

Ecological site AX004A01X003

Isomesic Udic Floodplain Forest

Last updated: 5/02/2025

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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.

MLRA notes

Major Land Resource Area (MLRA): 004A–Sitka Spruce Belt

This area consists of a long and narrow band of marine terraces, coastal estuaries, sand dunes, low relief hills, and mountain slopes that parallels the Pacific Ocean. This area is entirely within the Pacific Border Province of the Pacific Mountain System in Oregon and Washington. In Washington, this area ranges in elevation from sea level to a maximum of 1800 feet (550 meters) inland. The portion of this area in northern Washington consists primarily of glacial deposits, with some scattered young Tertiary sedimentary rocks. The climate is cool and moist, with minimal changes between seasons. Summer temperatures are moderated by the proximity of cool ocean water and fog. Sitka spruce forests are characteristic of this area. The average annual precipitation is 52 to 60 inches (1,320 to 1,525 millimeters) near the beach and can be as much as about 150 inches (3,800 millimeters) at the higher elevations along the inland edge of the MLRA. Most of the rainfall occurs during low-intensity, Pacific frontal storms. Precipitation is evenly distributed throughout fall, winter, and spring; summers are cool and dry. Snowfall accumulation is rare on the ocean side of this area, but some snowfall occurs along the eastern boundary. This area lies within the coastal fog belt zone, and heavy fogs are common in summer. Supplemental moisture is provided by fog condensation. Dominant soil orders in this MLRA are Andisols, Inceptisols, Spodosols, and Entisols.

Ecological site concept

Isomesic Udic Floodplain Forest sites occur on low river valley terraces in the isomesic fog belt. These sites are frequently flooded and are characterized by a dense overstory of Sitka spruce (*Picea sitchensis*) and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*). The understory shrub layer is dominated by salmonberry (*Rubus spectabilis*)

and vine maple (*Acer circinatum*). The forb layer is typically composed of western swordfern (*Polystichum munitum*), redwood-sorrel (*Oxalis oregana*), common ladyfern (*Athyrium filix-femina*), threeleaf foamflower (*Tiarella trifoliata*), youth on age (*Tolmiea menziesii*), and coastal hedgenettle (*Stachys cooleyae*).

Associated sites

AX001X01X001	<p>Temperate Flood Plain Shrubland</p> <p>Temperate Floodplain Shrublands occur between stream channels and adjacent Isomesic Udic Floodplain Forest sites. Temperate Floodplain Shrublands have higher shrub cover versus tree cover than Isomesic Udic Floodplain Forests.</p>
AX004A01X005	<p>Isomesic Udic Alluvial Terrace Forest</p> <p>Isomesic Udic Alluvial Terraces occur on higher terraces above Isomesic Udic Floodplain Forests. Plant communities in Isomesic Udic Alluvial Terrace Forests more closely resemble those of upland forests.</p>
AX001X01X200	<p>Temperate Wet Meadow</p> <p>Temperate Wet Meadow sites occur on depressions and seeps adjacent to or surrounded by Isomesic Udic Floodplain Forests. Temperate Wet Meadow sites lack tree cover.</p>

Similar sites

AX001X01X002	<p>Mesic Udic Flood Plain Forest</p> <p>Mesic Udic Floodplain Forests occur at higher elevations and lack Sitka spruce (<i>Picea sitchensis</i>).</p>
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Table 1. Dominant plant species

Tree	(1) <i>Picea sitchensis</i> (2) <i>Populus balsamifera ssp. trichocarpa</i>
Shrub	(1) <i>Acer circinatum</i> (2) <i>Rubus spectabilis</i>
Herbaceous	(1) <i>Polystichum munitum</i> (2) <i>Oxalis oregana</i>

Legacy ID

F004AA003WA

Physiographic features

This site primarily occurs on terrace treads in river valleys. Isomesic Udic Floodplain Forest sites occur on higher floodplain positions and low alluvial terraces. These sites only flood occasionally. As a result, these floodplain forest sites support mature trees and are

not subject to as frequent severe disturbance from intense flood events.

Table 2. Representative physiographic features

Landforms	(1) River valley > Terrace
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding frequency	None
Elevation	15–300 m
Slope	0–15%
Water table depth	150 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

This site occurs in an isomesic temperature and udic moisture regime. Precipitation arrives mostly via low-intensity, Pacific frontal storms. Precipitation mostly falls as rain, but some snowfall occurs along the eastern boundary of the area. Precipitation is evenly distributed throughout the fall, winter, and spring, while summers are dry. Heavy fog is very common in the summer, contributing supplemental moisture. The frost-free period of this area is strongly tied to ocean proximity; the eastern edge of the area has a significantly shorter growing season than the western edge. There is relatively little seasonal variation in air temperature due to Pacific Ocean influence.

Table 3. Representative climatic features

Frost-free period (characteristic range)	180-240 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	2,007-2,997 mm

Influencing water features

Isomesic Udic Floodplain Forest sites are located along rivers and streams. These sites are subject to occasional flooding for brief duration. Rare intense floods can cause significant surface disturbance to these sites. This site exists in the ecotone between the Temperate Floodplain Shrublands and upland forest sites.

Soil features

The soils are very deep, have very high or high Ksat throughout, and are well drained. The soils are formed in mixed alluvium. The soil surface texture is gravelly sandy loam or loam.

Clay content is three to 15 percent throughout. The soil series for this ecological site are Hatana and Cragcreek. Although representative of this site, these soils may exist across multiple ecological sites because of naturally variable slope, texture, rock fragments, and pH. An on-site soil pit and the most current ecological site key are necessary to classify a site.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Loam
Drainage class	Well drained
Soil depth	201 cm
Surface fragment cover ≤3"	0–5%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	3.81–15.24 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5–5.5
Subsurface fragment volume ≤3" (0-50.8cm)	25–50%
Subsurface fragment volume >3" (0-50.8cm)	15–50%

Ecological dynamics

Plant community dynamics of Isomesic Udic Floodplain Forest sites are driven primarily by the frequency and intensity of flooding events. Alpine snowmelt from higher elevations generates large amounts of water and may result in high-intensity flood events.

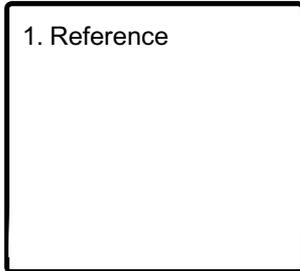
Frequently, flood waters will breach terrace risers and reach these floodplain forest sites. This ecological site is situated in the transition zone between floodplain shrublands and upland forests. Dominant species in the reference community are generally tolerant of low to moderate-intensity flooding events.

High-force windstorms are a major source of large-scale disturbance to these riparian forests. Blowdown events are often severe and may be stand replacing. (Van Pelt, 2007). Wildfires are an additional source of disturbance, though they occur much less frequently. The fire regime of this forest type is characterized by infrequent, severe fire events. The fire return interval is very high, 100 to nearly 1,000 years (FEIS, 2012). Major 100 to 500-year flood events may remove litter and scour the mineral soil surface. Windstorms, intense floods, and stand-replacing fire events are all capable of inducing high woody species mortality on these sites. The removal of overstory species will generally favor the

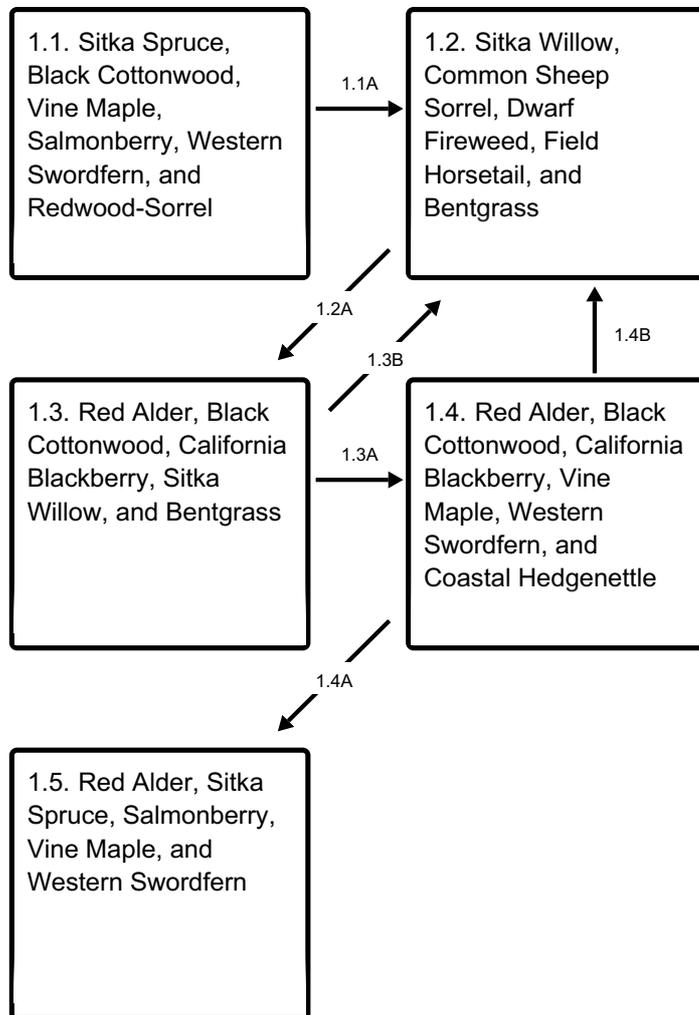
regeneration of shade-intolerant species in the aftermath of extreme disturbance events. Stand-replacing disturbance events provide a major source of instream wood recruitment in these riparian systems (Martens et al., 2020).

State and transition model

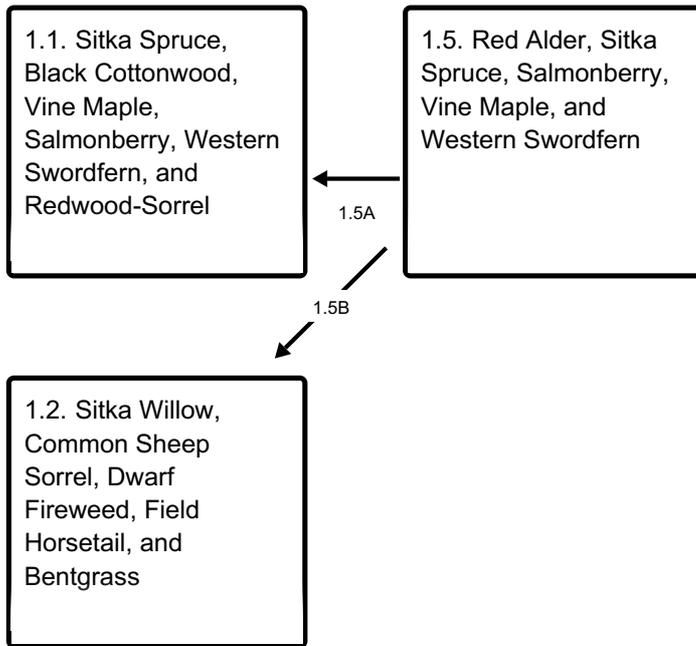
Ecosystem states



State 1 submodel, plant communities



Communities 1, 5 and 2 (additional pathways)



1.1A - High-intensity disturbance

1.2A - Time without disturbance

1.3B - High-intensity disturbance

1.3A - Time without disturbance

1.4B - High-intensity disturbance

1.4A - Time without disturbance

1.5A - Time without disturbance

1.5B - High-intensity disturbance

State 1 Reference

The reference state is comprised of five communities in varying stages of regeneration following either small-scale or large-scale disturbance.

Dominant plant species

- Sitka spruce (*Picea sitchensis*), tree
- black cottonwood (*Populus balsamifera ssp. trichocarpa*), tree
- red alder (*Alnus rubra*), tree
- vine maple (*Acer circinatum*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- California blackberry (*Rubus ursinus*), shrub
- Sitka willow (*Salix sitchensis*), shrub
- bentgrass (*Agrostis*), grass
- western swordfern (*Polystichum munitum*), other herbaceous
- redwood-sorrel (*Oxalis oregana*), other herbaceous
- coastal hedgenettle (*Stachys chamissonis*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous

- common sheep sorrel (*Rumex acetosella*), other herbaceous
- dwarf fireweed (*Chamerion latifolium*), other herbaceous

Community 1.1

Sitka Spruce, Black Cottonwood, Vine Maple, Salmonberry, Western Swordfern, and Redwood-Sorrel

Structure: multistory with small gap dynamics Sitka spruce (*Picea sitchensis*) and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) are the dominant overstory species in the reference community. Common understory species include salmonberry (*Rubus spectabilis*), vine maple (*Acer circinatum*), western swordfern (*Polystichum munitum*), redwood-sorrel (*Oxalis oregana*), common ladyfern (*Athyrium filix-femina*), threeleaf foamflower (*Tiarella trifoliata*), youth on age (*Tolmiea menziesii*), and coastal hedgenettle (*Stachys cooleyae*). High vertical stratification in the canopy and the presence of small gaps favors an abundant understory.

Community 1.2

Sitka Willow, Common Sheep Sorrel, Dwarf Fireweed, Field Horsetail, and Bentgrass

Structure: sparse understory of emergent shrubs, forbs, and grasses This community follows a stand-replacing disturbance event. Sitka willow rapidly germinates in the absence of canopy cover. Red alder (*Alnus rubra*) and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) seeds may begin to germinate where sunlight continues to reach the soil surface. If downed cottonwood individuals remain on the site, regeneration may occur through sprouting.

Community 1.3

Red Alder, Black Cottonwood, California Blackberry, Sitka Willow, and Bentgrass

Structure: shrubby single story with scattered understory of trees, shrubs, forbs, and grasses This community follows the initial phase of regeneration post-disturbance. As time progresses, red alder and black cottonwood successfully establish. The shrub and forb layers gradually diversify as slow-growing species begin to regenerate.

Community 1.4

Red Alder, Black Cottonwood, California Blackberry, Vine Maple, Western Swordfern, and Coastal Hedgenettle

Structure: deciduous forest with a mix of shrubs, forbs, and grasses, with conifer regeneration in the understory Red alder and black cottonwood continue to grow and form a discrete canopy layer. Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*) begin to regenerate in the understory. Vine maple (*Acer circinatum*) is a

significant understory shrub in this community.

Community 1.5

Red Alder, Sitka Spruce, Salmonberry, Vine Maple, and Western Swordfern

Structure: single story with few small openings By this point, the black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) population has likely suffered some mortality due to its high susceptibility to rot. Tree mortality creates small canopy openings which are exploited by understory plants. Salmonberry (*Rubus spectabilis*) recruits to the site. Sitka spruce (*Picea sitchensis*) and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) begin to replace deciduous species and will continually regenerate in the shaded understory.

Pathway 1.1A

Community 1.1 to 1.2

High-intensity disturbance. Severe flooding event that removes existing vegetation, intense windstorm, or stand-replacing wildfire.

Pathway 1.2A

Community 1.2 to 1.3

Time without disturbance allows regeneration, growth, and progression to a later seral stage.

Pathway 1.3B

Community 1.3 to 1.2

High-intensity disturbance. Severe flooding event that removes existing vegetation, intense windstorm, or stand-replacing wildfire.

Pathway 1.3A

Community 1.3 to 1.4

Time without disturbance allows regeneration, growth, and progression to a later seral stage.

Pathway 1.4B

Community 1.4 to 1.2

High-intensity disturbance. Severe flooding event that removes existing vegetation, intense windstorm, or stand-replacing wildfire.

Pathway 1.4A

Community 1.4 to 1.5

Time without disturbance allows regeneration, growth, and progression to a later seral stage. Individual tree mortality creates small canopy openings.

Pathway 1.5A

Community 1.5 to 1.1

Time without disturbance allows regeneration, growth, and progression to a later seral stage. Vertical stratification increases and forb diversity increases. Individual tree mortality creates varied-age patches.

Pathway 1.5B

Community 1.5 to 1.2

High-intensity disturbance. Severe flooding event that removes existing vegetation, intense windstorm, or stand-replacing wildfire.

Additional community tables

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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	03/13/2026
Approved by	Kirt Walstad
Approval date	

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:**
