USDA Natural Resources Conservation Service

Ecological site R002XN723WA
Salt Water Bluff

Last updated: 1/24/2025
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.

MLRA notes

Major Land Resource Area (MLRA): 002X–Willamette and Puget Sound Valleys

Major Land Resource Area-[MLRA][LRU]: 002X N Willamette and Puget Sound Valleys, North Puget. The Land Resource Unit (LRU) is described in detail in the reference Washington NRCS Pasture TN-101 Forage Zones available on the eFOTG. For more information on MLRA's, refer to the following web site: http://www.essc.psu.edu/soil_info/soil_lrr/. Additional information on Common Resource Areas is available on the eFOTG for NRCS Washington: http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=WA and the following website: http://soils.usda.gov/survey/geography/cra.html. This ecological site occurs in the following Common Resource Areas: 2.10 - Fraser Lowland; 2.11 - Eastern Puget Riverine Lowlands; 2.11 - Eastern Puget Mountain River Valleys; 2.12 - San Juan Islands; 2.13 - Olympic Rainshadow; 2.5 - Eastern Puget Uplands; and 2.6 - Central Puget Lowland

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

Salt water bluffs can consist of rocky headlands with shallow soils over bedrock or escarpments composed of glacial sediments. Herbaceous salt water bluffs are influenced by wind and salt spray and coarse-textured soils (very sandy or gravelly), which creates a harsh, droughty environment supporting small grasslands in a mosaic with stunted trees and shrublands. In the case of bluffs consisting of glacial sediments, herbaceous vegetation usually occurs only on those portions of steep slopes that have recently eroded, or on sunny aspects (southern to western).

Table 2. Representative physiographic features

Landforms	(1) Beach terrace (2) Shoreline (3) Sea cliff
Flooding frequency	None
Ponding frequency	None
Elevation	0–76 m
Slope	0–100%
Aspect	S, W

Climatic features

The average annual precipitation ranges from 18 to 60 inches, although most areas range from 30 to 50 inches. Annual precipitation less than 30 inches occurs in the rainshadow of the Olympic Mountains along the western border of this area and in the San Juan Islands. Higher average annual precipitation, 50 to 60 inches, occurs next to the foothills of the surrounding mountains. Most of the precipitation occurs as low intensity, Pacific frontal storms. The distribution is 75% in the fall and winter, 15% in the spring and 10% in the summer. Rain turns to snow at the higher elevations, although accumulations are usually small and of short duration. The number of days with snow on the ground varies from 0 to 9, with an averge of 3 days. Summers are cool and dry. Recorded temperature extremes range from -1 degrees to 90 degrees fahrenheit. See the climate tables in this document for information on temperatures and frost-free periods.

Table 3. Representative climatic features

Frost-free period (average)	243 days
Freeze-free period (average)	302 days
Precipitation total (average)	1,524 mm

Influencing water features

Soil features

Salt water bluffs can consist of rocky headlands with shallow soils over bedrock or escarpments with deep soils composed of glacial sediments. In the case of bluffs consisting of glacial sediments, herbaceous vegetation usually occurs only on soils mapped as Xerorthents on those portions of steep slopes that have recently eroded.
The soils which support this native plant community typically occur on steep bluffs directly above unprotected marine waters. This ecosite may also occur on flatter slopes adjacent to or at the toe-slopes of the bluffs. These soils are influenced by the various “Cold Phase” abiotic factors such as prevailing winds (especially across marine waters) and proximity to unprotected marine waters, which will cause these locales to be cooler than the climate generally associated with these soil series. The effect on the plant community is generally the absence of Oregon White Oak (*Quercus garryana*) from the community. The soils are generally sandy and droughty, with very dark A horizons in the soil profile. Typical soil series are Xerorthents and Umbric Dystrochrepts.

Table 4. Representative soil features

Surface texture	(1) Very gravelly sand
Drainage class	Excessively drained
Permeability class	Very rapid
Surface fragment cover <=3"	50%
Surface fragment cover >3"	9%
Available water capacity (0-101.6cm)	1.02–4.06 cm
Soil reaction (1:1 water) (0-101.6cm)	5.6–6
Subsurface fragment volume <=3" (Depth not specified)	50%
Subsurface fragment volume >3" (Depth not specified)	9%

Ecological dynamics

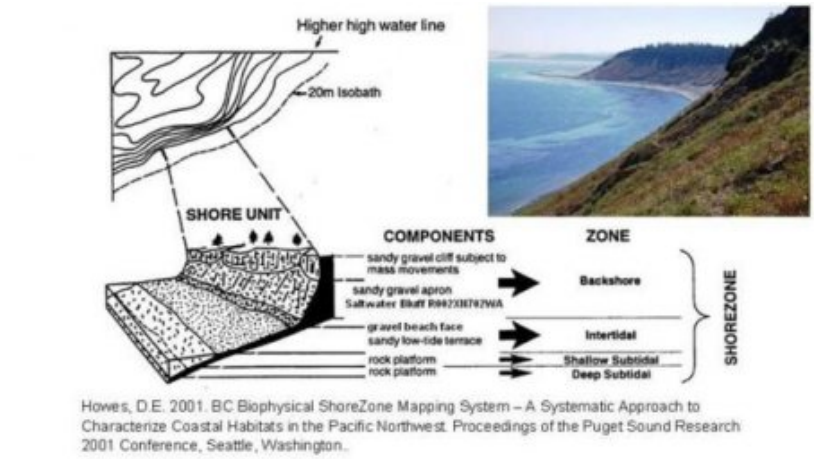
In comparison to other native prairie plant communities, these communities generally show an increase in Red Fescue (*Festuca rubra*) with a related reduction in the amount of Roemer's fescue (Festuca roemeri). Other common native plants are Oregon gumweed (*Grindelia stricta*), Field Chickweed (*Cerastium arvense*), Yarrow (*Achillea millefolium*), Hooker's onion (*Allium acuminatum*), Woodrush (*Luzula comosa*), Bare-stem lomatium (*Lomatium nudicaule*) and Great Camas (*Camassia leichtlinii*).

Some disturbance is natural in these plant communities, including: fire, both natural and human caused; soil perturbation resulting from causes such as small mammals, earthworms, root activity; freeze-thaw cycles; and harvest of bulbs and rhizomes; and wildlife grazing. . Disturbances can be reduced or eliminated through actions such as fire control, or cessation of activities such as mowing, soil disturbance, livestock grazing or vehicle access. If no disturbance occurs, this plant community will be invaded by shrub and tree species. Typical shrub and tree species include snowberry, rose, Douglas fir and lodgepole pine. Disturbance will affect the different plant classes in varying ways. Timing of disturbance will also affect shifts in plant communities. The Disturbance Effects on Plant Classes table summarizes some of these effects.

If nonnative species are present in the area, these will invade the site whether or not disturbance is maintained, increased, or eliminated. Their dominance in the community will be affected by the type and intensity of disturbance, as will the dominance of the different plant classes. If disturbance such as tillage, herbicide use, or intensive vehicle traffic eliminates the plant community, then a nonnative plant community will be established, either through planting, or invasion of introduced seral species.

Restoration – It's possible to reestablish plant communities on suitable soils. Native species can be replanted and the site managed to maintain or increase the percentage cover of these species. The Disturbance Effects table lists appropriate types of disturbance to help establish the desired plant community. If nonnatives are present on the site, there will always be a presence in the community as these species are adapted to a wide range of soils, climates and disturbance regimes. However, the management of disturbance types can affect the balance of species on a site.

State and transition model

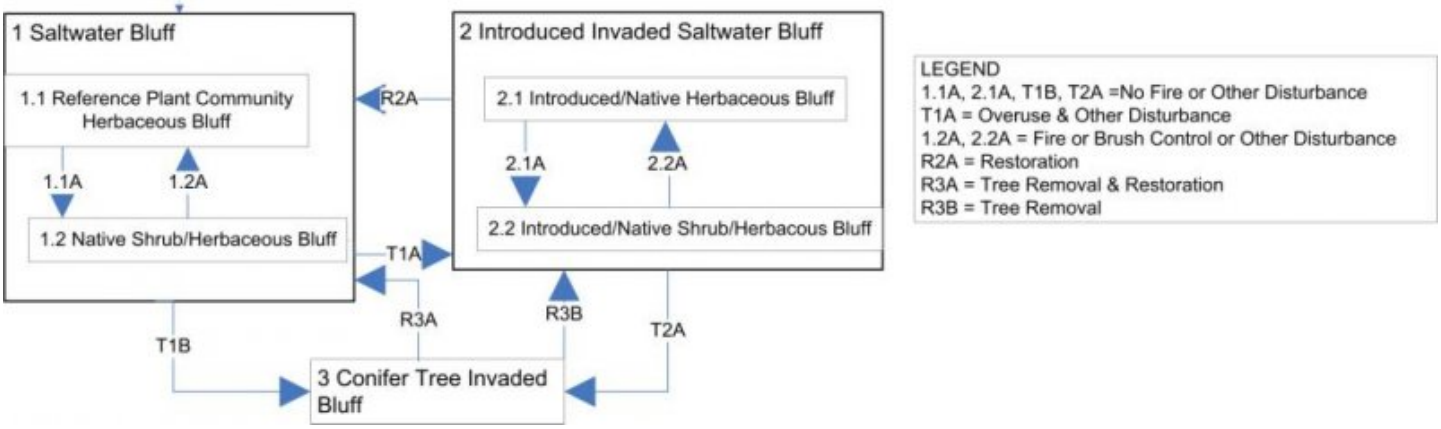


Howes, D.E. 2001. BC Biophysical ShoreZone Mapping System – A Systematic Approach to Characterize Coastal Habitats in the Pacific Northwest. Proceedings of the Puget Sound Research 2001 Conference, Seattle, Washington..

Disturbance Effects on Plant Classes

Disturbance type	Grasses	Forbs	Grass-like	Palatable shrubs	Unpalatable shrubs	Trees
Fire, periodic	M	E	D	D	D	D
Fire, frequent	D	E	D	D	D	D
Soil perturbation	E	E	E	E	E	D
Soil inversion	D	D	D	D	D	D
Managed livestock grazing	D	E	D	D	E	D
Grazing during spring bloom of native species	D	D	E	E	E	E
Overgrazing	D	D	E	D	E	D
Wildlife grazing	E	D	E	D	E	M
Light vehicle traffic	M	M	M	D	D	D
Excessive vehicle traffic	D	D	D	D	D	D
Grass specific herbicides	D	E	E	E	E	E
Forb & Shrub specific herbicides	E	D	E	D	D	E
Non specific herbicides	D	D	D	D	D	E

Effect: E = Enhance/Increase; D = Decrease; M = Maintain



State 1
Reference

The soils that support this native plant community typically occur on steep bluffs directly above unprotected marine waters. This ecological site description may also occur on flatter slopes adjacent to or at the toe-slopes of the bluffs. The soils are generally sandy and droughty, with very dark A horizons in the soil profile. Typical soil components are Xerorthents and Umbric Dystrochrepts. In comparison to other native prairie plant communities, these communities generally show an increase in Red Fescue (*Festuca rubra*) with a related reduction in the amount of Roemer's fescue (Festuca roemeri). Other common native plants are Oregon gumweed (*Grindelia stricta*), field chickweed (*Cerastium arvense*), yarrow (*Achillea millefolium*), Hooker's onion (*Allium acuminatum*), woodrush (*Luzula comosa*), bare-stem lomatium (*Lomatium nudicaule*) and great camas (*Camassia leichtlinii*). These soils are influenced by the various 'Cold Phase' abiotic factors such as prevailing winds (especially across marine waters) and proximity to unprotected marine waters, that will cause these locales to be cooler than the climate generally associated with these soil component. The effect on the plant community is generally the absence of Oregon white oak (*Quercus garryana*) from the community.

Community 1.1
Herbaceous Bluff

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Forb	177	252	378
Grass/Grasslike	157	224	336
Shrub/Vine	55	78	118
Tree	3	6	9
Total	**392**	**560**	**841**

Figure 5. Plant community growth curve (percent production by month). WA0222, Droughty. Droughty or limited depth soils (available water-holding capacity generally < 4.5"/40" soil depth).

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	8	15	23	19	17	5	1	1	5	3	1

Community 1.2
Native Shrub and Herbaceous Bluff

Pathway 1.1A
Community 1.1 to 1.2

No fire or other disturbance

Pathway 1.2A
Community 1.2 to 1.1

Fire or brush control or other disturbances such as erosion, sloughing or landslides

State 2
Introduced Invaded

Community 2.1
Introduced and Native Herbaceous Bluff

Community 2.2
Introduced, Native Shrub, and Herbaceous Bluff

Pathway 2.1A
Community 2.1 to 2.2

No fire or other disturbance.

Pathway 2.2A
Community 2.2 to 2.1

Fire or brush control or other disturbances such as erosion, sloughing or landslides in the presence of exotic species.

State 3
Conifer Invaded

Community 3.1
F002XN901WA

Transition T1A
State 1 to 2

Fire or brush control or other disturbances such as erosion, sloughing or landslides in the presence of exotic species.

Transition T1B
State 1 to 3

No fire or other disturbance.

Restoration pathway R2A
State 2 to 1

Restoration through removal of exotic species.

Transition T2A
State 2 to 3

No fire or other disturbance.

Restoration pathway R3A
State 3 to 1

Tree removal and restoration by existing plant release or planting of native species.

Restoration pathway R3B
State 3 to 2

Tree Removal

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				–	
	California oatgrass	DACA3	*Danthonia californica*	–	–
	red fescue	FERU2	*Festuca rubra*	–	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	–	–

	Sandberg bluegrass	POSE	*Poa secunda*	–	–
2	**Perennial Grasslike**			–	
	long-stolon sedge	CAIN9	*Carex inops*	–	–
	Pacific woodrush	LUCO6	*Luzula comosa*	–	–
3	**Annual Grasses**			–	
	Howell's bluegrass	POHO6	*Poa howellii*	–	–
Forb					
6	**Bulbs**			–	
	tapertip onion	ALAC4	*Allium acuminatum*	–	–
	crown brodiaea	BRCO3	*Brodiaea coronaria*	–	–
	large camas	CALE5	*Camassia leichtlinii*	–	–
	small camas	CAQU2	*Camassia quamash*	–	–
	meadow deathcamas	ZIVE	*Zigadenus venenosus*	–	–
7				–	
	darkthroat shootingstar	DOPU	*Dodecatheon pulchellum*	–	–
	hookedspur violet	VIAD	*Viola adunca*	–	–
8	**biscuitroots**			–	
	barestem biscuitroot	LONU2	*Lomatium nudicaule*	–	–
	common lomatium	LOUT	*Lomatium utriculatum*	–	–
9	**Balsamroot**			–	
	deltoid balsamroot	BADE2	*Balsamorhiza deltoidea*	–	–
10	**Perennial Forbs**			–	
	common yarrow	ACMI2	*Achillea millefolium*	–	–
	field chickweed	CEAR4	*Cerastium arvense*	–	–
	common woolly sunflower	ERLA6	*Eriophyllum lanatum*	–	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	–	–
	Oregon gumweed	GRST3	*Grindelia stricta*	–	–
	western buttercup	RAOC	*Ranunculus occidentalis*	–	–
12	**Perennial Legume**			–	
	American vetch	VIAM	*Vicia americana*	–	–
13	**Annual**			–	
	giant blue eyed Mary	COGR2	*Collinsia grandiflora*	–	–
14	**Annual Legume**			–	
	desert deervetch	LOMI	*Lotus micranthus*	–	–
	smallflower lupine	LUPO3	*Lupinus polycarpus*	–	–
Shrub/Vine					
20	**Shrubs**			–	
	Nootka rose	RONU	*Rosa nutkana*	–	–
	common snowberry	SYAL	*Symphoricarpos albus*	–	–
Tree					
25				–	
	Pacific madrone	ARME	*Arbutus menziesii*	–	–
	lodgepole pine	PICO	*Pinus contorta*	–	–
	Douglas-fir	PSME	*Pseudotsuga menziesii*	–	–

Contributors

Martha Chaney

Approval

Kirt Walstad, 1/24/2025

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):

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

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

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

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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:

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**
