USDA Natural Resources
Conservation Service

Ecological site F002XN901WA
Douglas-fir - Pacific madrone/oceanspray/rattlesnake plantain

Last updated: 5/09/2024
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Classification relationships

Related to plant associations PICO-PSME/GASH, PSME-ABGR/FEOC, PSME-ABGR/HODI/POMU, PSME-ARME/GASH, PSME-ARME/HODI/LOHI, PSME/GASH-HODI, SPME/HODI-SYAL, SPME/ROGY-HODI, QUGA-PSME/SYAL/POMU in Chappell, C.B. 2006. Upland plant associations of the Puget Trough ecoregion, Washington. Natural Heritage Rep. 2006-01. Washington Department of Natural Resources, Natural Heritage Program, Olympia , Wash. [http://www.dnr.wa.gov/nhp/refdesk/communities/pdf/intro.pdf].

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii* (2) *Arbutus menziesii*
Shrub	(1) *Holodiscus discolor*
Herbaceous	(1) *Goodyera oblongifolia*

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Bluff (3) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	3–732 m
Slope	3–75%
Water table depth	46 cm
Aspect	SE, S, SW

Climatic features

The climate for this site is characterized by warm dry summers and mild moist winters. Precipitation is received mostly in the early fall to late winter.

Table 3. Representative climatic features

Frost-free period (average)	220 days
Freeze-free period (average)	
Precipitation total (average)	635 mm

Influencing water features

Soil features

Applicable soil series:
Cady, Doebay, Hoypus, Keystone, Killebrew, Laconner, Roche, Sucia, Turtleback, Whidbey

Table 4. Representative soil features

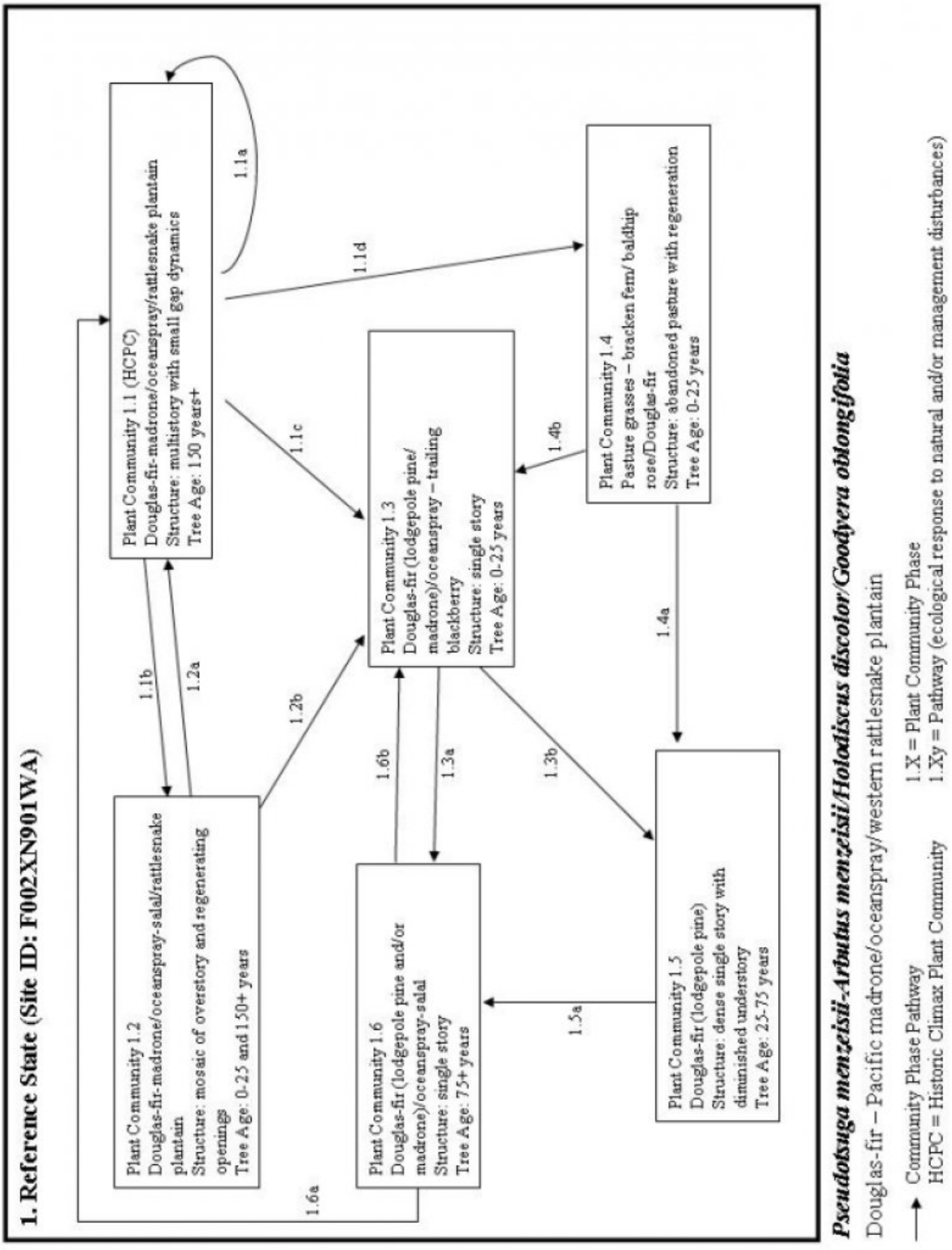
Surface texture	(1) Gravelly sandy loam (2) Loam (3) Sandy loam
Drainage class	Somewhat poorly drained to somewhat excessively drained
Permeability class	Slow to very rapid
Soil depth	25–254 cm
Available water capacity (0-101.6cm)	8.89–16.76 cm
Soil reaction (1:1 water) (0-101.6cm)	3.5–7.3

Ecological dynamics

These sites are found within the rainshadow of the Puget Trough, situated mainly on south facing slopes and ridges. The majority of annual precipitation is received from October through to March. Temperatures are high in the summer and the soils generally have low moisture, making them some of the hottest and driest conifer sites in the region. Douglas-fir is the dominant tree species in the historic climax plant community. Pacific madrone will establish itself as a minor component in some instances but may be major component where disturbance has occurred and Douglas-fir has not regenerated successfully.
Natural disturbances such as fires and wind storms have played a role in the development of this site, as have human endeavors such as timber harvesting and conversion to cropland. The natural fire regime appears to be one

of low to moderate intensity fires on a 30 to 100 year frequency.

State and transition model



State 1
Reference State

Community 1.1
Douglas-fir-Pacific madrone/oceanspray/western rattlesnake plantain

Structure: multistory with small gap dynamics. Douglas-fir is the dominant tree species in the historic climax plant community. Pacific madrone will establish itself as a minor component in some instances but may occasionally be major component. As Douglas-fir ages it can withstand more serious fire intensities; additionally, following fire or other stresses, trees generally produce copious amounts of seed. This situation would allow the site to develop into one that contains several age classes of Douglas-fir. Pacific madrone, a thin barked species, will be top-killed by fire but can sprout prolifically from underground burls, provided it receives adequate sunlight. Madrone also favors mineral soil for seedling establishment, competing with coniferous seedlings. If Douglas-fir does not re-occupy the site quickly, Pacific madrone will take advantage of the disturbed mineral soil and become a major component of the community, as will oceanspray. If a seed source is present, lodgepole pine will also become established on these sites.

Forest overstory. Dominated by Douglas-fir with varying amounts of madrone (0-20%); lodgepole pine may be present (up to 30% on some locations); grand fir and western redcedar present in small numbers (<5%)

Forest understory. Shrub species dominate.

Community 1.2
Douglas-fir - Pacific madrone - lodgepole pine/oceanspray/rattlesnake plantain

Structure: mosaic of mature overstory and regenerating openings. PC 1.2 retains some areas that resemble PC 1.1 but also contains moderate sized (2-5 acres) areas of regeneration. Either moderate to intense fires, pockets of disease or uneven-aged management (group selection or shelterwood with reserves) can create this type of plant community. Depending on the seed sources that are present, the seedling/sapling patches may contain Douglas-fir, madrone and/or lodgepole pine as well as oceanspray, dwarf rose and dull Oregon-grape. Both harvesting and fire can spur the growth of madrone, which may temporarily dominate in the overstory because it will root-sprout prolifically after disturbance. Lodgepole can out-compete Douglas-fir in height growth early on but a mixed species stand will result if the seedling density isn't too high. With no further management, some patches may be dominated by shrub species for many years, until their coverage gradually diminishes due to shading by the overstory.

Community 1.3
Oceanspray - salal/Douglas-fir (lodgepole pine and/or madrone)

Structure: single story/shrub. PC 1.3 is forestland in regeneration; species composition depends on the natural seed sources present and the intensity of management. If the regeneration is planted, Douglas-fir would most likely be the species selected. Douglas-fir, lodgepole and madrone are the common tree species available for natural seeding while typical shrubs include oceanspray, trailing blackberry, dwarf rose and dull Oregon-grape.

Community 1.4
Orchardgrass - bentgrass/oceanspray - dwarf rose/Douglas-fir

Structure: abandoned pasture with regeneration. PC 1.4 is abandoned crop or pasture land. It will typically include both native and nonnative grass species with shrubs and trees gradually encroaching from the edges. Over time, the shade intolerant species will diminish in cover as the overstory canopy closes.

Community 1.5
Douglas-fir (lodgepole pine)

Structure: single story with diminished understory. PC 1.5 is the 'stem exclusion' phase of stand development. The overstory canopy has closed, leading to intense competition for sunlight and a diminished understory. These stands are typically very dense with minimal vertical differentiation. If not thinned, this community will begin to self-thin

toward the end of this period.

Community 1.6
Douglas-fir - (lodgepole/madrone)/oceanspray - salal/rattlesnake plantain

Structure: single story with scattered openings. PC 1.6 is a maturing forest. Although still having basically a single story appearance, the stand is starting to differentiate vertically. Some sunlight is reaching the forest floor, allowing for an increased understory of mainly shrub species. Cycling between PC 1.6 and PC 1.3, most likely through even-aged management, will generate optimal wood fiber production.

Pathway 1.1a
Community 1.1 to 1.2

This pathway represents a larger disturbance – moderate- to high-intensity fires or major wind storms would be the natural disruptive forces while a group selection or shelterwood (with reserves) harvest would represent the human-initiated community. Areas of regeneration would generally range from 2 to 5 acres in size.

Pathway 1.1b
Community 1.1 to 1.3

This is the pathway of a major disturbance, such as a stand-replacing fire or clear-cut, followed by prescribed fire, with the intention of regeneration.

Pathway 1.1c
Community 1.1 to 1.4

This pathway signifies the conversion of forested land to either cropland or pasture.

Pathway 1.2a
Community 1.2 to 1.1

this pathway indicates growth over time with no additional disturbances. The areas of regeneration pass through the typical stand phases – competitive exclusion, maturation, understory re-initiation – until they resemble the old-growth structure of the PC 1.1.

Pathway 1.2b
Community 1.2 to 1.3

This pathway represents intensive management, such as a change from uneven-aged management to even-aged management. Block harvest with a post-harvest burn leads to a plant community in the stand initiation stage. Site preparation and planting improved seedlings would lead to a single-species stand; no further management would lead to a mixed species stand dependent on natural seed sources.

Pathway 1.3b
Community 1.3 to 1.5

This is the pathway of no management, denoting only growth over time. Without active management it is possible that large areas will be dominated by various shrubs for many years until they are gradually shaded out by the overstory.

Pathway 1.3a
Community 1.3 to 1.6

This pathway represents growth over time in conjunction with active management. Precommercial and/or commercial thinnings, combined with understory control, would lower stand density, decreasing competition between trees.

Pathway 1.4b
Community 1.4 to 1.3

This pathway indicates active management – restoring the pasture to forest through site preparation and tree planting.

Pathway 1.4a
Community 1.4 to 1.5

This pathway represents the gradual shift from open field to forest. Whatever seed source is present will, over time, fill in the pasture from the edges.

Pathway 1.5a
Community 1.5 to 1.6

This pathway includes growth over time, with or without thinning. If not thinned, mortality of intermediate and suppressed trees will occur.

Pathway 1.6a
Community 1.6 to 1.1

This is the pathway of no further management. Growth over time leads to continued vertical differentiation including occasional pockets of reproduction as well as increased shrubs and forbs.

Pathway 1.6b
Community 1.6 to 1.3

This pathway represents intensive management focusing on wood products. Clear-cutting, prescribed fire or other site preparation and tree planting are the steps to achieve this goal.

Additional community tables

Wood products

Site Index data for Pseudotsuga menziesii derived from: King, James E. 1966. Site index curves for Douglas-fir in the Pacific Northwest . Weyerhaeuser Company, Forestry Research Center. Forestry Paper 8. USDA NRCS curve # 795.

CMAI data for Pseudotsuga menziesii derived from: Chambers, C. Washington State Department of Natural Resources Technical Report #20.

Table 5. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
Douglas-fir	*PSME*	60	100	59	136	–	–	–	

Inventory data references

ECS-005 Plots:
ID Year State County

Other references

Fire Effects Information System, [Online].
U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).

http://www.fs.fed.us/database/feis/

Agee, J.K. Fire ecology of Pacific Northwest forests. Covelo, CA: Island Press; 1993. 493 pages .

Perry, D.A. Forest Ecosystems. Baltimore, MD: The Johns Hopkins University Press; 1994. 649 pages.

Contributors

Kathryn E. Smith

Approval

Kirt Walstad, 5/09/2024

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/09/2024
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**