, twinflower, prince's pine, pathfinder (*Adenocaulon bicolor*), and trailing blackberry (*Rubus ursinus*).

This subzone mostly occurs above the CMXdm_OR. The MHRFdm_OR occurs above. The CWFmm_OR occurs at similar elevations northward where western hemlock is common.

Zonal Habitat types:: ABCO-CADE25/TRLA6, ABCO/SYMO, ABCO-CACH6/PAME/CHUM, ABCO/ARNE, ABCO-PSME/ROGY (Atzet, White, Mccrimmon, et al. 1996).

CWFdm_OR

	A	B	C	D	E		Associations
0							
1	**FdOaRaPy**[QbPs](BcOyQg)				102		PSME-PIPO/RHDI6, PSME-CADE27/BEPI2, PSME-QUCH2/BENE2
2	**FdOaPy**[RaOyPsBc](Qb)				103		PSME-ABCO/SYMO, PSME/DRY SHRUB, PSME/ARNE, PIPO-PSME
3		**FdBc**		101			ABCO/ARNE, PSME-ABCO, ABCO-PSME/ROGY
4		[OyOaPs] (RaGpPy)					ABCO/SYMO, ABCO-CADE27/TRLA6, ABCO-CACH6/PAMY/CHUM
5	110	**FdBc**(OaOy)		**FdBc**[OaOy](PwP		112	ABCO/BENE2, ABCO/BENE2/LIBOL
6	111	**FdBc**		**FdBc**(PwPs)		113	ABCO-ABMAS/CHUM-ANDE3
7							
						112	**FdBc**[OaOy](PwPsGpPy)
						113	**FdBc**(PwPs)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 26. CWFmm_OR tree species suitability and plant associations displayed on edatopic grid.

2.5.5. CWFds_CA – Dry Submaritime California CWF

This subzone occurs on the leeward slopes of the Coast Mountains and the windward slopes of the Cascade and Sierra Nevada mountains of northern California, where the climate has a somewhat maritime influence (i.e., submaritime). Our data is limited for this subzone; however, forests are dominated by white fir, often with some Douglas-fir, ponderosa pine, incense-cedar, sugar pine, and/or Jeffrey pine (Table 5). California red fir increases in abundance with elevation. Giant sequoia occurs in this subzone.

Conceptually, the CWFds_CA occurs at elevations above the CMXxm_CA, however, there is some confusion in the mapping and the CMXwm_OR often occurs in between the two subzones. The IWFxm_CA usually occurs to the east of this subzone.

Zonal Association: White fir – Douglas-fir /Huckleberry oak; White fir – Douglas-fir /Trailing snowberry

CWFds_CA

	A	B	C	D	E	Associations
0						
1	**QbPyPsPz**			**102**		BcQb/Arctpat-Quervac; BcQb/Arctnev-Quervac; Bc/Ceancor; Bc/Ceanint
2	[QcFdBcOa]					
3		**BcFdOa**		**101**		BcFd/Quervac; BcFd/Sympmol
4		[QbObPyPsPz](PlBm)				
5		**Bc**			**110**	Bc/Ribes; Bc/Salix; Bc/Carex
6		[PyPsPzFdOa](Pl)				
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 27. CWFds_CA tree species suitability and plant associations displayed on edatopic grid.

2.6. Mountain Hemlock – Red Fir Zone [MHRF]

The Mountain Hemlock – Red Fir (MHRF) Zone is a high montane to subalpine zone of the Sierra Nevada and Cascade mountain ranges of California and southern Oregon, characterized by red fir (*Abies magnifica,* both vars. *magnifica* and *shastensis*) and mountain hemlock (*Tsuga mertensiana*) as the dominant tree species on mature, zonal sites (Table 1). White fir (*A. concolor*) is common in mature forests at lower elevations. Western white pine (*Pinus monticola*) and Sierra lodgepole pine (*P. contorta* var. *murrayana*) are common successional tree species.

Some common understory species include pinemat manzanita (*Arctostaphylos nevadensis*), greenleaf manzanita (*A. patula*), grouseberry (*Vaccinium scoparium*), prince's pine (*Chimaphilla umbellata*), and one-sided wintergreen (*Orthilia secunda*).

The Coastal White Fir (CWF) zone occurs at elevations below the MHRF over most of the range although on the lee side of the Sierra Nevada Mountains, the Interior White Fir (IWF) zone often occurs below the MHRF.

USNVC: Zonal forests are included in Macrogroup M025: Vancouverian Subalpine-High Montane Forest [*Abies magnifica – Tsuga mertensiana – Pinus contorta* var. *murrayana* Forest], specifically G749: Sierra-Cascade Red Fir – Mountain Hemlock Forest Group.

Comment: It is possible that subalpine elevations, at least in California, could be characterized as a new Sierra Nevada Subalpine zone—open woodland of mountain hemlock, whitebark pine, Sierra lodgepole pine (ssp. *murrayana*), western white pine and Sierra juniper. However, as mountain hemlock is the most common tree in this elevational belt, the zone has been included in the MHRF.

2.6.1. MHRF Subzones

Three subzones (Table 6) are recognized for the high montane portion of this zone, that encompass continentality and climatic moisture gradients. There are conceptually an additional three subzones for the subalpine elevations, termed “parkland”, but our data does not allow their characterization. They would be coded with a ‘p’ appended to the code for the montane subzone, e.g., the subalpine above the MHRFds would be coded MHRFdsp.

Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types used for the data summaries are listed.

Table 6. MHRF Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	MHRFds_CA	MHRFdm_OR	MHRFmm_OR	Common Name
Abies concolor	**C***	**C**	c	white fir
Abies magnifica	**C**	**C**	**C**	red fir
Tsuga mertensiana	c	c	**C**	mountain hemlock
Calocedrus decurrens		c		incense-cedar
Abies procera			c	noble fir
Abies amabilis			c	amabilis fir
Pinus monticola	**S**	s	s	western white pine
Pinus jeffreyi	s			Jeffrey pine
Pinus lambertiana	s			sugar pine
Pinus contorta var. *murrayana*	**S**		**S**	Sierra lodgepole pine
Pseudotsuga menziesii		s	s	Douglas-fir
Chrysolepis chrysophylla		s	s	giant chinquapin

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

2.6.2.MHRFmm_OR – Moist Maritime Oregon MHRF

This subzone occurs mostly in southern Oregon, on the windward side of the Cascade Mountains. Mountain hemlock is a common climax species along with red fir (Table 6), with mountain hemlock increasing in dominance with elevation. Sierra lodgepole pine and western white pine are common successional species. Grouseberry (*Vaccinium scoparium*), prince's pine and one-sided wintergreen characterize the understory. Other frequent species include black huckleberry (*Vaccinium membranaceum*) and dwarf bramble (*Rubus lasiococcus*).

The CWFmm_OR occurs at elevations below the MHRFmm_OR.

Zonal Habitat types: TSME/VASC/CHUM, ABMAS/VAME/CHUM, ABSH/VAME/CHUM, TSME/HERB, TSME-ABMAS/RULA2/PYSE and TSME/VASC (Atzet, White, McCrimmon, et al. 1996)

MHRFmm_OR

	A	B	C	D	E	Habitat Types/Associations
0						
1				102		PICO-TSME/DEP, ABMAS-TSME/ARNE/CHUM, TSME/ARNE/CHUM,
2	**Hm** [BmPlPwPa](Fd)					TSME/VASC/CHUM, TSME/VASC, ABSH-TSME/ARNE/CAIN3
3		**BmHm**		101		TSME/HERB, TSME-ABMAS/VAME/CHUM, ABAM-TSME/VAME/ACTR
4		[BcPlPwBp] (FdOy)				ABCO-ABMAS/CHUM-ANDE3, ABMAS/VAME/CHUM, TSME-ABMAS/RULA2/PYS
5					110	ABCO/BENE2/ACTR, ABCO-ABMAS/ACTR, ABAM/ROGY/ACTR
6		**BcBm** [HmFdPw] (BaOa)				
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 28. MHRFmm_OR tree species suitability and plant associations displayed on edatopic grid.

2.6.3.MHRFdm_OR – Dry Maritime Oregon MHRF

This subzone occurs in southern Oregon and northern California on the windward side of the Cascade and Sierra Nevada mountains, respectively. Red fir is the main climax species, co-occurring with white fir at lower elevations. Mountain hemlock is a frequent climax species, especially at higher elevations. Western white pine and Douglas-fir (*Pseudotsuga menziesii*) are common successional species (Table 6). Common understory species are falsebox (*Paxistima myrsinites*), trailing snowberry (*Symphoricarpos hesperius*), Columbian windflower (*Anemone deltoidei*), prince's pine, one-sided wintergreen (*Orthilia secunda*) and star-flowered false Soloman's-seal (*Maianthemum stellatum*).

The MHRFdm_OR occurs at elevations above the CWFmm_OR and CWFwm_OR.

Zonal Habitat types: ABCO-ABMAS/CHUM-ANDE3, ABCO-ABSH/CHUM-ANDE3, ABMAS/OSCH, ABMAS/VAME/CHUM (Atzet, White, McCrimmon, et al. 1996)

MHRFdm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1				102			ABCO/XETE, ABMAS-PICO/ARNE/CHUM, TSME/VAME/PYSE
2	**Bm** [PwPlBc] (HmFdPy)						ABSH/ARNE, ABSH-TSME/ARNE/CAIN3, TSME/VASC/CHUM
3		**BmBc**		101			ABCO-ABMAS/CHUM-ANDE3, TSME-ABMAS/VAME/CHUM,
4		[FdOyPwHm](PsOa)					ABMAS/VAME/CHUM, ABMAS-ABCO/SYMO/CHUM
5					110		ABMAS/OSCH, ABCO-ABMAS/QUSA2, ABCO-ABMAS/ACTR
6		**BmBc** (HmOa)					TSME/HERB, ABMAS-ABCO/QUSA2/PYSE
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 29. MHRFdm_OR tree species suitability and plant associations displayed on edatopic grid.

2.6.4.MHRFds_CA – Dry Submaritime California MHRF

This is the most extensive of the subzones, occurring primarily in the Sierra Nevada Mountains of California and the lee side of the Cascade Mountains of southern Oregon. Red fir is the main climax species, co-occurring with white fir at lower elevations. Mountain hemlock is a frequent climax species. Western white pine and Sierra lodgepole pine are the most prominent successional trees, but Jeffrey pine (*P. jeffreyi*) and sugar pine (*P. lambertiana*) are frequent (Table 6). The understory appears to be sparse with the main species being pinemat manzanita, prince's pine and long-stoloned sedge (*Carex inops*).

The MHRFds_CA typically occurs at elevations above the CWFds_CA, however, to the east it also occurs above the IWF zone.

Zonal Habitat types: ABMAS/ARNE, ABCO-ABGR/CHUM, ABMAS/CHUM (Simpson 2007) and unpublished ABSH/ARNE from "Timbercrater", "Unionpeak", "Sunnotch", and "Castlecrest"

MHRFds_CA

	A	B	C	D	E	Habitat Types/Associations
0						
1	**BcBm**			102		ABCO/CEVE-ARPA6-pumice, ABCO/CEVE-CHCHC4
2	[PlPyPwPz](PaPs)					
3		**Bm**		101		ABSH/ARNE, ABMAS/ARNE, ABMAS/CHUM
4		[BcPlPwPs](Hm)				
5					110	TSME/VASC
6		**BmHm** [Pl] (BcPwOa)				
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 30. MHRFds_CA tree species suitability and plant associations displayed on edatopic grid.

2.7. Mountain Hemlock Zone [MH]

The Mountain Hemlock (MH) Zone is a high montane to subalpine zone of the Cascade Mountains of Washington and Oregon, and north along the Coast Mountains of British Columbia to southeast Alaska (Franklin and Dyrness 1988; Meidinger and Pojar 1991). The key tree species dominating most sites are mountain hemlock (*Tsuga mertensiana*) and amabilis (or silver) fir (*Abies amabilis*) (Table 1). Subalpine fir (*A. lasiocarpa*) occurs locally in much of the zone but is particularly common in the areas with a submaritime climate, i.e., transitional to a continental climate. Yellow-cedar (*Chamaecyparis nootkatensis*) is common in the northern parts of the zone. Western white pine (*Pinus monticola*) is a successional species in much of the zone and Sierra lodgepole pine (*P. contorta* var. *murrayana*) is a common successional tree species in the southern distribution of the zone.

Black huckleberry (*Vaccinium membranaceum*) and dwarf bramble (*Rubus lasiococcus*) are understory species that occur over much of the zone. In the moister climate, northern area, white-flowered rhododendron (*Rhdodendron albiflorum*), false azalea (*Menziesia ferruginea*), Sitka mountain-ash (*Sorbus sitchensis*) and pink mountain-heather (*Phyllodoce empetriformis*) are frequent. In the drier climate southern areas, grouseberry (*V. scoparium*) is a common understory species.

The Coastal Western Hemlock (CWH) zone occurs at elevations below the MH over most of the range, especially on the windward side of the mountains. On the lee side, the Interior White Fir (IWF) or Interior Grand Fir zones can occur below the MH.

USNVC: Zonal forests are included in Macrogroup M025: Vancouverian Subalpine-High Montane Forest [*Abies magnifica – Tsuga mertensiana – Pinus contorta* var. *murrayana* Forest], specifically G849: North-Central Pacific Mountain Hemlock – Silver Fir Woodland Group.

2.7.1. MH Subzones

Four subzones (Table 7) are recognized for the high montane portion of this zone, that encompass continentality and latitudinal gradients. Although there are conceptually an additional four subzones for the subalpine elevations, termed “parkland”, our data does not allow their characterization. They would be coded with a ‘p’ appended to the code for the montane subzone, e.g., the subalpine above the MHmm would be coded MHmmp.

Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types used for the data summaries are listed.

Table 7. MH Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	MHmm_WA	MHms_WA	MHdm_OR	MHds_OR	MHds_WA	Common Name
Tsuga mertensiana	**C***	**C**	**C**	**C**	**C**	mountain hemlock
Abies amabilis	**C**	**C**	**C**	**C**	**C**	amabilis fir
Chamaecyparis nootkatensis	c	c				yellow-cedar
Abies lasiocarpa		**C**	c	**C**	**C**	subalpine fir
Picea engelmannii		c			c	Engelmann spruce
Abies procera			c		c	noble fir
Pinus monticola		s	s	s	s	western white pine
Pinus albicaulis		s		s	s	whitebark pine
Pseudotsuga menziesii			**S**			Douglas-fir
Pinus contorta			s	**S**	s	lodgepole pine

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

2.7.2.MHmm_WA – Moist Maritime Washington MH

This subzone occurs on the windward slopes of the Cascade Mountains of northern Washington and on the Olympic Peninsula. Mountain hemlock and amabilis fir are the main climax tree species, often with some yellow-cedar (Table 7). Medium height shrubs dominate the understory, including white-flowered rhododendron (*Rhododendron albiflorum*), false azalea (*Menziesia ferruginea*), oval-leaved and Alaskan blueberry (*Vaccinium ovalifolium, V. alaskaense*) and black huckleberry. Common dwarf shrubs are dwarf bramble (*Rubus lasiococcus*) and five-leaved bramble (*Rubus pedatus*).

The MHmm_WA typically occurs at elevations above the CWHvm_WA.

Zonal Habitat types: TSME/VAME, TSME/VAME (WEN), TSME/VAME-VAAL, TSME/VAME-VAOV, TSME/RHAL-VAME, TSME/RHAL2/VAME and TSME/RHAL2-VAOV (J A Henderson et al. 1992; Jan A. Henderson et al. 1989)

MHmm_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1				102			TSME/VAME, TSME/RHAL-VAME, TSME/PHEM-VADE
2	**BaHm** (Yc)						TSME/VAME-XETE, TSME/MEFE-VAME
3		**BaHm**		101			TSME/VAME-VAAL, TSME/VAAL, TSME/RHAL-VAAL
4		[YcBp] (HwPwBl)					TSME/VAAL-CLUN
5	110	**Hm**[BaYc](Hw		**Ba**[HmYc](Hw		112	TSME/VAAL-ERMO, TSME/CLPY-RUPE, TSME/VAAL-MADI2, TSME/VAME-STRO
6	111	**Hm**[BaYc](BlH		**Ba**[HmYc](Hw		113	TSME/TIUN-STRO, TSME/VAAL/STRO, TSME/CABI, TSME/VAME/VASI
7							

110	**Hm** [BaYc] (HwBl)
111	**Hm** [BaYc] (BlHw)
112	**Ba** [HmYc] (HwBl)
113	**Ba** [HmYc] (HwBl)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 31. MHmm_WA tree species suitability and plant associations displayed on edatopic grid.

2.7.3.MHms_WA – Moist Submaritime Washington MH

This subzone is found on the lee side of the Cascade Mountains of Washington. Mountain hemlock and amabilis fir are the main climax tree species, sometimes with yellow-cedar (Table 7). The main understory species are white-flowered rhododendron, black huckleberry, oval-leaved blueberry (*Vaccinium deliciosum*) dwarf bramble and pink mountain-heather (*Phyllodoce empetriformis*); grouseberry is sometimes present.

The MHms_WA occurs at elevations above the CWHms_WA. It abuts the MHmm_WA on its western edge.

Zonal Habitat types: TSME/PHEM-VADE, TSME/RHAL-VAME, TSME/VAME (WEN) (Lillybridge et al. 1995; J A Henderson et al. 1992)

MHms_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Pa** [Bl Hm](Pl Ba)			102			PIAL/VASC/LUHI, TSME/VASC/LUHI, PIAL/JUCO4, ABLA2/LUHI
2	**Hm**[Bl Ba Pw](Hw)			103			TSME/LUHI, ABAL2/ARLA-POPU, ABLA2/VADE, TSME/VAME, ABLA2/RHAL
3		**BaHm**		101			TSME/MEFE-VAME, ABAM/VAME-PYSE, ABAM/RHAL-VAME
4		[Bl Pw](SxYcHwBp)					TSME/RHAL-VAME, TSME/VAME, TSME/RULA, ABAM/RULA
5	110	**Hm**[Ba Bl Yc](H		**Ba**[HmBlSxYc](		112	
6	111	**Hm**[Ba Bl Yc]		**Ba**[HmBlSxYc]		113	ABAM/VAME-VASI, ABLA2/VASI
7							

110	**Hm** [Ba Bl Yc] (Hw)
111	**Hm** [Ba Bl Yc]
112	**Ba** [HmBlSxYc] (Hw)
113	**Ba** [HmBlSxYc]

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 32. MHms_WA tree species suitability and plant associations displayed on edatopic grid.

2.7.4.MHds_WA – Dry Submaritime Washington MH

The MHds_WA occurs on the lee side of the Cascade Mountains in Washington State around Gifford Pinchot National Forest and Mt. Rainier National Park. Mountain hemlock is the main climax tree species (Table 7) often with amabilis fir and/or subalpine fir. Black huckleberry and dwarf bramble are common in the understorey, often with falze azalea or white-flowered rhododendron, and on drier sites, some grouseberry and beargrass.

In the area where it occurs, this subzone is typically found in the transitional climate in between the MHms_WA and the ESSFmw_WA.

Zonal Habitat types: TSME/RHAL, ABAM/VAME/CLUN2, ABAM/MEFE, ABAM/RHAL2-VAME, TSME/VAME/CLUN (Franklin et al. 1988; Diaz et al. 1997)

MHds_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	[HmPa](PlBaBl)			102			TSME/PHEM-VADE, TSME/LUHI, TSME/LUGLH
2	**Hm**[BaBl](PlPa)			103			TSME/VAME/XETE, ABAM/VAME/XETE
3		**HmBa**		101			TSME/MEFE, ABAM/RHAL2-VAME, TSME/VAME/CLUN
4		[Bl](BpPw)					TSME/RHAL, ABAM/VAME/CLUN2, ABAM/MEFE
5	110	**Hm**[BaBl]		**Ba**[HmBlSx]		112	ABAM/ACTR, ABAM/TITRU,
6	111	**Hm**[BaBl]		**Ba**[HmBlSx]		113	ABAM/VAME/VASI, TSME/CAREX
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 33. MHds_WA tree species suitability and plant associations displayed on edatopic grid.

2.7.5.MHdm_OR – Dry Maritime Oregon MH

This subzone is primarily of the windward slopes of the Cascade Mountains of Oregon and southern Washington. Mountain hemlock and amabilis fir dominate the forest cover (Table 7). Subalpine fir and noble fir (*A. procera*) are often present. Sierra lodgepole pine (ssp. *murrayana*) and western white pine are common successional species; Douglas-fir occasionally occurs on zonal sites but is more common on drier sites. The main understory species are black huckleberry, grouseberry (*V. scoparium*) and bear-grass (*Xerophyllum tenax*).

The MHdm_OR occurs at elevations above the CWHms_OR. To the east it abuts the MHds_OR.

Zonal Habitat types: TSME/VAME/XETE, TSME/VAME/XETE-NWO, TSME/VASC, TSME/VASC-NWO, ABAM/VAME/XETE (Cindy McCain and Diaz 2002; C McCain and Diaz 2002)

MHdm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Hm** [Ba Pw] (Fd Pl)			102			TSME/RHAL, TSME/PHEM-VADE, TSME/RHAL2/XETE
2	**Hm Ba** [Pw] (Bl Fd Pl)			103			TSME/VAME, TSME/RHAL-VAME, TSME/XETE/VAMY
3		**BaHm**		101			ABAM/VAME/XETE, TSME/VASC, TSME/VAME/CLUN2,
4		[Bp Bl Pw] (Fd Hw Pl)					TSME/VAME/XETE
5	110	**Hm** [Ba Bl] (Yc H		**Ba** [Hm Bl Bp Sx]		112	ABAM/TITR, TSME/LUGLH, TSME/PHEM-VADE
6	111	**Hm** [Ba Bl Yc] (H		**Ba** [Hm Yc Bl Bp S		113	
7							

	110	**Hm** [Ba Bl] (Yc Hw)
	111	**Hm** [Ba Bl Yc] (Hw)
	112	**Ba** [Hm Bl Bp Sx] (Yc Hw Bg)
	113	**Ba** [Hm Yc Bl Bp Sx] (Hw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 34. MHdm_OR tree species suitability and plant associations displayed on edatopic grid.

2.7.6.MHds_OR – Dry Submaritime Oregon MH

This subzone found on the lee side of the Cascade Mountains of Oregon. Mountain hemlock is the main climax tree species (Table 7) often with amabilis fir. Subalpine fir is sometimes present. Sierra lodgepole pine (ssp. *murrayana*) is the most prominent successional species although western white pine often occurs. Grouseberry is the dominant understory species often with some black huckleberry and dwarf bramble.

The MHdm_OR occurs to the west of the MHds_OR. At lower elevations to the east, is the IWFdw_OR.

Zonal Habitat types: TSME/VASC, TSME/VASC-NWO, TSME/VASC-DES, TSME/CAIN4 (Simpson 2007; Volland 1985)

MHds_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	[HmPaPl](BaBlPw)			102			PICO/VAME/XETE, PICO/XETE, TSME/ARNE, PICO-TSME/VAME/XETE
2	**Hm**[BaBlPwPl]			103			TSME/VASC, TSME-ABAM/VAME-VASC, TSME-ABAM/VAME-ACTR
3		**HmBa**		101			TSME-ABAM/VAME/RULA, ABAM/VAME/RULA, TSME/VAME-SOSI2
4		[PwBl](BcBmPl)					TSME/VAME/XETE, TSME-ABAM/VAME/XETE, ABAM/VAME/XETE
5	110	**Hm**[BaBl]		**Ba**[HmBl]		112	TSME-ABAM/VAME/CLUN
6	111	**Hm**[BaBl]		**Ba**[HmBlSx]		113	ABAM/RHLA2/CLUN2, ABAM/VAME/CLUN2,
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 35. MHds_OR tree species suitability and plant associations displayed on edatopic grid.

3. INTERIOR FORESTED ZONES

3.1. Engelmann Spruce – Subalpine Fir [ESSF]

The Engelmann Spruce – Subalpine Fir (ESSF) Zone is a high montane and subalpine, forested zone of the sub-continental and continental climates of the mountains of the western cordillera. It ranges from British Columbia and Alberta, as far south as New Mexico in the Rocky Mountains (Meidinger and Pojar 1991; Pfister et al. 1978; Cooper, Neiman, and Roberts 1991; Lillybridge et al. 1995).

Mature forests are characterized by Engelmann spruce (*PIcea engelmannii*) and subalpine fir (*Abies lasiocarpa*) (Table 8). Lodgepole pine (*Pinus contorta*) is the most common seral species. Whitebark pine (*Pinus albicaulis*) is a common component of the canopy in many climates, and mountain hemlock (*Tsuga mertensiana*) occurs in some wetter climatic areas of the interior and along the Coast or Cascade mountains (where the ESSF abuts the Mountain Hemlock zone).

The understorey varies considerably. In the U.S. range, common shrubs are black huckleberry (*Vaccinium membranaceum*), falsebox (*Paxistima myrsinites*), false azalea (*Menziesia ferruginea*), western mountain-ash (*Sorbus scopulina*), white-flowered rhododendron (*Rhododendron albiflorum*), thimbleberry (*Rubus parviflorus*), Sitka alder (*Alnus viridis* ssp. *sinuata*), black gooseberry (*Ribes lacustre*), and Utah honeysuckle (*Lonicera utahensis*). Herbs include bear-grass (*Xerophyllum tenax*), grouseberry (*Vaccinium scoparium*), elk sedge (*Carex geyeri*), mountain arnica (*Arnica latifolia*), heart-leaved arnica (*Arnica cordifolia*), pinegrass (*Calamagrostis rubescens*), and western meadowrue (*Thalictrum occidentale*).

The ESSF is generally occurs above the Montane Spruce (MS) Zone but in moister climates it occurs above the Interior Cedar – Hemlock (ICH) Zone.

USNVC: Zonal forests are included in Macrogroup M020: Rocky Mountain Subalpine-High Montane Forest [*Abies lasiocarpa – Picea engelmannii – Pinus albicaulis* Rocky Mountain Forest]

3.1.1. ESSF Subzones

Fifteen subzones (Table 9) are recognized that encompass temperature, climatic moisture, and species distribution gradients. There are an additional 11 parkland subzones.

Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types used for the data summaries are listed.

Table 8. Tree species of Forested Interior Biogeoclimatic Zones

Scientific Name	PP*	IDF	IGF	ICH	IWF	MS	ESSF	Common Name
Pinus ponderosa	**C****	S	S	s	S			ponderosa pine
Pseudotsuga menziesii	c	**C**	**C**	S	S	S		Douglas-fir
Abies grandis			**C**	**C**				grand fir
Thuja plicata				**C**				western redcedar
Tsuga heterophylla				**C**				western hemlock
Abies concolor					**C**			white fir
Abies lasiocarpa						**C**	**C**	subalpine fir
Picea engelmannii				c		**C**	**C**	Engelmann spruce
Tsuga mertensiana							**c**	mountain hemlock
Pinus contorta		S	s	S	S	S	S	lodgepole pine
Larix occidentalis		s	s	S		s		western larch
Pinus monticola				s	s			western white pine
Betula papyrifera				s				paper birch
Populus tremuloides					s	s		trembling aspen
Pinus albicaulis							S	whitebark pine

* Zone names: PP: Ponderosa Pine; IDF: Interior Douglas-fir; IGF: Interior Grand Fir; ICH: Interior Cedar – Hemlock; IWF: Interior White Fir; MS: Montane Spruce; ESSF: Engelmann Spruce – Subalpine Fir.

** **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

Table 9. ESSF Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	ESSF xh WA	ESSF xx WY	ESSF xk MT	ESSF xk WY	ESSF xk UT	ESSF xc CO	ESSF xc WA	ESSF xw OR	ESSF dh WA	ESSF dm ID	ESSF dk MT	ESSF mw WA	ESSF wm MT	ESSF wh MT	ESSF vh ID	Common Name
Abies lasiocarpa	**C***	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	subalpine fir
Picea engelmannii	c	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	c	**C**	**C**	**C**	Engelmann spruce
Abies lasiocarpa var. arizonica						c										corkbark fir
Abies grandis								c	c						c	grand fir
Abies amabilis									c			c				amabilis fir
Tsuga mertensiana									c			c			c	mountain hemlock
Pinus contorta	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	s	**S**	**S**	s	lodgepole pine
Pseudotsuga menziesii	s						s		s			s	s		s	Douglas-fir
Larix occidentalis	**S**													**S**		western larch
Pinus albicaulis			**S**	**S**			s	s		s	s	s	s			whitebark pine
Populus tremuloides			s	s	**S**	**S**										trembling aspen
Pinus monticola									s						s	western white pine

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

3.1.2.ESSFdh_WA – Dry Hot Washington ESSF

This subzone occurs at mid elevations, in a sub-continental climate, on the eastern side of the Cascade Mountains. The ESSFdh_WA is transitional between the ESSFmw_WA, which occurs at higher elevations, and the IGFdk_WA, which occurs at elevations below. The ESSFdh_WA is similar to the ESSFdh in British Columbia.

Zonal forests of this subzone are dominated by subalpine fir, Engelmann spruce, and lodgepole pine (Table 9) but can also have some grand fir (*Abies grandis*) or Douglas-fir (*Pseudosuga menziesii*). Mountain hemlock (*Tsuga mertensiana*), amabilis fir (*Abies amabilis*), or western white pine (*Pinus monticola*) can also occur, due to proximity to submaritime climates. The shrub layer is well developed with falsebox and black huckleberry dominating, along with black gooseberry, Sitka alder, and thimbleberry.

Zonal Habitat types: ABLA2/VAME, ABAM/VAME-PYSE, ABAM/VAME/CLUN, ABLA2/RHAL (Lillybridge et al. 1995; Williams and Lillybridge 1983)

ESSFdh_WA

	A	B	C	D	E	Habitat Types/Associations
0						
1	**Fd** [PaPy] (BlLw)			102		PSME/SYOR, PSME/CARU, PSME/CAGE
2	**Fd**[BlBgPaLw](PlSe)			103		ABLA2/PAMY, ABLA2/VASC, ABLA2/ARLA-POPU, ABLA2/CARU, ABGR/ARCO, PSME/PAMY, ABGR/CARU, PSME/PAMY, ABGR/BENE
3		**PlBlSe**		101		TSME/VAME, TSME/RHAL-VAME
4		[FdPaHmBaPwBg]				ABLA2/VAME, ABAM/VAME-PYSE, ABAM/VAME/CLUN, ABLA2/RHAL
5		**BlSe** [Ba](Pw)			110	ABLA2/RULA, ABAM/RULA, ABLA2/GYDR, ALSI/GYDR
6			**SeBl** [Ba]		111	PIEN/CASCP2, ABAM/TITRU, ALIN/GLEL, Piceeng-Athyfil
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 36. ESSFdh_WA tree species suitability and plant associations displayed on edatopic grid.

3.1.3.ESSFmw_WA – Moist Warm Washington ESSF

This subzone occurs at high elevations, in a sub-continental climate, on the eastern side of the Cascade Mountains. It occurs at elevations above the ESSFdh_WA. It is similar to the ESSFmw (Lloyd et al. 1990) in British Columbia.

Zonal forests of this subzone are dominated by subalpine fir (Table 9). Engelmann spruce, mountain hemlock, and amabilis fir commonly occur as well. Lodgepole pine is the most common seral species. Douglas-fir can occur but is more frequent on drier sites on warm aspects. The understorey is dominated by white-flowered rhododendron and black huckleberry (including blue huckleberry – *Vaccinium globulare*), along with dwarf bramble (*Rubus lasiococcus*), grouseberry, and mountain arnica.

On its western edge it abuts the MHms_WA. At upper elevations, subalpine parkland occurs (**ESSFmwp_WA**).

Zonal Habitat types: AMAM/RHAL-VAME, ABLA2/RHAL, ABAM/VAME/CLUN (Williams and Lillybridge 1983; Lillybridge et al. 1995)

ESSFmw_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Pl** [FdPa] (PyBl)			102			PIAL/JUCO4, ABLA2/CARU, ABLA2/PAMY/CARU, PIAL/CARU, PSME/PAMY/CARU
2	**Pl** [FdLwSe] (BlPaBa)			103			ABLA2/PAMY, ABLA2/VASC, PIAL/VASC/LUHI, TSME/VASC/LUHI
3		**BlSe** [BaHm]		101			ABLA2/VADE, ABLA2/VAME, ABLA2/VASC/LUHI, TSME/RHAL-VAME
4		(HwFdPlPwBg)					ABAM/RHAL-VAME, ABLA2/RHAL, ABAM/VAME/CLUN, ABLA2/LUHI
5		**BlSe** [BaHm]			110		ABAM/TITRU, ABLA2/ARLA-POPU, ABLA2/RULA, ABLA2/GYDR
6		**BlSe** [Ba]			111		ABAM/ATFI, ABAM/OPHO, ABLA2/OPHO, PIEN/EQUIS
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 37. ESSFmw_WA tree species suitability and plant associations displayed on edatopic grid.

3.1.4.ESSFxc_WA – Very Dry Cold Washington ESSF

This subzone occurs at high elevations in northwest Washington, between the Okanogan River valley and the Lake Chelan/Ross Lake National Recreation Areas. On its northern boundary, it abuts the ESSFxc1 in British Columbia (Lloyd et al. 1990).

Zonal forests of this subzone are dominated by Engelmann spruce and subalpine fir, with considerable lodgepole pine, and some whitebark pine (Table 9). Grouseberry is a key understorey dwarf shrub. It often occurs with falsebox, white-flowered rhododendron, black gooseberry, Sitka valerian (*Valeriana sitchensis*), broadleaf lupine (*Lupinus latifolius*), and heart-leaved arnica. Trapper's tea (*Rhododendron neoglandulosum*) is a common shrub on nutrient-poor sites.

This subzone occurs at elevations above the MSxk_WA. It abuts the ESSFmw_WA on its western edge. Subalpine larch occurs at upper elevations in the parkland subzone (**ESSFxcp_WA)**. PIAL/VASC/LUHI, LALY/VASC/LUHI, and ABLA2/RHAL/LUHI habitat types are common at parkland elevations.

Zonal Habitat types: ABLA2/RHAL, ABLA2/VAME, ABLA2/VASC/LUHI (Lillybridge et al. 1995; Williams and Lillybridge 1983)

ESSFxc_WA

	A	B	C	D	E	Habitat Types/Associations
0						
1	**Pl** [PaFdBl] (La)			102		ABLA2/CARU, PIAL/CARU, PSME/CARU, PIAL/JUCO4, ABLA2/VASC/CARU
2	**Pl**[FdBlPa](SeLa)			103		ABLA2/PAMY, ABLA2/VASC
3				101		PIAL/VASC/LUHI, LALY/VASC/LUHI, ABLA2/RHAL/LUHI
4		**BlSePl** (AtPa)				ABLA2/RHAL, ABLA2/LEGL-VASC, ABLA2/VAME, ABLA2/VASC/LUHI
5			**BlSePl**		110	ABLA2/RHAL/SETR, ATFI-GYDR, ABLA2/TRCA3
6			**SeBl** (Pl)		111	PIEN/CASCP2, PIEN/EQUIS, ABLA2/TRLA4, ALIN/CACA
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 38. ESSFxc_WA tree species suitability and plant associations displayed on edatopic grid.

3.1.5.ESSFxh_WA – Very Dry Hot Washington ESSF

This subzone occurs at high elevations, mostly in the western portion of Colville National Forest in northern Washington State.

Zonal forests of this subzone are dominated by subalpine fir and lodgepole pine, with some Engelmann spruce, western larch, and whitebark pine (Table 9). Low bilberry (*Vaccinium myrtillus*) and pinegrass are the main understorey species. Falsebox, Sitka alder, black huckleberry, white-flowered rhododendron, silky lupine (*Lupinus sericeus*), and heart-leaved arnica are also common.

This subzone occurs at elevations above MSdm_WA.

Zonal Habitat types: ABLA2/VAME, ABLA2/VASC, ABLA2/LIBOL (Williams et al. 1995).

ESSFxh_WA

	A	B	C	D	E	Habitat Types/Associations
0						
1	**Fd** [Pl] (BlLa)			102		PSME/CARU
2	**PlFd** [BlLw] (La)			103		ABLA2/CARU
3				101		
4		**Pl** [BlLwFd] (Se)				ABLA2/VAME, ABLA2/VASC, ABLA2/LIBOL
5		**BlPlSe** (FdLw)			110	ABLA2/RHAL, ABLA2/TRCA3
6			**BlSe** (Pl)		111	PIEN/EQUIS
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 39. ESSFxh_WA tree species suitability and plant associations displayed on edatopic grid.

3.1.6.ESSFxw_OR – Very Dry Warm Oregon ESSF

This subzone occurs at high elevations in northeastern Oregon and into nearby Idaho.

Zonal forests of this subzone are dominated by Engelmann spruce, subalpine fir, and lodgepole pine (Table 9). Whitebark pine occurs sometimes. Black huckleberry and Utah honeysuckle are the main shrubs. Grouseberry is a key understorey dwarf shrub. It often occurs with Ross' sedge (*Carex rossii*), elk sedge, heart-leaved arnica, and showy Jacob's-ladder (*Polemonium pulcherrimum*).

This subzone mostly occurs at elevations above the MSxh_OR. At upper elevations, subalpine parkland occurs (**ESSFxwp_OR**).

Zonal Habitat types: ABLA2/VAME, ABLA2/VASC, ABLA2-PIEN/MEFE, ABLA2-PIEN/POPU, ABLA2/POPU, PICO(ABLA2)/VASC (C. G. Johnson and Simon 1987; Charles G. Johnson and Clausnitzer 1992).

ESSFxw_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Pa** [BlPl] (FdLwPy)			102			PIAL/RIMO/POPU, PIAL/CAGE, ABLA2-PIAL/CAGE, ABLA2/FEVI
2	**Bl**[PaPlFd](SeLwAt)			103			ABLA2/ARCO, ABLA2/CAGE, ABLA2-PIAL/VASC/ARCO, ABLA2/ARCO, ABLA2/CARU
3				101			ABLA2-PIEN/POPU, ABLA2/POPU, PICO(ABLA2)/VASC
4		**BlPl** [Se](BgPa)					ABLA2/VAME, ABLA2/VASC, ABLA2-PIEN/MEFE, ABLA2-PIEN/LEGL
5		**BlSe** [Pl]			110		ABLA2-PIEN/ARCO, ABLA2/STAM, ABLA2-PIEN/SETR
6			**BlSe** (Pl)		111		ABLA2/LEGL/CASC5, ABLA2/VAUL/CASC5, ABLA2/SAAR4
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 40. ESSFxw_OR tree species suitability and plant associations displayed on edatopic grid.

3.1.7.ESSFdm_ID – Dry Mild Idaho ESSF

This subzone occurs at high elevations in the mountains of central Idaho. It extends somewhat into the Bitterroot Mountains of western Montana.

Zonal forests of this subzone are dominated by Engelmann spruce, subalpine fir, lodgepole pine, and whitebark pine (Table 9). The understorey is dominated by false azalea, bear-grass, and grouseberry. Other common herbs include elk sedge, yellow glacier lily (*Erythronium grandiflorum*), bracted lousewort (*Pedicularis bracteosa*), and mountain arnica.

This subzone occurs at elevations above the MSmm_ID. At upper elevations, subalpine parkland occurs (**ESSFdmp_ID**).

Zonal Habitat types: ABLA/MEFE, ABLA/XETE-VAGL, ABLA/XETE-VASC, ABLA/XETE-LUHI (Steele et al. 1981; Pfister et al. 1978).

ESSFdm_ID

	A	B	C	D	E	Habitat Types/Associations
0						
1	**PaPl** [BlFd]			102		PIAL-ABLA/FEID
2	**PlBl** [PaFd] (Se)			103		ABLA/CAGE, ABLA/CARU
3				101		
4		**PlBlSe** [Pa] (Fd)				ABLA/MEFE, ABLA/XETE-VAGL, ABLA/XETE-VASC, ABLA/XETE-LUHI
5			**BlSe** [Pl]		110	ABLA/Ribelac, ABLA/STAM, ABLA/Senetri
6		**SeBl** [Pl]			111	ABLA/CACA, ABLA/CACA-LEGL
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 41. ESSFdm_ID tree species suitability and plant associations displayed on edatopic grid.

3.1.8.ESSFvh_ID – Very Wet Hot Idaho ESSF

This subzone occurs at high elevations in the mountains along the border between northern Idaho and northwestern Montana.

Zonal forests of this subzone are dominated by subalpine fir, mountain hemlock, and Engelmann spruce (Table 9). Lodgepole pine and western white pine are important seral trees. At lower elevations, western larch, Douglas-fir, and western redcedar can occur. The shrub understorey is dominated by black huckleberry and false azalea. Sitka alder is often present. Bear-grass is the dominant herb. Grouseberry can occur, along with mountain arnica, and queen's cup.

This subzone typically occurs at elevations above the ICHvk_ID and extends to the height of land. In the northern part of its range, it appears to occur below the ESSFwm_MT.

Zonal Habitat types: ABLA/MEFE, ABLA/CLUN2, TSME/CLUN2-MEFE, TSME/MEFE-XETE (Cooper, Neiman, and Roberts 1991).

ESSFvh_ID

	A	B	C	D	E		Habitat Types/Associations
0							
1	**FdPl** [Lw] (Bl)			102			BEPA/COCO6, PSME/VAME, ABLA/XETE,
2	**FdPl** [BlSe] (HmLw)			103			TSME/XETE, ABLA/XETE, PICO/XETE
3		**BlSe**		101			ABLA/MEFE, ABLA/CLUN2
4		[PlHmPw](LwBgFd)					TSME/CLUN2-MEFE, TSME/MEFE-XETE
5	110	**BlSe**[PlHmBg](FdCw)					ABGR/ASCA, ABGR/SETR, THPL/ASCA2, TSHE-THPL/POMU
6	111	**BlSe**[PlCwHwHmBg]					ABLA/CACA4, TSME/VACCI/CALEH2, ABLA/CACA4-LEGL, THPL/ATFI
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 42. ESSFvh_ID tree species suitability and plant associations displayed on edatopic grid.

3.1.9.ESSFxk_MT – Very Dry Cool Montana ESSF

This subzone occurs at high elevations in the mountains of western Montana, and into eastern Idaho. It is one of the most eastern of the ESSF subzones in northern Montana – the other being the ESSFdk_MT.

Zonal forests of this subzone are dominated by subalpine fir, Engelmann spruce, lodgepole pine, and whitebark pine (Table 9). The shrub understorey is lightly developed with some false azalea, thimbleberry, birch-leaved spirea, and Utah honeysuckle. Grouseberry and bear-grass are key understorey species, occurring along with elk sedge and mountain arnica.

In its northern range, it abuts the ESSFwm_MT to the west, and on its southern edge it abuts the ESSFxk_WY. It occurs at elevations above the MSdw_MT or MSdh_MT. At upper elevations, subalpine parkland occurs (**ESSFxkp_MT**).

Zonal Habitat types: ABLA/XETE/VASC, ABLA/XETE/VAME, ABLA/XETE, ABLA/VASC, ABLA-PIAL/VASC, PIAL/ABLA (Pfister et al. 1978; Steele et al. 1981; 1983).

ESSFxk_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd** [PaPfPl] (BlSe)			102			PSME/JUCO, PSME/CARU, PIFL/JUCO6, PIFL/FEID, PSME/FEID
2	**Pl** [FdBlPaSe]			103			ABLA/CARU, ABLA/CAGE2, ABLA/VASC-CARU, PIAL/VASC
3				101			ABLA/XETE/VASC, PICO/VASC, ABLA/XETE/VAME, ABLA/XETE
4		**BlPlSePa** (Fd)					ABLA/VASC, ABLA-PIAL/VASC, PIAL/ABLA
5		**BlPlSe** [Pa]			110		PlBlPa/MEFE, PlBlPa/ARLA-SETR, BlPa/Veravir
6			**SeBl** [Pl]		111		SeBl/LEGL/SETR, SeBl/CACA, Se/CAUT
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 43. ESSFxk_MT tree species suitability and plant associations displayed on edatopic grid.

3.1.10. ESSFdk_MT – Dry Cool Montana ESSF

This subzone occurs at high elevations in the mountains of northwestern Montana. On its northern boundary, it abuts the ESSFdk1 (D MacKillop et al. 2018), which occurs mostly in British Columbia but extends into Montana in some areas near the border with Canada. The ESSFdk_MT is one of the most eastern of the ESSF subzones in northern Montana – the other being the ESSFxk_MT.

Zonal forests of this subzone are dominated by subalpine fir and Engelmann spruce, with some lodgepole pine and whitebark pine (Table 9). The shrub and dwarf shrub layers are dominated by false azalea, black huckleberry, bear-grass, grouseberry, and elk sedge.

The ESSFdk_MT occurs at elevations above the MSdw_MT. The ESSFdk_MT abuts the ESSFxk_MT on its southern edge. At upper elevations, subalpine parkland occurs (**ESSFdkp_MT**).

Zonal Habitat types/associations: PlBl-Xeroten-Vaccsco, ABLA/XETE/VAME, BlSe-Vaccsco-Arnilat; ABLA/CLUN2-MEFE (Pfister et al. 1978).

ESSFdk_MT

	A	B	C	D	E	Habitat Types/Associations
0						
1				102		
2	**BlFd** [PlPa] (SeLa)					FdBl - Junicom - Arctuva - Pseuspi
3				101		PlBl-Xeroten-Vaccsco, ABLA/XETE/VAME
4		**BlSe** [Pl] (FdPa)				BlSe-Vaccsco-Arnilat; ABLA/CLUN2-MEFE, ABLA/LUGLH,
5			**BlSe** (Pl)		110	Bl-Menzfer-Violgla; Bl-Heramax; Bl-Rubupar; Bl-Alnuvir-Ribelac
6		**BlSe** [Act] (Pl)			111	Bl-Oplohor, Bl-Senetri-Valesit
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 44. ESSFdk_MT tree species suitability and plant associations displayed on edatopic grid.

3.1.11. ESSFwh_MT – Wet Hot Montana ESSF

This subzone occurs at mid elevations, primarily in the mountains of northwestern Montana, but also to the west in northern Idaho, and northeastern Washington. This is a transitional subzone between ICH and more typical ESSF forests at higher elevations.

Zonal forests of this subzone are dominated by subalpine fir, Engelmann spruce, western redcedar, and western hemlock (Table 9). Lodgepole pine and western white pine are important seral trees. Seral tree species include western larch, lodgepole pine, western white pine, and Douglas-fir. The shrub layer is dominated by Sitka alder, false azalea, Utah honeysuckle, and black huckleberry. Queen's cup, bear-grass, and grouseberry are dominant in the herb layer.

This subzone typically occurs at elevations above the ICHmw_MT and below the ESSFwm_MT. Near the British Columbia border, it is replaced by ESSFwh3 (Deb MacKillop and Ehman 2016).

Zonal Habitat types: ABLA2/XETE, TSHE/XETE, ABLA2/RHAL/XETE, ABLA2/RHAL, TSHE/CLUN, TSHE/MEFE, Bl-Menzfer-Loniuta-Paximyr-Clinuni (Cooper, Neiman, and Roberts 1991; Pfister et al. 1978)

ESSFwh_MT

	A	B	C	D	E	Habitat Types/Associations
0						
1				102		
2	**FdLw** [BlPl] (Se)					Fd-Spirbet-Xeroten
3		**BlSe** [LwPl]		101		ABLA2/XETE, TSHE/XETE, ABLA2/RHAL/XETE, ABLA2/RHAL
4		(FdHwCw)				TSHE/CLUN, TSHE/MEFE, Bl-Menzfer-Loniuta-Paximyr-Clinuni
5		**BlSe** [HwCw]			110	TSME/GYDR, Bl-Menzfer-Rhodalb-Gymndry-Athyfil
6		**BlSe** [HwCw]			111	TSHE/ATFI, Se-Oplohor, Bl-Ribelac-Senetri
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 45. ESSFwh_MT tree species suitability and plant associations displayed on edatopic grid.

3.1.12. ESSFwm_MT – Wet Mild Montana ESSF

This subzone occurs at high elevations in the mountains of northwestern Montana, northern Idaho, and northwestern Washington.

Zonal forests of this subzone are dominated by subalpine fir and Engelmann spruce (Table 9). Lodgepole pine and western white pine are seral species but do not tend to dominate many stands. At lower elevations, western hemlock or western redcedar can occur. The shrub understorey is dominated by white-flowered rhododendron, false azalea, Sitka alder, and black huckleberry. The most common herbs are bear-grass and queen's cup (*Clintonia uniflora*), and round-leaved violet (*Viola orbiculata*).

This subzone mostly occurs at elevations above the ICHdw_ID, and towards the British Columbia border, also above the ICHmw4 (Deb MacKillop and Ehman 2016), which ranges into BC. It also occurs above the ESSFvh_ID in some places. The ESSFwm_MT abuts the ESSFxk_MT in the southeast part of its range and is west of the ESSFdk_MT in the northeastern part of its range. It also abuts the ESSFwm3 (Deb MacKillop and Ehman 2016), another BC unit that extends into the US. At upper elevations, subalpine parkland occurs (**ESSFwmp_MT**).

Zonal Habitat types: ABLA2/RHAL, ABLA2/CLUN, ABLA2/VAME, BlPa alliance, Bl alliance (Cooper, Neiman, and Roberts 1991; Pfister et al. 1978)

ESSFwm_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Pl** [FdLw] (PaBl)			102			Fd-Arctuva, Fd-Spirbet, PaBl woodland, Fd woodland, Pa
2	**BlPl** [SeFd] (PaPw)			103			ABLA2/RHAL-XETE, PIAL-ABLA2/RHAL/XETE, ABLA2/RHAL-XETE, ABLA2/XETE
3				101			
4		**BlSe** [Pl](FdPwPa)					ABLA2/RHAL, ABLA2/CLUN, ABLA2/VAME, BlPa alliance, Bl alliand
5		**BlSe** (PlHwCw)			110		ABLA2/TRCA3, ABLA2/GYDR, BlSe-Streamp
6		**BlSe** (PlHwCw)			111		ABLA2/RHAL/SETR, PIEN/CASCP2, ABLA2/ATFI, Dm alliance
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 46. ESSFwm_MT tree species suitability and plant associations displayed on edatopic grid.

3.1.13. ESSFxx_WY – Very Dry Very Hot Wyoming ESSF

This subzone occurs at high elevations in the mountains of north central Wyoming. It is the furthest east of the ESSF subzones in Wyoming.

Zonal forests of this subzone are dominated by subalpine fir, Engelmann spruce, and lodgepole pine; whitebark pine is mostly absent (Table 9). The shrub understorey is lightly developed with some common juniper (*Juniperus communis*). Grouseberry dominates the understorey.

The ESSFxx_WY occurs at elevations above the MSdh_WY. At upper elevations, subalpine parkland occurs (**ESSFxxp_WY**).

Zonal Habitat types: ABLA-PIEN/VASC, ABLA-PIEN/ARCO9, ABLA/VASC.

ESSFxx_WY

	A	B	C	D	E		Habitat Types/Associations
0							
1	**PlPf** (Fd)			102			PIFL2/JUCO6, PIFL2/LEKI2, PSME/MARE11-JUCO6
2	**PlSe** [Bl] (Fd)			103			ABLA/JUCO, ABLA-PIEN/JUCO6, PICO/JUCO6, PIEN/JUCO6
3				101			PICO/VASC
4		**BlPlSe** (At)					ABLA-PIEN/VASC, ABLA-PIEN/ARCO9, ABLA/VASC
5		**SeBl** [Pl]			110		ABLA-PIEN/LIBO3/VASC, ABLA-PIEN/RUPA
6			**SeBl** [Pl]		111		PIEN/RIMO2
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 47. ESSFxx_WY tree species suitability and plant associations displayed on edatopic grid.

3.1.14. ESSFxk_WY – Very Dry Cool Wyoming ESSF

This subzone occurs at high elevations in the mountains of western Wyoming, southwest Montana, and into east-central Idaho.

Zonal forests of this subzone are dominated by subalpine fir, Engelmann spruce, lodgepole pine, and whitebark pine (Table 9). The shrub understorey is lightly developed with some common juniper (*Juniperus communis*), birch-leaved spirea, and shrubby cinquefoil (*Dasiphora fruticosa* ssp. *floribunda*). Grouseberry, elk sedge, and heart-leaved arnica are common understorey herbs/dwarf shrubs. In contrast to the ESSFxk_MT, this subzone lacks bear-grass.

The ESSFxk_WY occurs at elevations above the MSdh_WY. To the north, it abuts the ESSFxk_MT, and to the south it abuts the ESSFxc_CO. At upper elevations, subalpine parkland occurs (**ESSFxkp_WY**).

Zonal Habitat types: PICO/VASC, ABLA-PIEN/VASC, ABLA/VASC, ABLA-PIAL/VASC, ABLA-PIAL/VASC, ABLA/ARCO9 (Pfister et al. 1978; Steele et al. 1983).

ESSFxk_WY

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd** [PaPfPl] (BlSe)			102			PIFL/JUCO6, ABLE/PIEN/JUCO6, PIFL/FEID, PSME/FEID, PSME/JUCO, PSME/CARU,
2	**Pl** [FdBlPaSe]			103			ABLA/CAGE2, ABLA-PIEN/CAGE2
3				101			PICO/VASC, ABLA-PIEN/VASC
4		**BlPlSePa** (Fd)					ABLA/VASC, ABLA-PIAL/VASC, ABLA-PIAL/VASC, ABLA/ARCO9
5		**BlPlSe** [Pa]			110		ABLA/VAME, ABLA/VASC-THOC, ABLA/THOC
6			**SeBl** [Pl]		111		ABLA/CACA4, ABLA-PIEN/RIBES, ABLA/RIMO2
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 48. ESSFxk_WY tree species suitability and plant associations displayed on edatopic grid.

3.1.15. ESSFxc_CO – Very Dry Cold Colorado ESSF

This subzone occurs at high elevations in the mountains of Colorado, but also occurs in eastern Utah, in conjunction with ESSFxk_UT.

Zonal forests of this subzone are dominated by subalpine fir and Engelmann spruce (Table 9). Lodgepole pine and aspen are important seral trees. Corkbark fir (*Abies lasiocarpa* var. *arizonica*) is scattered in this subzone but is most prevalent in southern Colorado.

The shrub understorey is poorly developed and includes low bilberry and some common juniper. The herb layer commonly has grouseberry, heart-leaved arnica, elk sedge, wild strawberry, and tall fringed bluebells (*Mertensia ciliata*).

This subzone typically occurs at elevations above the MSdk_CO, but also is found above the MSxm_CO. At upper elevations, subalpine parkland occurs (**ESSFxcp_CO**).

Zonal Habitat types: ABLA-PIEN/VAMY2, ABLA-PIEN/VASC, ABLA-PIEN/ARCO9, PIEN/VAMY2, ABLA-PIEN/CAGE2, ABLA-PIEN/JUCO6 (Alexander 1988; Johnston 1987)

ESSFxc_CO

	A	B	C	D	E	Habitat Types/Associations
0						
1	[BlPlPfAt] (Fd)			102		
2	**Pl** [BlSeAt] (Fd)			103		PICO/VASC
3				101		PIEN/VAMY2, ABLA-PIEN/CAGE2, ABLA-PIEN/JUCO6
4		**PlBlSe** [Bla] (At)				ABLA-PIEN/VAMY2, ABLA-PIEN/VASC, ABLA-PIEN/ARCO9
5		**BlSe** [Pl]			110	ABLA-PIEN/RIBES
6		**BlSe**			111	ABLA-PIEN/SETR
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 49. ESSFxc_CO tree species suitability and plant associations displayed on edatopic grid.

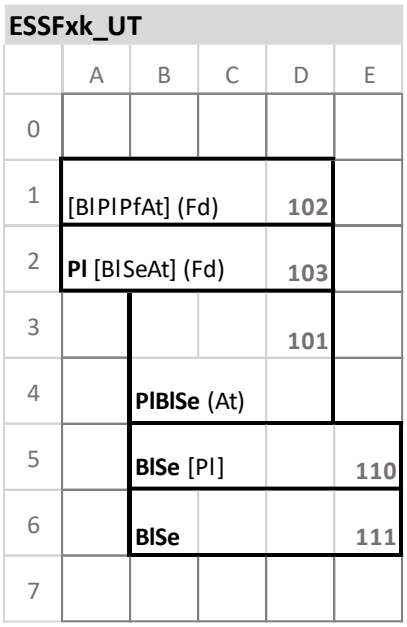
3.1.16. ESSFxk_UT – Very Dry Cool Utah ESSF

This subzone occurs at high elevations in the mountains of Utah, but also occurs in western Colorado, in conjunction with ESSFxc_CO.

Zonal forests of this subzone are dominated by subalpine fir and Engelmann spruce (Table 9). Lodgepole pine and aspen are important seral trees. The shrub understorey is mostly mountain snowberry (*Symphoricarpos oreophilus*), but also various currants/gooseberries, including mountain prickly gooseberry (*Ribes montigenum*). The herb layer is poorly characterized due to limited data.

This subzone typically occurs at elevations above the MSdh_UT, but also, for some reason, above the MSdh_WY or MSxm_CO. At upper elevations, subalpine parkland occurs (**ESSFxkp_UT**).

Zonal Habitat types: not available; limited data precludes listing of types.



Tree species codes are presented in Appendix 1.

Figure 50. ESSFxk_UT tree species suitability displayed on edatopic grid.

3.2. Interior Cedar – Hemlock [ICH]

The Interior Cedar – Hemlock (ICH) Zone occurs at low- to mid-elevations in mesic to moist, continental, temperate climates of the interior mountain ranges of Washington (Lillybridge et al. 1995; Williams et al. 1995), Idaho (Cooper, Neiman, and Roberts 1991), Montana (Pfister et al. 1978), and southern British Columbia (Meidinger and Pojar 1991). Mature forests are characterized by western hemlock (*Tsuga heterophylla*) and/or western redcedar (*Thuja plicata*) (Table 8). Grand fir (*Abies grandis*) is common in forests in the U.S. range. Douglas-fir (*Pseudotsuga menziesii*) is a common seral species and as it is long-lived, it is often a component of older forests. Other common seral tree species are western larch (*Larix occidentalis*), lodgepole pine (*Pinus contorta*), and ponderosa pine (*Pinus ponderosa*). In cooler climates, Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) are components of older stands.

The understorey varies considerably. In the U.S. range, common shrubs are black huckleberry (*Vaccinium membranaceum*), falsebox (*Paxistima myrsinites*), common snowberry (*Symphoricarpos albus*), birch-leaved spirea (*Spiraea betulifolia* ssp. *lucida*), Utah honeysuckle (*Lonicera utahensis*), and thimbleberry (*Rubus parviflorus*). Herbs include pinegrass (*Calamagrostis rubescens*), round-leaved violet (*Viola orbiculata*), Queen's cup (*Clintonia uniflora*), twinflower (*Linnaea borealis*), prince's pine (*Chimaphila umbellata*), and star-flowered false Solomon's-seal (*Maianthemum stellatum*).

Engelmann spruce and subalpine fir increase in abundance with elevation, and the Engelmann Spruce – Subalpine Fir (ESSF) zone usually occurs at elevations above the ICH.

USNVC: Zonal forests are included in Macrogroup M500: Central Rocky Mountain Mesic Lower Montane Forest [*Tsuga heterophylla – Abies grandis – Larix occidentalis* Lower Montane Forest], specifically, G217: Central Rocky Mountain Interior Western Red-cedar – Western Hemlock Forest Group.

3.2.1. ICH Subzones

Nine subzones (Table 10) are recognized, primarily over climatic moisture, temperature, and longitudinal gradients.

Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types used for the data summaries are listed.

Table 10. ICH Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	ICHxw_WA	ICHxh_ID	ICHxw_ID	ICHdh_ID	ICHdm_BC	ICHdw_ID	ICHmh_MT	ICHmw_MT	ICHvk_ID	Common Name
Thuja plicata	**C***	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	western redcedar
Abies grandis	c	**C**	**C**	**C**		**C**		c	**C**	grand fir
Tsuga heterophylla				c	**C**	**C**	c	**C**	c	western hemlock
Picea engelmannii			c		c	c	c	c	c	Engelmann spruce
Abies lasiocarpa			c		c	c	c	c	c	subalpine fir
Tsuga mertensiana									**C**	mountain hemlock
Larix occidentalis	**S**	s	s	s	**S**	**S**	**S**	**S**	s	western larch
Pseudotsuga menziesii	**S**	**S**	**S**	**S**	s	**S**	**S**	**S**	**S**	Douglas-fir
Pinus contorta	**S**			s	s	**S**	**S**	**S**	S	lodgepole pine
Pinus ponderosa	**S**	s		s		s				ponderosa pine
Betula papyrifera	s	s		s	s	s	**S**		s	paper birch
Populus tremuloides	s				s		s	s		trembling aspen
Pinus monticola				s	s	s	s	s	**S**	western white pine

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

3.2.2.ICHxw_WA – Very Dry Warm Washington ICH

This subzone occurs at low to mid elevations, mostly in Washington, but extends into some low elevation, warm valleys in Idaho.

Zonal forests of this subzone are dominated by Douglas-fir and western larch, with some western redcedar (Table 10). Western hemlock is absent. Other seral tree species on these sites are lodgepole and ponderosa pine. Grand fir is sometime present, but it is not a significant component. The shrub layer is well developed with black huckleberry, falsebox, common snowberry, oceanspray (*Holodiscus discolor*), mallow ninebark (*Physocarpus malvaceus*), tall Oregon-grape (*Mahonia aquifolium*), birch-leaved spirea, Douglas maple (*Acer glabrum* var. *douglasii*), and baldhip rose (*Rosa gymnocarpa*). The herb layer is lightly developed.

This subzone occurs at elevations above the IDFdh_WA in the western part of its range, whereas in the east, it occurs in valley bottoms, at elevations below the ICHdw_ID.

Zonal Habitat types: THPL/CLUN, THPL/VAME (Williams et al. 1995)

ICHxw_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		**PyFd**		102			PIPO-PSME/AGSP, PIPO/AGSP
2	**Fd** [PyLw] (Pl)			103			PSME/PHMA, PSME/PHMA-LIBOL, PSME/CARU, PSME/SYAL, PSME/VAME
3		**FdLw** [CwPyPlEp]					
4		(BlBgHw)		101			THPL/CLUN, TSHE/CLUN, THPL/VAME
5	110	**Cw**[BlPlFdAtLw]		**CwLw**[FdAtEp]		112	THPL/ARNU3, TSHE/ARNU3, THPL/GYDR, TSHE/GYDR
6	111	**Se**[BlCw](Fd)		**CwAct**[SeFd]		113	ALIN/EQUIS, PIEN/EQUIS
7							
						110	**Cw**[BlPlFdAtLw](HwSe)
						112	**CwLw**[FdAtEp](BgBl)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 51. ICHxw_WA tree species suitability and plant associations displayed on edatopic grid.

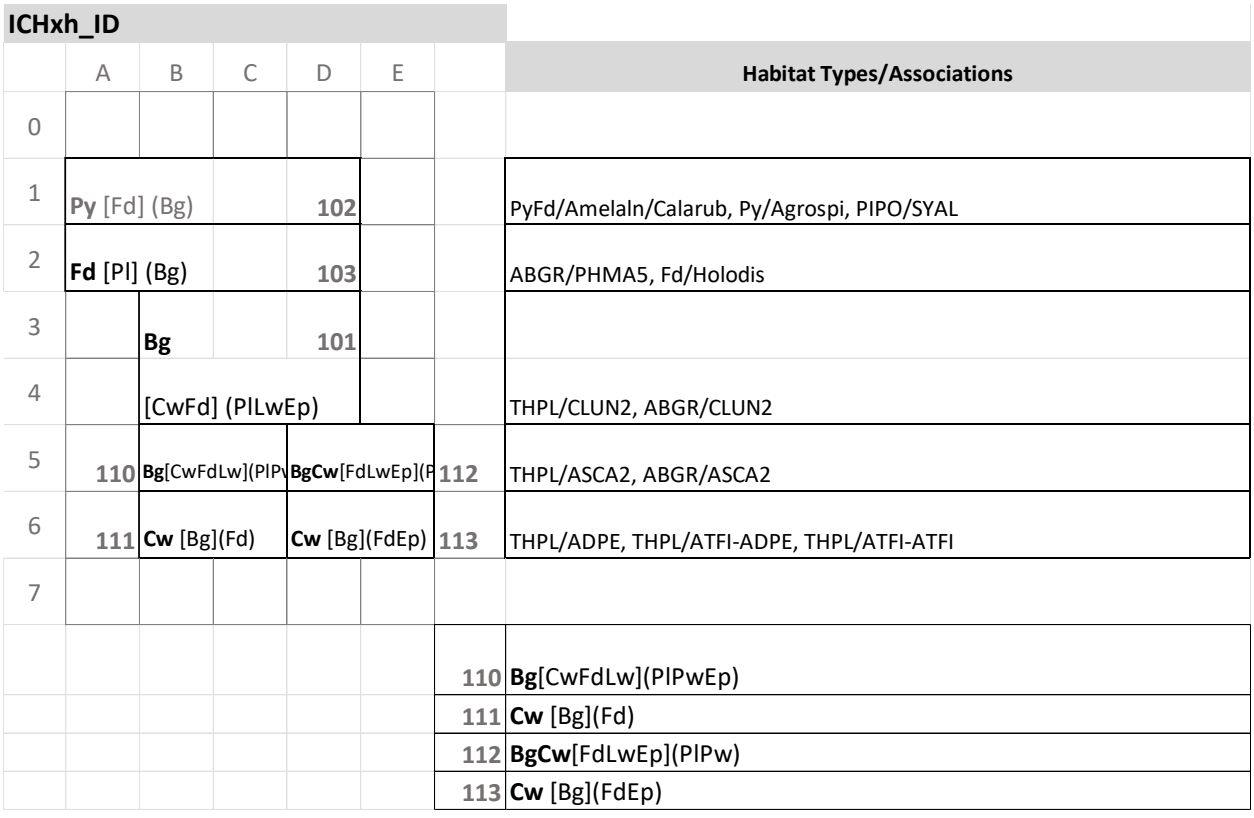
3.2.3.ICHxh_ID – Very Dry Hot Idaho ICH

This subzone occurs at low to mid elevations (500-1200 m) in northern Idaho from the community of Elk River, north of the Dwarshak Reservoir, SSE to the Selway River, mostly in the Nez-Perce-Clearwater National Forest.

Zonal forests are characterized by Douglas-fir, grand fir, and western redcedar (Table 10). Western hemlock is absent. Ponderosa pine is a common seral tree species; western larch and paper birch (Betula papyrifera) are other frequent seral species. The main understorey shrubs are common snowberry, Douglas maple, ocean-spray, saskatoon (*Amelanchier alnifolia*), and thimbleberry (*Rubus parviflorus*). The herb layer is mostly Idaho goldthread (*Coptis occidentalis*), star-flowered false Solomon's-seal (*Maianthemum stellatum*), queen's cup (*Clintonia uniflora*), bracken fern (*Pteridium aquilinum*), and Hooker's fairybells (*Prosartes hookeri*).

It mostly occurs at elevations above the IGFxm_OR and below the ICHxw_ID.

Zonal Habitat types: THPL/CLUN, ABGR/CLUN (Cooper, Neiman, and Roberts 1991; Pfister et al. 1978)



Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 52. ICHxh_ID tree species suitability and plant associations displayed on edatopic grid.

3.2.4.ICHxw_ID – Very Dry Warm Idaho ICH

This subzone occurs at moderately high elevations (1200-1600 m) in northern Idaho from the community of Elk River, north of the Dwarshak Reservoir, SSE to the Selway River, mostly in the Nez-Perce-Clearwater National Forest.

Zonal forests are characterized by Douglas-fir, grand fir, and western redcedar (Table 10). Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) can occur on zonal sites but are more common on moister sites. Western hemlock is absent. Ponderosa pine and western larch are frequent seral tree species.

The main understorey shrubs are common snowberry, Douglas maple, thimbleberry (*Rubus parviflorus*), saskatoon (*Amelanchier alnifolia*), black huckleberry (Vaccinium membranaceum), common snowberry, and false azalea (*Menziesia ferruginea*). The herb layer is mostly Idaho goldthread (*Coptis occidentalis*), star-flowered false Solomon's-seal (*Maianthemum stellatum*), queen's cup (*Clintonia uniflora*), bracken fern (*Pteridium aquilinum*), and bear-grass (*Xerophyllum tenax*).

It mostly occurs at elevations above the ICHxh_ID and below the ESSFdw_ID or ESSFdm_ID.

Zonal Habitat types: THPL/CLUN2, ABGR/CLUN2 (Cooper, Neiman, and Roberts 1991; Pfister et al. 1978)

ICHxw_ID

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Fd** (Py)		102			PSME/CAGE2, PSME/PHMA5, PSME/PHMA5/CARU
2	**Fd** (BgPy)			103			PSME/PHMA5-PHMA5, ABGR/PHMA5-PHMA5
3		**BgFd**		101			ABGR/CLUN2-CLUN2, ABGR/CLUN2-MEFE, ABGR/CLUN2-PHMA5
4		[LwCw] (SeBlPl)					THPL/CLUN2-CLUN2, THPL/CLUN2-TABR2, THPL/CLUN2-XETE
5	110	**Bg** [FdCwSe](LwP		**BgSe** [CwFdLw] (		112	THPL/ASCA2 (ASCA2, TABR2 & MEFE vars), ABGR/ASCA2ABLA/CLUN2-MEFE
6	111	**Bg** [CwSe](FdPw		**CwSeBg** [Fd] (Ep		113	THPL/ATFI-ATFI
7							

110	**Bg** [FdCwSe](LwPlPwEpBl)
111	**Bg** [CwSe](FdPwEpBl)
112	**BgSe** [CwFdLw] (PlPwEp)
113	**CwSeBg** [Fd] (EpPwBl)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 53. ICHxw_ID tree species suitability and plant associations displayed on edatopic grid.

3.2.5.ICHdh_ID – Dry Hot Idaho ICH

This subzone occurs at low elevations, mostly in northern Idaho, about as far south as Potlatch, ID, and extends into NW Montana.

Zonal forests are characterized by Douglas-fir, grand fir, and western redcedar (Table 10). Western hemlock occurs somewhat, but is more prevalent in the ICHdw_ID, which occurs at higher elevations. Ponderosa pine and western larch are common seral tree species.

The understorey is shrubby, with saskatoon (*Amelanchier alnifolia*), common snowberry, Douglas maple (*Acer glabrum*), oceanspray, and mallow ninebark (*Physocarpus malvaceous*). The herb layer is mostly pinegrass (Calamagrostis rubens), bracken fern (*Pteridium aquilinum*), star-flowered false, and Solomon's-seal (*Maianthemum stellatum*).

It mostly occurs at elevations below the ICHdw_ID. The IDFdh_WA occurs at lower elevations to the west, where climates are drier.

Zonal Habitat types: THPL/CLUN, (ABGR/CLUN) (Cooper, Neiman, and Roberts 1991; Pfister et al. 1978)

ICHdh_ID

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py** [Fd]		102			PyFd/Pseuspi (PIPO-PSME/AGSP?) PSME/CARU-ARUV
2	**Fd**[PlPyLw](BgEpAt)			103			FdPl/Calarub, PSME/CARU-CARU
3		**BgFdPlCwLw**		101			
4		[Pw] (PyAtEp)					THPL/CLUN, (ABGR/CLUN)
5	110	**CwFd**[PlLwBgSeP		**CwFd**[LwBgPwEp		112	CwBg/Polymun-Adiaale THPL/ASCA, THPL/GYDR
6	111	**CwSe**[BgBlFd](Ep		**Cw**[ActSeBgFdEp		113	THPL/Athyfil-Asarcau (Dr & Dm minor) THPL/ATFI
7							

110	**CwFd**[PlLwBgSePw](HwBlEp)
111	**CwSe**[BgBlFd](EpPwHw)
112	**CwFd**[LwBgPwEpSe](BlPlHw)
113	**Cw**[ActSeBgFdEp](PwBlHw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 54. ICHdh_ID tree species suitability and plant associations displayed on edatopic grid.

3.2.6.ICHdw_ID – Dry Warm Idaho ICH

This subzone occurs at mid elevations, mostly in eastern Washington and northern Idaho, but extending into NW Montana.

Zonal forests are dominated by Douglas-fir, grand fir, and western redcedar, with a component of western hemlock (Table 10). Western larch and lodgepole pine are common seral tree species. The main understorey shrubs are black huckleberry, falsebox, Douglas maple, thimbleberry, and birch-leaved spirea. Key herbs are queen's cup (*Clintonia uniflora*), twinflower (*Linnaea borealis*), prince's pine (*Chimaphila umbellata*), and round-leaved violet (*Viola orbiculata*).

In the northern part of its range, the ICHdw_ID occurs at elevations above the ICHxw_WA, whereas in the southern part of it range it occurs above the ICHdh_ID.

Zonal Habitat types: TSHE/CLUN, THPL/CLUN, ABGR/VAME/CLUN, ABGR/ACGLD/CLUN (Cooper, Neiman, and Roberts 1991; Pfister et al. 1978; Williams et al. 1995).

ICHdw_ID

	A	B	C	D	E		Habitat Types/Associations
0							
1		**PyFd**		**102**			PIPO-PSME/AGSP
2	**Fd** [LwPy](PlPwBg)			**103**			PSME/PHMA, PSME/PHMA-LIBOL, PSME/CARU, PSME/VAME, ABGR/PHMA
3		**BgFdLw** [CwHwAtPlPw]					
4		(SeEpPy)		**101**			TSHE/CLUN, THPL/CLUN, ABGR/VAME/CLUN, ABGR/ACGLD/CLUN
5	**110**	**CwFdBgPwLw**		**CwSe** [BgHwBl		**112**	THPL/ARNU3, TSHE/GYDR, TSHE/ARNU3
6	**111**	**CwFdBgPw** [Lw		**Cw** [SeActEp](I		**113**	TSHE/OPHO, THPL/OPHO, TSHE/ATFI, THPL/ATFI

110	**CwFdBgPwLw** [Hw] (SeBlAtEp)
111	**CwFdBgPw** [LwSeEpAt] (Hw)
112	**CwSe** [BgHwBl](Ep)
113	**Cw** [SeActEp](Bl)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 55. ICHdw_ID tree species suitability and plant associations displayed on edatopic grid.

3.2.7.ICHmh_MT – Moist Hot Montana ICH

This subzone occurs in northwestern Montana, primarily in Glacier National Park.

Zonal forests are dominated by Douglas-fir, western hemlock, and western redcedar, with a component of Engelman spruce and subalpine fir (Table 10). Western larch, lodgepole pine, and paper birch (*Betula papyrifera*) are common seral tree species. The main understorey shrubs are black huckleberry, Douglas maple, common snowberry, thimbleberry, birch-leaved spirea, and Utah honeysuckle. Key herbs are queen's cup, star-flowered false Solomon's-seal, Hooker's fairybells, pathfinder (*Adenocaulon bicolor*), bear-grass (*Xerophyllum tenax*), three-leaved foamflower (*Tiarella trifoliata*), and wild sarsaparilla (*Aralia nudicaulis*).

The ICHmh_MT occurs at elevations above the ICHdh_ID and below the MSdw_MT.

Zonal Habitat types: THPL/CLUN2-CLUN2, TSHE/CLUN2-CLUN2 (Pfister et al. 1978)

ICHmh_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1	102	**Fd** [EpPy] (Lw)					FdPl/Amelaln-Sympalb/Pseuspi. FdEp/Acergla/Pseuspi
2	**LwFdPl** [Pw](BlSePy)				103		FdLw/Spirbet/Calarub, FdLw/Sympalb/Caregey
3		**CwFdLw**		101			THPL/CLUN2-CLUN2, TSHE/CLUN2-CLUN2
4		[SeEpPlPwAt] (Hw)					CwHw/Clinuni-Xeroten, Pl/Linnbor-Clinuni
5	110	**Cw** [FdLwHwP		**Cw** [FdLwPwB		112	CwHw/Gymndry-Tiartri, FdLwEp/Acergla/Aralnud, CwHw/Aralnud
6	111	**CwSe** [HwBl] ([		**Cw** [SeActBg] (		113	HwSe/Oplohor,Se/Athyfil, Hw/Athyril, SeEp-Equiarv
7							
						110	**LwFd** [CwAtSeEpPwPlHw] (Bl)
						111	**SeBlHw** [Cw] (PwAct)
						112	**CwLwFd** [AtSeEpPwHwBl] (Pl)
						113	**Se** [CwEpAct] (BlPw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 56. ICHmh_MT tree species suitability and plant associations displayed on edatopic grid.

3.2.8.ICHmw_MT – Moist Warm Montana ICH

This subzone occurs in northwestern Montana, mostly west and south of Lake Kookanusa.

Zonal forests are dominated by western hemlock and western redcedar, with a component of Engelman spruce and subalpine fir (Table 10). Grand fir is sometimes present. Douglas-fir, western larch, lodgepole pine, and western white pine (*Pinus monticola*) are common seral tree species. The main understorey shrubs are false azalea (*Menziesia ferruginea*), Sitka alder (*Alnus viridis* ssp. *sinuata*), thimbleberry, birch-leaved spirea, grouseberry (*Vaccinium scoparium*), and Utah honeysuckle. Key herbs are queen's cup, twinflower, and three-leaved foamflower.

The ICHmw_MT abuts the ICHdm, which occurs to the north; and mostly occurs at elevations below the ESSFwh_MT, however, due mostly to mapping issues, it also abuts the ESSFwm_MT or sometimes MSdw_MT, at higher elevations.

Zonal Habitat types: TSHE/CLUN2, TSHE/CLUN2-CLUN2, THPL/CLUN2 (Pfister et al. 1978)

ICHmw_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1	**PlFd** [LwPy]			102			FdPl/Pseuspi, Pl(LwFd)/Spirbet/Calarub
2	**PlLwFd** (PyCwPw)				103		LwFd/Xeroten, CwPl/Paximyr-Vaccsco, CwHwPl/Paximyr
3		**FdLw**[AtCwHwSeBgPw]					
4		(BlEpPl]		101			CwHwLw/Paximyr/Clinuni, CwHwSe/Paximyr/Tiartri-Clinuni
5	110	**Cw**[FdLwHwPw		**Cw**[FdLwPwBg		112	CwHw/Gymndry, Pl/Gymndry
6	111	**CwSe**[HwBl](B		**Cw**[SeActBg](P		113	CwHw/Oplohor, CwHw/Athyfil, Dr/Athyfil
7							
						110	**Cw** [FdLwHwPwBgSeBl] (PlAt)
						111	**CwSe** [HwBl] (Bg)
						112	**Cw**[FdLwPwBgSeAtEp](Hw)
						113	**Cw** [SeActBg] (Pw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 57. ICHmw_MT tree species suitability and plant associations displayed on edatopic grid.

3.2.9.ICHvk_ID – Very Wet Cool Idaho ICH

This subzone occurs at mid elevations in northern Idaho and northwestern Montana, along the border between the two States.

Zonal forests are dominated by grand fir, western hemlock and western redcedar, with a component of Engelman spruce and subalpine fir, and sometimes mountain hemlock (*Tsuga mertensiana*) (Table 10). Douglas-fir, western larch, lodgepole pine, and western white pine are common seral tree species. The main understorey shrubs are black huckleberry and false azalea. Other common shrubs are Sitka alder and thimbleberry. Key herbs are bear-grass, queen's cup, star-flowered false Solomon's-seal, bracken fern (*Pteridium aquilinum*), and Idaho goldthread (*Coptis occidentalis*).

This subzone mostly occurs at elevations between the ICHdh_ID and the ESSFvh_ID.

Zonal Habitat types: TSME/MEFE-XETE, TSME/XETE-VAME, TSME/CLUN2-MEFE (Pfister et al. 1978; Cooper, Neiman, and Roberts 1991).

ICHvk_ID

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd**[PyLw](Pl)			102			
2	**Fd**[BgLw](PwPlEp)			103			FdBg(Lw)/Acergla-Rubupar
3		**FdBgLw**		101			HwHmBl/Menzfer-Paximyr/Xeroten
4		[PwCwSxHwHmPlBl](Ep)					
5	110	**CwSxPw**[HmH		**CwSx**[HmHwP		112	CwHw/Oplohor/Gymndry
6	111	**CwSx**[BlBgHm		**CwSx**[ActBgHn		113	CwHwBl/Equiarv, CwBlSe/Cornsto/Calacan
7							

110	**CwSxPw** [HmHwFdBlBg]
111	**CwSx** [BlBgHmHw]
112	**CwSx** [HmHwPwFd] (Ep)
113	**CwSx** [ActBgHmHw](Bl)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 58. ICHvk_ID tree species suitability and plant associations displayed on edatopic grid.

3.3. Interior Douglas-fir [IDF]

The Interior Douglas-fir (IDF) Zone occurs at low- to mid-elevations in dry, continental, temperate climates of the intermountain plateaus and interior mountain valleys and slopes of Washington (Lillybridge et al. 1995; Williams et al. 1995), northern Oregon (Franklin and Dyrness 1988), Idaho (Cooper, Neiman, and Roberts 1991; Steele et al. 1981; 1983), Montana (Pfister et al. 1978), and southern British Columbia (Meidinger and Pojar 1991).

Douglas-fir (*Pseudotsuga menziesii*) is the key climax species of this zone (Table 8). Ponderosa pine (*Pinus ponderosa*) is the most common seral species. Other frequent seral trees are lodgepole pine (*Pinus contorta*), and western larch (*Larix occidentalis*).

The understorey shrub cover is generally light and characterized by birch-leaved spirea (*Spiraea betulifolia* ssp. *lucida*), common snowberry (*Symphoricarpos albus*), and saskatoon (*Amelanchier alnifolia*). The forb and grass cover is higher and includes pinegrass (*Calamagrostis rubescens*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), arrowleaf balsamroot (*Balsamorhiza sagittata*), kinnikinnick (*Arctostaphylos uva-ursi*), yarrow (*Achillea millefolium*), and heart-leaved arnica (*Arnica cordifolia*).

The Ponderosa Pine (PP) zone often occurs in drier and warmer climates at elevations below the IDF. In dry climatic areas, the Montane Spruce (MS) zone occurs at elevations above the IDF, whereas in moister climates, the Interior Cedar – Hemlock (ICH) zone occurs above.

USNVC: Zonal forests are included in Macrogroup M501: Central Rocky Mountain Dry Lower Montane-Foothill Forest [*Pinus ponderosa* var. *ponderosa* – *Pseudotsuga menziesii* – *Pinus flexilis* Central Rocky Mountain Dry Forest], mostly G210: Central Rocky Mountain Douglas-fir - Pine Forest, and G215: Middle Rocky Mountain Montane Douglas-fir Forest & Woodland

3.3.1. IDF Subzones

Fifteen subzones (Table 11) are recognized in series of gradients affecting climatic moisture and temperature, including sub-continental to continental, latitude, longitude, and elevation.

Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types used for the data summaries are listed.

Table 11. IDF Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	IDFxx_WA	IDFxh_WA	IDFdh_WA	IDFdm_WA	IDFdk_WA	IDFxh_OR	IDFxh_ID	IDFxx_MT	IDFdh_MT	IDFdm_MT	IDFdk_MT	IDFdx_MT	IDFdkx_MT	IDFdxx_WY	IDFxm_CO	IDFdh_UT	Common Name
Quercus garryana	**C***																Garry oak
Pseudotsuga menziesii	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	Douglas-fir
Abies grandis	c					c	c			c							grand fir
Juniperus scopulorum								c				c	c	c	c		Rocky Mountain juniper
Quercus gambelii																**C**	Gambel oak
Pinus ponderosa	**S**	**S**	**S**	s	**S**	**S**	**S**	**S**	**S**	*		s		s	s	**S**	ponderosa pine
Populus tremuloides											**S**	s	**S**	s	**S**	**S**	trembling aspen
Larix occidentalis			s	**S**						s							western larch
Pinus contorta				**S**	**S**					s	**S**		**S**				lodgepole pine
Pinus flexilis														s			limber pine

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

3.3.2.IDFxx_WA – Very Dry Very Hot Washington IDF

This subzone occurs at low elevations, along the east slope of the Cascade Mountains from northern Oregon to central Washington State.

Zonal forest stands are dominated by Douglas-fir and ponderosa pine (Table 11). Garry oak (*Quercus garryana*) also occurs in this subzone. Common snowberry, oceanspray (*Holodiscus discolor*), and saskatoon are the most frequent shrubs. The herb layer is mostly pinegrass and elk sedge (*Carex geyeri*), with some heart-leaved arnica.

This subzone mostly occurs at elevations between the PPxx_OR and the IGF (IGFdw_OR or IGFdk_WA). It abuts the IDFxh_WA on its northern boundary (it lacks Garry oak).

Zonal Habitat types: PSME/CARU, PSME/SPBEL, PSME/SPBEL/CARU (Simpson 2007; Lillybridge et al. 1995).

IDFxx_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py** [Fd] (Qg)		102			PIPO/PUTR/AGSP, PSME/PUTR, PSME/PUTR/AGSP, PIPO/AGSP
2		**Fd** [PyQg]		103			PSME/CAGE, PSME/SYOR, PSME/SYAL/AGSP, QUGA/CARU-CAGE
3				101			
4			**Fd** [PyQg]				PSME/CARU, PSME/SPBEL, PSME/SPBEL/CARU
5	110	**Fd** [Py](BgQg)		**Fd** [PyBgQg]		112	PSME/SYAL, PSME/SYAL/CARU, QUGA/COCO2-SYAL
6	111	**FdPl** (Lw)		**Act**[BgLwOa](FdD		113	POTR2/COST, ALIN/EQUIS, POTR/SYAL, ALIN/COST
7							Oa - CADE
						113	**Act**[BgLwOa](AtFdDrQg)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 59. IDFxx_WA tree species suitability and plant associations displayed on edatopic grid.

3.3.3.IDFxh_WA – Very Dry Hot Washington IDF

This subzone occurs at low elevations, east of the Cascade Mountains, including the Okanogan-Wenatchee National Forest.

Zonal forest stands are dominated by Douglas-fir and ponderosa pine (Table 11). Common snowberry, birch-leaved spirea, saskatoon, and falsebox (*Paxistima myrsinites*) are the most frequent shrubs. The herb layer is mostly pinegrass, with some bluebunch wheatgrass, elk sedge, arrowleaf balsamroot, and heart-leaved arnica.

This subzone mostly occurs at elevations above the PPxh_WA, although sometimes it appears to go to BG, with no PP. In the northern part of the range, the IDFdk_WA occurs above this subzone; in the southern part, the IGFdk_WA occurs above. To the south is the IDFxx_WA, which has Garry oak.

Zonal Habitat types: PSME/CARU, PSME/SPBEL/CARU, PSME/PAMY/CARU (Williams and Lillybridge 1983; Lillybridge et al. 1995).

IDFxh_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py** [Fd]		102			PIPO/AGSP, PSME/PUTR/AGSP, PIPO/PUTR/AGSP, PSME/AGSP
2		**FdPy**		103			PSME/ARUV, PSME/ARUV/CARU, PSME/CARU-AGSP, PSME/SYOR
3				101			
4			**FdPy**				PSME/CARU, PSME/SPBEL/CARU, PSME/PAMY/CARU
5	110	**Fd** [Py] (At)		**Fd** [PyAt]		112	PSME/SYAL/CARU, PSME/SYAL, PSME/SPBEL, PSME/PAMY
6	111	**Fd** [Se] (At)		**Fd** [SeActAt]		113	PIEN/COST, POTR2/ALIN, POTR2/COST, ABLA2/LIBOL, PIEN/SYAL
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 60. IDFxh_WA tree species suitability and plant associations displayed on edatopic grid.

3.3.4.IDFdk_WA – Dry Cool Washington IDF

This subzone occurs at mid elevations, east of the Cascade Mountains, including the Okanogan-Wenatchee National Forest.

Zonal forest stands are dominated by Douglas-fir, with lodgepole pine and ponderosa pine (Table 11). The most common shrubs are falsebox, saskatoon, and birch-leaved spirea. The herb layer is dominated by pinegrass, with some kinnikinnick, balsamroot, heart-leaved arnica, and northwestern sedge (*Carex concinnoides*),

This subzone occurs at elevations between the IDFxh_WA and the MSxk_WA.

Zonal Habitat types: PSME/ARUV/CARU, PSME/CARU, PSME/PAMY/CARU (Williams and Lillybridge 1983; Lillybridge et al. 1995).

IDFdk_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py** [Fd]		102			PSME/PUTR/AGSP, PSME/AGSP, PSME/CARU-AGSP, PIPO alliance
2		**FdPy** (Pl)		103			PSME/ARUV, PSME/SPBEL,/CARU, PSME/SYOR
3				101			PSME/ARUV/CARU
4		**Fd** [PyPl] (At)					PSME/CARU, PSME/PAMY/CARU, PSME alliances, PICO alliance
5	110	**FdPl** [Py](At)		**Fd** [PlAt](Py)		112	PSME/SYAL/CARU, PSME/PAMY, PSME/VAMY/CARU, PSME/VAME
6	111	**Se** [FdBlPl]		**Se** [FdAt](Cw)		113	ABLA2/VAME, PIEN alliance
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 61. IDFdk_WA tree species suitability and plant associations displayed on edatopic grid.

3.3.5.IDFdh_WA – Dry Hot Washington IDF

This subzone occurs at low elevations, in northeastern Washington, east of the Okanogan River, extending east into northwestern Idaho. It is a southern variation of the IDFdh in British Columbia, which also extends south into Washington State.

Zonal forest stands are dominated by Douglas-fir and ponderosa pine (Table 11). At higher elevations, western larch can sometimes occur. The most frequent shrubs are common snowberry, mallow ninebark (*Physocarpus malvaceus*), tall Oregon-grape (*Mahonia aquifolium*), oceanspray, saskatoon, and birch-leaved spirea. Pinegrass dominates the understorey. Other common understorey plants are kinnikinnick, twinflower (*Linnaea borealis*), and heart-leaved arnica.

The PPxh_WA occurs at elevations below the IDFdh_WA. In its western range, the IDFdm_WA is found at higher elevations, but to the east, where the climate gets moister, the ICHxw_WA occurs above. In some eastern areas, the IDFdh_WA abuts the ICHdw_ID. It abuts the IDFdh (from B.C.) in some valleys near the Canadian border.

Zonal Habitat types: PSME/CARU, PSME/PHMA-LIBOL, PSME/CARU-ARUV (Williams et al. 1995; Cooper, Neiman, and Roberts 1991).

IDFdh_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py** [Fd]		102			PIPO-PSME/AGSP, PIPO-PSME/PSSPS, PIPO/PSSPS
2		**Py** [Fd]		103			PSME/SYOR, PSME/PHMA, PSME/HODI
3				101			
4		**FdPy** [Lw]					PSME/CARU, PSME/PHMA-LIBOL, PSME/CARU-ARUV
5	110	**Fd** [LwPyAt](EpPl)		**Fd** [LwAtBg](Ep)		112	PSME/SYAL, PSME/VACA, PSME/VAME
6	111	**Se**[FdEpPl](At)		**SeAct**[FdEp](LwAt		113	ABLA2/COCA, ABLA2/LIBOL, POTR2/ALIN, PIEN/COCA, PIEN/EQUIS
7							
						113	**SeAct**[FdEp](LwAtBgCw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 62. IDFdh_WA tree species suitability and plant associations displayed on edatopic grid.

3.3.6.IDFdm_WA – Dry Mild Washington IDF

This subzone occurs at mid elevations, in northeastern Washington, east of the Okanogan River. It is a southern variation of the IDFdm1 in British Columbia (Lloyd et al. 1990), which also extends south into Washington State.

Douglas-fir is the climax species of zonal forests (Table 11). Lodgepole pine and western larch are the main seral tree species. At lower elevations, ponderosa pine can also occur. The shrub cover is very light—the most frequent shrubs are common snowberry, birch-leaved spirea, falsebox, and black/blue huckleberry (*Vaccinium membranaceum/globulare*). Pinegrass dominates the understorey. Other common understorey plants are the dwarf shrubs kinnikinnick and twinflower, as well as the forbs silky lupine (*Lupinus sericeus*) and heart-leaved arnica.

This subzone occurs at elevations between the IDFdh_WA and MSdm_WA. To the north, it abuts the IDFdm1 (from B.C.).

Zonal Habitat type: PSME/CARU (Williams et al. 1995)

IDFdm_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		**FdPy**		102			PIPO-PSME/AGSP, PSME/SYOR, PSME/ARUV/CARU
2		**Fd** [LwPy]		103			PSME/PHMA, PSME/PHMA-LIBOL
3				101			
4			**FdLw** [Pl]				PSME/CARU, PSME/VAME
5	110	**FdLwPl**[BlSe](At)		**FdLw**[AtSe](Bl)		112	PSME/SYAL, ABLA2/VAME, ABLA2/LIBOL
6	111	**Se**[PlBl](FdAt)		**Se**[BlActAt](Fd)		113	PIEN/COCA, PIEN/EQUIS, ABLA2/TRCA3, PICO/CACA, PIPO/CAUT
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 63. IDFdm_WA tree species suitability and plant associations displayed on edatopic grid.

3.3.7.IDFxh_OR – Very Dry Hot Oregon IDF

This subzone occurs at mid elevations, mostly in central Oregon.in the Ochoco, Malheur, and western Umatilla National Forests.

Douglas-fir is the main climax species of zonal forests (Table 11). Ponderosa pine is the primary seral tree species. Grand fir/ white fir (*Abies concolor*) can occur on moister sites, especially near the boundary with the IGF. Elk sedge (*Carex geyeri*) is the main species in the understorey of mesic sites, often with a bit of pinegrass. On moist sites, the shrub cover increases, with common or mountain snowberry (*Symphoricarpos oreophilus*) being most frequent. On dry sites bluebunch wheatgrass and Idaho fescue (*Festuca idahoensis*) often occur.

This subzone mostly occurs at elevations between the PPxm_OR and the IGFmh_OR,

Zonal Habitat type: PSME/CAGE2, (PSME/CARU) (C. G. Johnson and Simon 1987; Charles G. Johnson and Clausnitzer 1992)

IDFxh_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Jw**					JUOC/FEID-PSSPS, FEID-AGSP
2	**Py** [Jw] (Fd)			102			PIPO/PSSPS, PIPO/CAGE
3				101			PIPO/CARU
4			**PyFd** (Om)				PSME/CAGE2, PSME/CARU
5	110	**FdPy** (BgBc)		**FdPy** (BgBc)		112	PIPO/SYAL, PSME/HODI, PSME/SYAL
6	111	**Bg** [FdPyBc]		**Bg** [FdPyBc]		113	ABGR/CARU
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 64. IDFxh_OR tree species suitability and plant associations displayed on edatopic grid.

3.3.8.IDFxh_ID – Very Dry Hot Idaho IDF

This subzone occurs at low elevations, mostly in west central Idaho, north and east of Boise.

Douglas-fir is the main climax species of zonal forests (Table 11). Ponderosa pine is the primary seral tree species. Grand fir can occur on moister sites, especially near the boundary with the IGF. The shrub cover is mostly mountain snowberry (*Symphoricarpos oreophilus*), mallow ninebark, and birch-leaved spirea. Pinegrass and elk sedge dominate the understorey; other species are bluebunch wheatgrass and arrowleaf balsamroot.

This subzone mostly occurs at elevations between the PPxh_WA and the IGFmm_OR or MSmm_ID; however, in the northeastern portion of its range, it occurs between the below the IDFdx_MT and in the northern portion of its range it occurs below the IGFxm_OR.

Zonal Habitat types: PSME/CARU, PSME/SPBE, PSME/PHMA, PSME/PHMA5/PIPO (Charles G. Johnson and Simon 1987).

IDFxh_ID

	A	B	C	D	E		Habitat Types/Associations
0							
1		grasslands					FEID-KOCR, FEID/AGSP-BASA, FEID-AGSP-LUSE
2		**Py**		102			PIPO/SYAL, PIPO/SPBE, PIPO-FEID, PIPO/PSSPS
3				101			PSME/CARU, PSME/SPBE
4			**Py** [Fd]				PSME/PHMA, PSME/PHMA5/PIPO
5	110	**FdPy** (BgAt)		**FdPy** [BgAt]		112	PSME/SYAL, PSME/ACGL-PHMA
6	111	**Se**[Fd](AtBgPl)		**Se**[BgFdActAt]		113	ABGR/TRCA3
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 65. IDFxh_ID tree species suitability and plant associations displayed on edatopic grid.

3.3.9.IDFxx_MT – Very Dry Very Hot Montana IDF

This subzone occurs at low elevations, around Lake Kookanusa, south of British Columbia, and further south around Flathead Lake and Flathead Indian Reservation. The IDFxx_MT is a southern variation of the IDFxx2 in British Columbia (D MacKillop et al. 2018).

Zonal forest stands are dominated by Douglas-fir and ponderosa pine (Table 11). Rocky Mountain juniper (*Juniperus scopulorum*) is common in this subzone. Saskatoon and common snowberry are common shrubs, but pinegrass dominates the understorey—along with some bluebunch wheatgrass, Idaho fescue, and/or rough fescue (*F. campestris*).

At elevations above this subzone, the IDFdm_MT occurs in the northern part of the range, whereas IDFdh_MT mostly occurs above it in the southern part of the range (sometimes IDFdm_MT). Near the Canadian border, the IDFxx_MT abuts the IDFxx2 (D MacKillop et al. 2018), a unit from British Columbia that occurs in Montana near the border.

Zonal Habitat types: PSME/CARU-AGSP, PSME/CARU (Pfister et al. 1978).

IDFxx_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1		grassland		Gg			non-treed
2		(Jr)					
3				101			FdPy-Physmal-Pseuspi, PIPO/AGSP, PSME/FEID, PSME/AGSP,
4		**FdPy** (Jr)					PSME/CARU-AGSP, PSME/CARU
5	110	**Fd**[Py](EpAt)		**ActFd**[AtEp]		112	Act-Acergla-Corycor, PSME/SYAL-CARU, PSME/PHMA5-CARU,
6	111	**Fd** (At)		**Act**[AtEp]		113	ActDm-Cornsto-Equiarv
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 66. IDFxx_MT tree species suitability and plant associations displayed on edatopic grid.

3.3.10. IDFdh_MT – Dry Hot Montana IDF

This subzone occurs at low elevations, in the Missoula, Kalispell, and Flathead Lake regions of Montana. It is similar to the IDFxx_MT, but being a slightly moister climate, there is more Douglas-fir and moister sites have a greater variety of tree species.

Zonal forest stands are dominated by Douglas-fir and ponderosa pine (Table 11). Western larch appears at higher elevations. The dominant shrubs are common snowberry, mallow ninebark, and saskatoon. Pinegrass dominates the understorey—along with some bluebunch wheatgrass and elk sedge.

This subzone occurs between the IDFxx_MT and the IDFdm_MT, where the elevation sequence has all three subzones. In areas lacking the IDFxx_MT, the IDFdh_MT occurs at lower elevations than the IDFdm_MT.

Zonal Habitat types: PSME/CARU-AGSP, PSME/CARU (Pfister et al. 1978).

IDFdh_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py** [Fd]		102			PIPO/PSSPS
2		**Py** [Fd]		103			PSME/PSSPS
3				101			PSME/PHMA5/CARU, PSME/SYAL-CARU, PSME/PHMA5-PHMA5,
4		**FdPy** [Lw]					PSME/CARU-AGSP, PSME/CARU
5	110	**Fd**[LwPy](PlAt)		**Fd**[LwPyAt](Ep)		112	PIPO/SYAL-SYAL, PSME/SYAL-SYAL,
6	111	**Se**[FdPl](LwAt)		**Se**[FdEpActAt](Lw		113	THPL/CLUN2, PSME/VACA13
7							
						113	**Se** [FdEpActAt](LwCw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 67. IDFdh_MT tree species suitability and plant associations displayed on edatopic grid.

3.3.11. IDFdm_MT – Dry Mild Montana IDF

This subzone occurs at low-mid elevations in northwestern Montana, in the Bitterroot National Forest, Missoula, and Kalispell regions, north to the Canadian border. It is a southern equivalent of the IDFdm2 in British Columbia (D MacKillop et al. 2018).

Douglas-fir is the climax species of zonal forests (Table 11). Lodgepole pine and western larch are the main seral tree species. Ponderosa pine can also occur, especially on dry sites or near boundaries with the IDFdh_MT. The shrub cover is typically common snowberry, saskatoon, birch-leaved spirea, and mallow ninebark. Pinegrass dominates the understorey. Other common understorey plants are the dwarf shrubs kinnikinnick and twinflower, as well as elk sedge, and heart-leaved arnica.

This subzone mostly occurs at elevations between the IDFdh_MT and MSdw_MT. However, it can occur below the ICHdw_ID, or sometimes the ICHdh_ID, or in the north, the ICHdm (a Canadian unit). The IDFdm_MT abuts the IDFdm2 near the border with British Columbia (D MacKillop et al. 2018).

Zonal Habitat types: PSME/CARU-CARU, PSME/CARU-ARUV (Pfister et al. 1978).

IDFdm_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py** [Fd]		102			Py-Pseuspi, Py-Festida, PyFd-Purstri, PyFd-Ceanvel
2		**FdPy** [Lw]		103			FdPy-Arctuva, FdPy-Caregey
3				101			PSME/PHMA5-CARU, PSME/SYAL-CARU, PSME/PHMA5-PHMA5
4		**FdLwPl** [Py]					PSME/CARU-CARU, FdPy-Spirbet, PSME/CARU-ARUV
5	110	**Fd**[SePlLw](PyAtB		**FdLw**[SeBgEpAt]		112	Fd-Linnbor, FdLw-Clinuni, Fd-Phillew
6	111	**Se**[Fd](Bl)		**Se**[FdLwBgAtAct]		113	SeFd-Ribelac, SeDm-Cornsto, Act-Poa pra
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 68. IDFdm_MT tree species suitability and plant associations displayed on edatopic grid.

3.3.12. IDFdk_MT – Dry Cool Montana IDF

This subzone occurs at mid elevations in northwestern Montana. It occurs on the east slopes of the Rocky Mountains from Canada south to about highway MT200, and then south to Butte, and west into the mountain valleys, as far as the Bitterroot National Forest.

Douglas-fir is the climax species of zonal forests (Table 11). Lodgepole pine and trembling aspen (*Populus tremuloides*) are the main seral tree species. The most frequent shrubs are common snowberry, saskatoon, birch-leaved spirea, and prairie rose (*Rosa woodsii*). Pinegrass dominates the understorey. Other common understorey plants are elk sedge, northern bedstraw (*Galium boreale*), heart-leaved arnica, wild strawberry (*Fragaria virginiana*), and sticky purple geranium (*Geranium viscosissimum*).

In the northern part of its range, the IDFdk_MT occurs at elevations between the FGff and MSdw_MT. In the southern areas, it is mostly between the IDFdx_MT and MSdh_MT. It abuts the IDFdkx_MT along its southern boundaries.

Zonal Habitat types: PSME/CARU-CARU, PSME/CARU, PSME/SYAL-CARU (Pfister et al. 1978).

IDFdk_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1		**[PfJr]** (Py)		102			Jr-Artetri-Festida , Pf-Junicom-Pseuspi, PSME/FEID, PSME/JUCO6
2		**PyFd** [Pf] (Jr)		103			PyFd-Pseuspi,
3				101			PSME/CARU-CARU, PSME/CARU, PSME/SYAL-CARU
4			**Fd** [PlAt](Jr)				Fd-Sympalb-Calarub-Caregey, Pl-Calarub
5	110	**Pl** [Fd](At)		**At** [Fd]		112	At-Rosaaci, At-Rosawoo, PSME/SYAL-SYAL
6	111	**Se** [Bl]		**Se** (Act)		113	Se-Ribelac-Maiaste
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 69. IDFdk_MT tree species suitability and plant associations displayed on edatopic grid.

3.3.13. IDFdx_MT – Dry Very Hot Montana IDF

This subzone occurs at low elevations in southwestern Montana and east central Idaho.

Douglas-fir is the primary species of zonal forests (Table 11). Ponderosa pine or trembling aspen are sometimes present. The most frequent shrubs are common snowberry, prairie rose, common juniper, and birch-leaved spirea. Bunchgrasses, including bluebunch wheatgrass, Idaho fescue, and rough fescue dominate the understorey, with some pinegrass.

The subzone generally occurs at elevations below the IDFdk_MT. In the northeast part of its range, it occurs at elevations between the PPxw_MT and IDFdkx_MT. If the PPxw_MT is absent, if occurs above the BGmk_MT. In the southwestern part of its range, it occurs at elevations between the BGmk_MT and the MSdh_WY or, sometimes, the IDFdkx_MT.

Zonal Habitat types: PSME/AGSP; PSME/FEID; PSME/FESC; PSME/SYOR (Pfister et al. 1978).

IDFdx_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1		grassland		Gg			Festida, Pseuspi
2		**PfJr** [Py]		102			Pf-Junihor-Pseuspi, Junisco-Pseuspi-Pascsmi, PIFL2/PSSPS
3				101			PSME/PSSPS, PIPO/PSSPS
4			**PyFd** [At](Jr)				PSME/AGSP; PSME/FEID; PSME/FESC; PSME/SYOR
5	110	**Fd** [Py] (At)		**ActAt** [FdPy]		112	PSME/SYAL-SYAL, PSME/SYAL,
6	111	**Se** [FdPl] (At)		**Act** [SeFdAt]		113	
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 70. IDFdx_MT tree species suitability and plant associations displayed on edatopic grid.

3.3.14. IDFdkx_MT – Dry Cool-Mild Montana IDF

This subzone occurs at low to mid elevations in southwestern Montana, east central Idaho, and into Wyoming.

Douglas-fir is the climax species of zonal forests (Table 11). Lodgepole pine and trembling aspen (*Populus tremuloides*) are the main seral tree species, although lodgepole pine is not consistently present across the subzone. Rocky Mountain juniper is often present. The most frequent shrubs are common snowberry, prairie rose, common juniper, and birch-leaved spirea. Bunchgrasses, including bluebunch wheatgrass, Idaho fescue, and rough fescue dominate over pinegrass in the understorey.

Throughout most of the range of the IDFdkx_MT, it occurs at elevations above the IDFdx_MT and below the MSdh_WY. In the southern areas, though, it is mostly between the IDFdh_UT and MSdh_WY, although sometimes below the MSxm_CO.

Zonal Habitat types: PSME/CARU-AGSP (Pfister et al. 1978; Steele et al. 1983; 1981).

IDFdkx_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1		**[PfJr]** (Py)		102			Jr-Artetri-Festida , Pf-Junicom-Pseuspi, PSME/FEID, PSME/JUCO6
2		**PyFd** [Pf] (Jr)		103			PyFd-Pseuspi,
3				101			PSME/CARU, PSME/SYAL-CARU, PSME/AGSP,
4			**Fd** [PlAt](Jr)				PSME/CARU-AGSP
5	110	**Pl** [Fd](At)		**At** [Fd]		112	At-Rosaaci, At-Rosawoo, PSME/SYAL-SYAL
6	111	**Se** [Bl]		**Se** (Act)		113	Se-Ribelac-Maiaste
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 71. IDFdkx MT tree species suitability and plant associations displayed on edatopic grid.

3.3.15. IDFdxx_WY – Dry Very Hot Wyoming IDF

This subzone occurs at low to mid elevations in south central Montana, and central Wyoming.

Douglas-fir is the climax species of zonal forests (Table 11). Limber pine and Rocky Mountain juniper often occur. Lodgepole pine, trembling aspen, and ponderosa pine occur infrequently on these sites. Common juniper is the most frequent shrub, often with common snowberry. Idaho fescue and bluebunch wheatgrass are the main understorey.

Throughout much of the range of the IDFdxx_WY, it occurs at elevations between the PPxw_MT and the MSdh_WY. Sometimes it abuts the IDFdkx_MT at higher elevations. In the south, it occurs between the IDFdh_UT and the MSdh_WY.

Zonal Habitat types: PSME/JUCO6, PSME/MARE11-JUCO6 (Pfister et al. 1978; Steele et al. 1983).

IDFdxx_WY

	A	B	C	D	E		Habitat Types/Associations
0							
1	(Jr)	grassland		Gg			Festida, Pseuspi, Junihor, ARTR2/FEID, JUSC2/ARTR2
2		**Pf** [Jr] (Fd)		**102**			PIFL2/PSSPS, PIFL2/FEID, PSME/FEID
3				**101**			PIFL2/JUCO6
4		**Fd** [Pf] (PyAtJr)					PSME/JUCO6, PSME/MARE11-JUCO6
5	**110**	**Fd** [Py] (At)		**At** [FdPy]		**112**	PSME/SYAL, PSME/PHMO4,
6	**111**	**PlFd** (At)		**ActAt**[PlFd](Se)		**113**	PICE/PHMA5, PSME/PHMA5-PHMA5
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 72. IDFdxx_WY tree species suitability and plant associations displayed on edatopic grid.

3.3.16. IDFxm_CO – Very Dry Mild Colorado IDF

This subzone occurs at mid elevations in western Colorado.

Douglas-fir is the climax species of zonal forests (Table 11). Ponderosa pine and trembling aspen are the main seral tree species. Gambel oak or Rocky Mountain juniper are often present, depending upon the area. The most frequent shrubs are common juniper and mountain snowberry. Kinnikinnick and elk sedge characterize the herb layer.

This subzone occurs at elevations below the MSxm_CO. The subzone at elevations below the IDFxm_CO varies—in the east slope of the Rockies, it is PPxh_CO or JPWwm_CO; in the west it is IDFdh_UT; and, in the central region, it is IWFdm_CO.

Zonal Habitat types: PSME/JUCO6, PIPO-PSME/MUMO, PSME/QUGA, PSME/FEAR2 (Marr 1961; Alexander 1988)

IDFxm_CO

	A	B	C	D	E		Habitat Types/Associations
0							
1	(Jr)	grassland		Gg			
2	**Jr** [PePfPyQa] (Fd)			102			PSME/ARUV-JUCO6, PIPO/CEMO2
3				**101**			PSME/JUCO6
4		**PyFd** [At]					PIPO-PSME/MUMO, PSME/QUGA, PSME/FEAR2
5	**110**	**PyFd** [AtPl] (Bc)		**FdAt** [PlPyBc]		**112**	POTR5/SYOR2, PSME/SYOR2
6	**111**	**Se**[PlPyFd](BcAt)		**SeAt**[BcPyFd](Pl)		**113**	POTR/AMAL2-PRVIV
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 73. IDFxm_CO tree species suitability and plant associations displayed on edatopic grid.

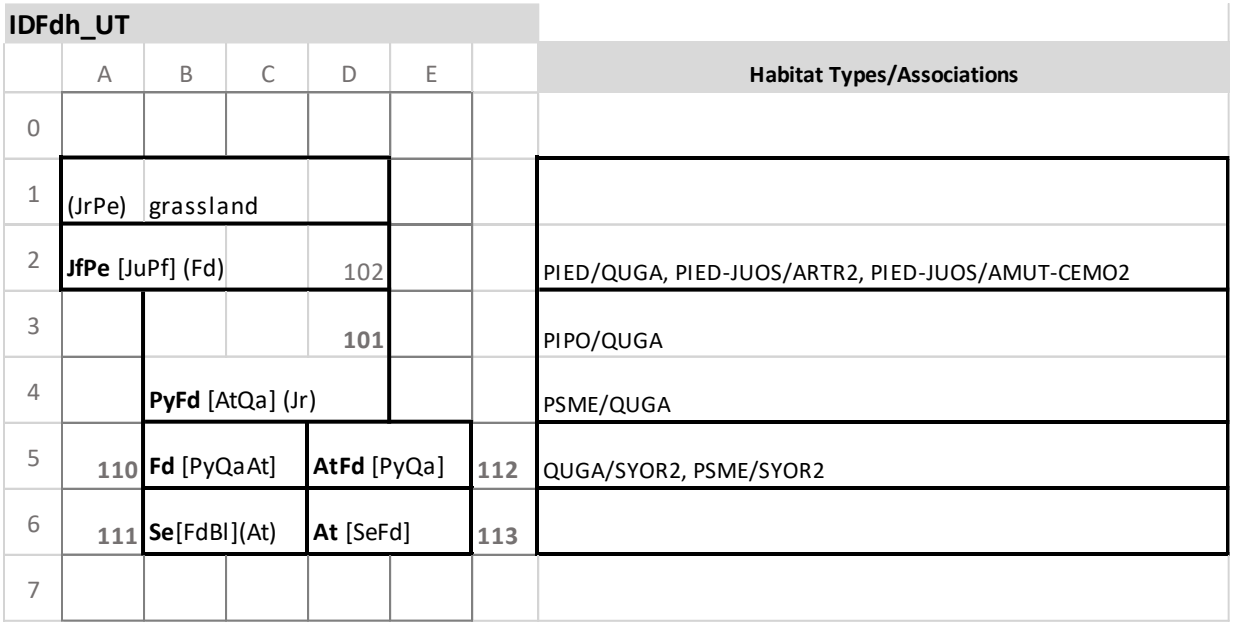
3.3.17. IDFdh_UT – Dry Hot Utah IDF

This subzone occurs at low elevations in Utah, in western Colorado, and eastern Nevada.

Douglas-fir is the climax species of zonal forests (Table 11). Gambel oak is often present. The most frequent shrub is mountain snowberry. Various grasses characterize the herb layer.

Throughout most of the range of the IDFdh_UT, it occurs at elevations between the JPWdw_UT and MSdh_UT.

Zonal Habitat types: PSME/QUGA (Banner 1992).



Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 74. IDFdh_UT tree species suitability and plant associations displayed on edatopic grid.

3.4. Interior Grand Fir [IGF]

The Interior Grand Fir (IGF) Zone occurs at mid-elevations in dry to mesic, continental, temperate climates on the lee side of the Cascade Mountains and in the highlands of the intermountain basin of Washington, Oregon, and central Idaho. Grand fir (*Abies grandis*) is the key climax species of this zone (Franklin and Dyrness 1988; Clausnitzer 1993; Topik 1983). Stands are dominated by grand fir, Douglas-fir (*Pseudotsuga menziesii*) (Table 8), and/or ponderosa pine (*Pinus ponderosa*). Western larch (*Larix occidentalis*) and lodgepole pine (*Pinus contorta*) also occur. Western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) are absent from circum-mesic sites in the zone.

The understorey varies considerably from the areas in the Coast transition along the East Cascades across the interior to Idaho. Shrub cover is generally light and characterized by birch-leaved spirea (*Spiraea betulifolia* ssp. *lucida*), common snowberry (*Symphoricarpos albus*), and saskatoon (*Amelanchier alnifolia*). Frequent herbs include pinegrass (*Calamagrostis rubescens*), elk sedge (*Carex geyeri*), prince's pine (*Chimaphila umbellata*), and heart-leaved arnica (*Arnica cordifolia*). In the Coast Transition, the understorey includes a greater variety of species.

The IGF usually occurs at elevations above the Interior Douglas-fir (IDF) or Ponderosa Pine (PP) zones. It generally occurs below the Montane Spruce (MS) Zone.

USNVC: Zonal forests are included in Macrogroup M500: Central Rocky Mountain Mesic Lower Montane Forest [*Tsuga heterophylla – Abies grandis – Larix occidentalis* Lower Montane Forest], specifically, G211: Central Rocky Mountain Mesic Grand Fir – Douglas-fir Forest & G212: East Cascades Mesic Grand Fir – Douglas-fir Forest groups.

3.4.1. IGF Subzones

Five subzones (Table 12) are recognized in series of climate moisture and temperature gradients, from sub-continental to continental, longitude, and elevation.

Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types used for the data summaries are listed.

Table 12. IGF Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	IGFdk_WA	IGFdw_OR	IGFmh_OR	IGFmm_OR	IGFxm_OR	Common Name
Pseudotsuga menziesii	**C***	**C**	**C**	**C**	**C**	Douglas-fir
Abies grandis	**C**	**C**	**C**	**C**	c	grand fir
Pinus ponderosa	**S**	**S**	**S**	**S**	**S**	ponderosa pine
Larix occidentalis		s	s	s		western larch
Pinus contorta			s	s		lodgepole pine

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

3.4.2.IGFdk_WA – Dry Cool Washington IGF

This subzone occurs at mid elevations, along the east slope of the Cascade Mountains in mid to northern Washington State. Zonal forest stands are dominated by grand fir and Douglas-fir, although western larch, lodgepole pine, or ponderosa pine are often stand components (Table 12). In this area, a minor amount of western hemlock or western redcedar can occur, especially along the western boundary of the subzone. Although falsebox, birch-leaved spirea, and saskatoon are common shrubs, some shrubs indicating a transitional submaritime/subcontinental climate also can occur, including dull Oregon-grape (*Mahonia nervosa*), oceanspray (*Holodiscus discolor*), and baldhip rose (*Rosa gymnocarpa*). The herb layer is mostly pinegrass and elk sedge, but can also include some 'coastal' species, such as vanilla-leaf (*Achlys triphylla*).

This subzone occurs at elevations above the IDFxh_WA, or in some places, the IDFxx_WA. It occurs below the ESSFmw_WA, and sometimes the ESSFdh_WA. This subzone abuts the submaritime climates along the Cascades where it often meets the CWHms_WA.

Zonal Habitat types: ABGR/ARCO, ABGR/ACCI, ABGR/ACCI-CHUM, ABGR/BENE, ABGR/SPBEL/PTAQ (Lillybridge et al. 1995).

IGFdk_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		**PyFd**		102			PSME/PUTR/AGSP, PSME/PUTR, PIPO/CARU/AGSP, PSME/AGSP, PSME/CARU-AGSP
2		**FdPy** [Bg]		103			ABGR/CARU, PSME/CARU, ABGR/ARNE, ABGR/BENE/CARU, ABGR/CARU-LUPIN, PSME/SPBEL/CARU, PSME/CAGE, ABGR/HODI/CARU, PSME/PAMY
3				101			ABGR/ARCO, ABGR/ACCI, ABGR/ACCI-CHUM
4			**FdBg** [Py]				ABGR/BENE, ABGR/SPBEL/PTAQ
5	110	**BgFd** [LwPl](SeHw		**BgFd** [CwLw](Se)		112	ABGR/ACTR, TSHE/ACTR, THPL/GYDR
6	111	**BgPl** [FdHwSe] (Lw		**Bg** [ActFdCwPwSe		113	ALIN/ATFI, ALIN/LYAM, THPL/OPHO, TSHE/OPHO, THPL/ATFI
7							

110	**BgFd** [LwPl](SeHw)
111	**BgPl** [FdSe] (LwHwBl)
112	**BgFd** [CwLw](Se)
113	**Bg** [ActFdCwPwSe] (Lw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 75. IGFdk_WA tree species suitability and plant associations displayed on edatopic grid.

3.4.3.IGFdw_OR – Dry Warm Oregon IGF

This subzone occurs at mid elevations, along the east slope of the Cascade Mountains in northern Oregon and southern Washington State.

Zonal forest stands are dominated by grand fir and Douglas-fir, although western larch or ponderosa pine are often stand components (Table 12). Along the western boundary of the subzone, a minor amount of western hemlock can occur. Garry oak is present on dry sites.

Although falsebox, birch-leaved spirea, common snowberry, and saskatoon are common shrubs, some shrubs indicating a transitional submaritime/subcontinental climate also can occur, including dull Oregon-grape, oceanspray, baldhip rose, and vine maple (*Acer circinatum*). The herb layer is lightly developed, with some elk sedge, Prince's pine, star-flowered false Solomon's-seal (*Maianthemum stellatum*), broad-leaved starflower (*Trientalis borealis* ssp. *latifolia*), and vanilla-leaf.

This subzone occurs west of, and at elevations above, the IDFxx_WA. To the west, it abuts subzones with a submaritime climate, mostly CWHms_OR. To the south, it abuts the IWFdw_OR.

Zonal Habitat types: ABGR/ACCI-BEAQ/TRLA2, ABGR/TRLA2, ABGR/COCO2/ACTR, ABGR/ACTR, ABGR/BENE/ACTR, ABGR/ACCI/ACTR (Simpson 2007; Topik 1997)

IGFdw_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py** [FdQg](Bg)		102			PIPO-QUGA/PUTR, PIPO-QUGA/BASA, PSME/FEOC
2		**FdPyBg**		103			PSME/CAGE, PSME/HODI/CAGE, PSME/SYAL, ABGR/CAGE, ABGR/HODI, ABGR/POPU
3				**101**			ABGR/ACCI-BEAQ/TRLA2, ABGR/TRLA2, ABGR/COCO6/ACTR
4		**FdBg** [Py](Lw)					ABGR/ACTR, ABGR/BENE/ACTR, ABGR/ACCI/ACTR,
5	**110**	**FdBg**(PyLwHw)		**FdBg**(CwLw)		**112**	THPL-ABGR/ACTR, ABGR/CONU/ACTR, ABGR/RUPA/DIHO, ABGR/SYMO/ACTR
6	**111**	**Fd**[SeBg](PlHw)		**Bg**[FdPwCw](SeM		**113**	
7							
						113	**Bg** [FdPwCw] (SeMbDr)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 76. IGFdw_OR tree species suitability and plant associations displayed on edatopic grid.

3.4.4.IGFmh_OR – Moist Hot Oregon IGF

This subzone occurs at mid to high elevations, on the Columbia Plateau of northeastern Oregon.

Zonal forest stands are dominated by grand fir, ponderosa pine, and Douglas-fir, although western larch or lodgepole pine are often stand components (Table 12). The shrub cover is light and is comprised mostly of falsebox, birch-leaved spirea, common snowberry, and creeping Oregon-grape (*Mahonia repens*). The herb layer is dominated by pinegrass and elk sedge.

The subzone occurs at elevations above the PPxm_OR and below the MSxh_OR.

Zonal Habitat types: ABGR/CARU, ABGR/CAGE (C. G. Johnson and Simon 1987; Charles G. Johnson and Clausnitzer 1992).

IGFmh_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1		**PyJw**		102			PIPO/PSSPS, JUOC/CERCO, JUOC/ARTRV
2		**Py** [Fd] (Bg)		103			PSME/PHMA5, ABGR/SPBE, PSME/SYAL,
3				101			PICO(ABGR)/LIBO2, ABGR/ACGL/PHMA, ABGR/ACGL
4		**BgFdPy** [PlLw]					ABGR/CARU, ABGR/CAGE, PSME/CAGE, PIPO/CARU, PIPO/CAGE, PSME/CARU
5	110	**FdBg**[PyPl](SeLw)		**FdBg**[LwAt](Py)		112	PICO/VASC ABGR/CLUN, ABGR/TABR/CLUN, ABGR/VASC, ABGR/VASC/LIBO
6	111	**Bg**[FdSe](Lw)		**Bg**[ActFdLwSe]		113	ABGR/ATFI, PIEN/SETR, ALIN/ATFI, POTR/SYAL, POTR/ALIN-COST, PIEN/CADI
7							
						110	**FdBg** [PyPl] (SeLw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 77. IGFmh_OR tree species suitability and plant associations displayed on edatopic grid.

3.4.5.IGFxm_OR – Very Dry Mild Oregon IGF

This subzone occurs at low to mid elevations, in northeastern Oregon, southeastern Washington, and central Idaho. Zonal forests are mostly dominated by Douglas-fir and ponderosa pine, with a component of grand fir, particularly in the regen (Table 12). The understorey is mostly shrubs and grasses, including common snowberry, birch-leaved spirea, saskatoon, mock-orange (*Philadelphus lewisii*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), Sandberg's bluegrass (*Poa secunda* ssp. *secunda*), and yarrow (*Achillea millefolium*).

The IGFxm_OR occurs at elevations below the IGFmm_OR, and above BGwm_WA in the north, and above BGdh_OR in the south. To the east it abuts the IDFdh_ID.

Zonal Habitat types: PSME/PHMA, PSME/SYAL, PSME/HODI, ABGR/SPBE2 (Charles G. Johnson and Simon 1987).

IGFxm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Grassland**		Gg			FEID-KOCR, FEID-PSSPS-BASA, AGSP-POSA
2		**Py** [Fd] (Bg)		102			PIPO/PSSPS, PIPO/FEID
3				101			PSME/CARU, PIPO/CARU
4		**PyFd** [Bg]					PSME/PHMA, PSME/SYAL, PSME/HODI, ABGR/SPBE2
5	110	**FdBg**[Py](LwSe)		**FdBg**[Py](SeAt)		112	ABGR/LIBO3, ABGR/CLUN2, PSME/ACGL-PHMA
6	111	**Bg**[FdSe]		**Bg**[ActFd](Se)		113	PICO/VAME, ABGR/GYDR, ABGR/POMU, ALIN/COST, POTR2/ALIN-COST
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 78. IGFxm_OR tree species suitability and plant associations displayed on edatopic grid.

3.4.6.IGFmm_OR – Moist Mild Oregon IGF

This subzone occurs at mid elevations, in northeastern Oregon, southeastern Washington, and central Idaho.

Zonal forests are dominated by Douglas-fir, grand fir, and ponderosa pine (Table 12). Western larch and lodgepole pine are additional seral tree species. The main understorey shrubs are black huckleberry, common snowberry, birch-leaved spirea, and baldhip rose, and. Key herbs are pinegrass, elk sedge, twinflower, yarrow, parsnip-flowered buckwheat (*Eriogonum heracleoides*), and heart-leaved arnica (*Arnica cordifolia*).

This subzone occurs at elevations above the IGFxm_OR and below MS: the MSxh_OR in western portions, and MSmm_ID in eastern portions.

Zonal Habitat types: ABGR/PHMA-PHMA, ABGR/VAME, ABGR/SPBE2, ABGR/LIBO (Charles G. Johnson and Simon 1987).

IGFmm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1		**Py**		102			PIPO/FEID, PIPO/PSSPS
2		**Py** [Fd] (Bg)		103			PSME/PHMA, PSME/CARU, ABGR/CARU,
3				101			ABGR/PHMA-PHMA,
4		**BgFd** [PlPyLw]					ABGR/VAME, ABGR/SPBE2, ABGR/LIBO, PSME/SYAL,
5	110	**FdBgPl**[PySe](Lw		**FdBg**[SeLwPl](Py,		112	ABGR/ACGL, ABGR/CLUN2
6	111	**Bg**[SeBl](Fd)		**Bg**[ActSeFdLw]		113	POTR5/ALIN-COST, POTR/CACA, PIEN/EQAR, PIEN/ATFI
7							
						112	**FdBg**[SeLwPl](PyAt)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 79. IGFmm_OR tree species suitability and plant associations displayed on edatopic grid.

3.5. Interior White Fir [IWF]

The Interior White Fir (IWF) Zone occurs at mid to high elevations in dry to mesic, continental, temperate climates across the western States of southern Oregon, northern California, Nevada, Utah, and Colorado. White fir (*Abies concolor*) is the key climax species of this zone (Volland 1985; Simpson 2007). Stands are dominated by white fir, Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*) or aspen (*Populus tremuloides*) (Table 8). In the west, some species of submaritime climates occur, like Jeffrey pine (*Pinus jeffreyi*), sugar pine (*Pinus lambertiana*), or incense-cedar (*Calocedrus decurrens*). The understorey varies considerably across the zone and reflects that this zone occurs in transition from hot, dry climates (Ponderosa Pine [PP] or Juniper Pine Woodland [JPW] zones) to montane forests (Montane Spruce [MS] or Mountain Hemlock – Red Fir [MHRF] zones).

USNVC: Zonal forests are included in Macrogroup M022: Southern Rocky Mountain Lower Montane Forest [*Abies concolor – Pseudotsuga menziesii – Picea pungens* Forest], specifically, G226: Southern Rocky Mountain White Fir – Douglas-fir Dry Forest Group.

3.5.1. IWF Subzones

Four subzones (Table 13) are recognized, characterizing primarily sub-continental to continental temperature and longitudinal climatic moisture gradients.

Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types used for the data summaries are listed.

Table 13. IWF Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	IWFdm_CO	IWFdw_OR	IWFxk_NV	IWFxm_CA	Common Name
Abies concolor	**C***	**C**	**C**	**C**	white fir
Calocedrus decurrens		c		c	incense-cedar
Pinus flexilis			c		limber pine
Pinus monophylla			c		singleleaf pinyon
Quercus gambelii	s				Gambel oak
Pseudotsuga menziesii	**S**			s	Douglas-fir
Pinus ponderosa	**S**	**S**		s	ponderosa pine
Populus tremuloides	s		**S**		trembling aspen
Pinus jeffreyi		s		**S**	Jeffrey pine
Pinus lambertiana		s		s	sugar pine
Pinus contorta		**S**			lodgepole pine
Cercocarpus ledifolius			s		curl-leaf mountain mahogany

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

3.5.2.IWFdw_OR – Dry Warm Oregon IWF

This subzone occurs at mid to high elevations along the east slope of the Cascade Mountains from southern Oregon into northern California. Zonal forest stands are characterized by white fir (Table 13). Stands can be dominated by white fir or Douglas-fir. Common seral trees are lodgepole pine and ponderosa pine. Other trees include giant chinquapin (*Chrysolepis chrysophylla*), incense-cedar (*Calocedrus decurrens*), sugar pine (*Pinus lambertiana*) and western white pine (*Pinus monticola*). Shrubs are of low cover and can include saskatoon (*Amelanchier alnifolia*), common snowberry (*Symphoricarpos albus*), baldhip rose (*Rosa gymnocarpa*), or falsebox (*Paxistima myrsinites*). Common herbs are squirreltail grass (*Elymus elymoides*), prince's pine (*Chimaphila umbellata*), stiff needlegrass (*Achnatherum occidentale*), wild strawberry (*Fragaria virginiana*), and Ross' sedge (Carex rossii).

To the west of this subzone, at higher elevations, is the MHRFds_CA. To the east is either the PPxk_OR or the PPxm_OR.

Zonal Habitat types: ABCO/CEVE-CHCHC4, ABCO/SYAL/FRVI, ABCO/SYMO (Simpson 2007; Volland 1985; Hopkins, William 1979).

IWFdw_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1		**PyJw** (PlBc)		102			PIPO/PUTR2-CEVE/CAINI3
2		**PyBc** [Jw](Pl)		103			ABCO/CEVE-ARPA6, ABCO/CEVE-ARPA/CAPE-PEEU, ABCO-PSME/CEVE-CACH/CARU
3				101			
4		**Bc** [PyPlPsPzOa]					ABCO/CEVE-CHCHC4, ABCO/SYAL/FRVI, ABCO/SYMO
5	110	**PlBc**[PyFd](Ps)		**FdBc**[Py]		112	ABCO/CHCHC4-PAMY/CHUM, ABCO-CADE27/TRLA6
6	111	**BcPl**[Fd]		**Bc**[FdAt]		113	PICO/SPDO/CAAN15, PICO/CAAN15, PICO/VAUL/CAAN15
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 80. IWFdw_OR tree species suitability and plant associations displayed on edatopic grid.

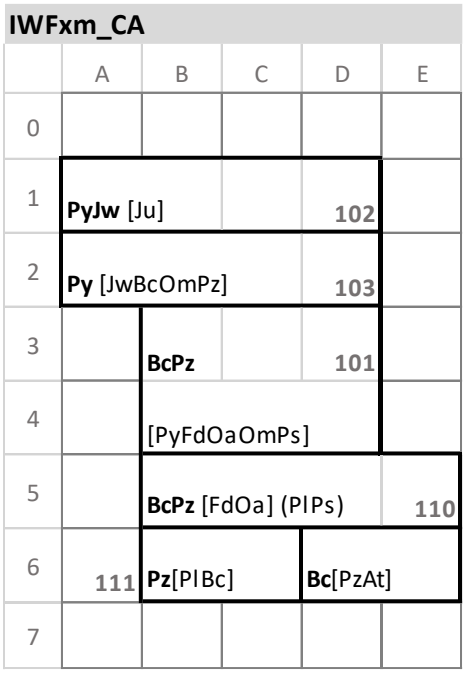
3.5.3.IWFxm_CA – Very Dry Mild California IWF

This subzone occurs on the east slopes of the Sierra Nevada Mountains, centred around Lake Tahoe. It extends from Lasson and Plumas National forests in the north to about Inyo National Forest in the south.

Zonal forest stands are characterized by white fir. Seral species include lodgepole pine, Douglas-fir, Jeffrey pine (*Pinus jeffreyi*), western white pine (*Pinus monticola*), and ponderosa pine (Table 13). California red fir (*Abies magnifica*) can occur at higher elevations and on the western edge of the subzone. Some understorey species are pinemat manzanita (*Arctostaphylos nevadensis*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), squirreltail grass (*Elymus elymoides*), and sulphur buckwheat (*Eriogonum umbellatum*).

This subzone abuts the CWFds_CA to the west, and the JPWxw_NV to the east.

Zonal Habitat types: not available.



Tree species codes are presented in Appendix 1.

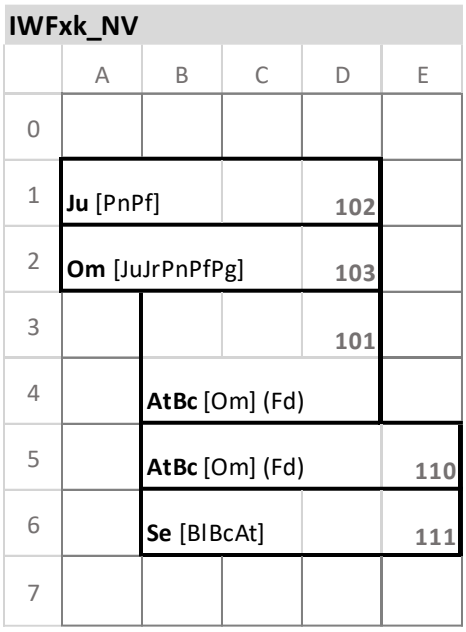
Figure 81. IWFxm_CA tree species suitability displayed on edatopic grid.

3.5.4.IWFxk_NV – Very Dry Cool Nevada IWF

This subzone occurs on and near the top of a series of ridges in northeastern Nevada. Zonal forests are characterized by white fir and can have a high aspen component (Table 13). Limber pine (*Pinus flexilis*) occurs on dry sites. A few understorey species are mountain snowberry (*Symphoricarpos oreophilus*), green rabbit-brush (*Chrysothamnus viscidiflorus*), and curl-leaf mountain mahogany (*Cercocarpus ledifolius*). Herbs are mostly grasses, such as bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*).

This subzone occurs at elevations above the JPWxw_NV and below the MSxx_NV.

Zonal Habitat types: ABCO/CELE3 (Youngblood and Mauk 1985); limited data.



Tree species codes are presented in Appendix 1.

Figure 82. IWFxk_NV tree species suitability displayed on edatopic grid.

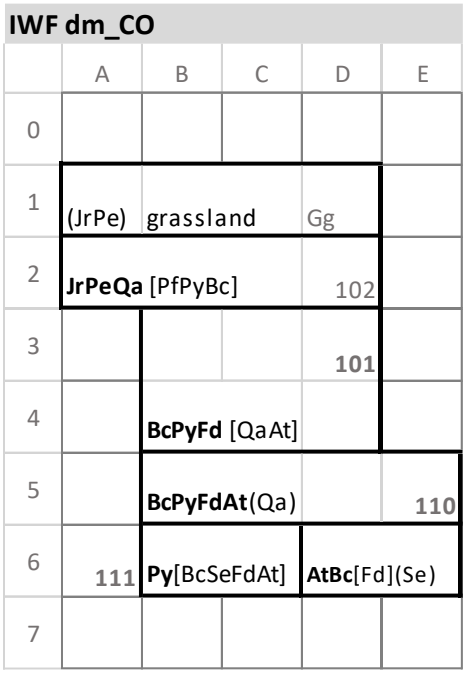
3.5.5.IWFdm_CO – Dry Mild Colorado IWF

This subzone occurs at mid elevations in south central and southwestern Colorado.

Stands are characterized by white fir, Douglas-fir, and ponderosa pine (Table 13). Trembling aspen can also occur. The understorey is uncertain due to few plots in mature forests, but may include prairie rose (*Rosa woodsii*) and introduced grasses.

The subzone occurs at elevations above the PPxh_CO and below the MSdk_CO. Other vegetation mapping has the IWFdm_CO as IDF or Pine-Douglas-fir potential vegetation.

Zonal Habitat types: ABCO-PSME/QUGA, ABCO-PSME/ACGL, ABCO-PSME/SYOR2 (Alexander 1988)



Tree species codes are presented in Appendix 1.

Figure 83. IWF dm_CO tree species suitability displayed on edatopic grid.

3.6. Montane Spruce [MS]

The Montane Spruce (MS) Zone is a montane, forested zone of temperate, continental climates of the mountains of the western cordillera. It ranges from southern British Columbia and Alberta, as far south as New Mexico in the Rocky Mountains (Meidinger and Pojar 1991; Pfister et al. 1978; Cooper, Neiman, and Roberts 1991; Lillybridge et al. 1995).

Mature forests are characterized by Engelmann spruce (*PIcea engelmannii*) and subalpine fir (*Abies lasiocarpa*) (Table 8), however, due to fire history, many forests are younger and dominated by lodgepole pine (*Pinus contorta*), with spruce and fir regeneration. Douglas-fir (*Pseudotsuga menziesii*) is usually present, as it is a long-lived seral species. Aspen (*Populus tremuloides*) and western larch (*Larix occidentalis*) are other common seral tree species. In some regions, grand fir (*Abies grandis*) or white fir (*A. concolor*) occur in the MS—especially when the IGF or IWF occurs at elevations below. Whitebark pine (*Pinus albicaulis*) can also occur, especially in the southeastern part of the zone.

Common understorey shrubs are black huckleberry (*Vaccinium membranaceum*), falsebox (*Paxistima myrsinites*), birch-leaved spirea (*Spiraea betulifolia*), snowberries (*Symphoricarpos albus, S. oreophilus*), and common juniper (*Juniperus communis*). Pinegrass (*Calamagrostis rubescens*) and grouseberry (*Vaccinium scoparium*) are the most common and abundant understorey plants. Other frequent forbs/grasses are elk sedge (*Carex geyeri*), yarrow (*Achillea millefolium*), heart-leaved arnica (*Arnica cordifolia*), and western meadowrue (*Thalictrum occidentale*). Bear-grass (*Xerophyllum tenax*) is abundant in some areas.

The Interior Douglas-fir (IDF) Zone generally occurs at elevations below the MS, although sometimes the Interior Grand Fir (IGF) or Interior White Fir (IWF) zones are found. The Englemann Spruce – Subalpine Fir (ESSF) Zone occurs above the MS zone. The MS zone is somewhat of a transitional zone between the IDF and ESSF.

USNVC: Zonal forests are included in Macrogroup M020: Rocky Mountain Subalpine-High Montane Forest [*Abies lasiocarpa – Picea engelmannii – Pinus albicaulis* Rocky Mountain Forest]

3.6.1. MS Subzones

Eleven subzones (Table 14) are recognized across the range of the MS, reflecting temperature, climatic moisture, and species distribution gradients

Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types used for the data summaries are listed.

Table 14. MS Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	MSxk_ WA	MSdw_ MT	MSdm_ WA	MSxh_ OR	MSmm _ID	MSxm_ CO	MSdh_ MT	MSdh_ WY	MSdh_ UT	MSxx_ NV	MSdk_ CO	Common Name
Picea engelmannii	**C***	**C**	**C**	**C**	c	**C**	c	**C**	**c**	**C**	**C**	Engelmann spruce
Abies lasiocarpa	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	c	c	subalpine fir
Abies grandis				**C**	c							grand fir
Abies concolor									**C**	c	c	white fir
Abies lasiocarpa var. *arizonica*											**C**	corkbark fir
Pseudotsuga menziesii	**S**	**S**	**S**	**S**	**S**	s	**S**	**S**	**S**	s	s	Douglas-fir
Pinus contorta	**S**	**S**	**S**	**S**	**S**	**S**	s	**S**	s			lodgepole pine
Larix occidentalis	**S**	**S**	**S**	**S**								western larch
Populus tremuloides	s		s			**S**	**S**	s	**S**	**S**	**S**	trembling aspen
Pinus ponderosa			s									ponderosa pine
Pinus albicaulis								s				whitebark pine
Quercus gambelii									s			Gambel oak
Pinus flexilis							s			S		limber pine
Pinus longaeva										s		Great Basin bristlecone pine

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

3.6.2.MSxk_WA – Very Dry Cool Washington MS

This subzone occurs at mid to high elevations in northwest Washington, between the Okanogan River valley and the Lake Chelan/Ross Lake National Recreation Areas—in a rainshadow area from the Cascade Mountains. On its northern boundary, it abuts the MSxk1 in British Columbia (Lloyd et al. 1990).

Zonal forests of this subzone are generally dominated by lodgepole pine, with some Engelmann spruce and subalpine fir, especially in the regeneration (Table 14). Douglas-fir can be a significant component of some stands—particularly those on warm aspects or at low elevation. Pinegrass dominates the understory. Other common plants are falsebox, grouseberry, heart-leaved arnica, and twinflower (*Linnaea borealis*).

This subzone occurs at elevations above the IDFdk_WA and below the ESSFxc_WA. It abuts the MSdm_WA in the northwest (although MSdm_WA is most extensive east of the Okanogan River valley).

Zonal Habitat types: ABLA2/CARU, ABLA2/LIBOL, ABLA2/PAMY, ABLA2/VASC, ABLA2/VASC/CARU (Lillybridge et al. 1995; Williams and Lillybridge 1983).

MSxk_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1	**FdPy** [Pl] (Pa)			102			PSME/ARUV/CARU, PSME/CARU-AGSP, PSME/PUTR/AGSP, PIPO-PSME/AGSP
2	**FdPlLw** [Py]			103			PSME/CARU, PSME/ARUV, PSME/PAMY/CARU, PSME/SPBEL/CARU, PSME/VAMY/CARU, PSME/VAMY
3				101			ABLA2/COCA, ABLA2/CARU, ABLA2/LIBOL, POTR/CARU
4		**FdPl** [SeBlLw]					ABLA2/VASC, ABLA2/PAMY, ABLA2/VASC/CARU
5	110	**PlSe**[Bl](FdLwA		**PlSe**[FdLwAtBl		112	ABLA2/GYDR, ABLA2/STAMC, ABLA2/LEGL-VASC, PIEN/COCA
6	111	**SeBl**[Pl](AtFd)		**Pl**[SeBlAct](Fd		113	PIEN/CASCP2, PIEN/EQUIS, ABLA2/ATFI, ALIN/EQUIS, ALIN/ATFI
7							

110	**PlSe** [Bl] (FdLwAt)
112	**PlSe** [FdLwAtBl]
113	**Pl** [SeBlAct] (FdAt)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 84. MSxk_WA tree species suitability and plant associations displayed on edatopic grid.

3.6.3.MSdm_WA – Dry Mild Washington MS

This subzone occurs at mid to high elevations, mostly in the western portion of Colville National Forest in northern Washington State, but also a small area occurs west of the Okanogan River near British Columbia.

Zonal forests of this subzone are dominated by mixed stands of subalpine fir, lodgepole pine, and Engelmann spruce (Table 14). Western larch is a common seral species in the Colville National Forest (larch is not in the northwestern range of the subzone). Falsebox, black huckleberry, and Sitka alder are common shrubs. Pinegrass dominates the understorey. Other common plants of the herb layer are grouseberry, low bilberry (*Vaccinium myrtillus*), kinnikinnick (*Arctostaphylos uva-ursi*), silky lupine (*Lupinus sericeus*), twinflower, and heart-leaved arnica.

This subzone occurs at elevations above the IDFdm_WA and below ESSFxh_WA. In the western part of its range, it abuts the MSdm2 (Lloyd et al. 1990) from British Columbia, which also occurs a bit in the U.S., near the border.

Zonal Habitat types: ABLA2/LIBOL, ABLA2/VAME, ABLA2/PAMY, ABLA2/VASC (Williams et al. 1995).

MSdm_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		**FdPy** (Pl)		102			PSME/ARUV/CARU, PSME/VAMY/CARU, PSME/ARUV, PSME/SYAL/AGSP
2	**Fd** [LwPyPl]			103			PSME/PHMA, PSME/CARU, PSME/SYAL, PSME/SYOR, PSME/PAMY/CARU
3				101			ABLA2/COCA, ABLA2/CARU, PSME/PAMY, ABLA2/CLUN
4		**FdSePl** [BlLw] (At)					ABLA2/LIBOL, ABLA2/VAME, ABLA2/PAMY, ABLA2/VASC
5	110	**PlSeBl**(FdLwAt		**PlSe**[FdLwAtBl		112	ABLA2/TRCA3, ABLA2/GYDR, ABLA2/STAMC, POTR/CACA
6	111	**PlSe**[BlAt](Act		**Se**[PlBlActAt]((		113	PIEN/CASCP2, PIEN/EQUIS, ABLA2/ATFI, ABLA2/TRLA4, ALIN/ATFI
7							

110	**PlSeBl** (FdLwAt)
111	**PlSe** [BlAt] (FdAct)
112	**PlSe** [FdLwAtBl]
113	**Se** [PlBlActAt] (Fd)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 85. MSdm_WA tree species suitability and plant associations displayed on edatopic grid.

3.6.4.MSxh_OR – Very Dry Hot Oregon MS

This subzone occurs at mid to high elevations in northeastern Oregon, extending slightly into southeast Washington.

Zonal forests of this subzone are dominated by Engelmann spruce, subalpine fir, and lodgepole pine (Table 14). Grand fir and Douglas-fir often occur, especially at lower elevations. Black huckleberry is the main understorey shrub. Pinegrass, elk sedge, and grouseberry are the main plants in the herb layer. Heart-leaved arnica is common.

This subzone occurs at elevations above the IGFmh_OR or the western range of the IGFmm_OR, and below the ESSFxw_OR. The MS subzone to the east is the MSmm_ID, which occurs east of the Snake River.

Zonal Habitat types: ABLA2/PIEN/ARCO, ABLA2-PIEN/LIBO2, ABLA2/VAME, ABLA/VASC (C. G. Johnson and Simon 1987; Charles G. Johnson and Simon 1987; Powell et al. 2007).

MSxh_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd** [Py] (PlBgLwPf)			102			PIFL/JUCOM2, PSME/CARU; PIPO-PSME/CAGE2
2	**PlFdLw** [BgPySe](BlAt)			103			ABLA2/VASC, ABLA2/ARCO, PSME/CAGE2
3		**SePlLw**		101			ABGR/VAME, ABGR/LIBO2, ABGR/VASC, ABLA2/CLUN, PICO/VASC
4		[FdBgBl] (At)					ABLA2/PIEN/ARCO, ABLA2-PIEN/LIBO2, ABLA2/VAME, ABLA/VASC
5	110	**SeBl**[BgLwPl](F		**SeBlBg**[Lw](Fd		112	ABLA2-PIEN/SETR, ABGR/TRCA, ABLA/TRCA,
6	111	**SeBl**[Bg](LwPl)		**SeBlBg**(Lw)		113	
7							
						110	**SeBl** [BgLwPl](Fd)
						111	**SeBl** [Bg](LwPl)
						112	**SeBlBg** [Lw](FdPlAt)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 86. MSxh_OR tree species suitability and plant associations displayed on edatopic grid.

3.6.5.MSmm_ID – Moist Mild Idaho MS

This subzone occurs at mid to high elevations in the mountains of central Idaho. It extends somewhat into the Bitterroot Mountains of western Montana.

Zonal forests of this subzone are dominated by Engelmann spruce, subalpine fir, and lodgepole pine (Table 14). Grand fir and Douglas-fir often occur, especially at lower elevations. Black huckleberry is the main understorey shrub. Birch-leaved spirea and false azalea are often present. Bear-grass, pinegrass, elk sedge, and grouseberry are the main plants in the herb layer.

This subzone mostly occurs at elevations between the IGFmm_OR and ESSFdm_ID. In a small portion of the northern part of its range, it occurs above the ICHdh_ID. The MS to the east if mostly the MHdh_WY, although in the northeast it is the MSdw_MT.

Zonal Habitat types: ABLA/XETE-VAME, ABLA/VASC, ABLA/VAME, ABLA/SPBE2, ABLA/CARU (Steele et al. 1981).

MSmm_ID

	A	B	C	D	E		Habitat Types/Associations
0							
1	**FdPy** (PlPa)			102			FdPy/Junicom-Physmal
2	**FdPl**(PyBlSeBgLw)			103			FdPl/Calarub-Caregey-Xeroten
3		**PlFdSe**		101			ABLA/XETE-VAME
4		[BgBl] (At)					ABLA/VASC, ABLA/VAME, ABLA/SPBE2, ABLA/CARU,
5	110	**SeBlPl**[Fd](Bg)		**SeBl**[FdPl](BgA		112	SeBl/Ledugla/Xeroten, SeBl/Ribelac
6	111	**SeBl** [Pl]		**SeBl** (PlAt)		113	Se/Calacan, SeBl/Athyfil-Equiarv-Tiartri
7							
						112	**SeBl** [FdPl](BgAt)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 87. MSmm_ID tree species suitability and plant associations displayed on edatopic grid.

3.6.6.MSdw_MT – Dry Warm Montana MS

This subzone occurs at mid to high elevations in the mountains of western Montana. It is a southern version of the MSdw in British Columbia (D MacKillop et al. 2018).

Zonal forests of this subzone are dominated by lodgepole pine, western larch, subalpine fir, and Engelmann spruce (Table 14). Douglas-fir often occurs, especially at lower elevations. The shrub understorey is moderately developed with a variety of shrubs, including birch-leaved spirea, saskatoon (*Amelanchier alnifolia*), common snowberry, black huckleberry, thimbleberry (*Rubus parviflorus*), and Douglas maple (*Acer glabrum*). Pinegrass and bear-grass are key understorey species, occurring along with elk sedge, grouseberry, heart-leaved arnica, and queen's cup.

Over much of its range, the MSdw_MT occurs at elevations below the ESSFxk_MT. In the northern part, it can occur below the ESSFdk_MT. It usually occurs at elevations above the IDF—the IDFdm_MT in the west, and the IDFdk_MT in the east. Sometimes, in the north, it occurs above the ICHmh_MT. Along the Canadian border, it abuts the MSdw from British Columbia. To the south, it abuts the MSdh_MT.

Zonal Habitat types: ABLA/LIBO3-VASC, ABLA/CLUN2, ABLA/XETE-VAME, ABLA/CLUN2-CLUN2, ABLA/CLUN2-MEFE, ABLA/XETE (Pfister et al. 1978).

MSdw_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Fd** [Pl] (PaPf)			102			Pl/Junicom, FdPf/Juni, AtFd/Arctuva, Fd/Festida, Fd/Juni
2	**FdPl** [Lw] (SeBlPy)			103			FdPl/Spirbet/Calarub, Pl/Vacccae, FdLw/Sympalb/Calarub
3				101			ABLA/LIBO3-VASC, ABLA/CLUN2, ABLA/XETE-VAME
4		**FdLwSePl** [Bl]					ABLA/CLUN2-CLUN2, ABLA/CLUN2-MEFE, ABLA/XETE
5	110	**SeBl**[LwPl](Fd/		**Se**[LwPlBlAt](F		112	SeBl/Streamp, FdSe/Cornsto, SeBl/Calacan, Act/Cornsto
6	111	**SeBl** [Pl]		**Se**[BlAct]		113	SeBl/Oplohor, Se/Equiarv, Se/Cornsto
7							
						110	**SeBl** [LwPlFd] (At)
						112	**Se** [LwPlBlAt] (FdAct)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 88. MSdw_MT tree species suitability and plant associations displayed on edatopic grid.

3.6.7.MSdh_MT – Dry Hot Montana MS

This subzone occurs at mid to high elevations in the mountains of southwestern Montana and into central Idaho.

Zonal forests of this subzone are dominated by lodgepole pine, along with some subalpine fir and Engelmann spruce (Table 14). Douglas-fir occurs frequently, especially at lower elevations. The shrub understorey is lightly developed with black huckleberry and some common juniper. Pinegrass and grouseberry dominate the understorey, occurring along with bear-grass, and some elk sedge and heart-leaved arnica.

The subzone occurs at elevations below the ESSFxk_MT. At lower elevations, it occurs above the IDFdk_MT or IDFdx_MT. To the north, it abuts the MSdw_MT. To the south, it abuts the MSdh_WY, which lacks bear-grass.

Zonal Habitat types: ABLA/VASC-CARU, ABLA/VASC-VASC, ABLA/XETE-VASC, ABLA/XETE-VAME, ABLA/VAME, ABLA/MEFE (Pfister et al. 1978)

MSdh_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1	**FdPl**(PaPf)			102			PSME/JUCO6, PIFL2, PSME/CARU, PIFL2/JUCO6, PSME/FEID
2	**FdPl**[Pa](SeBl)			103			PSME/CARU, ABLA/XETE-VASC, ABLA/JUCO6, PSME/CAGE2
3			(LwPa	101			ABLA/VASC-CARU, ABLA/VASC-VASC
4		**PlSe** [FdBlAt]					ABLA/XETE-VASC, ABLA/XETE-VAME, ABLA/VAME, ABLA/MEFE
5	110	**SeBlPl** [Fd]		**SePl**[FdBlAt]		112	Se-Ribelac-Equiarv; BlSe-Calacan;
6	111	**SeBlPl**		**Se**[ActBlPl]		113	ABLA/ALVIS, ABLA/SYAL, ABLA/ACGL
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 89. MSdh_MT tree species suitability and plant associations displayed on edatopic grid.

3.6.8.MSdh_WY – Dry Hot Wyoming MS

This subzone occurs at mid to high elevations in the mountains of Wyoming, southwest Montana, and east central Idaho.

Zonal forests of this subzone are dominated by lodgepole pine, along with some subalpine fir and Engelmann spruce (Table 14). Douglas-fir occurs often, especially at lower elevations. The shrub understorey is lightly developed with snowberries and common juniper. Pinegrass and grouseberry dominate the understorey, occurring along with elk sedge and heart-leaved arnica.

This subzone occurs at elevations below the ESSFxk_WY. To the north, it abuts the MHdh_MT, and to the south it abuts the MSxm_CO and MSdh_UT. At lower elevations, it occurs above the IDFdk_MT or IDFdkx_MT.

Zonal Habitat types: ABLA/VASC, ABLA/CARU, ABLA/CAGE2, ABLA-PIEN/VASC (Pfister et al. 1978; Steele et al. 1983).

MSdh_WY

	A	B	C	D	E		Habitat Types/Associations
0							
1	**FdPl**(PaPf)			102			PSME/JUCO6, PIFL2, PSME/CARU, PIFL2/JUCO6, PSME/FEID
2	**FdPl**[Pa](SeBl)			103			PSME/CARU, ABLA/JUCO6, PSME/CAGE2
3				101			
4		**PlSe** [FdBlAt] (Pa)					ABLA/VASC, ABLA/CARU, ABLA/CAGE2, ABLA-PIEN/VASC
5	110	**SeBlPl** [Fd]		**SePl**[FdBlAt]		112	Se-Ribelac-Equiarv; BlSe-Calacan;
6	111	**SeBlPl**		**Se**[ActBlPl]		113	ABLA/ALVIS, ABLA/SYAL, ABLA/ACGL
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 90. MSdh_WY tree species suitability and plant associations displayed on edatopic grid.

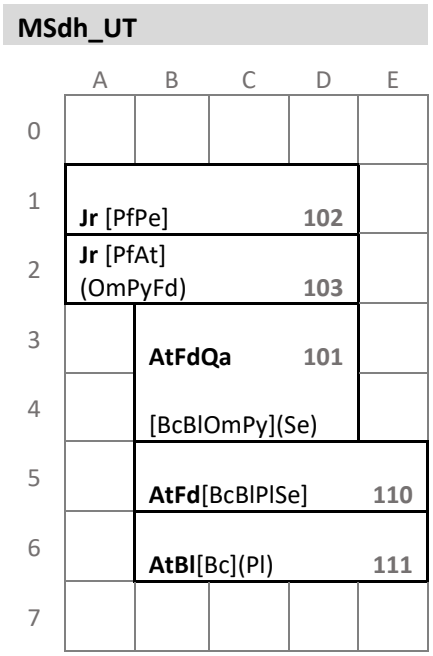
3.6.9.MSdh_UT – Dry Hot Utah MS

This subzone occurs at mid to high elevations in the mountains of Utah, western Colorado, eastern Nevada, and southern Idaho.

Zonal forests of this subzone are dominated by subalpine fir, Douglas-fir, and aspen (Table 14). Some Engelmann spruce is present. The shrub understorey is mostly mountain snowberry (*Symphoricarpos oreophilus*). The herb layer is poorly characterized due to limited data.

This subzone typically occurs at elevations between the ESSFxk_UT and the IDFdh_UT.

Zonal Habitat types: not available; limited data precludes listing of types.



Tree species codes are presented in Appendix 1.

Figure 91. MSdh_UT tree species suitability displayed on edatopic grid.

3.6.10. MSxm_CO – Very Dry Mild Colorado MS

This subzone occurs at mid to high elevations in the mountains of Colorado, Utah, and southern Wyoming.

Zonal forests of this subzone are dominated by aspen, subalpine fir, Engelmann spruce, and lodgepole pine (Table 14). At lower elevations, Douglas-fir is common. Mountain snowberry and common juniper are frequent shrubs. Grouseberry, elk sedge, and heart-leaved arnica characterize the ground layer.

This subzone typically occurs at elevations between the IDFxm_CO and the ESSFxc_CO. It can also occur above the IDFdh_UT.

Zonal Habitat types: PIEN/JUCO6, ABLA-PIEN/JUCO6, ABLA-PIEN/VASC, ABLA-PIEN/CAGE2, ABLA/CAGE2 (Alexander 1988)

MSxm_CO

	A	B	C	D	E		Habitat Types/Associations
0							
1	[Pf](JrPy)			102			
2	**Fd** [PfPy](QaAt)			103			
3		**PlFdAt**		101			PIEN/JUCO6, ABLA-PIEN/JUCO6
4		[BlSe](Qa)					ABLA-PIEN/VASC, ABLA-PIEN/CAGE2, ABLA/CAGE2
5	110	**BlPlSe**[Fd](BcA		**PlSeAt**[BlFd]		112	POTR5/SYOR2
6	111	**BlPlSe**(BcAt)		**At**[SePlBl]		113	
7							
						110	**BlPlSe** [Fd] (BcAt)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 92. MSxm_CO tree species suitability and plant associations displayed on edatopic grid.

3.6.11. MSdk_CO – Dry Cool Colorado MS

This subzone occurs at mid to high elevations in the mountains of southern Colorado.

Zonal forests of this subzone are dominated by aspen, subalpine fir, corkbark fir (*Abies lasiocarpa* var. *arizonica*), and Engelmann spruce (Table 14), usually with lodgepole pine, and at lower elevations, Douglas-fir and white fir. Common shrubs are low bilberry and mountain snowberry. Grouseberry, elk sedge, and heart-leaved arnica characterize the ground layer.

This subzone typically occurs at elevations between the IWFdm_CO and the ESSFxc_CO.

Zonal Habitat types: ABLA-PIEN/CAGE2, ABLA/VASC, ABLA-PIEN/VASC, ABLA-PIEN/VAMY2, ABLA-PIEN/ARCO9 (Alexander 1988)

MSdk_CO

	A	B	C	D	E		Habitat Types/Associations
0							
1	**Jr** [PfQa] (Py)			102			
2	**Fd** [PfQaPy] (JrAt)			103			PIEN-PSME/JUCO6
3		**FdSeAt**		101			ABLA-PIEN/CAGE2, ABLA/VASC
4		[BcBlBla]					ABLA-PIEN/VASC, ABLA-PIEN/VAMY2, ABLA-PIEN/ARCO9
5	110	**Se**[FdSpBcBlAt		**At**[SeSpFd](Bc		112	
6	111	**Se**[SpBcBlAt](P		**At**[AaSeSp](Bc		113	
7							

110	**Se** [FdSpBcBlAt]
111	**Se** [SpBcBlAt] (Pl)
112	**At** [SeSpFd] (BcBl)
113	**At** [AaSeSp] (BcBl)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 93. MSdk_CO tree species suitability and plant associations displayed on edatopic grid.

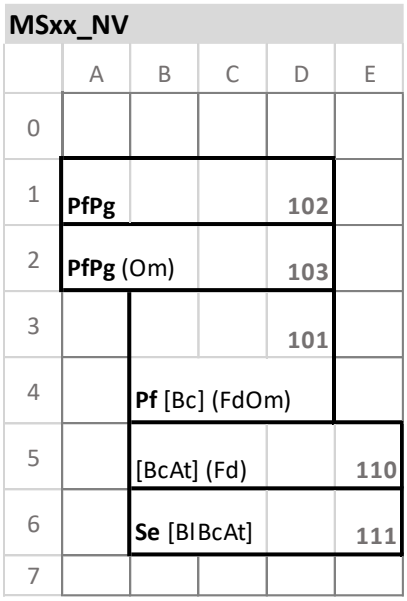
3.6.12. MSxx_NV – Very Dry Very Hot Nevada MS

This subzone occurs at high elevations in the mountains of central Nevada.

Zonal forests of this subzone are characterized by subalpine fir, Engelmann spruce, aspen, and limber pine (*Pinus flexilis*) (Table 14). White fir and Douglas-fir occur at lower elevations. Understory data is limited. The most prominent shrub is mountain snowberry.

This subzone typically occurs at elevations above the IWFxk_NV but also occurs above the MMMdk_NV in the southern part of the MSxx_NV range.

Zonal Habitat types: ABLA/CARO5 (Youngblood and Mauk 1985); limited data.



Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 94. MSxx_NV tree species suitability displayed on edatopic grid.

3.7. Ponderosa Pine [PP]

The Ponderosa Pine (PP) Zone occurs at low elevations in dry, continental, temperate climates of the intermountain plateaus and interior mountain valleys and slopes of Washington (Lillybridge et al. 1995; Williams et al. 1995), Oregon (Franklin and Dyrness 1988), Idaho (Steele et al. 1981; 1983), Montana (Pfister et al. 1978), Wyoming (Hoffman and Alexander 1987; Steele et al. 1983), and southern British Columbia (Meidinger and Pojar 1991).

Ponderosa pine (*Pinus ponderosa*) is the key climax species of this zone (Table 8). Douglas-fir (*Pseudotsuga menziesii*) is frequent in moister regions or on moister sites, and, due to fire suppression, is increasing in some parts of the PP zone. Rocky Mountain juniper (*Juniperus scopulorum*) or western juniper (*Juniperus occidentalis*) are frequent in some areas.

The understorey is characterized by bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*).

The Interior Douglas-fir (IDF) zone often occurs at elevations above the PP.

USNVC: Zonal forests are included in Macrogroup M501: Central Rocky Mountain Dry Lower Montane-Foothill Forest [*Pinus ponderosa* var. *ponderosa* – *Pseudotsuga menziesii* – *Pinus flexilis* Central Rocky Mountain Dry Forest], specifically G213: Central Rocky Mountain Ponderosa Pine Open Woodland

3.7.1. PP Subzones

Eight subzones (Table 15) are recognized across the range of the PP zone, characterizing regional climates and floristics due to a wide latitudinal and longitudinal range.

Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types used for the data summaries are listed.

Table 15. PP Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	PPxh_WA	PPxx_OR	PPxm_OR	PPxk_OR	PPxw_MT	PPxw_WY	PPmx_WY	PPxh_CO	Common Name
Pinus ponderosa	**C**	**C**	**C**	**C**	**C***	**C**	**C**	**C**	ponderosa pine
Juniperus scopulorum					**C**	c	c	c	Rocky Mountain juniper
Quercus macrocarpa							**C**		bur oak
Quercus gambelii								**C**	Gambel oak
Pinus edulis								c	twoneedle pinyon
Pseudotsuga menziesii	c	c							Douglas-fir
Quercus garryana		**C**							Garry oak
Juniperus occidentalis			**C**						western juniper
Cercocarpus montanus								c	alderleaf mountain mahogany
Cercocarpus ledifolius			c			c			curl-leaf mountain mahogany
Pinus contorta				**C**					lodgepole pine
Populus tremuloides						s	s		trembling aspen
Betula papyrifera							s		paper birch

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

3.7.2.PPxh_WA – Very Dry Hot Washington PP

This subzone occurs at low elevations, in northeastern Washington State, south to northwestern Idaho and bordering Oregon. It is a southern variation of the PPxh1 in British Columbia (Lloyd et al. 1990).

Zonal forest stands are dominated by ponderosa pine, with some Douglas-fir (Table 15). The understorey is characterized by bluebunch wheatgrass and Idaho fescue, with some arrowleaf balsamroot (*Balsamorhiza sagittata*).

In the northern part of its range, the PPxh_WA occurs at elevations above the BGdw_WA, and below either the IDFxh_WA (west of Okanogan R.) or the IDFdh_WA (east of Okanogan R.). In its southern range, the PPxh_WA is found at elevations between the BGdh_OR and IDFxh_ID. It abuts the PPxh1 (from B.C.) across the Okanogan valley into Canada. To the south, at similar elevations, is the PPxx_OR.

Zonal Habitat types: PIPO-PSME/AGSP, PSME/CARU-AGSP, PIPO/AGSP (Williams et al. 1995; Cooper, Neiman, and Roberts 1991; Lillybridge et al. 1995; Williams and Lillybridge 1983).

PP xh_WA

	A	B	C	D	E		Habitat Types/Associations
0							
1		grassland		Gg			non-treed?
2		**Py**		102			PIPO/PUTR/AGSP, PIPO/PUTR
3				101			
4			**Py** (Fd)				PIPO-PSME/AGSP, PSME/CARU-AGSP, PIPO/AGSP
5		**Fd** [Py]			110		PSME/SPBEL/CARU, PSME/SYAL, PSME/SPBEL
6	111	**Fd**		**Fd (**Ep)		113	COST-SYAL
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 95. PPxh_WA tree species suitability and plant associations displayed on edatopic grid.

3.7.3.PPxx_OR – Very Dry Very Hot Oregon PP

This subzone occurs at low elevations on the east side of the Cascade Mountains from southern Washington into northern Oregon.

Zonal forest stands are characterized by ponderosa pine and Garry oak (*Quercus garryana*), along with some Douglas-fir (Table 15). The understorey is characterized by bluebunch wheatgrass, Idaho fescue, and Sandberg's bluegrass (*Poa secunda*).

This subzone occurs at elevations between the BGxh_WA and IDFxx_WA To the south, it abuts the PPxm_OR. The PP subzone to the north is the PPxh_WA

Zonal Habitat types: QUGA4/PSSPS, PIPO/PSSPS (Simpson 2007; Lillybridge et al. 1995; Topik, Halverson, and High 1988).

PP xx_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1	NA	grassland		Gg			
2		**PyQg** [Jw]		102			PIPO-QUGA4/PUTR, PIPO/QUGA4/BASA3
3				101			PIPO/PUTR2/PSSPS
4			**Py** [Qg]				QUGA4/PSSPS, QUGA4-QUKE, PIPO/PSSPS, PIPO/PUTR
5		**PyQg** [FdBg]			110		ABGR/ARNE, ABGR/SYMPH, PIPO/PSME/SYMPH
6	111	**Py**[Fd](Qg)		[FdActPyQgBg]		113	PSME/CAGE2, PSME/CARU, PSME/SYAL
7							
						113	**Fd** [ActPyQgBg] (Dw)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 96. PPxx_OR tree species suitability and plant associations displayed on edatopic grid.

3.7.4.PPxm_OR – Very Dry Mild Oregon PP

This subzone occurs at low elevations over central Oregon, and along the east slope of the Cascade Mountains of Oregon and northern California.

Zonal forest stands are characterized by ponderosa pine (Table 15). Western juniper and curl-leaf mountain mahogany (*Cercocarpus ledifolius*) sometimes occur. Grand fir or white fir occur on some moister sites or at higher elevations. Antelope-brush (*Purshia tridentata*) is a common shrub. The main understorey species are Idaho fescue, elk sedge (*Carex geyeri*), squirreltail grass (*Elymus elymoides*) and Sandberg's bluegrass.

This subzone occurs at elevations above the WJPxm_OR. In the western part of the range of this subzone, where it is along the east slope of the Cascade Mountains, it occurs at elevations below the IWFdw_OR. To the east, it occurs below the IGFmh_OR. It abuts the PPxk_OR in the Pumice Region along the East Cascades. The PP subzone to the north is the PPxx_OR.

Zonal Habitat types: PIPO/CAGE2, PIPO/CELE, PIPO/FEID, PIPO/PUTR/FEID, PIPO/PSSPS (Charles G. Johnson and Clausnitzer 1992; Simpson 2007).

PP xm_OR

	A	B	C	D	E		Habitat Types/Associations
0							
1		grasslands		Gg			FEID-KOCR, AGSP-POSA3-PHCO2, ACSP-SPCR-ARLO3,
2		(Jw)					AGSP-POSA3-OPPO, AGSP-POSA3
3				101			PIPO/CAGE2, PIPO/CELE
4		**Py** [Om] (Jw)					PIPO/FEID, PIPO/PUTR/FEID, PIPO/PSSPS
5	110	**Py**(BgBcOm)		**Py**[BgBc](Om)		112	PIPO/SYOR, PSME/SYAL, PIPO/SYAL, PSME/CARU
6	111	**Fd**[BgBcPy]		**BgBc**[FdAct]		113	POTR/POPR, POTR/MESIC FORB, POTR/CALA3, ALIN-RIBES/MESIC F
7							

110	**Py** [Fd] (BgBcOm)
112	**Py** [BgBcFd] (Om)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 97. PPxm_OR tree species suitability and plant associations displayed on edatopic grid.

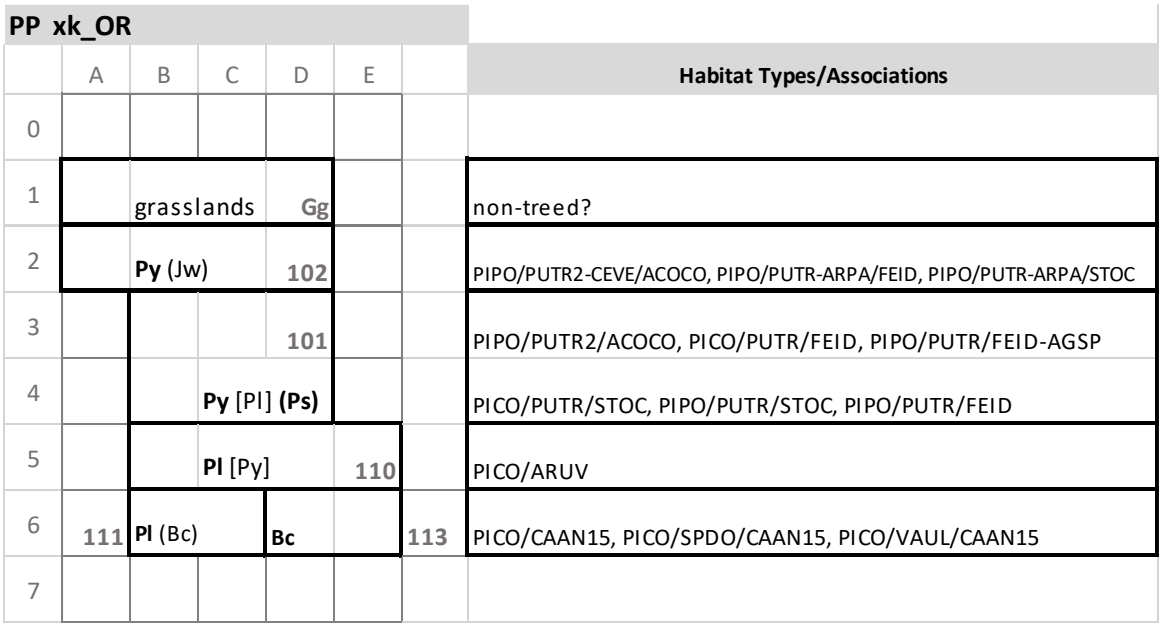
3.7.5.PPxk_OR – Very Dry Cool Oregon PP

This subzone occurs at low elevations along the east slope of the Cascade Mountains in the "pumice region".

Zonal forest stands are characterized by ponderosa and lodgepole pines (Table 15). Antelope-brush and greenleaf manzanita (*Arctostaphylos patula*) are common shrubs. The understorey is graminoid dominated with Ross' sedge (*Carex rossii*), Idaho fescue, squirrelltail grass, and stiff needlegrass (*Achnatherum occidentale*).

This subzone occurs at elevations below the IWFdw_OR. The PPxk_OR also abuts the PPxm_OR.

Zonal Habitat types: PIPO/PUTR2/ACOCO, PICO/PUTR/FEID, PIPO/PUTR/FEID-AGSP, PICO/PUTR/STOC, PIPO/PUTR/STOC, PIPO/PUTR/FEID (Volland 1985; Hopkins, William 1979).



Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 98. PPxk_OR tree species suitability and plant associations displayed on edatopic grid.

3.7.6.PPxw_MT – Very Dry Warm Montana PP

This subzone occurs at low to mid elevations in central and southeastern Montana, and into northeastern Wyoming. Zonal forest stands are characterized by ponderosa pine (Table 15), usually with Rocky Mountain juniper. Bluebunch wheatgrass is the main understory species. Western wheatgrass (*Pascopyrum smithii*) and Idaho fescue can also occur.

This subzone mostly occurs at elevations above the MGPmw_MT and below the IDFdx_MT. It abuts the PPmw_WY in the southeast part of its range.

Zonal Habitat types: PIPO/JUSC2, PIPO/PSSPS, PIPO/FEID, PIPO/JUHO2 (Pfister et al. 1978).

PP xw_MT

	A	B	C	D	E		Habitat Types/Associations
0							
1	NA	grassland		Gg			FEID
2		PyJr		102			JUSC2/ARTR2, JUSC2/PSSPS
3				101			
4			Py [Jr]				PIPO/JUSC2, PIPO/PSSPS, PIPO/FEID, PIPO/JUHO2
5			Py [Jr](Fd)		110		PIPO/SYAL, PIPO/PRVI, PSME/JUSC2, PSME/ACGL
6	111	Py		[Aa](Py)		113	PLWR2, PODE3/FRPE, PODE3/JUSC2, POTR5
7							
						113	[ActAaAtFd](Py)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 99. PPxw_MT tree species suitability and plant associations displayed on edatopic grid.

3.7.7.PPxw_WY – Very Dry Warm Wyoming PP

This subzone occurs at low to mid elevations in central and southeastern Wyoming. Zonal forest stands are characterized by ponderosa pine (Table 15), often with Rocky Mountain juniper and/or curl-leaf mountain-mahogany (*Cercocarpus ledifolius*). Bluebunch wheatgrass, Idaho fescue and elk sedge are the main graminoids.

This subzone occurs at elevations above the BGmm_MT or the MGPmw_MT. and mostly below the IDFdxx_WY. It abuts the PPxw_MT to the north.

Zonal Habitat types: PIPO/JUSC2/PSSPS, PIPO/CAGE2 (Johnston 1987).

PP xw_WY

	A	B	C	D	E		Habitat Types/Associations
0							
1	NA	grassland		Gg			FEID
2		**Py** [JrPf]		102			PIPO/PUTR2, PIFL2/JUCO6, PIPO/FEID-ARTR2, PIPO/CARO5
3				101			PIPO/JUSC2/PSSPS
4			**Py** [Jr]				PIPO/CAGE2
5			**Py** [Jr]		110		PSME/PHMA
6	111	**Py**		**At**[Aa](Py)		113	
7							
						113	[ActAa AtFd](Py)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 100. PPxw_WY tree species suitability and plant associations displayed on edatopic grid.

3.7.8.PPmx_WY – Moist Very Hot Wyoming PP

This subzone occurs at low to mid elevations in northeastern Wyoming. Zonal forest stands are characterized by ponderosa pine and bur oak (*Quercus macrocarpa*) (Table 15), often with Rocky Mountain juniper. Common understorey plants include creeping Oregon-grape (*Mahonia repens*), common snowberry (*Symphoricarpos albus*), western mugwort (*Artemisia ludoviciana*), junegrass (*Koeleria macrantha*), and yarrow (*Achillea millefolium*).

This subzone occurs at elevations above the MGPmw_MT. It abuts the PPxw_MT to the west.

Zonal Habitat types: PIPO/JUSC2, PIPO/QUMA2; PIPO/MARE11, PIPO/JUCO6-SYAL (Hoffman and Alexander 1987).

PP mx_WY

	A	B	C	D	E		Habitat Types/Associations
0							
1		grasslands		Gg			
2	**Py** [Jr] (Qm)			102			PIPO/SCSC
3				101			PIPO/JUSC2
4		**Py** [Qm] (JrAtEp)					PIPO/QUMA2; PIPO/MARE11, PIPO/JUCO6-SYAL
5	110	**Py** [QmAt]		**PyQmAt** [Ep]		112	PIPO/SYAL
6	111	**Py** [At](Qm)		**QmOpAt**[EpPy		113	POTR5/COCO6-COCO6
7							
						113	**QmOpAt**[EpPy]

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 101. PPmx_WY tree species suitability and plant associations displayed on edatopic grid.

3.7.9.PPxh_CO – Very Dry Hot Colorado PP

This subzone occurs at low to mid elevations in central and southern Colorado. Zonal forest stands are characterized by ponderosa pine with Gambel oak (*Quercus gambelii*) (Table 15). Mountain snowberry (*Symphoricarpos oreophilus*) is a common shrub; elk sedge is a common graminoid.

This subzone mostly occurs at elevations between the JPWwm_CO and IWFdm_CO. In the northern part of its range, it occurs between the MGPmw_MT and the IDFxm_CO.

Zonal Habitat types: PIPO/QUGA, PIPO/BOGR2, PIPO/QUGA/FEAR2 (Johnston 1987; Alexander 1988).

PP xh_CO

	A	B	C	D	E		Habitat Types/Associations
0							
1		grasslands		Gg			
2	**JrPe** [PfPy] (Qa)			102			PIPO/PIED-QUGA, PIED/QUGA
3				101			
4		**Py** [QaJr]					PIPO/QUGA, PIPO/BOGR2, PIPO/QUGA/FEAR2
5	110	**PyFdQa**		**PyFdQa**		112	PIPO/QUGA-SYOR2, PSME/QUGA, PSME/QUGA/FEAR2
6	111	**Fd** [PyQa]		**Fd** [PyQa]		113	PIPO-PSME/MUMO
7							

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 102. PPxh_CO tree species suitability and plant associations displayed on edatopic grid.

4. JUNIPER, OAK, AND MOUNTAIN MAHOGANY DOMINATED ZONES

4.1. Juniper – Pine Woodland [JPW]

The Juniper – Pine Woodland (JPW) Zone is a woodland zone of the arid, interior plateaus and mountains of the western United States (West, Tausch, and Tueller 1998).

Mature vegetation is characterized by open to closed stands of intermediate height pines, usually accompanied by moderately tall junipers. The pines are mostly “pinyon” pines (

Table 16): twoleaf pinyon (*Pinus edulis*) or singleleaf pinyon (*P. monophylla*) – twoleaf mostly in the western range, and singleleaf in the east. The widest ranging juniper is Utah juniper (*Juniperus osteosperma*). In the western range, California juniper *(J. californica*) occurs, and in the south, mostly in Colorado, oneseed juniper dominates (*J. monosperma*). Rocky Mountain juniper (*J. scopulorum*) occurs commonly in the east and south. Mountain mahogany is a common associate, including both curl-leaf (*Cercocarpus ledifolius*) and alderleaf mountain mahogany (*C. montanus*).

Common shrubs are big sagebrush (*Artemisia tridentata*, including ssp. *wyomingensis*, ssp. *vaseyana*), little sagebrush (*Artemisia arbuscula*), black sagebrush (*Artemisia nova*), and antelope-brush (*Purshia tridentata*). Grasses dominate the understorey with cover depending upon the density of the canopy. Common species are blue grama (*Bouteloua gracilis*), Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Sandberg's bluegrass (*Poa secunda*).

The JPW zone occurs at elevations above various grassland or shrub-steppe zones, including Bunchgrass, Great Basin Desert, California Valley Grasslands, Shortgrass Prairie, and Mixed-grass Prairie.

USNVC: Zonal forests are included in two Macrogroups: M896 Intermountain Pinyon – Juniper Woodland [*Pinus monophylla – Juniperus osteosperma – Juniperus occidentalis* Intermountain Woodland] and M897 Southern Rocky Mountain Two-needle Pinyon – Juniper Woodland [*Pinus edulis – Juniperus monosperma* Southern Rocky Mountain Woodland]

Table 16. Tall Shrub and Tree species of juniper, oak and mountain mahogany dominated Biogeoclimatic Zones

Scientific Name	WJP*	JPW	GO	OW	MMM	Common Name
Juniperus occidentalis	**C****					western juniper
Pinus ponderosa	c		c	c		Ponderosa pine
Pinus monophylla		**C**				singleleaf pinyon
Pinus edulis		**C**				twoneedle pinyon
Juniperus osteosperma		**C**	c			Utah juniper
Quercus gambelii			**C**			Gambel oak
Populus tremuloides			c		s	trembling aspen
Quercus garryana				**C**		Garry oak
Quercus kelloggii				**C**		black oak
Quercus wislizeni				**C**		interior live oak
Quercus douglasii				**C**		blue oak
Quercus kelloggii				**C**		black oak
Quercus lobata				**C**		valley oak
Pinus sabiniana				c		California foothill pine
Cercocarpus ledifolius					**C**	curl-leaf mountain mahogany
Aesculus californica				c		California buckeye

* Zone names: WJP: Western Juniper – Pine; JPW: Juniper – Pine Woodland; GO: Gambel Oak; OW: Oak Woodland; MMM: Montane Mountain Mahogany ** **C** – major climax species; c – minor climax species

4.1.1. JPW Subzones

Six subzones (Table 17) are recognized across the range of the JPW.

Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types used for the data summaries are listed.

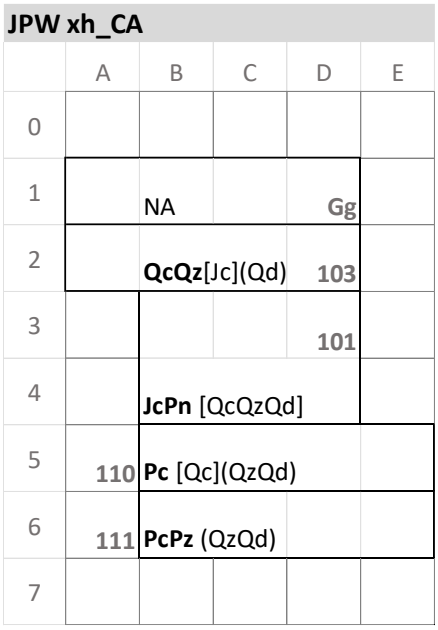
4.1.2. JPWxh_CA – Very Dry Hot California JPW

This subzone occurs at low elevations, in southern California.

Zonal vegetation is dominated by California juniper and California foothill pine (Table 17). Canyon live oak (*Quercus chrysolepis*), interior live oak (*Quercus wislizeni*), singleleaf pinyon, and birchleaf mountain mahogany (*Cercocarpus montanus* var. *glaber*) are also frequent. Understorey species include bigberry manzanita (*Arctostaphylos glauca*), chamise (*Adenostoma fasciculatum*), and various introduced grasses such as soft brome (*Bromus hordeaceus*), rattail fescue (*Vulpia myuros*) and red brome (*Bromus rubens*). Frequent fires can result in conversion of this pinyon-juniper woodland to open chaparral or sagebrush vegetation.

This subzone mostly occurs between the CVGdm_CA and the CCHun_CA. In the southeast part of its range, it occurs next to the MSSDun_NV

Zonal Habitat types: unknown due to limited data (Horton 1960).



Tree species codes are presented in Appendix 1.

Figure 103. JPWxh_CA tree species suitability displayed on edatopic grid.

Table 17. JPW Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	JPWxh_CA	JPWxw_NV	JPWdw_UT	JPWwm_CO	JPWdm_WY	JPWmk_WY	Common Name
Pinus monophylla	**C***	**C**					singleleaf pinyon
Pinus edulis			**C**	**C**	c		twoneedle pinyon
Pinus sabiniana	c						California foothill pine
Juniperus californica	c						California juniper
Juniperus osteosperma		**C**	**C**		**C**		Utah juniper
Juniperus scopulorum				**C**	**C**	**C**	Rocky Mountain juniper
Juniperus monosperma				c			oneseed juniper
Quercus chrysolepis	**C**						canyon live oak
Quercus wislizeni	c						interior live oak
Cercocarpus ledifolius		c			c	c	curl-leaf mountain mahogany
Cercocarpus montanus			c	c	c		alderleaf mountain mahogany
Quercus gambelii			**C**	c			Gambel oak

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

4.1.3. JPWxw_NV – Very Dry Warm Nevada JPW

This subzone occurs at low to moderate elevations throughout Nevada and into western Utah, southern Idaho, southern Oregon, and eastern California.

Mature vegetation is characterized by Utah juniper and singleleaf pinyon (Table 17). Curl-leaf mountain mahogany commonly occurs. The understorey is characterized by big sagebrush (including ssp. *wyomingensis*, ssp. *vaseyana*), as well as black sagebrush and antelope-brush (*Purshia tridentata*).

This subzone mostly occurs at elevations above the GBDxh_NV, but also, in its northern range, above the BGdh_OR. It mostly occurs below the IWFxk_NV or the MMMmk_NV. The JPW subzone to the east is the JPWdw_UT.

Zonal Habitat types: PIMO-JUOS/ARTR2, PIMO-JUOS/ARNO4, PIMO-JUOS/ARTRV (West, Tausch, and Tueller 1998).

JPW xw_NV

	A	B	C	D	E		Habitat Types/Associations
0							
1		NA		Gg			ARNO/FEID, ARTR/FEID, ARTRV/FEID
2		**Om** (JuPn)		103			CELE3/PSSPS, CELE3/ARTR2/FEID, CERCO, CELE3/SYOR2
3				101			JUOS, JUOS/ARTRT/PSSP6, JUOS-PIMO/CORA, PIED, PIMO/ARTR2
4		**JuPn** (OmPe)					PIMO-JUOS/ARTR2, PIMO-JUOS/ARNO4, PIMO-JUOS/ARTRV
5	110	**Ju**[Pn](QaOmPsBc)					ABCO/CELE3, PIJE/ARPA6-CEVE, PIPO/ARPA6, PIPO/QUGA
6	111	**Py**(JuPnOmQaBc)		**At**(QaBc)		113	POTR5, POTR5/ARTR2, POTR5/PTAQ
7							
						111	**Py**(JuPnOmQaBc)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 104. JPWxw_NV tree species suitability and plant associations displayed on edatopic grid.

4.1.4. JPWdw_UT – Dry Warm Utah JPW

This subzone occurs at moderate elevations in Utah and western Colorado.

Mature vegetation is characterized by twoneedle pinyon and Utah juniper (Table 17). Alderleaf mountain mahogany often occurs. The main shrubs are big sagebrush, Wyoming big sagebrush, black sagebrush, shadscale saltbush (*Atriplex confertifolia*), and broom snakeweed (*Gutierrezia sarothrae*)

This subzone mostly occurs at elevations above the GBDdw_UT or GBDxx_UT, and below the IDFdh_UT. The JPWxw_NV is the equivalent subzone to the west.

Zonal Habitat types: PIED-JUOS/AMUT-CEMO2, PIED-JUOS/ARTR2, PIED/JUOS/CEMO2 (West, Tausch, and Tueller 1998; Youngblood and Mauk 1985).

JPW dw_UT

	A	B	C	D	E		Habitat Types/Associations
0							
1		NA		Gg			ARNO4/FEID, ARTR2/PSSPS, ARTRS, ARNO4/PSSPS
2	**Pe**[JuOmQa](Jr)			103			CERCO, PIFL2-PILO, PIMO-CELE3/ARTR2
3				101			JUOS/ACHY, JUOS/ARTR2, JUOS-PIED/PSSPS, PIED, PIED/QUGA
4		**JuPe** (QaJrOm)					PIED-JUOS/AMUT-CEMO2, PIED-JUOS/ARTR2, PIED/JUOS/CEMO2
5	110	**Pe**[JuQaPy](Jr)					PIPO/ARPA6, PIPO/PUTR2, PIPO/QUGA, PSME/ARPA6, PSME/CEMO
6	111	**FdPy** [At] (QaJu)		[Aa]		113	POPUL, POAN3, POAN3/SAEX, POTR5/AMAL2, POTR5/SYOR2
7							
						111	**FdPy** [At] (QaJu)

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 105. JPWdw_UT tree species suitability and plant associations displayed on edatopic grid.

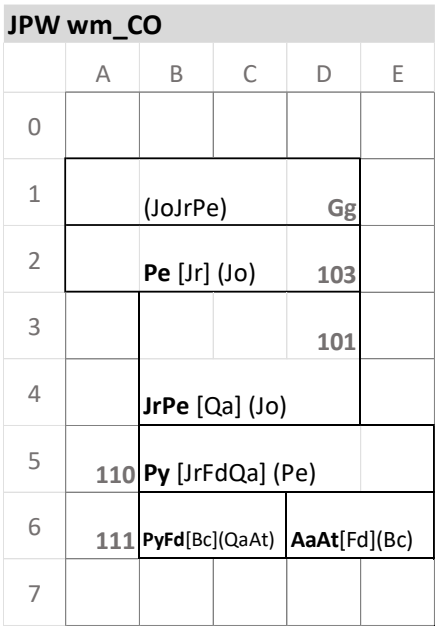
4.1.5. JPWwm_CO – Wet Mild Colorado JPW

This subzone occurs at mid elevations along the east slopes of the Rocky Mountains of Colorado.

Mature vegetation is characterized by twoneedle pinyon, oneseed juniper, Rocky Mountain juniper, gambel oak (*Quercus gambelii*) and alderleaf mountain mahogany (Table 17). Blue grama is common in the understorey.

This subzone occurs at elevations above the SGPdm_CO or MGPmw_CO, and below the PPxh_CO or IDFxm_CO. The JPWdw_UT occurs in western Colorado.

Zonal Habitat types: PIED/BOGR2, PIED-JUMO/CEMO2, PIED/QUGA (West, Tausch, and Tueller 1998; Marr 1961).



Tree species codes are presented in Appendix 1.

Figure 106. JPWwm_CO tree species suitability displayed on edatopic grid.

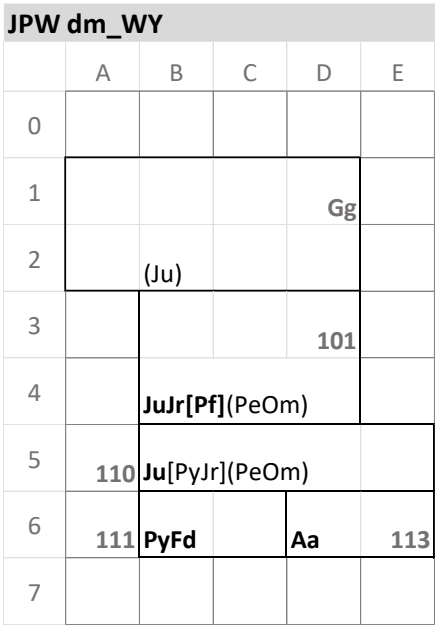
4.1.6. JPWdm_WY – Dry Mild Wyoming JPW

This subzone occurs at low to moderate elevations in central and southwestern Wyoming.

Mature vegetation is characterized by Utah juniper along with some Rocky Mountain juniper (Table 17). Big sagebrush is a common shrub (includes ssp. *wyomingensis*). Other common species are bluebunch wheatgrass and Idaho fescue.

This subzone mostly occurs at elevations above the BGxx_WY or BGmm_MT. The JPWmk_WY occurs above.

Zonal Habitat types: JUOS/ARTR2 (West, Tausch, and Tueller 1998; Johnston 1987).



Tree species codes are presented in Appendix 1.

Figure 107. JPWdm_WY tree species suitability and plant associations displayed on edatopic grid.

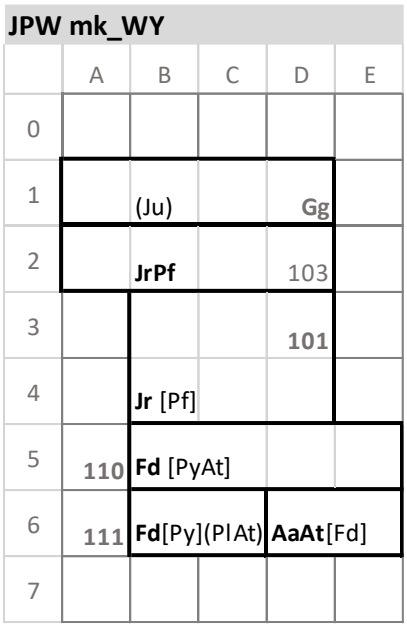
4.1.7. JPWmk_WY – Moist Cool Wyoming JPW

This subzone occurs at moderate to high elevations in central Wyoming.

Mature vegetation is characterized by Rocky Mountain juniper and limber pine (Table 17). Big sagebrush, bluebunch wheatgrass, and Idaho fescue characterize the understorey.

This subzone mostly occurs at elevations above the JPWdm_WY. At upper elevations, the IDFdxx_WY can occur, although the JPWmk_WY often is at the height of land in the areas where it occurs.

Zonal Habitat types: JUSC/ARTR2, PIFL2/PSSPS, JUSC2/PSSPS (West, Tausch, and Tueller 1998; Johnston 1987).



Tree species codes are presented in Appendix 1.

Figure 108. JPWmk_WY tree species suitability and plant associations displayed on edatopic grid.

4.2. Western Juniper – Pine [WJP]

The Western Juniper – Pine (JPW) Zone is a woodland zone of the arid Columbia Plateau, centred in Oregon and extending into northeastern California, northwestern Nevada, and southwestern Idaho (Franklin and Dyrness 1988).

Mature vegetation is characterized by open stands of western juniper (*Juniperus occidentalis*) (

Table 16). It is generally the only conifer, although some ponderosa pine (*Pinus ponderosa*) may occur at upper elevations of the zone. Big sagebrush (*Artemisia tridentata*) is the dominant shrub. Other key understorey species are bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*) and Sandberg's bluegrass (*Poa secunda*).

The WJP zone occurs at elevations between the Bunchgrass (BG) and Ponderosa Pine (PP) zones.

USNVC: Zonal forests are included in Macrogroup: M896 Intermountain Pinyon – Juniper Woodland [*Pinus monophylla – Juniperus osteosperma – Juniperus occidentalis* Intermountain Woodland], specifically G248 Columbia Plateau Western Juniper Open Woodland

4.2.1. WJP Subzones

Only one subzone is recognized at present. Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types used for the data summaries are listed.

4.2.2. WJPxm_OR – Very Dry Mild Oregon WJP

This subzone occurs at low to moderate elevations in central and eastern Oregon, northeastern California, northeastern Nevada, and southwestern Idaho.

Mature vegetation is characterized by western juniper. The understorey is characterized by big sagebrush bluebunch wheatgrass, Idaho fescue, and Sandberg's bluegrass.

This subzone mostly occurs at elevations above the BGdh_OR, however on its northern edge, it is above the BGxh_WA. The PPxm_OR generally occurs above. The JPWxw_NV occurs at similar elevations to the southeast.

Zonal Habitat types: JUOC/ARTR2, JUOC/ARTRT/PSSPS-FEID, JUOC/ARTRV, JUOC/FEID-PSSPS, JUOC/PUTR2/FEID-PSSPS (Volland 1985; Franklin and Dyrness 1988).

WJP xm_OR

	A	B	C	D	E	Habitat Types/Associations
0						
1		NA		Gg		PSSPS, PSSPS-ERHE2, PSSPS-POSE, ARTRV/FEID, FEID-PSSPS
2		**Jw**		103		JUOC/ARAR8, JUOC/ARAR8/FEID,
3				101		JUOC/ARTR2, JUOC/ARTRT/PSSPS-FEID, JUOC/ARTRV,
4			**Jw** (Om)			JUOC/FEID-PSSPS, JUOC/PUTR2/FEID-PSSPS
5	110	**Jw** (Py)				PIPO/FEID, PIPO/PSSPS, PIPO/PUTR/FEID, PIPO/SYAL
6		[Act] (PyJw)			111	
7						

Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 109. WJPxm_OR tree species suitability and plant associations displayed on edatopic grid.

4.3. Oak Woodland [OW]

The Oak Woodland (OW) Zone is a low elevation woodland zone (Griffin 1977) that occurs in California and SW Oregon. Blue oak (*Quercus douglasii*) and interior live oak (*Quercus wislizeni*) are the main oak species in California (

Table 16), whereas Garry oak (*Q. garryana*) and black oak (*Quercus kelloggii*) are the main oaks in Oregon. Associated trees include valley oak (*Quercus lobata*), interior live oak (*Quercus wislizeni*), and California foothill pine (*Pinus sabiniana*), and California buckeye (*Aesculus californica*).

In California, this zone occurs above the California Valley Grassland (CVG) zone and below the Coastal Mixed Evergreen (CMX) zone, often in association with the California Chaparral (CCH) zone. In Oregon, it occurs at elevations below the CDF zone.

USNVC: Zonal forests in California are included in Macrogroup M009: Californian Forest & Woodland [*Quercus agrifolia – Umbellularia californica – Hesperocyparis* spp. Forest & Woodland], specifically G195: Californian Broadleaf Forest & Woodland. In Oregon, zonal forests are included in Macrogroup M886: Southern Vancouverian Dry Foothill Forest & Woodland, in G206: Cascadian Oregon White Oak – Conifer Forest & Woodland.

Three subzones are recognized currently. It is possible that another subzone occurs in the Willamette Valley (see, e.g., Alaica et al. 2022), or that the OWmm_OR extends into that valley, but data to confirm mapping is limited currently. Vegetation descriptions in this section are for zonal (or "average") sites.

Table 18. OW Subzones – Climax and Seral Trees of Upland Sites

Scientific Name	OWdm_OR	OWmm_OR	OWun_CA	Common Name
Quercus garryana	**C**	**C**		Garry oak
Quercus kelloggii	**C**	**C**	c	black oak
Quercus douglasii			**C**	blue oak
Quercus wislizeni			**C**	interior live oak
Jumiperus occidentalis	c			western juniper
Arbutus menziesii		c		arbutus
Pinus sabiniana			c	California foothill pine
Quercus lobata			c	valley oak
Quercus chrysolepis			c	canyon live oak
Quercus agrifolia			c	California live oak
Aesculus californica			s	California buckeye

* **C** – major climax species; c – minor climax species; **S** – major seral species; s – minor seral species

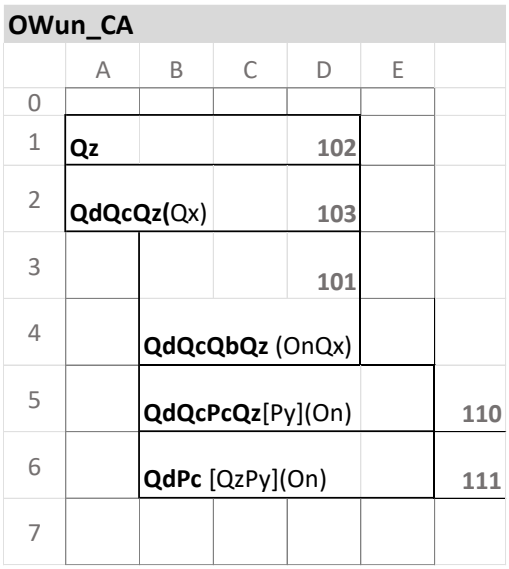
4.3.1. OWun_CA – Undifferentiated California OW

This subzone occurs in the interior of California, associated with the Central Valley.

Blue oak and interior live oak are the main oak species (Table 18). Associated trees include California black oak, valley oak, canyon live oak, California foothill pine, and California buckeye. Poison oak (*Toxicodendron diversilobum*) and toyon (*Heteromeles arbutifolia*) are common shrubs in the understorey. Introduced grasses are also common, including soft brome (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), hedgehog dogtail (*Cynosurus echinatus*), silver hairgrass (*Aira caryophyllea*).

This subzone occurs at elevations above the CVGdm_CA and below the CMXxm_CA. It often occurs in association with the CCHun_CA. The CDFxm_CA occurs on the northern edge of the OWun_CA.

Zonal association: *Quercus douglasii / Bromus* sp. - *Daucus pusillus* Woodland is the most common association.



Tree species codes are presented in Appendix 1

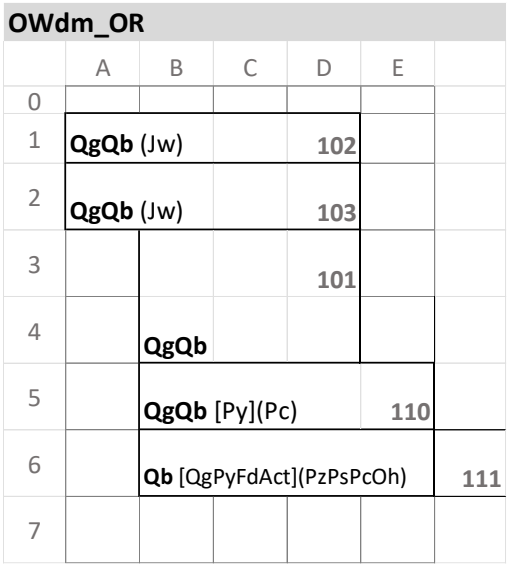
Figure 110. OWun_CA tree species suitability and plant associations displayed on edatopic grid.

4.3.2. OWdm_OR – Dry Maritime Oregon OW

This subzone occurs in SW Oregon and northern California, associated with the Umpqua River Valley near Roseburg, OR, and the Hat Creek valley and Crystal Lake area of California.

Garry oak and black oak characterize the oak forests and woodlands on most sites. Western juniper (*Juniperus occidentalis*) occurs in the eastern range of the subzone. Some California foothill pine occurs in the southern range of subzone in California.

The OWdm_OR occurs at elevations below the CDFxm_CA.



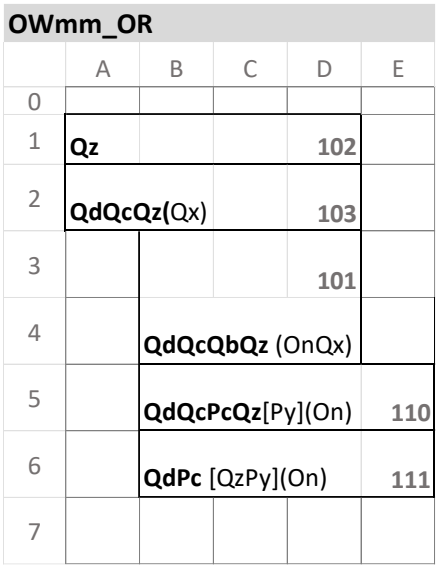
Tree species codes are presented in Appendix 1

Figure 111. OWdm_OR tree species suitability and plant associations displayed on edatopic grid.

4.3.3. OWmm_OR – Moist Maritime Oregon OW

The OWmm_OR occurs in SW Oregon, associated with the Rogue River Valley near Medford. Garry oak and black oak characterize the oak forests and woodlands on most sites.

The OWmm_OR occurs at elevations below the CDFmm_OR.



Tree species codes are presented in Appendix 1

Figure 112. OWmm_OR tree species suitability and plant associations displayed on edatopic grid.

4.4. Gambel Oak [GO]

This zone occurs at mid elevations in Utah and Colorado. It is a “transition zone” between the Juniper – Pine Woodland (JPW) and Interior Douglas-fir (IDF) zones or sometimes, the Montane Spruce (MS) zone at higher elevations. It is also termed the “Mountain Brush” zone (Banner 1992).

Gambel oak (*Quercus gambelii*) characterizes the mature vegetation, sometimes with mountain mahogany (curl-leaf [*Cercocarpus ledifolius*] in the western range; alderleaf [*C. montanus*] in the east) or some aspen (*Populus tremuloides*) (

Table 16). Associated understorey species include mountain snowberry (*Symphoricarpos oreophilus*), big sagebrush (*Artemisia tridentata*), Utah serviceberry (*Amelanchier utahensis*), and saskatoon (*Amelanchier alnifolia*).

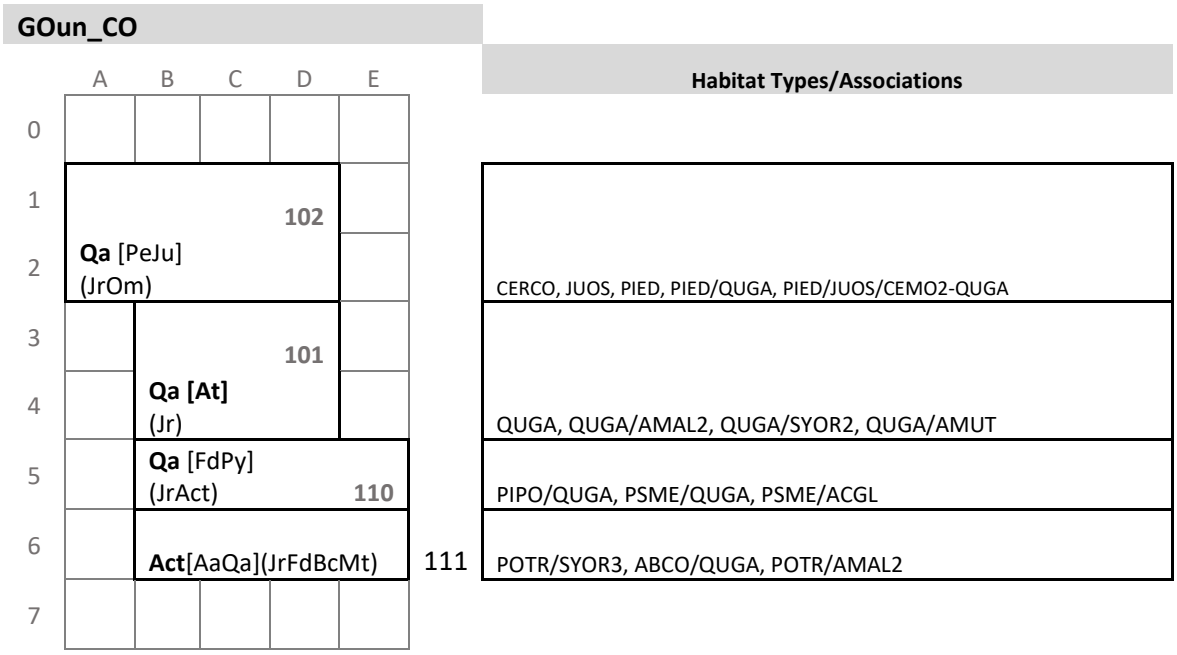
USNVC: Zonal vegetation is included in Macrogroup M049 Southern Rocky Mountain Montane Shrubland [*Quercus gambelii – Cercocarpus montanus – Purshia* spp.], specifically, G277 *Quercus gambelii – Amelanchier spp. – Prunus virginiana* Southern Rocky Mountain Montane Shrubland Group.

4.4.1. GOun_CO – Undifferentiated Colorado GO

The subzone occurs in montane elevations in in central Utah and western Colorado. Mature stands are characterized, but not always dominated by, Gambel oak. Associated species include curl-leaf or alderleaf mountain mahogany, aspen, mountain snowberry, big sagebrush, Utah serviceberry, and saskatoon.

The subzone typically occurs at elevations above the JPWdw_UT and below the IDFdh_UT.

Zonal Habitat types: QUGA, QUGA/AMAL2, QUGA/SYOR2, QUGA/AMUT (Johnston 1987)



Tree species codes are presented in Appendix 1; Habitat type association codes in Appendix 2.

Figure 113. GOun_CO tree species suitability and plant associations displayed on edatopic grid.

4.5. Montane Mountain Mahogany [MMM]

The MMM occurs at montane elevations in southern Nevada. Also described as the Mountain Shrub zone[5], it is an elevation band that is below the drought tolerance for high-elevation conifers (such as limber pine [*Pinus flexilis*] or bristlecone pine [*P. longaeva*]) but too cold for the Juniper – Pine Woodland zone.

Curl-leaf mountian mahogany (*Cercocarpus ledifolius*) characterizes the zone (

[5] https://www.onlinenevada.org/articles/nevada-vegetation-overview

Table 16). Other species include big sagebrush (ssp. *vasayana*), mountain snowberry (*Symphoricarpos oreophilus*), little sagebrush (*Artemisia arbuscula*) and some trembling aspen (*Populus tremuloides*). The herb understorey is usually sparse with the main species being bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*).

The zone occurs between the Juniper – Pine Woodland (JPW) and the Montane Spruce (MS) zones.

USNVC: Zonal vegetation is included in Macrogroup M896 Intermountain Pinyon – Juniper Woodland [*Pinus monophylla – Juniperus osteosperma – Juniperus occidentalis* Intermountain Woodland], specifically part of G249 Intermountain Basins Curl-leaf Mountain-mahogany Woodland & Scrub. Note: USNVC[6] suggests that this Group could be moved to M049 Southern Rocky Mountain Montane Shrubland.

Only one subzone is recognized at present.

[6] Explore The Classification « The U.S. National Vegetation Classification (usnvc.org)

4.5.1. MMMdk_NV – Dry Cool Nevada MMM

The subzone occurs in montane elevations in central and south-central Nevada. See zone description.

The subzone occurs at elevations above the JPWxw_NV and below the MSxx_NV. At similar elevations to the north, IWFxk_NV occurs.

MMM dk_NV

	A	B	C	D	E
0					
1		**Om**		**102**	
2		**Om**		**103**	
3				**101**	
4		**Om** [At]			
5		**AtOm**			**110**
6		[AtOm]			**111**
7					

Tree species codes are presented in Appendix 1

Figure 114. MMMdk_NV tree species suitability and plant associations displayed on edatopic grid.

5. GRASSLAND ZONES

5.1. Bunchgrass [BG]

The Bunchgrass (BG) Zone is a shrub-steppe zone of the arid, interior plateaus and mountains of the western United States (Franklin and Dyrness 1988; Brown and Makings 2010) and southern British Columbia (Meidinger and Pojar 1991). It occurs mostly in Washington, Oregon, Idaho, western Wyoming and Montana, and northern Nevada.

5.1.1. Mature vegetation is characterized by open to closed stands of big sagebrush (*Artemisia tridentata* ssp. *tridentata & wyomingensis*) (BG Subzones

Eleven subzones are recognized across the range of the BG zone. Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types are listed, if known.

Table 19BG Subzones

Eleven subzones are recognized across the range of the BG zone. Vegetation descriptions in this section are for zonal (or “average”) sites. The zonal habitat types are listed, if known.

Table 19). Antelope-brush (*Purshia tridentata*) often occurs with big sagebrush. Other accompanying species are bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), junegrass (*Koeleria macrantha*), and Sandberg's bluegrass (*Poa secunda*).

The BG zone occurs at elevations below various arid climate zones, including Ponderosa Pine (PP), Interior Grand Fir (IGF), Interior Douglas-fir (IDF), Interior White Fir (IWF), Juniper – Pine Woodland (JPW), and Western Juniper – Pine (WJP). It abuts the Great Basin Desert zone to the south and Mixed-grass Prairie to the east.

USNVC: Zonal vegetation is included in Macrogroup M169 Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland **[***Artemisia tridentata – Artemisia tripartita ssp. tripartita – Purshia tridentata* Steppe & Shrubland].

5.1.2.BG Subzones

Eleven subzones are recognized across the range of the BG zone. Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types are listed, if known.

Table 19. Key species of Grassland Zones

Scientific Name	BG*	GBD	SGP	MGP	FG	Common Name
Purshia tridentata	**a****					antelope-brush
Artemisia tridentata	**C**	**c**		**C**		big sagebrush
Poa secunda	**C**					Sandberg's bluegrass
Pseudoroegneria spicata	**C**					bluebunch wheatgrass
Chrysothamnus viscidiflorus	**C**	**C**				green rabbit-brush
Atriplex confertifolia		**C**				shadscale saltbush
Pleuraphis jamesii		**C**				James' galleta
Achnatherum hymenoides		**C**				Indian ricegrass
Bouteloua gracilis			**C**	a		blue grama
Bouteloua dactyloides			**C**			buffalograss
Cylindropuntia imbricata var. imbricata			**C**			tree cholla
Sporobolus cryptandrus			**C**	a		sand dropseed
Yucca glauca			**C**			soapweed yucca
Gutierrezia sarothrae			**C**			broom snakeweed
Aristida purpurea			**C**			red three-awn
Pascopyrum smithii			**C**	**C**	a	western wheatgrass
Artemisia frigida			**C**	**C**		prairie sagewort
Opuntia polyacantha			**C**	**C**		plains prickly-pear cactus
Hesperostipa comata				**C**		needle-and-thread grass
Tradescantia occidentalis				**C**		prairie spiderwort
Festuca idahoensis	a				**C**	Idaho fescue
Festuca campestris					**C**	rough fescue
Achnatherum nelsonii					**C**	Columbia needlegrass

* Zone names: BG: Bunchgrass; GBD: Great Basin Desert; SGP: Short Grass Prairie; MGP: Mid Grass Prairie; FG: Fescue Grassland

** **C** – characteristic species; a – accompanying species

5.1.3.BGxh_WA – Very Dry Hot Washington BG

This subzone occurs at low elevations in northern Oregon, central Washington, and north to the Canadian border. This is the US equivalent of the BGxh1 in British Columbia (Lloyd et al. 1990).

It is characterized by big sagebrush, bluebunch wheatgrass, and Idaho fescue.

Zonal habitat types: ARTR/FEID-PSSP (Franklin and Dyrness 1988).

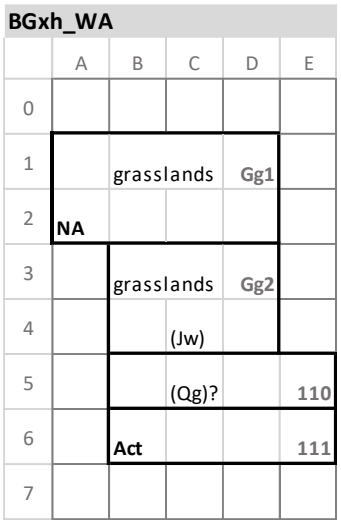


Figure 115. BGxh_WA tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.4.BGdw_WA – Dry Warm Washington BG

This subzone occurs at low to moderate elevations in north central to northwest Washington, at elevations above the BGxh_WA.

It is characterized by threetip sagebrush (*Artemisia tripartita*) along with bluebunch wheatgrass and Idaho fescue. Arrowleaf balsamroot (*Balsamorhiza sagittata*) is common.

Zonal habitat types: ARTR4/FEID-PSSPS, ARTR4/PSSPS-FEID (Franklin and Dyrness 1988)

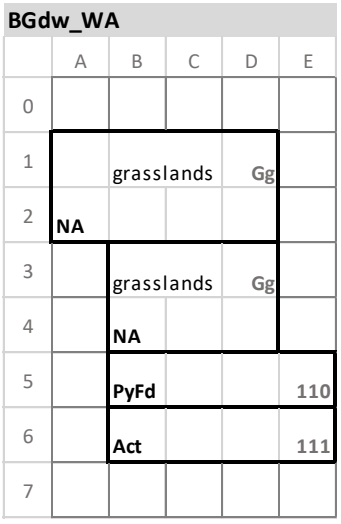


Figure 116. BGdw_WA tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.5.BGmw_WA – Moist Warm Washington BG

This subzone occurs at low elevations in southeastern Washington, into western Idaho and northeast Oregon, east of the BGxh_WA.

It is characterized by bluebunch wheatgrass and Idaho fescue, i.e., it lacks big sagebrush.

Zonal habitat types: FEID-PSSPS, PSSPS, PSSPS-FEID (Franklin and Dyrness 1988)

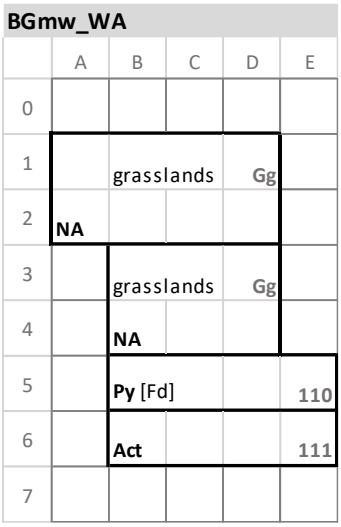


Figure 117. BGmw_WA tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.6.BGwm_WA – Wet Mild Washington BG

This subzone occurs at low to mid elevations in southeastern Washington, into western Idaho, north and east of the BGmw_WA.

It is characterized by common snowberry (*Symphoricarpos albus*), mallow ninebark (*Physocarpus malvaceus*), bluebunch wheatgrass and Idaho fescue. The subzone lacks big sagebrush.

Zonal habitat types: SYAL/FEID-PSSPS, SYAL/PSSPS-FEID (Franklin and Dyrness 1988)

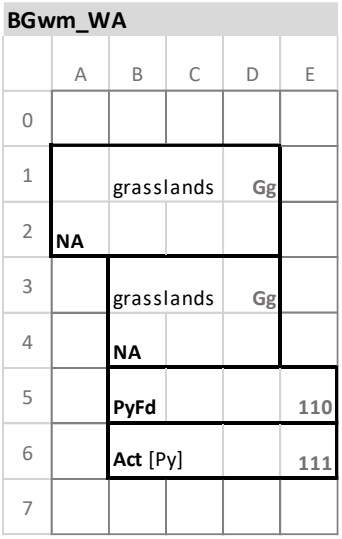


Figure 118. BGwm_WA tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.7.BGdh_OR – Dry Hot Oregon BG

This wide-ranging subzone occurs at low to moderate elevations in southeast Oregon, southern Idaho, and northern Nevada.

It is characterized by big sagebrush (mostly ssp. *wyomingensis*) along with green rabbit-brush (*Chrysothamnus viscidiflorus*), common rabbit-brush (*Ericameria nauseosa*), black sagebrush (*Artemisia nova*), bluebunch wheatgrass, and Sandberg's bluegrass.

Zonal vegetation: Wyoming Big Sagebrush Shrubland Alliance (Franklin and Dyrness 1988; Hironaka, Fosberg, and Winward 1983)

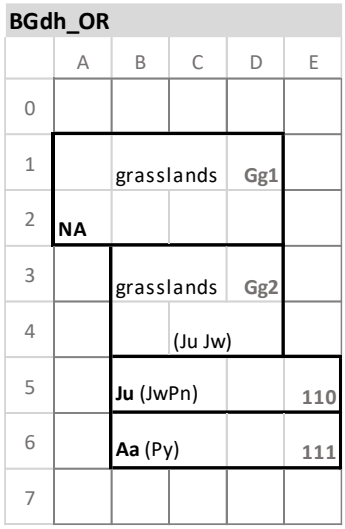


Figure 119. BGdh_OR tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.8.BGdw_OR – Dry Warm Oregon BG

This subzone occurs at low to moderate elevations in northeast Oregon.

It is characterized by big sagebrush (mostly ssp. *wyomingensis*) and bluebunch wheatgrass. At higher elevations to the east is the BGmw_OR.

Zonal vegetation: Wyoming Big Sagebrush Shrubland Alliance (Franklin and Dyrness 1988)

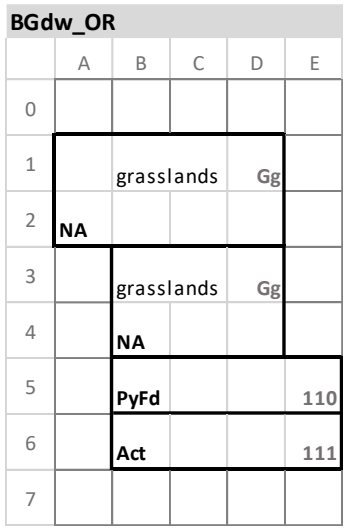


Figure 120. BGdw_OR tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.9.BGmw_OR – Moist Warm Oregon BG

This subzone occurs at moderate elevations in northeast Oregon.

The zonal vegetation is represented by Idaho fescue and bluebunch wheatgrass. Associated species are Sandberg's bluegrass, yarrow (*Achillea millefolium* var. *lanulosa*) and junegrass (*Koeleria macrantha*) (Endress et al. 2020). At lower elevations, to the west, is the BGdw_OR.

Zonal habitat types: FEID-PSSPS, PSSPS-FEID (Franklin and Dyrness 1988).

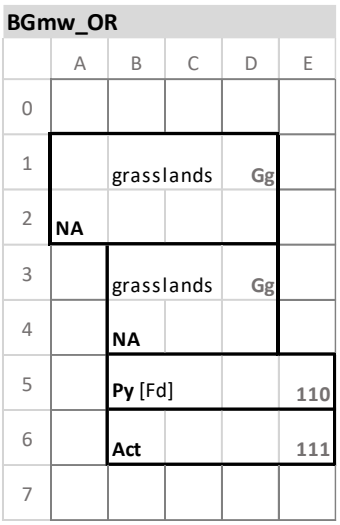


Figure 121. BGdw_OR tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.10. BGmk_NV – Moist Cool Nevada BG

This subzone occurs at moderate elevations in northern Nevada, extreme southeast Oregon, southern Idaho, and into northwestern Colorado. It generally occurs at elevations above the BGdh_OR.

It is characterized by mountain big sagebrush (ssp. *vaseyana*), Idaho fescue, and bluebunch wheatgrass.

Zonal vegetation: ARTRV/FEID, ARTRV/PSSPS, ARTR2/FEID, CELE3/ARTR2/FEID (Hironaka, Fosberg, and Winward 1983)

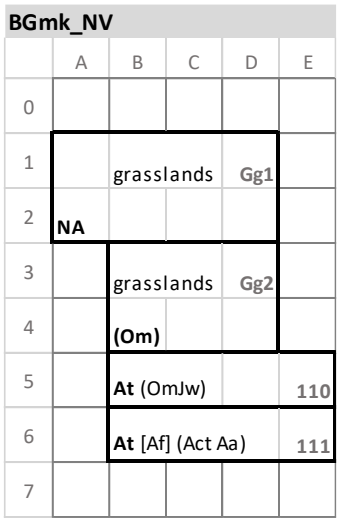


Figure 122. BGmk_NV tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.11. BGmk_MT – Moist Cool Montana BG

This subzone occurs at low to moderate elevations southwestern Montana and adjacent Idaho.

It is characterized by big sagebrush (including ssp. *vaseyana*), threetip sagebrush (*Artemisia tripartita*) daho fescue, and bluebunch wheatgrass. Rocky Mountain juniper (*Juniperus scopulorum*) is often present.

Zonal vegetation: ARTR2/FEID, ARTR2/PSSPS (Hironaka, Fosberg, and Winward 1983)

.

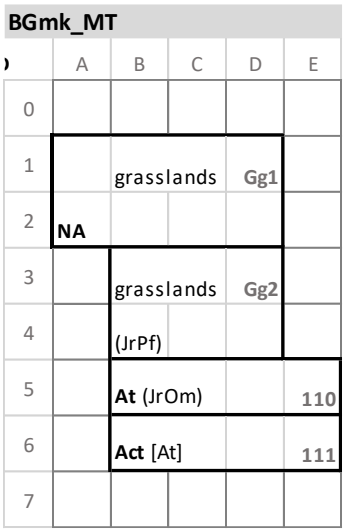


Figure 123. BGmk_MT tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.12. BGmm_MT – Moist Mild Montana BG

This subzone occurs at moderate elevations mostly in Wyoming, but also into southern Montana.

It is characterized by big sagebrush, Idaho fescue, and bluebunch wheatgrass. Rocky Mountain juniper (*Juniperus scopulorum*) is commonly present.

Zonal vegetation: big sagebrush steppe

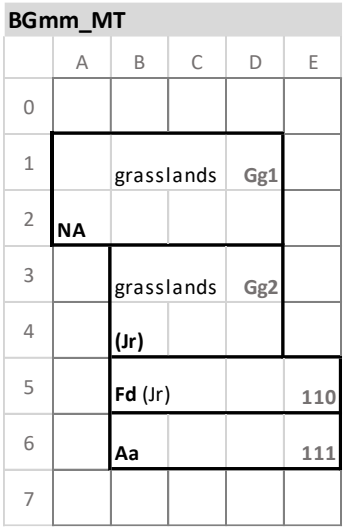


Figure 124. BGmm_MT tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.1.13. BGxx_WY – Very Dry Very Hot Wyoming BG

This subzone occurs at moderate elevations in southwest Wyoming.

It is characterized by big sagebrush (including *wyomingensis, vasayana*), rabbit-brush (*Chrysothamnus* sp. & *Ericameria nauseosa*), greasewood (*Sarcobatus vermiculatusis*), and various grasses.

Zonal vegetation: big sagebrush steppe

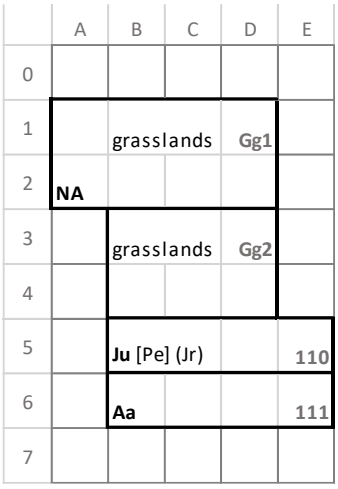


Figure 125. BGxx_WY tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.2. Great Basin Desert [GBD]

The Great Basin Desert (GBD) Zone is a shrub-steppe / salt desert shrub zone of low elevation, arid climates centred on the Great Basin. It occurs mostly in Nevada and Utah, in the hydrological Great Basin, although the zone extends somewhat into the Colorado Plateau and Snake River Plain. The northern part of the Great Basin is included in the Bunchgrass zone.

The vegetation of the GBD, as characterized here, mostly lacks big sagebrush, although some Wyoming big sagebrush can occur (BG Subzones

Eleven subzones are recognized across the range of the BG zone. Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types are listed, if known.

Table 19). In the Great Basin area, big sagebrush areas with bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*), junegrass (*Koeleria macrantha*), and Sandberg's bluegrass (*Poa secunda*) are included in the Bunchgrass (BG) zone. Desert shrub / salt desert shrub communities are common in the GBD. Plants in this zone include shadscale saltbush (*Atriplex confertifolia*), greasewood (*Sarcobatus vermiculatus*), winterfat (*Krascheninnikovia lanata*), broom snakeweed (*Gutierrezia sarothrae*), mormon tea (*Ephedra viridis*), green rabbit-brush (*Chrysothamnus viscidiflorus*), blackbrush (*Coleogyne ramosissima*), Bailey's greasewood (*Sarcobatus baileyi*), and Nevada jointfir (*Ephedra nevadensis*). Common grasses include Indian ricegrass (*Achnatherum hymenoides*) and James' galleta (*Pleuraphis jamesii*). Historically, needle-and-thread grass (*Hesperostipa comata*), and sand dropseed (*Sporobolus cryptandrus*) would have been more frequent than they are now.

The GBD zone mostly occurs at elevations below the Juniper – Pine Woodland (JPW) zone.

USNVC: Zonal vegetation is included in Macrogroup M171 Great Basin-Intermountain Dry Shrubland & Grassland [*Chrysothamnus viscidiflorus – Coleogyne ramosissima / Achnatherum hymenoides* Dry Shrubland & Grassland], both G312 Colorado Plateau Blackbrush – Mormon-tea Shrubland Group, and G310 Intermountain Semi-Desert Steppe & Shrubland Group. The zone includes large areas of Macrogroup M093 Great Basin Saltbush Scrub [*Atriplex confertifolia – Atriplex canescens – Atriplex corrugata* Great Basin Scrub], mostly G300 Intermountain Shadscale – Saltbush Scrub Group.

5.2.1. GBD Subzones

Three subzones are recognized across the range of the GBD zone. Vegetation descriptions in this section are for zonal (or "average") sites. The zonal vegetation is listed.

5.2.2. GBDxh_NV – Very Dry Hot Nevada GBD

This subzone mostly occurs at low elevations in Nevada, and into northeastern California. It also potentially occurs in southern Oregon and Idaho. It is characterized by dry shrubland and salt desert scrub comprised of Wyoming big sagebrush, shadscale saltbush, green rabbit-brush, bud sagebrush, Bailey's greasewood, greasewood, Nevada jointfir, and Indian ricegrass.

Zonal vegetation: *Artemisia tridentata* ssp. *wyomingensis*, *Sarcobatus baileyi*, *Sarcobatus vermiculatus*, *Atriplex confertifolia*, and *Chrysothamnus viscidiflorus* Shrubland Alliances; Artemisia nova Dwarf-shrub Alliance.

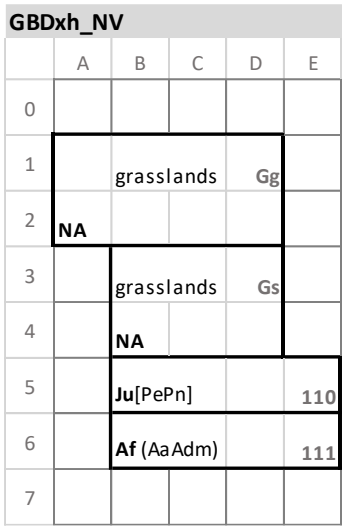


Figure 126. GBDxh_NV tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.2.3. GBDdw_UT – Dry Warm Utah GBD

This subzone occurs primarily at low elevations in Utah, extending slightly into eastern Nevada and western. The main species of this subzone are shadscale saltbush, greasewood, winterfat, Indian ricegrass, James' galleta, saltlover (*Halogeton glomeratus*), and green molly (*Bassia americana*).

Zonal vegetation: Shadscale Shrubland Alliance, Black Greasewood Shrubland Alliance

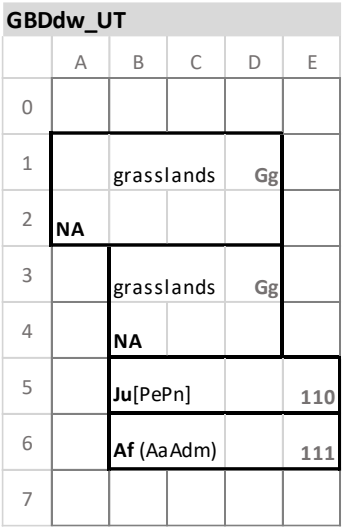


Figure 127. GBDdw_UT tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.2.4. GBDxx_UT – Very Dry Very Hot Utah GBD

The GBDxx_UT occurs in southeast Utah, extending slightly into Colorado. It is characterized by blackbrush rangelands, with blackbrush, mormon tea, broom snakeweed, Torrey's jointfir (*Ephedra torreyana*), shadscale saltbush, Indian ricegrass, and James' galleta.

Zonal vegetation: Blackbrush Shrubland Alliance

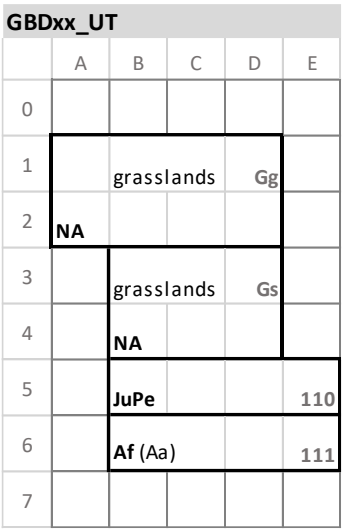


Figure 128. GBDxx_UT tree species suitability and plant associations displayed on edatopic grid. Tree species codes are presented in Appendix 1.

5.3. Mixed-grass Prairie [MGP]

The MGP zone is a subdivision of Plains Grassland (Brown and Makings 2010) that includes elements of short-grass and tall-grass prairies. It extends from the south of Canada's prairie provinces through eastern Montana, and western North and South Dakota, south to Texas.

This vegetation is characterized by medium-tall grasses, including needle-and-thread grass (*Hesperostipa comata*), and western wheatgrass (*Pascopyrum smithii*) (BG Subzones

Eleven subzones are recognized across the range of the BG zone. Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types are listed, if known.

Table 19). Other common species are sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), silver bluestem (*Bothriochloa laguroides* ssp. *torreyana*), buffalograss *(Bouteloua dactyloides*), thread-leaf sedge (*Carex filifolia*), thickspike wheatgrass (*Elymus lanceolatus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and little bluestem (*Schizachyrium scoparium*).

USNVC: Zonal vegetation is included in Macrogroup M051: Great Plains Mixedgrass & Fescue Prairie Grassland [*Hesperostipa comata – Pascopyrum smithii – Festuca hallii* Grassland]

Only one subzone is recognized in the mapped area.

5.3.1. MGPmw_MT – Moist Warm Montana MGP

As presently mapped, this subzone occurs in eastern Montana and eastern Wyoming, and into Colorado. See zone description for vegetation of this subzone.

MGPmw_MT

	A	B	C	D	E
0					
1		grasslands		Gg	
2	**NA**				
3		grasslands		Gg	
4		**NA**			
5		**PyJr**			110
6		**PyJr** [Adm]			111
7					

Tree species codes are presented in Appendix 1

Figure 129. MGPmw_MT tree species suitability displayed on edatopic grid.

5.4. Short Grass Prairie [SGP]

The SGP zone is mapped in eastern Colorado and north into southeastern Wyoming. The zone extends outside our map area into western Nebraska, and south to northern Texas and eastern New Mexico.

The vegetation is characterized by short grasses, mainly blue grama (*Bouteloua gracilis*) and buffalograss (*Bouteloua dactyloides*) (BG Subzones

Eleven subzones are recognized across the range of the BG zone. Vegetation descriptions in this section are for zonal (or "average") sites. The zonal habitat types are listed, if known.

Table 19). Other common species are three awns (*Aristida* spp.), broom snakeweed (*Gutierrezia sarothrae*), plains prickly-pear cactus (*Opuntia polyacantha*), tree cholla (*Cylindropuntia imbricata* var. *imbricata*), western wheatgrass (*Pascopyrum smithii*), sand dropseed (*Sporobolus cryptandrus*), and prairie sagewort (*Artemisia frigida*) (Brown and Makings 2010).

USNVC: Zonal vegetation is included in Macrogroup M053: Western Great Plains Shortgrass Prairie [*Bouteloua gracilis – Bouteloua dactyloides* Shortgrass Prairie]

Only one subzone is recognized in the mapped area.

5.4.1. SGPdm_CO – Dry Mild Colorado SGP

See zone description for vegetation of this subzone.

SGP dm_CO

	A	B	C	D	E
0					
1		grasslands		Gg	
2	**NA**				
3		grasslands		Gg	
4		**NA**			
5		**JoPe** (JrQa)			110
6		**Adm** [AaMe]			111
7					

Tree species codes are presented in Appendix 1

Figure 130. SGPdm_CO tree species suitability displayed on edatopic grid.

5.5. Fescue Grassland [FG]

The Fescue Grassland zone occurs in northwestern Montana, north into southwestern Alberta.

The vegetation is dominated by rough fescue (*Festuca campestris*), along with the western wheatgrass (*Pascopyrum smithii*), Idaho fescue (*Festuca idahoensis*), Parry's oatgrass (*Danthonia parryi*), and Columbia needlegrass (*Achnatherum nelsonii*) (Table 19). Common forbs are silvery lupine (*Lupinus argenteus*), sticky purple geranium (*Geranium viscosissimum*), old-man's whiskers (*Geum triflorum*), pasture sagewort (*Artemisia frigida*), and prairie golden bean (*Thermopsis rhombifolia*) (Natural Regions Committee 2006).

Only one subzone is recognized in the mapped area.

5.5.1. FGff – Fescue Grassland

See zone description. No tree species recommendations.

6. MOJAVE AND MADREAN ZONES

6.1. Mojave – Sonoran Semi-Desert [MSSD]

This zone is a low elevation, warm temperate climate zone of semi-desert climates in the southwest U.S. and into adjacent Mexico. It includes the Mojave and Sonoran deserts.

USNVC: Zonal vegetation is included in Macrogroup M088: Mojave-Sonoran Semi-Desert Scrub [*Carnegiea gigantea – Stenocereus thurberi – Ambrosia dumosa* Mojave-Sonoran Semi-Desert Scrub].

Only one subzone, which characterizes the Mojave Desert, is recognized in the map area. Vegetation descriptions in this section are for zonal (or "average") sites.

6.1.1.MSSDun_NV – Nevada MSSD

This subzone occurs in southern California, southern Nevada, and adjacent Arizona. Cacti occur along with agaves and other drought-tolerant species. Creosote bush (*Larrea tridentata*) is usually present, along with burrobush (*Ambrosia dumosa*), Nevada jointfir (*Ephedra nevadensis*), Mojave yucca (*Yucca schidigera*), and Joshua tree (*Yucca brevifolia*).

MSSDun_NV

	A	B	C	D	E
0					
1		grasslands		Gg	
2	NA				
3		grasslands		Gg	
4		NA			
5		JuPn			110
6					111
7					

Tree species codes are presented in Appendix 1

Figure 131. MSSDun_NV tree species suitability displayed on edatopic grid.

6.2. Madrean Chaparral [MDCH]

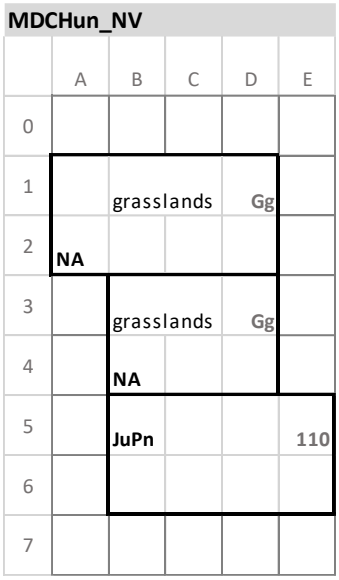
This zone characterizes “interior” chaparral, occurring mostly in Arizona but also occurs in the desert mountains above the Mojave and Sonoran deserts into California and Nevada. Some key species are Sonoran scrub oak (*Quercus turbinella*), desert ceanothus (*Ceanothus greggii*), pointleaf manzanita (*Arctostaphylos pungens*), greenleaf manzanita (*Arctostaphylos patula*), alderleaf mountain mahogany (*Cercocarpus montanus*), narrowleaf yerba santa (*Eriodictyon angustifolium*), and ashy silktassel (*Garrya flavescens*).

USNVC: Zonal vegetation is included in Macrogroup M091: Warm Interior Chaparral [*Quercus turbinella – Arctostaphylos pungens – Ceanothus greggii* Warm Interior Chaparral].

Only one subzone is recognized, at present.

6.2.1. MDCHun_NV – Nevada MDCH

This subzone is mapped in southern California and Nevada but would extend into Arizona. The vegetation is as described for the zone. Data is limited in the area of mapping.



Tree species codes are presented in Appendix 1

Figure 132. MDCHun_NV tree species suitability displayed on edatopic grid.

7. LITERATURE CITED

Alaica, S., Z. Clark-Henry, A. Pfeifer, A. Lamas, and A. Esterson. 2022. Prairie and oak ecosystems in the BLM Northwest Oregon District – 2022 report. Report to the U.S. Bureau of Land Management. Institute of Applied Ecology, Corvallis, Oregon. 291 pp.

Alexander, R. R. 1988. "Forest Vegetation on National Forests in the Rocky Mountain and Intermountain Regions: Habitat Types and Community Types." *General Technical Report - US Department of Agriculture, Forest Service*. https://doi.org/10.5962/bhl.title.99935.

Allen, B H. 2005. "Sierran Mixed Conifer." *Wildlife Habitats - California Wildlife Habitat Relationships System*, no. April: 1–4. https://www.wildlife.ca.gov/Data/CWHR/Wildlife-Habitats.

Atzet, Thomas, Diane E White, Lisa A Mccrimmon, Patricia A Martinez, and Vince D Randall. 1996. "Field Guide To the Forested Plant Associations of Southwestern Oregon." *USDA Forest Service - Technical Paper* R6-NR-ECOL (17–96).

Atzet, Thomas, Diane E White, Lisa A McCrimmon, Patricia A Martinez, Vince D Randall, and Forest Service. 1996. "Field Guide To the Forested Plant Associations of Southwest Oregon." *USDA Forest Service - Technical Paper*. Vol. R6-NR-ECOL.

Banner, Roger E. 1992. "Vegetation Types of Utah." *Rangelands* 14 (2): 109–14.

Brockway, Dale G., Christopher Topik, Miles A. Hemstrom, and William H. Emmington. 1983. "Plant Association and Management Guide for the Pacific Silver Fir Zone: Gifford Pinchot National Forest." *USDA Forest Service*. Vol. R6-Ecol.

Brown, David E, and Elizabeth Makings. 2010. "A Guide to North American Grasslands." *Desert Plants* 29 (2). https://doi.org/10.1007/978-3-642-02550-1.

Christy, J A, J S Kagan, and A M Wiedemann. 1998. "Plant Associations of the Oregon Dunes National Recreation Area." *USDA Forest Service - Technical Paper* R6-NR-ECOL (TP-09-98): 1–183.

Clausnitzer, Rodrick R. 1993. "The Grand Fir Series of Northeastern Oregon and Southeastern Washington: Successional Stages and Management Guide." *USDA Forest Service - Technical Paper*. Vol. R6-ECO-TP.

Cooper, S. V., K. E. Neiman, and D. W. Roberts. 1991. "Forest Habitat Types of Northern Idaho: A Second Approximation." *USDA Forest Service - General Technical Report*. Vol. INT. https://doi.org/10.2737/INT-GTR-236.

Diaz, Nancy M., C. Tom High, T. Kim Mellen, and Christopher Topik. 1997. "Plant Association and Management Guide for the Mountain Hemlock Zone: Gifford Pinchot and Mt. Hood National Forests." *USDA Forest Service - Technical Paper*. Vol. R6-MTH-GP.

Endress, Bryan A., Joshua P. Averett, Bridgett J. Naylor, Lesley R. Morris, and Robert V. Taylor. 2020. "Non-Native Species Threaten the Biotic Integrity of the Largest Remnant Pacific Northwest Bunchgrass Prairie in the United States." *Applied Vegetation Science* 23 (1): 53–68. https://doi.org/10.1111/avsc.12464.

Franklin, Jerry F., and C. T. Dyrness. 1988. *Natural Vegetation of Oregon and Washington*. Oregon State University Press. https://doi.org/10.2307/3899130.

Franklin, Jerry F, William H Moir, Miles A. Hemstrom, Sarah E. Greene, and Bradley G. Smith. 1988. "The Forest Communities of Mount Rainier National Park." *Scientific Monograph Series*, no. 19: 194.

Green, R., and K. Klinka. 1994. "A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region." Victoria, B.C. https://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh28.htm.

Griffin, J.R. 1977. “Oak Woodland.” In *Terrestrial Vegetation of California*, edited by M.G Barbour and J. Major, 383–415. New York: John Wiley and Sons.

Hall, F. C. 1998. “Pacific Northwest Ecoclass Codes for Seral and Potential Natural Communities.” *USDA Forest Service - General Technical Report PNW*. https://doi.org/10.2737/PNW-GTR-418.

Hemstrom, Miles A., and Sheila E. Logan. 1986. “Plant Association and Management Guide: Suislaw National Forest.” *USDA Forest Service*. Vol. R6-Ecol.

Hemstrom, Miles a, William H Emmingham, Nancy M Halverson, Sheila E Logan, and Christopher Topik. 1982. “Plant Association and Management Guide for the Pacific Silver Fir Zone, Mt. Hood and Willamette National Forests.” *USDA Forest Service* R6-Ecol (100): 106.

Henderson, J A, R D Lesher, D H Peter, and D C Shaw. 1992. “Field Guide to the Forested Plant Associations of the Mt. Baker-Snoqualmie National Forest.” *USDA Forest Service - Technical Paper*. Vol. R6-ECOL-TP.

Henderson, Jan A., David H. Peter, Robin D. Lesher, and David C. Shaw. 1989. “Forested Plant Associations of the Olympic National Forest.” *USDA Forest Service - Technical Paper*. Vol. R6-ECOL. http://ir.library.oregonstate.edu/xmlui/handle/1957/16059.

Hironaka, M, M A Fosberg, and A H Winward. 1983. “Sagebrush-Grass Habitat Types of Southern Idaho.” *Univ. of Idaho, FWR Bull. 35.*, no. 3: 44p.

Hoffman, G. R., and R. R. Alexander. 1987. “Forest Vegetation of the Black Hills National Forest of South Dakota and Wyoming: A Habitat Type Classification.” *USDA Forest Service - Research Paper*. Vol. RM-276. https://doi.org/10.5962/bhl.title.98704.

Hopkins, William, E. 1979. “Plant Associations of the Fremont National Forest.” *USDA Forest Service* R6-ECOL (79–004): 138.

Horton, J.S. 1960. “Vegetation Types of the San Bernardino Mountains.” 44. Technical Paper. Berkeley, CA.

Johnson, C. G., and S. A. Simon. 1987. “Plant Associations of the Wallowa-Snake Province” 4: 136.

Johnson, Charles G., and Rodrick R. Clausnitzer. 1992. “Plant Associations of the Blue and Ochoco Mountains.” *USDA Forest Service* R6-ERW-TP (036–92): 163 pp. + Appendices.

Johnson, Charles G., and Steven A. Simon. 1987. “Plant Associations of the Wallowa-Snake Province: Wallowa-Whitman National Forests (Oregon) /.” *USDA Forest Service - Technical Paper* R6-ECOL-TP (255A-86). https://doi.org/10.5962/bhl.title.117223.

Johnston, Barrry C. 1987. “Plant Associations of Region Two. Potential Plant Communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas.” 4th ed. Lakewood, CO: USDA Forest Service. https://ia902709.us.archive.org/25/items/CAT87869967/CAT87869967.pdf.

Lillybridge, Terry R., Bernard L. Kovalchik, Clinton K. Williams, and Bradley G. Smith. 1995. “Field Guide for Forested Plant Association of the Wenatchee National Forest.” *USDA Forest Service - General Technical Report*. Vol. PNW-GTR. https://doi.org/10.2307/1223530.

Lloyd, D, K Angove, G Hope, and C Thompson. 1990. “Land Management Guidebook No. 23 - A Guide to Site Identification and Interpretation for the Kamloops Forest Region.” https://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh23.htm.

MacKenzie, W.H., and C.R. Mahony. 2021. “An Ecological Approach to Climate Change-Informed Tree Species Selection for Reforestation.” *Forest Ecology and Management* 481 (November 2020): 118705. https://doi.org/10.1016/j.foreco.2020.118705.

MacKenzie, W.H., and D.V. Meidinger. 2018. “The Biogeoclimatic Ecosystem Classification Approach:

An Ecological Framework for Vegetation Classification." *Phytocoenologia* 48 (2). https://doi.org/10.1127/phyto/2017/0160.

MacKillop, D, A Ehman, K Iverson, and E McKenzie. 2018. *A Field Guide to Ecosystem Classification and Identification for Southeast British Columbia, The East Kootenay*. *Prov. B.C.* Victoria, B.C. www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh71.htm.

MacKillop, Deb, and Audrey Ehman. 2016. *A Field Guide to Ecosystem Classification and Identification for Southeast British Columbia: The South-Central Columbia Mountains*. *Land Management Handbook No. 70*. www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh68.htm.

Marr, John W. 1961. "Ecosystems of the East Slope of the Front Range in Colorado." *Series in Biology*, no. 21: 144. https://doi.org/10.2307/2483242.

McCain, C, and N M Diaz. 2002. "Field Guide to the Forested Plant Associations of the Westside Central Cascades of Northwest Oregon." *USDA Forest Service - Technical Paper*. Vol. R6-NR-ECOL. https://doi.org/R6-NR-ECOL-TP-02-02.

McCain, Cindy, and Nancy Diaz. 2002. "Field Guide to the Forested Plant Associations of the Northern Oregon Coast Range." *USDA Forest Service - Technical Paper*. Vol. R6-NR-ECOL.

Meidinger, D., and J. Pojar. 1991. *Ecosystems of British Columbia*. Victoria, B.C.: Province of British Columbia. https://www.for.gov.bc.ca/hfd/pubs/Docs/Srs/Srs06.htm.

Natural Regions Committee. 2006. *Natural Regions and Subregions of Alberta*. Edited by D.J. Downing and W.W. Pettapiece. Pub. No. T. Edmonton, Alberta.

Pfister, Robert D., Bernard L. Kovalchik, Stephen F. Arno, and Richard C. Presby. 1978. "Forest Habitat Types of Montana." *USDA Forest Service - General Technical Report*. Vol. INT-34. Ogden, UT.

Pojar, J., K. Klinka, and D. V. Meidinger. 1987. "Biogeoclimatic Ecosystem Classification in British Columbia." *Forest Ecology and Management* 22 (1–2): 119–54. https://doi.org/10.1016/0378-1127(87)90100-9.

Powell, David C, Charles G Johnson, Elizabeth A Crowe, Aaron Wells, and David K Swanson. 2007. "Potential Vegetation Hierarchy for the Blue Mountains Section of Northeastern Oregon , Southeastern Washington , and West-Central Idaho." *USDA Forest Service - General Technical Report*. Vol. PNW-GTR.

Sawyer, J.O. 2007. "Forests of Northwestern California." In *Terrestrial Vegetation of California*, edited by M. Barbour, T. Keeler-Wolf, and A.A. Schoenherr, 3rd ed., 253–95. University of California at Los Angeles. https://www.ucpress.edu/book/9780520249554/terrestrial-vegetation-of-california-3rd-edition.

Simpson, Michael. 2007. "Plant Associations of the Oregon East Cascades." *USDA Forest Service - Technical Paper*. Vol. R6-NR-ECOL.

Steele, Robert, Stephen V. Cooper, David M. Ondov, David W. Roberts, and Robert D. Pfister. 1983. *Forest Habitat Types of Eastern Idaho-Western Wyoming*. *General Technical Report - US Department of Agriculture, Forest Service*. https://doi.org/10.2737/int-gtr-144.

Steele, Robert, Robert D. Pfister, Russell A. Ryker, and Jay A. Kittams. 1981. "Forest Habitat Types of Central Idaho." *USDA Forest Service - General Technical Report* INT-114. https://doi.org/10.5962/bhl.title.100633.

Topik, Christopher. 1983. "Plant Association and Management Guide for the Grand Fir Zone: Gifford Pinchot National Forest." *USDA Forest Service* R6-ECOL-TP (006–88): 120.

———. 1997. "Plant Association and Management Guide for the Grand Fir Zone: Gifford Pinchot

National Forest," no. June.

Topik, Christopher, Nancy M. Halverson, and Dale G. Brockway. 1986. "Plant Association and Management Guide for the Western Hemlock Zone: Gifford Pinchot National Forest." *USDA Forest Service*. Vol. R6-ECOL.

Topik, Christopher, Nancy M Halverson, and Tom High. 1988. "Plant Association and Management Guide for the Ponderosa Pine, Douglas-Fir, and Grand Fir Zones: Mt Hood National Forest." *USDA Forest Service* R6-Ecol-TP (004–88): 118. https://doi.org/R6-ECOL-TP-004-88.

Volland, Leonard A. 1985. "Plant Associations of the Central Oregon Pumice Zone." *USDA Forest Service* R6-ECOL (104–1985): 216.

West, N. E., R. J. Tausch, and P. T. Tueller. 1998. "A Management-Oriented Classification of Pinyon-Juniper Woodlands of the Great Basin." *USDA Forest Service - General Technical Report RMRS-GTR*, no. RMRS-GTR-12. https://doi.org/10.2737/RMRS-GTR-12.

Williams, Clinton K., F. Kelley, Brian, Bradley G. Smith, and Terry R. Lillybridge. 1995. "Forested Plant Associations of the Colville National Forest." *USDA Forest Service - General Technical Report* PNW-GTR (360): 375. https://doi.org/10.1029/2010WR009341.Citation.

Williams, Clinton K., and Terry R. Lillybridge. 1983. "Forested Plant Associations of the Okanogan National Forest." *USDA Forest Service* R6-Ecol (132b-1983): 135. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/16134/ForestedPlantAssocOkanoganNF.pdf.

Youngblood, Andrew P, and Ronald L Mauk. 1985. "Habitat Types of Central and Southern Utah THE AUTHORS," no. October. https://www.fs.fed.us/rm/pubs_int/int_gtr187.pdf.

APPENDIX 1: TREE SPECIES CODES USED IN EDATOPIC GRIDS

Tree species are presented on the edatopic grid, within site series (ecosystems), using three formats:

1. Bold type: primary species
2. In square brackets: secondary species
3. In round brackets: tertiary species

TreeCode	*Scientific Name*	English Name	US code
Aa	*Populus angustifolia*	narrowleaf cottonwood	POAN3
Acb	*Populus balsamifera*	balsam poplar	POBA2
Act	*Populus trichocarpa*	black cottonwood	POBAT
Ad	*Populus deltoides*	eastern cottonwood	PODE3
Add	*Populus deltoides* ssp. *deltoides*	eastern cottonwood	PODED
Adm	*Populus deltoides* ssp. *monilifera*	plains cottonwood	PODEM
Af	*Populus freemontii*	Fremont cottonwood	POFR2
At	*Populus tremuloides*	trembling aspen	POTR5
Ax	*Populus sp. x Populus sp.*	poplar hybrid	
Ba	*Abies amabilis*	amabilis fir	ABAM
Bb	*Abies balsamea*	balsam fir	ABBA
Bc	*Abies concolor*	white fir	ABCO
Bg	*Abies grandis*	grand fir	ABGR
Bl	*Abies lasiocarpa*	subalpine fir	ABLA
Bla	*Abies lasiocarpa var. arizonica*	corkbark fir	ABLAA
Bm	*Abies magnifica var. shastensis*	Shasta red fir	ABSH
Bp	*Abies procera*	noble fir	ABPR
Cw	*Thuja plicata*	western redcedar	THPL
Dr	*Alnus rubra*	red alder	ALRU2
Dw	*Alnus rhombifolia*	white alder	ALRH2
Ea	*Betula neoalaskana*	Alaska paper birch	BENE4
Ee	*Betula pendula*	European birch	BEPE3
Ep	*Betula papyrifera*	common paper birch	BEPA
Es	*Betula pubescens*	silver birch	BEPU5
Ew	*Betula occidentalis*	water birch	BEOC2
Exp	*Betula x winteri*	Alaska x paper birch hybrid	BEWI2
Ey	*Betula alleghaniensis*	yellow birch	BEAL2
Fd	*Pseudotsuga menziesii*	Douglas-fir	PSME
Fdc	*Pseudotsuga menziesii var. menziesii*	coast Douglas-fir	PSMEM
Fdi	*Pseudotsuga menziesii var. glauca*	Rocky Mountain Douglas-fir	PSMEG
Gp	*Cornus nuttallii*	western flowering dogwood	CONU4
Hm	*Tsuga mertensiana*	mountain hemlock	TSME
Hw	*Tsuga heterophylla*	western hemlock	TSHE
Hxm	*Tsuga heterophylla x mertensiana*	mountain x western hemlock hybrid	TSJE
Jc	*Juniperus californica*	California juniper	JUCA7
Jo	*Juniperus monosperma*	oneseed juniper	JUMO
Jr	*Juniperus scopulorum*	Rocky Mountain juniper	JUSC2
Js	*Juniperus maritima*	seaside juniper	JUMA10
Ju	*Juniperus osteosperma*	Utah juniper	JUOS
Jw	*Juniperus occidentalis*	western juniper	JUOC
Kc	*Frangula (Rhamnus) purshiana*	cascara	FRPU7
La	*Larix lyallii*	subalpine larch	LALY

TreeCode	*Scientific Name*	English Name	US code
Ld	*Larix gmelinii*	Dahurian larch	LAGM3
Ls	*Larix sibIrica*	Siberian larch	LASI3
Lt	*Larix laricina*	tamarack	LALA
Lw	*Larix occidentalis*	western larch	LAOC
Mb	*Acer macrophyllum*	bigleaf maple	ACMA3
Me	*Acer negundo*	box-elder	ACNE2
Mn	*Acer platanoides*	Norway maple	ACPL
Ms	*Acer pseudoplatanus*	sycamore maple	ACPS
Mt	*Acer grandidentatum*	bigtooth maple	ACGR3
Mv	*Acer circinatum*	vine maple	ACCI
Oa	*Calocedrus (Libocedrus) decurrens*	incense-cedar	CADE27
Ob	*Sequoiadendron giganteum*	giant sequoia	SEGI2
Oc	*Sequoia sempervirens*	coast redwood	SESE3
Od	*Sorbus aucuparia*	European mountain-ash	SOAU
Oe	*Ulmus pumila*	Siberian elm	ULPU
Of	*Pyrus communis*	common pear	PYCO
Og	*Fraxinus latifolia*	Oregon ash	FRLA
Oh	*Fraxinus americana*	white ash	FRAM2
Oi	*Carya ovata*	shagbark hickory	CAOV2
Oj	*Ailanthus altissima*	tree-of-heaven	AIAL
Ok	*Juglans ailanthifolia*	Japanese walnut	JUAI2
Ol	*Umbellularia californica*	California laurel	UMCA
Om	*Cercocarpus ledifolius*	curl-leaf mountain mahogany	CELE3
On	*Aesculus californica*	California buckeye	AECA
Op	*Fraxinus pennsylvanica*	green ash	FRLA
Ot	*Notholithocarpus densiflorus*	tanoak	LIDE3/NODE3
Oy	*Chrysolepis chrysophylla*	giant chinkapin	CHCH7
Oz	*Platanus racemosa*	western sycamore	PLRA
Pa	*Pinus albicaulis*	whitebark pine	PIAL
Pb	*Pinus aristida*	bristlecone pine	PIAR
Pc	*Pinus sabiniana*	California foothill pine	PISA2
Pe	*Pinus edulis*	twoneedle pinyon	PIED
Pf	*Pinus flexilis*	limber pine	PIFL2
Pg	*Pinus longaeva*	Great Basin bristlecone pine	PILO
Pj	*Pinus banksiana*	jack pine	PIBA2
Pk	*Pinus attenuata*	knobcone pine	PIAT
Pl	*Pinus contorta*	lodgepole pine	PICO
Plc	*Pinus contorta var. contorta*	shore pine	PICOC
Pli	*Pinus contorta var. latifolia*	lodgepole pine	PICOL
Pm	*Pinus radiata*	Monterey pine	PIRA2
Pn	*Pinus monophylla*	singleleaf pinyon	PIMO
Pr	*Pinus resinosa*	red pine	PIRE
Ps	*Pinus lambertiana*	sugar pine	PILA
Pw	*Pinus monticola*	western white pine	PIMO3
Pxj	*Pinus x murraybanksiana*	lodgepole x jack pine hybrid	
Py	*Pinus ponderosa*	ponderosa pine	PIPO
Pz	*Pinus jeffreyi*	Jeffrey's pine	PIJE
Qa	*Quercus gambelii*	Gambel oak	QUGA
Qb	*Quercus kelloggii*	black oak	QUKE
Qc	*Quercus chrysolepis*	canyon live oak	QUCH2

TreeCode	*Scientific Name*	English Name	US code
Qd	*Quercus douglasii*	blue oak	QUDO
Qe	*Quercus robur*	English oak	QURO2
Qg	*Quercus garryana*	Garry oak	QUGA4
Ql	*Quercus lobata*	valley oak	QULO
Qm	*Quercus macrocarpa*	bur oak	QUMA
Qs	*Quercus sadleriana*	Sadler oak	QUSA2
Qv	*Quercus vaccinifolia*	huckleberry oak	QUVA
Qw	*Quercus alba*	white oak	QUAL
Qx	*Quercus agrifolia*	California live oak	QUAG
Qz	*Quercus wislizeni*	interior live oak	QUWI2
Ra	*Arbutus menziesii*	arbutus	ARME
Sb	*Picea mariana*	black spruce	PIMA
Se	*Picea engelmannii*	Engelmann spruce	PIEN
Sn	*Picea abies*	Norway spruce	PIAB
Sp	*Picea pungens*	blue spruce	PIPU
Ss	*Picea sitchensis*	Sitka spruce	PISI
Sw	*Picea glauca*	white spruce	PIGL
Sx	*Picea engelmannii x glauca*	interior spruce	
Sxs	*Picea x lutzii*	hybrid Sitka spruce	
Tw	*Taxus brevifolia*	western yew	TABR2
Ua	*Malus pumila*	cultivated apple	MAPU
Up	*Malus fusca*	Pacific crab apple	MAFU
Vb	*Prunus emarginata*	bitter cherry	PREM
Vp	*Prunus pensylvanica*	pin cherry	PRPE2
Vs	*Prunus avium*	sweet cherry	PRAV
Vv	*Prunus virginiana*	choke cherry	PRVI
Wa	*Salix amygdaloides*	peach-leaf willow	SAAM2
Wb	*Salix bebbiana*	Bebb's willow	SABE2
Wd	*Salix discolor*	pussy willow	SADI
Wp	*Salix lasiandra*	Pacific willow	SALUL
Ws	*Salix scouleriana*	Scouler's willow	SASC
Wt	*Salix sitchensis*	Sitka willow	SASI2
Yc	*Chamaecyparis nootkatensis*	yellow-cedar	CHNO
Yp	*Chamaecyparis lawsoniana*	Port Orford-cedar	CHLA

APPENDIX 2: HABITAT TYPE CODES

HABITAT TYPE	COMMON NAME
ABAM/ACCI/TITR	Pacific silver fir/vine maple/oneleaf foamflower
ABAM/ACTR	Pacific silver fir/vanilla leaf
ABAM/ATFI	Pacific silver fir/lady fern
ABAM/BENE	Silver fir/dwarf Oregon-grape
ABAM/GASH	Pacific silver fir/salal
ABAM/GYDR	Pacific silver fir/oak fern
ABAM/LYAM	Pacific silver fir/American skunkcabbage
ABAM/MANE	Silver fir/dwarf Oregon-grape
ABAM/MEFE	Pacific silver fir/rusty menziesia
ABAM/OPHO	Pacific silver fir/devilsclub
ABAM/OPHO-VAAL	Pacific silver fir/devilsclub-Alaska huckleberry
ABAM/OXOR	Pacific silver fir/redwood-sorrel
ABAM/RHAL2-VAME	Pacific silver fir/Cascade azalea-thinleaf huckleberry
ABAM/RHLA2/CLUN2	Pacific silver fir/Cascade azalea/bride's bonnet
ABAM/RHMA3/XETE	Pacific silver fir/Pacific rhododendron/common beargrass
ABAM/RHMA3-MANE2	Pacific silver fir/Pacific rhododendron-Cascade barberry
ABAM/RHMA3-VAAL/COCA13	Pacific silver fir/Pacific rhododendron-Alaska huckleberry/bunchberry dogwood
ABAM/ROGY/ACTR	Pacific silver fir/baldhip rose/vanilla leaf
ABAM/RULA	Pacific silver fir/roughfruit berry
ABAM/RUSP-BLSP	Pacific silver fir/salmonberry-deer fern
ABAM/TITR	Pacific silver fir/coolwort foamflower
ABAM/TITRU	Pacific silver fir/oneleaf foamflower
ABAM/TIUN	Silver fir/coolwort foamflower
ABAM/TIUN-STRO	Pacific silver fir/oneleaf foamflower-twistedstalk
ABAM/VAAL	Silver fir/Alaska huckleberry
ABAM/VAAL/COCA13	Silver fir/Alaska huckleberry/bunchberry
ABAM/VAAL-BENE	Pacific silver fir/Alaska huckleberry-Oregongrape
ABAM/VAAL-CLUN	Pacific silver fir/Alaska huckleberry/bride's bonnet
ABAM/VAAL-GASH	Pacific silver fir/Alaska huckleberry-salal
ABAM/VAAL-MADI2	Pacific silver fir/Alaska huckleberry/false lily of the valley
ABAM/VAAL-TIUN	Pacific silver fir/Alaska huckleberry/oneleaf foamflower
ABAM/VAME/CLUN2	Pacific silver fir/blue huckleberry/queencup beadlily
ABAM/VAME/RULA	Pacific silver fir/blue huckleberry/roughfruit berry
ABAM/VAME/VASI	Pacific silver fir/thinleaf huckleberry/Sitka valerian
ABAM/VAME/XETE	Silver fir/big huckleberry/beargrass
ABAM/VAME-PYSE	Pacific silver fir/thinleaf huckleberry/sidebells wintergreen
ABAM/VAME-VASI	Pacific silver fir/thinleaf huckleberry/Sitka valerian
ABAM/XETE	Pacific silver fir/common beargrass
ABAM-TSHE/VAME/ACTR	Pacific silver fir-western hemlock/thinleaf huckleberry/sweet after death
ABAM-TSME/VAME/ACTR	Pacific silver fir-mountain hemlock/thinleaf huckleberry/sweet after death
ABCO/ACCI/OXOR	white fir/vine maple/redwood-sorrel
ABCO/ARNE	white fir/pinemat manzanita
ABCO/BENE/ACTR	white fir/dwarf oregongrape/vanilla leaf
ABCO/BENE2	white fir/dwarf oregongrape
ABCO/BENE2/ACTR	white fir/dwarf oregongrape/vanilla leaf
ABCO/BENE2/LIBOL	white fir/dwarf oregongrape/western twinflower
ABCO/CELE3	white fir/curl-leaf mountain mahogany
ABCO/CEVE-ARPA/CAPE-PEEU	white fir/snowbrush ceanothus-greenleaf manzanita/long-stolon sedge-glaucus beardtongue

HABITAT TYPE	COMMON NAME
ABCO/CEVE-ARPA6	white fir/snowbrush ceanothus-greenleaf manzanita
ABCO/CEVE-CHCHC4	white fir/snowbrush ceanothus-giant chinquapin
ABCO/CHCHC4-PAMY/CHUM	white fir/giant chinquapin-Oregon boxleaf/pipissewa
ABCO/GASH-BENE2	white fir/salal-dwarf oregongrape
ABCO/QUGA	white fir/Gamble oak
ABCO/RHMA3-BENE2	white fir/Pacific rhododendron-dwarf oregon-grape
ABCO/SYAL/FRVI	white fir/common snowberry/Virginia strawberry
ABCO/SYMO	white fir/creeping snowberry
ABCO/XETE	white fir/common beargrass
ABCO-ABMAS/ACTR	white fir-shasta red fir/vanillaleaf
ABCO-ABMAS/CHUM-ANDE3	white fir-shasta red fir/common prince's-pine-threeleaf anemone
ABCO-ABMAS/QUSA2	white fir-shasta red fir/Sadler oak
ABCO-CADE27/TRLA6	white fir-incense cedar/western starflower
ABCO-PSME/CEVE-CACH/CARU	white fir-Douglas-fir/snowbrush ceonothus-giant chinquapin/pinegrass
ABCO-PSME/ROGY	white fir-Douglas-fir/dwarf rose
ABCO-TSHE/BENE2/LIBOL	white fir-western hemlock/dwarf oregongrape/western twinflower
ABGR/ACCI	grand fir/vine maple
ABGR/ACCI/ACTR	grand fir/vine maple/sweet after death
ABGR/ACCI-BEAQ/TRLA2	grand fir/vine maple-hollyleaved barberry/broadleaf starflower
ABGR/ACCI-CHUM	grand fir/vine maple-pipissewa
ABGR/ACGL	grand fir/Rocky Mountain maple
ABGR/ACGL/PHMA	grand fir/Rocky Mountain maple-mallow ninebark
ABGR/ACGLD/CLUN	grand fir/Douglas maple/bride's bonnet
ABGR/ACTR	grand fir/sweet after death
ABGR/ARCO	grand fir/heartleaf arnica
ABGR/ARNE	grand fir/pinemat manzanita
ABGR/ARUV	grand fir/kinnikinnick
ABGR/ASCA	grand fir/British Columbia wildginger
ABGR/ATFI	grand fir/common ladyfern
ABGR/BENE	Grand fir/dwarf Oregongrape
ABGR/BENE/ACTR	grand fir/Cascade barberry/sweet after death
ABGR/BENE/CARU	grand fir/Cascade barberry/pinegrass
ABGR/CAGE	grand fir/Geyer's sedge
ABGR/CARU	grand fir/pinegrass
ABGR/CARU-LUPIN	Grand fir/pinegrass-lupine
ABGR/CLUN2	grand fir/bride's bonnet
ABGR/COCO6/ACTR	grand fir/beaked hazelnut/sweet after death
ABGR/COCO6/VAHE	grand fir/California hazel/inside out flower
ABGR/CONU/ACTR	grand fir/Pacific dogwood/sweet after death
ABGR/GYDR	grand fir/western oakfern
ABGR/HODI	grand fir/oceanspray
ABGR/HODI/CARU	grand fir/oceanspray/pinegrass
ABGR/HODI/POMU	Grand fir/oceanspray/swordfern
ABGR/LIBO	grand fir/twinflower
ABGR/LIBO2	grand fir/twinflower
ABGR/LIBO3	grand fir/twinflower
ABGR/MANE2	grand fir/Cascade barberry
ABGR/MANE2-GASH	Grand fir/dwarf Oregon grape-salal
ABGR/PHMA	grand fir/mallow ninebark
ABGR/PHMA-PHMA	grand fir/mallow ninebark-mallow ninebark

HABITAT TYPE	COMMON NAME
ABGR/POMU	grand fir/western swordfern
ABGR/POPU	grand fir/Jacob's-ladder
ABGR/RUPA/DIHO	grand fir/thimbleberry/drops of gold
ABGR/SETR	grand fir/arrowleaf ragwort
ABGR/SPBE	grand fir/white spirea
ABGR/SPBE2	grand fir/white spirea
ABGR/SPBEL/PTAQ	grand fir/shinyleaf spirea/western brackenfern
ABGR/SYMO/ACTR	grand fir/creeping snowberry/sweet after death
ABGR/SYMPH	grand fir/snowberry
ABGR/TABR/CLUN	grand fir/Pacific yew/bride's bonnet
ABGR/TODI	grand fir/poison oak
ABGR/TRCA	grand fir/Carolina bugbane
ABGR/TRCA3	grand fir/Carolina bugbane
ABGR/TRLA2	grand fir/broadleaf starflower
ABGR/VAME	grand fir/thinleaf huckleberry
ABGR/VAME/CLUN	grand fir/thinleaf huckleberry/bride's bonnet
ABGR/VASC	grand fir/grouse huckleberry
ABGR/VASC/LIBO	grand fir/grouse huckleberry/twinflower
ABLA/ACGL	subalpine fir/Rocky Mountain maple
ABLA/ALVIS	subalpine fir/Sitka alder
ABLA/ARCO9	subalpine fir/heartleaf arnica
ABLA/CACA	subalpine fir/bluejoint
ABLA/CACA4	subalpine fir/bluejoint
ABLA/CACA4-LEGL	subalpine fir/bluejoint-western Labrador tea
ABLA/CACA-LEGL	subalpine fir/bluejoint-western Labrador tea
ABLA/CAGE	subalpine fir/Geyer's sedge
ABLA/CAGE2	subalpine fir/Geyer's sedge
ABLA/CARO5	subalpine fir/Ross' sedge
ABLA/CARU	subalpine fir/pinegrass
ABLA/CLUN2	subalpine fir/bride's bonnet
ABLA/CLUN2-CLUN2	subalpine fir/bride's bonnet-bride's bonnet
ABLA/CLUN2-MEFE	subalpine fir/bride's bonnet-rusty menziesia
ABLA/JUCO	subalpine fir/common juniper
ABLA/JUCO6	subalpine fir/common juniper
ABLA/LIBO3-VASC	subalpine fir/twinflower-grouse whortleberry
ABLA/LUGLH	subalpine fir/Hitchcock's smooth woodrush
ABLA/MEFE	subalpine fir/fools huckleberry
ABLA/RIMO2	subalpine fir/gooseberry currant
ABLA/SPBE2	subalpine fir/white spirea
ABLA/STAM	subalpine fir/claspleaf twistedstalk
ABLA/SYAL	subalpine fir/common snowberry
ABLA/THOC	subalpine fir/western meadow-rue
ABLA/TRCA	subalpine fir/Carolina bugbane
ABLA/VAME	subalpine fir/thinleaf huckleberry
ABLA/VASC	subalpine fir/grouse whortleberry
ABLA/VASC-CARU	subalpine fir/grouse whortleberry-pinegrass phase
ABLA/VASC-THOC	subalpine fir/grouse whortleberry-western meadow rue phase
ABLA/VASC-VASC	subalpine fir/grouse whortleberry-grouse whortleberry phase
ABLA/XETE	subalpine fir/common beargrass
ABLA/XETE/VAME	subalpine fir/common beargrass/thinleaf huckleberry

HABITAT TYPE	COMMON NAME
ABLA/XETE/VASC	subalpine fir/common beargrass/grouse whortleberry
ABLA/XETE-LUHI	subalpine fir/common beargrass-Hitchcock's smooth woodrush
ABLA/XETE-VAGL	subalpine fir/common beargrass-thinleaf huckleberry
ABLA/XETE-VAME	subalpine fir/common beargrass-big huckleberry phase
ABLA/XETE-VASC	subalpine fir/common beargrass-grouse whortleberry phase
ABLA2/ARCO	subalpine fir/heartleaf arnica
ABLA2/ARLA-POPU	subalpine fir/broadleaf arnica-Jacob's-ladder
ABLA2/ATFI	subalpine fir/common ladyfern
ABLA2/CAGE	subalpine fir/Geyer's sedge
ABLA2/CARU	subalpine fir/pinegrass
ABLA2/CLUN	subalpine fir/bride's bonnet
ABLA2/COCA	subalpine fir/bunchberry dogwood
ABLA2/FEVI	subalpine fir/greenleaf fescue
ABLA2/GYDR	Subalpine fir/oakfern
ABLA2/LEGL/CASC5	subalpine fir/western labrador tea-bluejoint
ABLA2/LEGL-VASC	subalpine fir/western labrador tea-grouse whortleberry
ABLA2/LIBOL	subalpine fir/twinflower
ABLA2/LUHI	subalpine fir/Hitchcock's smooth woodrush
ABLA2/OPHO	subalpine fir/devilsclub
ABLA2/PAMY	subalpine fir/Oregon boxleaf
ABLA2/PAMY/CARU	subalpine fir/Oregon boxleaf/pinegrass
ABLA2/PIEN/ARCO	subalpine fir-Engelmann spruce/heartleaf arnica
ABLA2/POPU	subalpine fir/Jacob's-ladder
ABLA2/RHAL	subalpine fir/Cascade azalea
ABLA2/RHAL/LUHI	subalpine fir/Cascade azalea/Hitchcock's smooth woodrush
ABLA2/RHAL/SETR	subalpine fir/Cascade azalea/arrowleaf ragwort
ABLA2/RHAL/XETE	subalpine fir/Cascade azalea/common beargrass
ABLA2/RHAL-XETE	subalpine fir/Cascade azalea-common beargrass
ABLA2/RULA	subalpine fir/roughfruit berry
ABLA2/SAAR4	subalpine fir/Arctic willow
ABLA2/STAM	subalpine fir/claspleaf twistedstalk
ABLA2/STAMC	subalpine fir/claspleaf twistedstalk
ABLA2/TRCA3	subalpine fir/Carolina bugbane
ABLA2/TRLA4	subalpine fir/broadleaf starflower
ABLA2/VADE	subalpine fir/Cascade bilberry
ABLA2/VAME	subalpine fir/thinleaf huckleberry
ABLA2/VASC	subalpine fir/grouse whortleberry
ABLA2/VASC/CARU	subalpine fir/grouse whortleberry/pinegrass
ABLA2/VASC/LUHI	subalpine fir/grouse whortleberry/Hitchcock's smooth woodrush
ABLA2/VASI	subalpine fir/Sitka valerian
ABLA2/VAUL/CASC5	subalpine fir/bog blueberry/broom sedge
ABLA2/XETE	subalpine fir/common beargrass
ABLA2-PIAL/CAGE	subalpine fir-whitebark pine/Geyer's sedge
ABLA2-PIAL/VASC/ARCO	subalpine fir-whitebark pine/grouse whortleberry/heartleaf arnica
ABLA2-PIEN/ARCO	subalpine fir-Engelmann spruce/heartleaf arnica
ABLA2-PIEN/LEGL	subalpine fir-Engelmann spruce/western Labrador tea
ABLA2-PIEN/LIBO2	subalpine fir-Engelmann spruce/twinflower
ABLA2-PIEN/MEFE	subalpine fir-Engelmann spruce/rusty menziesia
ABLA2-PIEN/POPU	subalpine fir-Engelmann spruce/Jacob's-ladder
ABLA2-PIEN/SETR	subalpine fir-Engelmann spruce/arrowleaf ragwort

HABITAT TYPE	COMMON NAME
ABLA-PIAL/VASC	subalpine fir-whitebark pine/grouse whortleberry
ABLA-PIEN/ARCO9	subalpine fir-Engelmann spruce/heartleaf arnica
ABLA-PIEN/CAGE2	subalpine fir-Engelmann spruce/Geyer's sedge
ABLA-PIEN/JUCO6	subalpine fir-Engelmann spruce/common juniper
ABLA-PIEN/LIBO3/VASC	subalpine fir-Engelmann spruce/twinflower/grouse whortleberry
ABLA-PIEN/RIBES	subalpine fir-Engelmann spruce/currant
ABLA-PIEN/RUPA	subalpine fir-Engelmann spruce/thimbleberry
ABLA-PIEN/SETR	subalpine fir-Engelmann spruce/arrowleaf ragwort
ABLA-PIEN/VAMY2	subalpine fir-Engelmann spruce/whortleberry
ABLA-PIEN/VASC	subalpine fir-Engelmann spruce/grouse whortleberry
ABLE/PIEN/JUCO6	subalpine fir-Engelmann spruce/common juniper
ABMAS/ARNE	Shasta red fir/pinemat manzanita
ABMAS/CHUM	Shasta red fir/common prince's pine
ABMAS/OSCH	shasta red fir/mountain sweet-root
ABMAS/VAME/CHUM	shasta red fir/thin-leaved huckleberry/common prince's pine
ABMAS-ABCO/QUSA2/PYSE	shasta red fir-white fir/saddler oak/one-sided pyrola
ABMAS-ABCO/SYMO/CHUM	shasta red fir-white fir/creeping snowberry/commor prince's pine
ABMAS-PICO/ARNE/CHUM	shasta red fir-lodgepole pine/pinemat manzanita/common prince's pine
ABMAS-TSME/ARNE/CHUM	shasta red fir-mountain hemlock/pinemat manzanita/common prince's pine
ABSH/ARNE	Shasta red fir/pinemat manzanita
ABSH-TSME/ARNE/CAIN3	Shasta red fir-mountain hemlock/pinemat manzanita/long-stolon sedge
ACSP-SPCR-ARLO3	bluebunch wheatgrass-sand dropseed-Fendler threeawn
AGSP-POSA	bluebunch wheatgrass/Sandberg bluegrass
AGSP-POSA3	bluebunch wheatgrass/Sandberg bluegrass
AGSP-POSA3-OPPO	bluebunch wheatgrass-Sandberg bluegrass-prickly pear
AGSP-POSA3-PHCO2	bluebunch wheatgrass-Sandberg bluegrass-Snake River phlox
ALIN/ATFI	gray alder/common ladyfern
ALIN/CACA	gray alder/bluejoint
ALIN/COST	gray alder/redosier dogwood
ALIN/EQUIS	gray alder/horsetail
ALIN/GLEL	gray alder/fowl mannagrass
ALIN/LYAM	gray alder/waterhorehound
ALIN-RIBES/MESICF	gray alder-currant/mesic forb
ALSI/GYDR	Sitka alder/oakfern
ALSI-OPHO	Sitka alder/devilsclub
ARAR	little sagebrush
ARNO/FEID	black sagebrush/Idaho fescue
ARNO4/FEID	black sagebrush/Idaho fescue
ARNO4/PSSPS	black sagebrush/bluebunch wheatgrass
ARTR/FEID	big sagebrush/Idaho fescue
ARTR/FEID-PSSP	big sagebrush/Idaho fescue-bluebunch wheatgrass
ARTR2/FEID	big sagebrush/Idaho fescue
ARTR2/PSSPS	big sagebrush/bluebunch wheatgrass
ARTR4/FEID-PSSPS	threetip sagebrush/Idaho fescue-bluebunch wheatgrass
ARTR4/PSSPS-FEID	threetip sagebrush/bluebunch wheatgrass-Idaho fescue
ARTRS	big sagebrush series
ARTRV/FEID	mountain big sagebrush/Idaho fescue
ARTRV/PSSPS	mountain big sagebrush/bluebunch wheatgrass
ARTRW8	Wyoming big sagebrush
ATFI-GYDR	ladyfern-oakfern

HABITAT TYPE	COMMON NAME
BEPA/COCO6	paper birch/beaked hazelnut
CELE3/ARTR2/FEID	curl-leaf mountain mahogany/big sagebrush/Idaho fescue
CELE3/PSSPS	curl-leaf mountain mahogany/bluebunch wheatgrass
CELE3/SYOR	curl-leaf mountain mahogany/mountain snowberry
CELE3/SYOR2	curl-leaf mountain mahogany/mountain snowberry
CERCO	mountain mahogany series
CHLA/RHMA3/GASH	Port Orford cedar/Pacific rododendron-salal
CHLA/VAOV2/POMU	Port Orford cedar/California huckleberry/western swordfern
CHLA/VAOVA2	Port Orford cedar/Evergreen huckleberry
CHLA-ABCO/BENE2	PORT-ORFORD-CEDAR-WHITE FIR/DWARF OREGONGRAPE
CHLA-TSHE/POMU	Port Orford cedar-western hemlock/western swordfern
FEID	Idaho fescue series
FEID/AGSP-BASA	Idaho fescue-bluebunch wheatgrass-arrowleaf balsamroot
FEID-AGSP-LUSE	Idaho fescue-bluebunch wheatgrass-silky lupine
FEID-KOCR	Idaho fescue-prairie Junegrass
FEID-PSSPS	Idaho fescue-bluebunch wheatgrass
FEID-PSSPS-BASA	Idaho fescue-bluebunch wheatgrass-arrowleaf balsamroot
JUMO	oneseed juniper series
JUMO/BOCU	oneseed juniper/sideoats grama
JUOC	western juniper series
JUOC/ARAR8	western juniper/little sagebrush
JUOC/ARAR8/FEID	western juniper/little sagebrush/Idaho fescue
JUOC/ARTR2	western juniper/big sagebrush
JUOC/ARTRT/PSSPS-FEID	western juniper/basin big sagebrush/bluebunch wheatgrass-Idaho fescue
JUOC/ARTRV	western juniper/mountain big sagebrush
JUOC/CERCO	western juniper/mountain mahogany
JUOC/FEID-PSSPS	western juniper/Idaho fescue-bluebunch wheatgrass
JUOC/PUTR2/FEID-PSSPS	western juniper/antelope bitterbrush/Idaho fescue-bluebunch wheatgrass
JUOS	Utah juniper series
JUOS/ACHY	Utah juniper/Indian ricegrass
JUOS/ARTR2	Utah juniper/big sagebrush
JUOS/ARTRT/PSSP6	Utah juniper/basin big sagebrush/bluebunch wheatgrass
JUOS-PIED/PSSPS	Utah juniper-twoneedle pinyon/beardless wheatgrass
JUOS-PIMO/CORA	Utah juniper-singleleaf pinyon/blackbrush
JUSC2/ARTR2	Rocky Mountain juniper/big sagebrush
JUSC2/PSSPS	Rocky Mountain juniper/bluebunch wheatgrass
LALY/VASC/LUHI	subalpine larch/grouse whortleberry/Hitchcock's smooth woodrush
LIDE3/VAOV2	tanoak/California huckleberry
LIDE3-ACMA3-QUCH2/POMU	tanoak-bigleaf maple-canyon live oak/western swordfern
LIDE3-PSME/GASH-BENE2	tanoak-douglas-fir/salal-dwarf oregongrape
LIDE3-PSME/GASH-RHMA3	tanoak-Douglas-fir/salal-Pacific rhododendron
LIDE3-PSME/GASH-VAOV2	tanoak-Douglas-fir/salal-California huckleberry
LIDE3-PSME-QUCH2/BENE2	tanoak-douglas-fir-canyon live oak/dwarf oregongrape
LIDE3-PSME-QUCH2/RHDI6	tanoak-douglas-fir-canyon live oak/poison oak
LIDE3-TSHE/VAOV2/POMU	tanoak-western hemlock/California huckleberry/western swordfern
PIAL/ABLA	whitebark pine/subalpine fir communities
PIAL/CAGE	whitebark pine/Geyer's sedge
PIAL/CARU	whitebark pine/pinegrass
PIAL/JUCO4	whitebark pine/common juniper
PIAL/RIMO/POPU	subalpine fir/gooseberry currant/Jacob's-ladder

HABITAT TYPE	COMMON NAME
PIAL/VASC	whitebark pine/grouse whortleberry
PIAL/VASC/LUHI	whitebark pine/grouse whortleberry/Hitchcock's smooth woodrush
PIAL-ABLA/FEID	whitebark pine-subalpine fir/Idaho fescue
PIAL-ABLA2/RHAL/XETE	whitebark pine-subalpine fir/Cascade azalea/common beargrass
PICE/PHMA5	spruce/mallow ninebark
PICO(ABGR)/LIBO2	lodgepole pine-grand fir/twinflower
PICO(ABLA2)/VASC	lodgepole pine-subalpine fir/grouse whortleberry
PICO/ARUV	lodgepole pine/kinnikinnick
PICO/CAAN15	lodgepole pine/widefruit sedge
PICO/CACA	lodgepole pine/bluejoint
PICO/JUCO6	lodgepole pine/common juniper
PICO/PUTR/FEID	lodgepole pine/bitterbrush/Idaho fescue
PICO/PUTR/STOC	lodgepole pine/bitterbrush/western needlegrass
PICO/SPDO/CAAN15	lodgepole pine/rose spiraea/widefruit sedge
PICO/VAME	lodgepole pine/thinleaf huckleberry
PICO/VAME/XETE	lodgepole pine/thinleaf huckleberry/beargrass
PICO/VASC	lodgepole pine/grouse whortleberry
PICO/VAUL/CAAN15	lodgepole pine/bog blueberry/widefruit sedge
PICO/XETE	lodgepole pine/common beargrass
PICOC/ARUV	Shore pine/Bearberry
PICOC/CYSC4/AMAR4	Shore pine/Scots broom/European beachgrass
PICO-PSME/MYCA-VAOV2	Shore pine-Douglas-fir/Wax myrtle-Evergreen huckleberry
PICO-TSME/DEP	lodgepole pine-mountain hemlock/depauperate
PICO-TSME/VAME/XETE	lodgepole pine-mountain hemlock/thinleaf huckleberry/beargrass
PIED	twoneedle pinyon series
PIED/BOGR2	twoneedle pinyon/blue grama
PIED/JUOS/CEMO2	twoneedle pinyon-Utah juniper/alderleaf mountain mahogany
PIED/JUOS/CEMO2-QUGA	twoneedle pinyon-Utah juniper/alderleaf mountain mahogany-Gambel oak
PIED/QUGA	twoneedle pinyon/Gambel oak
PIED-JUOS/AMUT-CEMO2	twoneedle pinyon-Utah juniper/Utah serviceberry-alderleaf mountain mahogany
PIED-JUOS/ARTR2	twoneedle pinyon-Utah juniper/big sagebrush
PIEN/ATFI	Engelmann spruce/common ladyfern
PIEN/CADI	Engelmann spruce/softleaf sedge
PIEN/CASCP2	Engelmann spruce/western singlespike sedge
PIEN/COCA	Engelmann spruce/bunchberry dogwood
PIEN/COST	Engelmann spruce/redosier dogwood
PIEN/EQAR	Engelmann spruce/field horsetail
PIEN/EQUIS	Engelmann spruce/horsetail
PIEN/JUCO6	Engelmann spruce/common juniper
PIEN/RIMO2	Engelmann spruce/gooseberry current
PIEN/SETR	Engelmann spruce/arrowleaf ragwort
PIEN/SYAL	Engelmann spruce/common snowberry
PIEN/VAMY2	Engelmann spruce/whortleberry
PIEN-PSME/JUCO6	Engelmann spruce-Douglas-fir/common juniper
PIFL/FEID	limber pine/Idaho fescue
PIFL/JUCOM2	limber pine/common juniper
PIFL2	limber pine series
PIFL2/FEID	limber pine/Idaho fescue
PIFL2/JUCO6	limber pine/common juniper
PIFL2/LEKI2	limber pine/spike fescue

HABITAT TYPE	COMMON NAME
PIFL2/PSSPS	limber pine/bluebunch wheatgrass
PIFL2-PILO	limber pine series
PIJE/ARPA6-CEVE	Jeffrey pine/greenleaf manzanita-snowbrush ceonothus
PIJE-CADE27/ARVI4	jeffrey pine-incense-cedar/whiteleaf manzanita
PIMO/ARTR2	singleleaf pinyon/big sagebrush
PIMO-CELE3/ARTR2	singleleaf pinyon-curl-leaf mountain mahogany/big sagebrush
PIMO-JUOS	singleleaf pinyon-Utah juniper series
PIMO-JUOS/ARNO4	singleleaf pinyon-Utah juniper/black sagebrush
PIMO-JUOS/ARTR2	singleleaf pinyon-Utah juniper/big sagebrush
PIMO-JUOS/ARTRV	singleleaf pinyon-Utah juniper/mountain big sagebrush
PIPO/AGSP	Ponderosa Pine/Bluebunch Wheatgrass
PIPO/ARPA6	ponderosa pine/greenleaf manzanita
PIPO/BOGR2	ponderosa pine/blue grama
PIPO/CAGE	ponderosa pine/Geyer's sedge
PIPO/CAGE2	ponderosa pine/Geyer's sedge
PIPO/CARO5	ponderosa pine/Ross' sedge
PIPO/CARU	ponderosa pine/pinegrass
PIPO/CARU/AGSP	ponderosa pine/pinegrass-bluebunch wheatgrass
PIPO/CAUT	ponderosa pine/Northwest Territory sedge
PIPO/CELE	ponderosa pine/curl-leaf mountain mahogany
PIPO/CEMO2	ponderosa pine/alderleaf mountain mahogany
PIPO/FEID	ponderosa pine/Idaho fescue
PIPO/FEID-ARTR2	ponderosa pine/Idaho fescue-big sagebrush
PIPO/JUCO6-SYAL	ponderosa pine/common juniper-common snowberry
PIPO/JUHO2	ponderosa pine/creeping juniper
PIPO/JUSC2	ponderosa pine/Rocky Mountain juniper
PIPO/JUSC2/PSSPS	ponderosa pine-Rocky Mountain juniper/bluebunch wheatgrass
PIPO/MARE11	ponderosa pine/creeping barberry
PIPO/PIED-QUGA	ponderosa pine/twoneedle pinyon-Gambel oak
PIPO/PRVI	ponderosa pine/chokecherry
PIPO/PSME/SYMPH	ponderosa pine-Douglas-fir/snowberry
PIPO/PSSPS	ponderosa pine/bluebunch wheatgrass
PIPO/PUTR	ponderosa pine/bitterbrush
PIPO/PUTR/AGSP	ponderosa pine/antelope bitterbrush-bluebunch wheatgrass
PIPO/PUTR/FEID	ponderosa pine/bitterbrush/Idaho fescue
PIPO/PUTR/FEID-AGSP	ponderosa pine/antelope bitterbrush/Idaho fescue-bluebunch wheatgrass
PIPO/PUTR/STOC	ponderosa pine/antelope bitterbrush/western needlegrass
PIPO/PUTR2	ponderosa pine/antelope bitterbrush
PIPO/PUTR2/ACOCO	ponderosa pine/antelope bitterbrush/western needlegrass
PIPO/PUTR2/PSSPS	ponderosa pine/antelope bitterbrush/bluebunch wheatgrass
PIPO/PUTR2-CEVE/ACOCO	ponderosa pine/antelope bitterbrush-snowbrush ceanothus/western needlegrass
PIPO/PUTR2-CEVE/CAINI3	ponderosa pine/antelope bitterbrush-snowbrush ceanothus/long-stolon sedge
PIPO/PUTR-ARPA/FEID	ponderosa pine/antelope bitterbrush-greenleaf manzanita/Idaho fescue (pumice)
PIPO/PUTR-ARPA/STOC	ponderosa pine/antelope bitterbrush-snowbrush ceanothus/western needlegrass
PIPO/QUGA	ponderosa pine/Gambel oak
PIPO/QUGA/FEAR2	ponderosa pine/Gambel oak/Arizona fescue
PIPO/QUGA4/BASA3	ponderosa pine-Oregon white oak/arrowleaf balsamroot
PIPO/QUGA-SYOR2	ponderosa pine/Gambel oak-mountain snowberry
PIPO/QUKE	ponderosa pine-California black oak
PIPO/QUMA2	ponderosa pine/bur oak

HABITAT TYPE	COMMON NAME
PIPO/SCSC	ponderosa pine/little bluestem
PIPO/SPBE	ponderosa pine/white spirea
PIPO/SYAL	ponderosa pine/common snowberry
PIPO/SYAL-SYAL	ponderosa pine/common snowberry-common snowberry phase
PIPO/SYOR	ponderosa pine/mountain snowberry
PIPO-PSME	ponderosa pine-Douglas-fir
PIPO-PSME/AGSP	ponderosa pine-Douglas-fir/bluebunch wheatgrass
PIPO-PSME/CAGE2	Ponderosa pine-Douglas-fir/Geyer's sedge
PIPO-PSME/MUMO	ponderosa pine-Douglas-fir/mountain muhly
PIPO-PSME/PSSPS	ponderosa pine-Douglas-fir/bluebunch wheatgrass
PIPO-QUGA/BASA	ponderosa pine-Oregon white oak/arrowleaf balsamroot
PIPO-QUGA/PUTR	ponderosa pine-Oregon white oak/bitterbrush
PIPO-QUGA4/PUTR	ponderosa pine-Oregon white oak/bitterbrush
PIPO-QUKE	ponderosa pine-California black oak
PIPO-QUKE/PUTR2/ACOCO	ponderosa pine-California black oak/antelope bitterbrush/western needlegrass
PISI/GASH	Sitka spruce/salal
PISI/MEFE/VAPA	Sitka spruce/rusty menziesia-red huckleberry
PISI/OPHO	Sitka spruce/devilsclub
PISI/OXOR	Sitka spruce/redwood-sorrel
PISI/POMU	Sitka spruce/swordfern
PISI/RUSP	Sitka spruce/salmonberry
PISI/RUSP-GASH	Sitka spruce/salmonberry-salal
PISI/VAOV2	Sitka spruce/Evergreen huckleberry
PLWR2	Arizona sycamore
POAN3	narrowleaf cottonwood series
POAN3/RHAR4	narrowleaf cottonwood/fragrant sumac
POAN3/SAEX	narrowleaf cottonwood/narrowleaf willow
PODE3/FRPE	eastern cottonwood/green ash
PODE3/JUSC2	eastern cottonwood/Rocky Mountain juniper
PODEM/SALIX	plains cottonwood/willow
PODEM/SYOC	plains cottonwood/western snowberry
PODEM-POAN3/SALIX	plains cottonwood-narrowleaf cottonwood/willow
POPUL	cottonwood series
POTR/ALIN-COST	quaking aspen/thinleaf alder/redosier dogwood
POTR/AMAL2	quaking aspen/Saskatoon serviceberry
POTR/AMAL2-PRVIV	quaking aspen/Saskatoon serviceberry-chokecherry
POTR/CACA	quaking aspen/bluejoint
POTR/CALA3	quaking aspen/bluejoint
POTR/CARU	quaking aspen/pinegrass
POTR/MESIC FORB	quaking aspen/mesic forb
POTR/POPR	quaking aspen/Kentucky bluegrass
POTR/SYAL	quaking aspen/common snowberry
POTR/SYOR3	quaking aspen/mountain snowberry
POTR2/ALIN	quaking aspen/thinleaf alder
POTR2/ALIN-COST	quaking aspen/thinleaf alder/redosier dogwood
POTR2/COST	quaking aspen/redosier dogwood
POTR5	quaking aspen series
POTR5/ALIN-COST	quaking aspen/thinleaf alder/redosier dogwood
POTR5/AMAL2	quaking aspen/Saskatoon serviceberry
POTR5/ARTR2	quaking aspen/big sagebrush

HABITAT TYPE	COMMON NAME
POTR5/COCO6-COCO6	quaking aspen/beaked hazelnut-beaked hazelnut
POTR5/PTAQ	quaking aspen/western brackenfern
POTR5/SYOR2	quaking aspen/mountain snowberry
PSME/ACCI-BENE2	douglas-fir/vine maple-dwarf oregongrape
PSME/ACGL	Douglas-fir/Rocky Mountain maple
PSME/ACGL-PHMA	Douglas-fir/Rocky Mountain maple-mallow ninebark
PSME/AGSP	Douglas-fir/bluebunch wheatgrass
PSME/ARPA6	Douglas-fir/greenleaf manzanita
PSME/ARUV	Douglas-fir/kinnikinnik
PSME/ARUV/CARU	Douglas-fir/kinnikinnick/pinegrass
PSME/ARUV-JUCO6	Douglas-fir/kinnikinnick-common juniper
PSME/BENE	Douglas-fir/dwarf Oregon grape
PSME/BENE2/POMU	douglas-fir/dwarf oregongrape/western sword-fern
PSME/CAGE	Douglas-fir/elk sedge
PSME/CAGE2	Douglas-fir/Geyer's sedge
PSME/CARU	Douglas-fir/pinegrass
PSME/CARU-AGSP	Douglas-fir/pinegrass-bluebunch wheatgrass
PSME/CARU-ARUV	Douglas-fir/pinegrass-kinnikinnick phase
PSME/CARU-CARU	Douglas-fir/pinegrass-pinegrass phase
PSME/CEMO	Douglas-fir/alderleaf mountain mahogany
PSME/COCO6/SYMO/POMU	Douglas-fir/California hazel-creeping snowberry/swordfern
PSME/DRYSHRUB	Douglas-fir/dry shrub
PSME/FEAR2	Douglas-fir/Arizona fescue
PSME/FEID	Douglas-fir/Idaho fescue
PSME/FEOC	Douglas-fir/western fescue
PSME/FESC	Douglas-fir/rough fescue
PSME/GASH	Douglas-fir/salal
PSME/GASH-BENE2	douglas-fir/salal-dwarf oregongrape
PSME/GASH-HODI	douglas-fir/salal-oceanspray
PSME/HODI	Douglas-fir/oceanspray
PSME/HODI/CAGE	Douglas-fir/oceanspray/Geyer's sedge
PSME/HODI/WHMO	Douglas-fir/oceanspray/whipple vine
PSME/HODI-MANE2	Douglas-fir/oceanspray-Cascade barberry
PSME/HODI-ROGY	Douglas-fir/oceanspray-dwarf rose
PSME/HODI-SYMPH	Douglas-fir/oceanspray-snowberry
PSME/JUCO	Douglas-fir/common juniper
PSME/JUCO6	Douglas-fir/common juniper
PSME/JUSC2	Douglas-fir/Rocky Mountain juniper
PSME/MANE2	Douglas-fir/dwarf Oregon grape
PSME/MANE2-GASH	Douglas-fir/dwarf Oregon grape-salal
PSME/MARE11-JUCO6	Douglas-fir/creeping barberry-common juniper
PSME/PAMY	Douglas-fir/Oregon boxleaf
PSME/PAMY/CARU	Douglas-fir/Oregon boxleaf/pinegrass
PSME/PHMA	Douglas-fir/ninebark
PSME/PHMA5	Douglas-fir/mallow ninebark
PSME/PHMA5/CARU	Douglas-fir/mallow ninebark/pinegrass
PSME/PHMA5/MAST4	Douglas-fir/mallow ninebark/starry false lily of the vally
PSME/PHMA5/PIPO	Douglas-fir/mallow ninebark/ponderosa pine
PSME/PHMA5-CARU	Douglas-fir/mallow ninebark-pinegrass phase
PSME/PHMA5-PHMA5	Douglas-fir/mallow ninebark-mallow ninebark phase

HABITAT TYPE	COMMON NAME
PSME/PHMA-LIBOL	Douglas-fir/mallow ninebark/longtube twinflower
PSME/PHMO4	Douglas-fir/mountain ninebark
PSME/PSSPS	Douglas-fir/bluebunch wheatgrass
PSME/PUTR	Douglas-fir/bitterbrush
PSME/PUTR/AGSP	Douglas-fir/antelope bitterbrush/bluebunch wheatgrass
PSME/QUGA	Douglas-fir/Gambel oak
PSME/QUGA/FEAR2	Douglas-fir/Gambel oak/Arizona fescue
PSME/SPBE	Douglas-fir/shinyleaf spirea
PSME/SPBEL	Douglas-fir/shinyleaf spirea
PSME/SPBEL/CARU	Douglas-fir/shinyleaf spirea/pinegrass
PSME/SYAL	Douglas-fir/common snowberry
PSME/SYAL/AGSP	Douglas-fir/common snowberry/bluebunch wheatgrass
PSME/SYAL/CARU	Douglas-fir/common snowberry/pinegrass
PSME/SYAL-CARU	Douglas-fir/common snowberry-pinegrass phase
PSME/SYAL-SYAL	Douglas-fir/common snowberry-common snowberry phase
PSME/SYOR	Douglas-fir/mountain snowberry
PSME/SYOR2	Douglas-fir/mountain snowberry
PSME/TODI	Douglas-fir/poison oak
PSME/VACA	Douglas-fir/dwarf bilberry
PSME/VACA13	Douglas-fir/dwarf bilberry
PSME/VAME	Douglas-fir/thinleaf huckleberry
PSME/VAMY/CARU	Douglas-fir/velvetleaf huckleberry/pinegrass
PSME-ARME/GASH	Douglas-fir/Pacific madrone/salal
PSME-CADE27/BEPI2	douglas-fir-incense-cedar/piper's oregongrape
PSME-CADE27-PIJE	Douglas-fir-incense cedar-Jeffery pine
PSME-PIPO/RHDI6	douglas-fir-ponderosa pine/poison oak
PSME-PIPO/TODI	Douglas-fir-ponderosa pine/Pacific poison oak
PSME-QUCH2/BENE2	douglas-fir-canyon live oak/dwarf oregongrape
PSME-QUCH2/POMU	douglas-fir-canyon live oak/swordfern
PSME-QUCH2/RHDI6	douglas-fir-canyon live oak/poison oak
PSME-QUCH2-LIDE3	douglas-fir-canyon live oak-tanoak
PSME-QUKE/RHDI6	douglas-fir-california black oak/poison oak
PSME-TSHE/MANE2	Douglas-fir-western-hemlock/Cascade barberry
PSME-TSHE/RHMA3	Douglas-fir-western hemlock/Pacific rhododendron
PSSPS	bluebunch wheatgrass series
PSSPS-ERHE2	bluebunch wheatgrass-parsnipflower buckwheat
PSSPS-FEID	bluebunch wheatgrass-Idaho fescue
QUGA	Gambel oak series
QUGA/AMAL2	Gambel oak/Saskatoon serviceberry
QUGA/AMUT	Gambel oak/Utah serviceberry
QUGA/CARU-CAGE	Oregon white oak/pinegrass-Geyer's sedge
QUGA/COCO2-SYAL	Oregon white oak/beaked hazelnut-common snowberry
QUGA/SYOR2	Gambel oak/mountain snowberry
QUGA4/CYEC	Oregon white oak/bristly dogstail grass
QUGA4/PSSPS	Oregon white oak/bluebunch wheatgrass
QUGA4-PSME/RHDI6	oregon white oak-douglas-fir/poison oak
QUGA4-PSME/TODI	Oregon white oak-Douglas-fir/Pacific poison oak
QUGA4-QUKE	Oregon white oak-California black oak
SESE2/POMU1-TROV	redwood/western swordfern-Pacific trillium
SESE2/PTAQL-WOFP//Streamsides	redwood/western brackenfern-giant chainfern (streamsides)

HABITAT TYPE	COMMON NAME
SESE2-MAFA-VIAN	redwood/California manroot-garden vetch
SYAL/FEID-PSSPS	common snowberry/Idaho fescue-bluebunch wheatgrass
SYAL/PSSPS-FEID	common snowberry/bluebunch wheatgrass-Idaho fescue
THPL/ARNU3	western red cedar/wild sarsparilla
THPL/ASCA2	western red cedar/British Columbia wildginger
THPL/ATFI	western red cedar/common ladyfern
THPL/BENE2/POMU	western redcedar/dwarf oregongrape/western sword-fern
THPL/CLUN	western red cedar/queencup beadlily
THPL/CLUN2	western red cedar/bride's bonnet
THPL/CLUN2-CLUN2	western red cedar/bride's bonnet-bride's bonnet
THPL/GYDR	Western redcedar/oakfern
THPL/OPHO	western red cedar/devilsclub
THPL/VAME	western red cedar/thinleaf huckleberry
THPL-ABGR/ACTR	western red cedar-grand fir/sweet after death
TSHE/ACCI/CLUN	western hemlock/vine maple/bride's bonnet
TSHE/ACCI/POMU	western hemlock/vine maple/western swordfern
TSHE/ACCI-GASH	western hemlock/vine maple-salal
TSHE/ACCI-MANE2	western hemlock/vine maple-Cascade barberry
TSHE/ACCI-RHMA3	western hemlock/vine maple-pacific rhododendron
TSHE/ACTR	western hemlock/sweet after death
TSHE/ARNU3	western hemlock/wild sarsparilla
TSHE/ASCA3	western hemlock/wild ginger
TSHE/ATFI	western hemlock/common ladyfern
TSHE/BENE	western hemlock/Cascade barberry
TSHE/BENE-CHME	western hemlock/Cascade barberry/little prince's pine
TSHE/CLUN	Western hemlock/Queencup beadlily
TSHE/CLUN2-CLUN2	western hemlock/bride's bonnet-bride's bonnet
TSHE/GASH	western hemlock/salal
TSHE/GASH/OXOR	western hemlock/salal/redwood-sorrel
TSHE/GASH/POMU	western hemlock/salal/western swordfern
TSHE/GASH-BENE	western hemlock/salal-Cascade barberry
TSHE/GASH-BENE2	western hemlock/salal-Cascade barberry
TSHE/GASH-HODI	western hemlock/salal-oceanspray
TSHE/GASH-MANE2	western hemlock/salal-Cascade barberry
TSHE/GASH-RHMA3	western hemlock/salal-Pacific rhododendron
TSHE/GASH-VAOV2	western hemlock/salal-California hucklebery
TSHE/GASH-XETE	western hemlock/salal-beargrass
TSHE/GYDR	western hemlock/western oakfern
TSHE/LYAM	western hemlock/skunk cabbage
TSHE/LYAM3	western hemlock/American skunkcabbage
TSHE/MANE2	western hemlock/Cascade barberry
TSHE/MANE2/POMU	western hemlock/Cascade barberry/western swordfern
TSHE/MANE2-DRY	western hemlock/Cascade barberry-Dry
TSHE/MANE2-GASH	western hemlock/Cascade barberry-salal
TSHE/MEFE	western hemlock/rusty menziesia
TSHE/OPHO	western hemlock/devilsclub
TSHE/OPHO/MAST4	western hemlock/devilsclub/starry false lily of the vally
TSHE/OPHO-ATFI	western hemlock/devilsclub-common ladyfern
TSHE/OXOR	western hemlock/redwood-sorrel
TSHE/PAMY	western hemlock/Oregon boxleaf

HABITAT TYPE	COMMON NAME
TSHE/POMU	western hemlock/western swordfern
TSHE/POMU-OXOR	western hemlock/western swordfern-redwood-sorrel
TSHE/POMU-TITR	western hemlock/western swordfern-threeleaf foamflower
TSHE/RHMA3/GASH	western hemlock/Pacific rhododendron-salal
TSHE/RHMA3/XETE	western hemlock/Pacific rhododendron/common beargrass
TSHE/RHMA3-BENE2	western hemlock/Pacific rhododendron-Cascade barberry
TSHE/RHMA3-GASH	western hemlock/Pacific rhododendron-salal
TSHE/RHMA3-MANE2	western hemlock/Pacific rhododendron-Cascade barberry
TSHE/RHMA3-VAOV2	western hemlock/Pacific rhododendron-California huckleberry
TSHE/RUSP	western hemlock/salmonberry
TSHE/RUSP-ACCI	western hemlock/salmonberry-vine maple (coast)
TSHE/RUSP-GASH	western hemlock/salmonberry-salal (coastal)
TSHE/TITR	western hemlock/threeleaf foamflower
TSHE/VAAL	western hemlock/Alaska huckleberry
TSHE/VAAL/OXOR	western hemlock/Alaska huckleberry/oxalis
TSHE/VAAL-OPHO	western hemlock/Alaska huckleberry-devil's club
TSHE/VAOV	western hemlock/oval-leaf blueberry
TSHE/VAOV2	western hemlock/California huckleberry
TSHE/VAOV2/POMU	western hemlock/California huckleberry/western swordfern
TSHE/VAOV-GASH	western hemlock/oval-leaf blueberry-salal
TSHE/XETE	western hemlock/common beargrass
TSHE-ABCO/ACCI-BENE2	western hemlock-white fir/vine maple-dwarf oregongrape
TSHE-ABCO/BENE2	western hemlock-white fir/dwarf oregongrape
TSHE-THPL/POMU	western hemlock-western redcedar/western swordfern
TSME/ARNE	mountain hemlock/pinemat manzanita
TSME/ARNE/CHUM	mountain hemlock/pinemat manzanita/common prince's-pine
TSME/CABI	mountain hemlock/white marshmarigold
TSME/CAREX	mountain hemlock/sedge
TSME/CLPY-RUPE	mountain hemlock/copperbush/strawberryleaf raspberry
TSME/CLUN2-MEFE	mountain hemlock/bride's bonnet-rusty menziesia
TSME/GYDR	mountain hemlock/oakfern
TSME/HERB	mountain hemlock/herb
TSME/LUGLH	mountain hemlock/smooth woodrush
TSME/LUHI	mountain hemlock/smooth woodrush
TSME/MEFE	mountain hemlock/rusty menziesia
TSME/MEFE-VAME	mountain hemlock/rusty menziesia-thinleaf huckleberry
TSME/MEFE-XETE	mountain hemlock/rusty menziesia-common beargrass
TSME/PHEM-VADE	mountain hemlock/pink mountain heath-Cascade bilberry
TSME/RHAL	mountain hemlock/Cascade azalea
TSME/RHAL2/XETE	mountain hemlock/Cascades azalea/beargrass
TSME/RHAL-VAAL	mountain hemlock/Cascade azalea-Alaska blueberry
TSME/RHAL-VAME	mountain hemlock/Cascade azalea-thinleaf huckleberry
TSME/RULA	mountain hemlock/roughfruit berry
TSME/TIUN-STRO	mountain hemlock/oneleaf foamflower-twistedstalk
TSME/VAAL	mountain hemlock/Alaska blueberry
TSME/VAAL/STRO	mountain hemlock/Alaska blueberry/twistedstalk
TSME/VAAL-CLUN	mountain hemlock/Alaska blueberry/bride's bonnet
TSME/VAAL-ERMO	mountain hemlock/Alaska blueberry/white avalanche-lily
TSME/VAAL-MADI2	mountain hemlock/Alaska blueberry/false lily of the valley
TSME/VACCI/CALEH2	mountain hemlock/blueberry/Howells marsh marigold

HABITAT TYPE	COMMON NAME
TSME/VAME	mountain hemlock/thinleaf huckleberry
TSME/VAME/CLUN	mountain hemlock/thinleaf huckleberry/bride's bonnet
TSME/VAME/CLUN2	mountain hemlock/thinleaf huckleberry/bride's bonnet
TSME/VAME/PYSE	mountain hemlock/thin-leaved huckleberry/one-sided pyrola
TSME/VAME/VASI	mountain hemlock/thinleaf huckleberry/Sitka valerian
TSME/VAME/XETE	mountain hemlock/thinleaf huckleberry/common beargrass
TSME/VAME-SOSI2	mountain hemlock/big huckleberry-Sitka mountain ash
TSME/VAME-STRO	mountain hemlock/thinleaf huckleberry/twistedstalk
TSME/VAME-VAAL	mountain hemlock/thinleaf huckleberry-Alaska blueberry
TSME/VAME-XETE	mountain hemlock/thinleaf huckleberry/common beargrass
TSME/VASC	mountain hemlock/grouse whortleberry
TSME/VASC/CHUM	mountain hemlock/grouse whortleberry/pipsissewa
TSME/VASC/LUHI	mountain hemlock/grouse whortleberry/Hitchcock's smooth woodrush
TSME/XETE	mountain hemlock/common beargrass
TSME/XETE/VAMY	mountain hemlock/common beargass-thinleaf huckleberry
TSME-ABAM/VAME/CLUN	mountain hemlock-Pacific silver fir/thinleaf huckleberry/bride's bonnet
TSME-ABAM/VAME/RULA	mountain hemlock-Pacific silver fir/thinleaf huckleberry/roughfruit berry
TSME-ABAM/VAME/XETE	mountain hemlock-Pacific silver fir/thinleaf huckleberry/common beargrass
TSME-ABAM/VAME-ACTR	mountain hemlock-Pacific silver fir/thinleaf huckleberry/vanilla leaf
TSME-ABAM/VAME-VASC	mountain hemlock-Pacific silver fir/thinleaf huckleberry-grouse whortleberry
TSME-ABMAS/RULA2/PYSE	mountain hemlock-shasta red fir/dwarf bramble/one-sided pyrola
TSME-ABMAS/VAME/CHUM	mountain hemlock-shasta red fir/thin-leaved huckleberry/common prince's-pine