USDA Natural Resources
Conservation Service

Ecological site F002XN904WA
Sitka spruce - red alder/salmonberry/field horsetail

Last updated: 11/27/2024
Accessed: 05/13/2025

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.

Table 1. Dominant plant species

Tree	(1) *Picea sitchensis* (2) *Alnus rubra*
Shrub	(1) *Rubus spectabilis*
Herbaceous	(1) *Equisetum arvense*

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Valley (2) Drainageway (3) Depression
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	0–168 m

Slope	0–5%
Ponding depth	0–23 cm
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is characterized by warm, dry summers and mild, moist winters. Precipitation is received mostly during the early fall to late winter.

Table 3. Representative climatic features

Frost-free period (average)	240 days
Freeze-free period (average)	
Precipitation total (average)	1,016 mm

Influencing water features

Soil features

Applicable soil series:
Bazal, Coupeville, Frostad, Limepoint, Spieden

Table 4. Representative soil features

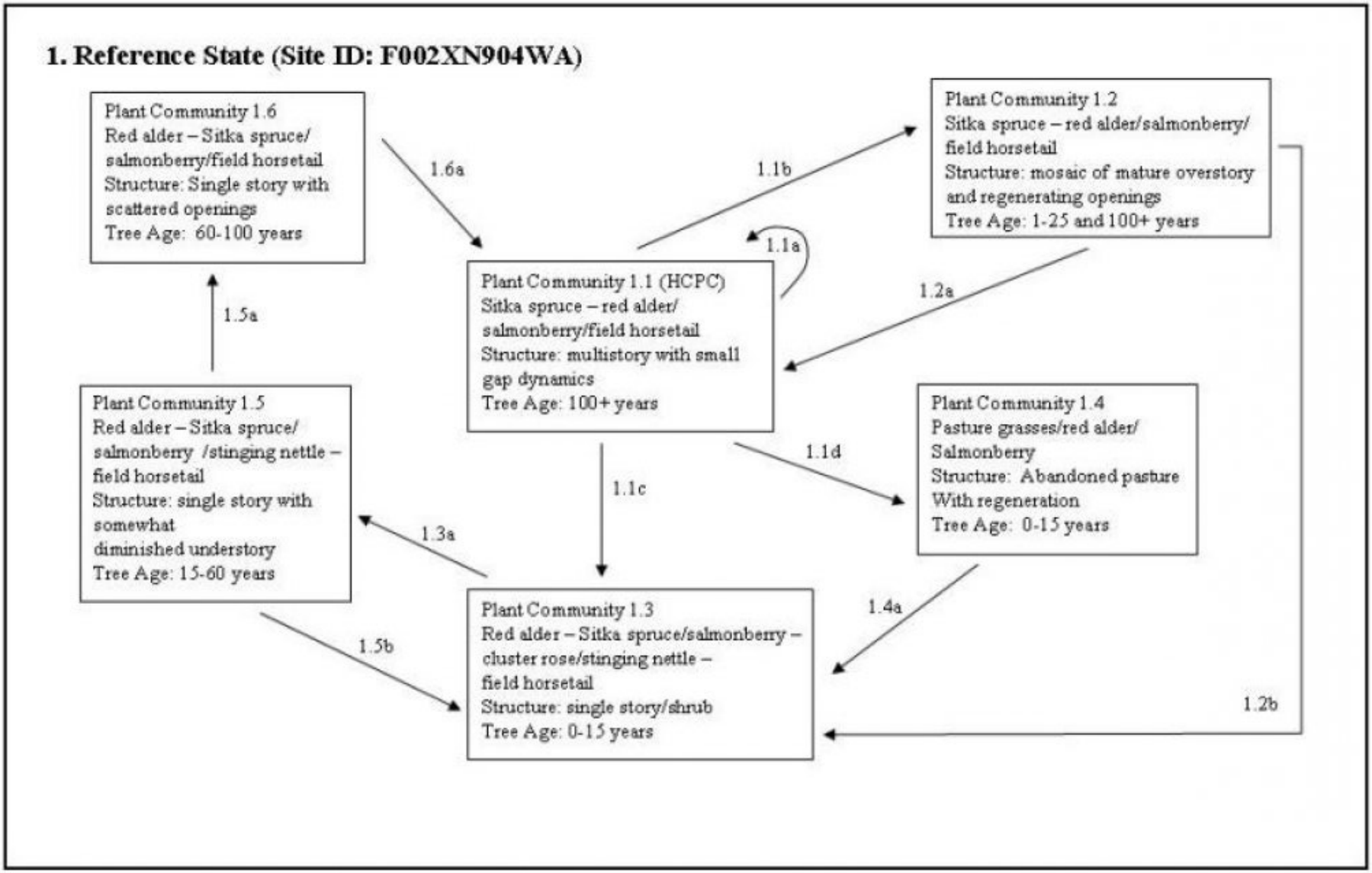
Surface texture	(1) Loam (2) Mucky silt loam
Drainage class	Poorly drained
Permeability class	Very slow to rapid
Soil depth	51 cm
Available water capacity (0-101.6cm)	6.35–24.38 cm
Soil reaction (1:1 water) (0-101.6cm)	3.5–7.8

Ecological dynamics

These sites are found within the rainshadow of the Olympic Mountains in the Puget Trough on moist soils and are not restricted to San Juan county. Red alder is a pioneer species – it produces a consistent seed crop, prefers mineral soil in full sun for a seed bed and has rapid height growth. Because Sitka spruce is moderately shade tolerant and prefers light shade for early growth, it will often seed in after red alder when there is a major disturbance. Sitka spruce is much longer lived than red alder; it would be common to find very few alders in stands over 100 years old without a large disturbance. Both overstory species are at least somewhat susceptible to pathogens that cause root rot and pockets of wind-thrown trees due to either rot or shallow root structures are the most common natural disturbance on these sites. Competition of regeneration in these pockets would be strong; smaller pockets would favor Sitka spruce, while larger pockets would favor red alder. These sites also support several species of shrubs, such as salmonberry and red elderberry, which can out-compete red alder in some instances. The resulting shrub-dominated areas may persist for years.

State and transition model

State 1
Reference



Picea sitchensis – Alnus rubra/Rubus spectabilis/Equisetum arvense

Sitka spruce – red alder/salmonberry/field horsetail

→ Community Phase Pathway
HCPC = Historic Climax Plant Community

1.X = Plant Community Phase
1.Xy = Pathway (ecological response to natural and/or management disturbances)

Community 1.1
Sitka Spruce, Red Alder, Salmonberry, and Field Horsetail

Structure: multistory with small gap dynamics. Sitka spruce is the dominant tree species in community 1.1. Red alder will appear sporadically in the plant community, most frequently as mature trees resulting from old, large disturbances. In the small openings most common in this plant community, spruce seedlings and horsetails will be the most common species. Depending on light levels and seed availability, salmonberry patches may be present in the understory. Communities on the wettest end of the range will often have an understory of slough sedge.

Community 1.2
Sitka spruce, Red Alder, Salmonberry, Cluster Rose, and Field Horsetail

Structure: mosaic of mature overstory and regenerating openings. Community 1.2 retains some areas that resemble the HCPC but also contains moderate sized (2-5 acres) areas of regeneration. Pockets of disease or insect infestations, multiple tree tip-ups or uneven-aged management create these openings, allowing sunlight to reach the forest floor. Red alder, lodgepole pine, black cottonwood and Sitka spruce seedlings can be found in these gaps. Salmonberry, red elderberry and other understory species that require more sunlight than is found in the HCPC, such as cluster rose and trailing blackberry, will become more prevalent given these conditions. Without management some openings may be dominated by shrubs for many years until their coverage gradually diminishes due to overstory shading.

Community 1.3
Red Alder, Sitka Spruce, Salmonberry, Cluster Rose, Stinging Nettle, and Field Horsetail

Structure: regenerating single story/shrub. Community 1.3 is forestland in regeneration; species composition depends on the natural seed sources present and the intensity of management. If the seedlings are planted, red alder would most likely be selected because spruce prefers more shade than is found early in community 1.3. The major disturbance which led to this community exposes mineral soil and all four of the common tree species germinate well given these conditions. Increased sunlight will also benefit many understory species, including cluster rose and stinging nettle. Control of the shrub community may be necessary to allow trees to become successfully established.

Community 1.4
Pasture Grasses, Red Alder, and Salmonberry

Structure: abandoned pasture with regeneration. Community 1.4 is abandoned crop or pasture land. It will typically include both native and non-native grass species, with shrubs and trees gradually encroaching from the edges. Because Sitka spruce prefers some shade for regeneration, it would likely be a secondary colonizer after red alder and/or lodgepole pine. Over time shade-intolerant understory species will diminish as the overstory canopy closes.

Community 1.5
Red Alder, Sitka Spruce, Salmonberry, Cluster Rose, Stinging Nettle, and Field Horsetail

Structure: single story with somewhat diminished understory. Community 1.5 is the ‘competitive exclusion’ phase of stand development. The overstory canopy has closed, leading to competition for sunlight and a somewhat diminished understory. These stands are typically dense with minimal vertical differentiation. Alder stands at this stage could be commercially thinned for pulpwood; if not, mortality due to self-thinning will occur. In the later stages of this plant community alder could be commercially harvested for saw logs.

Community 1.6
Sitka Spruce, Red Alder, Salmonberry, and Field Horsetail

Structure: single story with scattered openings. Community 1.6 is a transitional community with alder losing any remaining co-dominance to the spruce. Alder trees in this age range are susceptible to various fungi and any management at this stage would likely be to salvage remaining alders and to maintain the health of spruce trees. If not harvested, the majority of alders will succumb to age and the stand will be primarily spruce. The community is starting to differentiate vertically, with the death of individual alders allowing more sunlight to reach the forest floor.

Pathway 1.1A
Community 1.1 to 1.2

This pathway represents a larger disturbance – major windstorms or spreading disease pockets would be the main natural disruptive force 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.

Pathway 1.1B
Community 1.1 to 1.3

This is the pathway of major disturbance. Because this plant community is found on moist to very moist soils, major fires are rare (150-350+ year return interval). When fires do occur, they would result in almost 100% mortality, as represented by this pathway. A clear-cut or block harvest would simulate this disturbance.

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 further major 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 HCPC.

Pathway 1.2B
Community 1.2 to 1.3

This pathway represents intensive management or large-scale disturbance, most likely either a major wind storm or a block harvest. The mature forest is cleared; regeneration would be either planted red alder or a mix of species that naturally seed in.

Pathway 1.3A
Community 1.3 to 1.5

This pathway represents growth overtime with or without active management. In alder stands, a pulpwood thinning in the later stage or PC 1.3 would lower stand density and prevent mortality due to competition. If not managed, the stand will start to self-thin because only dominant or co-dominant trees receive sufficient sunlight to survive.

Pathway 1.4A
Community 1.4 to 1.3

This pathway represents either the gradual shift from open field to forest or the active management of restoring forestland.

Pathway 1.5B
Community 1.5 to 1.3

This pathway indicates intensive management focusing on wood products. Block harvest with subsequent site preparation will create a suitable seedbed for either natural seeding or tree planting.

Pathway 1.5A
Community 1.5 to 1.6

This pathway represents growth over time, with or without management. Trees released by prior thinnings will

continue to grow although some individuals may start to develop various rots at this stage.

Pathway 1.6A
Community 1.6 to 1.1

This pathway represents growth over time with no further management or major disturbance. Vertical differentiation continues as small openings allow for regeneration of tolerant tree species. The diversity of understory species increases as the stand regains the characteristics of the HCPC.

Additional community tables

Other information

Site index data based on:

Worthington, Norman P. ,Floyd A. Johnson, George R. Staebler, and William J. Lloyd. 1960. Normal yield tables for red alder. USDA, Forest Service. Pacific Northwest Forest and Range Experiment Station Research Paper No 36. USDA NRCS curve # 100.

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
red alder	*ALRU2*	65	120	58	152	–	–	–	

Contributors

Kathryn E. Smith

Approval

Kirt Walstad, 11/27/2024

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	11/27/2024
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:**
