USDA Natural Resources Conservation Service

Ecological site R004AB200OR
Tidal Marsh and Estuary

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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 resource area is along the coast of the Pacific Ocean. It is characterized by a marine climate and coastal fog belt. The parent material is primarily glacial, marine, or alluvial sediment and some scattered areas of Tertiary sedimentary rock and organic deposits. Glacial deposits are dominant in the northern part of the MLRA in Washington; marine and alluvial deposits and eolian sand are dominant along the southern part of the Washington coast and extending into Oregon. The mean annual precipitation ranges from 52 to 60 inches near the beaches to more than 190 inches in the inland areas of the MLRA.
Andisols and Inceptisols are the dominant soil orders in the MLRA, but Spodosols, Entisols, and Histosols are also present. The soils are shallow to very deep and very poorly drained to somewhat excessively drained. They are on hilly marine terraces and drift plains; coastal uplands, hills, and foothills; flood plains; and coastal dunes, marshes, and estuaries.
The soil temperature regimes of MLRA 4A are moderated by the proximity to the Pacific Ocean, which eases the differences between the mean summer and winter temperatures. The seasonal differences in temperature are more pronounced in adjacent MLRAs further inland. Included in MLRA 4A are soils in cooler areas at higher elevations or on northerly aspects that have an isofrigid temperature regime.
The soil moisture regimes of MLRA 4A are typified by soils that do not have an extended dry period during normal years. Many of the soils further inland in MLRA 2 have a dry period in summer. Soils in low-lying areas and depressions of MLRA 4A are saturated in the rooting zone for extended periods due to a high water table or long or very long periods of flooding or ponding.

LRU notes

The Central Sitka Spruce Belt land resource unit (LRU B) of MLRA 4A is along the west coast of Washington and Oregon. The LRU extends from the Chehalis River in Washington to South Slough in Oregon, and it is bounded on the west by the Pacific Ocean. This area consists of sand dunes, flood plains, and marine terraces that extend a few miles east and are parallel to the Pacific Ocean, and it transitions to steeper and higher elevation ridges and mountainsides of the western slopes of the Coast Range in Oregon. Near the shore in coastal lowland areas, the parent material is dominantly eolian (wind-deposited) sand, alluvium, and marine sediment. Residuum, colluvium, and landslide deposits derived from sedimentary and basaltic sources are on the coastal foothills and mountains, and minor additions of recent alluvium are along the river valleys. Several major rivers carved steep, narrow valleys through the coastal mountains and foothills before entering broader coastal valleys. Subduction zones along the Pacific Coast may cause significant earthquakes and tsunamis, which would disrupt the ecological processes beyond what is described in this ecological site description.

Ecological site concept

This ecological site is on the western coastline of the Pacific Northwest, from southern Washington through central Oregon. Marshes and estuaries are at low elevations that are tidally influenced. The areas are saline to brackish. Hydrology is the primary abiotic driver of the ecological site. The vegetation commonly is patchy. The distribution

and diversity of the vegetation are influenced by freshwater inputs, tidal flooding, and evaporation. The soils associated with this site formed in mixed alluvium along tidally influenced flood plains, and they are subject to a high water table and flooding. Slopes range from 0 to 3 percent.
The vegetation is well adapted to tidal fluctuations, salt spray, brackish water, and saltwater. The most common species include pickleweed (Salicornia virginia), Pacific silverweed (*Argentina egedii*), marsh jaumea (*Jaumea carnosa*), pursh seepweed (*Suaeda calceoliformis*), saltgrass (*Distichlis spicata*), tufted hairgrass (*Deschampsia cespitosa*), seaside arrowgrass (*Triglochin maritima*), common threesquare (*Schoenoplectus pungens*), and Lyngbye's sedge (Carex lynbnyei).
The most common disturbance is alteration of the watershed and hydrologic system. Tidal inundation and channel flow may be altered by dams, dikes, and levees. Storm surges may flood the marsh and estuary causing movement of sediment and an increase in the amount of large driftwood on the site.

Figure 1. The area designated as "A" is the Foredune Scrub and Grassland site, "B" is the Dune Forest site, "C" is the Aquic Interdune site, and "D" is the Tidal Marsh and Estuary site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Salicornia* (2) *Argentina egedii*

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Estuary > Tidal flat
Aspect	W, NW, N, S, SW

Climatic features

The maritime climate is characterized by cool, moist summers and cool, wet winters. The mean annual precipitation is 60 to 110 inches. Coastal fog provides supplemental moisture in summer. The mean annual air temperature is 48 to 52 degrees F.

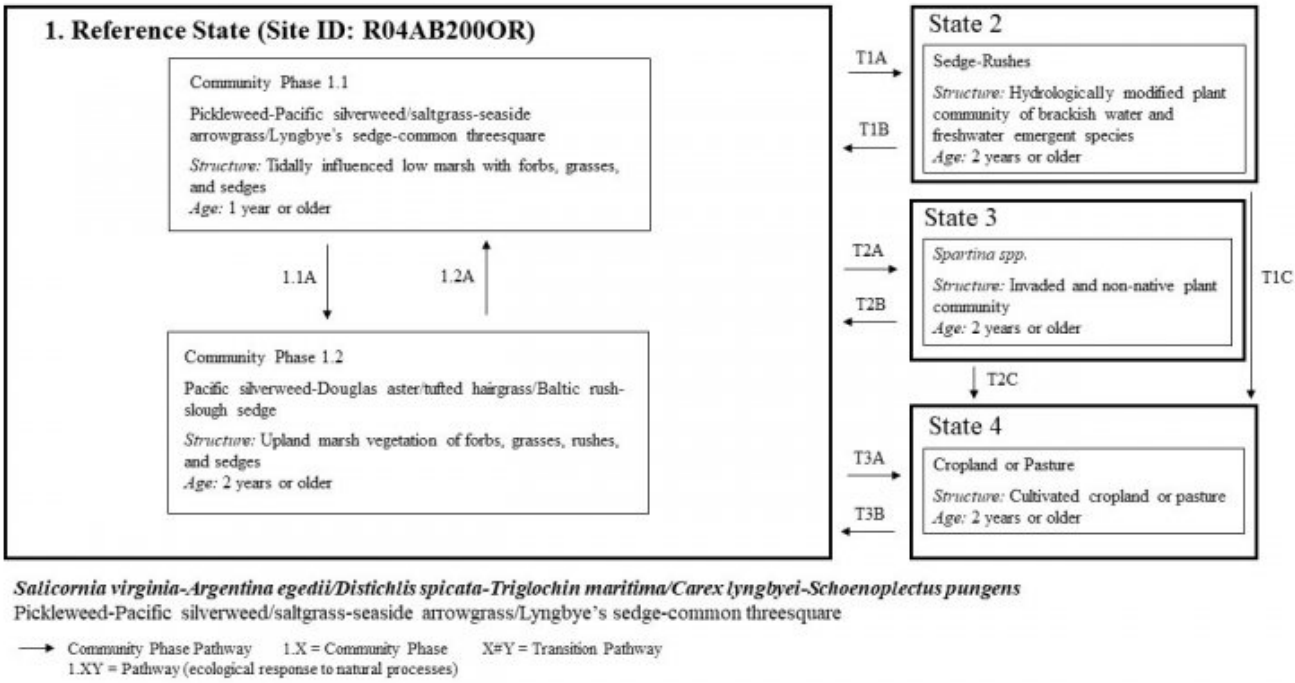
Influencing water features

Soil features

The soils associated with this site formed in mixed alluvium along tidally influenced flood plains, and they are subject to a high water table and flooding. Slopes range from 0 to 3 percent.

Ecological dynamics

State and transition model



State 1
Reference State

Community 1.1
Pickleweed-Pacific silverweed/saltgrass-seaside arrowgrass/Lyngbye's sedge-common threesquare Structure: Tidally influenced low marsh with forbs, grasses, and sedges

The reference community is a mosaic of tidally influenced, salt-tolerant species. The most common species include pickleweed (Salicornia virginia), Pacific silverweed (*Argentina egedii*), marsh jaumea (*Jaumea carnosa*), pursh seepweed (*Suaeda calceoliformis*), saltgrass (*Distichlis spicata*), tufted hairgrass (*Deschampsia cespitosa*), seaside arrowgrass (*Triglochin maritima*), common threesquare (*Schoenoplectus pungens*), and Lyngbye's sedge (Carex lynbnyei). The vegetation cover is dominantly graminoids, and less than 15 percent is herbaceous. The reference community is influenced by frequent, long periods of flooding. The community represents a lack of major disturbance and hydrological modifications. During the dry summer, salt pans may form in areas that have high

salinity. The community is important for coastal and wetland wildlife.

Dominant plant species

- saltgrass (*Distichlis spicata*), grass
- seaside arrowgrass (*Triglochin maritima*), grass
- tufted hairgrass (*Deschampsia cespitosa*), grass
- pickleweed (*Salicornia*), other herbaceous
- Pacific silverweed (*Argentina egedii*), other herbaceous
- marsh jaumea (*Jaumea carnosa*), other herbaceous
- Pursh seepweed (*Suaeda calceoliformis*), other herbaceous
- common threesquare (*Schoenoplectus pungens*), other herbaceous
- Lyngbye's sedge (*Carex lyngbyei*), other herbaceous

Community 1.2
Pacific silverweed-Douglas aster/tufted hairgrass/Baltic rush-slough sedge Structure: Upland marsh vegetation of forbs, grasses, rushes, and sedges

Community phase 1.2 represents a salt meadow that is upland from a low to mid marsh or is subject to limited tidal flooding. Common plant species include Pacific silverweed (*Argentina egedii*), Douglas aster (*Symphyotrichum subspicatum*), tufted hairgrass (*Deschampsia cespitosa*), Baltic rush (Juncus balticus), and slough sedge (*Carex obnupta*).

Dominant plant species

- tufted hairgrass (*Deschampsia cespitosa*), grass
- Pacific silverweed (*Argentina egedii*), other herbaceous
- Douglas aster (*Symphyotrichum subspicatum*), other herbaceous
- slough sedge (*Carex obnupta*), other herbaceous

Pathway 1.1A
Community 1.1 to 1.2

Pickleweed-Pacific silverweed/saltgrass-seaside arrowgrass/Lyngbye's sedge-common threesquare Structure: Tidally influenced low marsh with forbs, grasses, and sedges

Pacific silverweed-Douglas aster/tufted hairgrass/Baltic rush-slough sedge Structure: Upland marsh vegetation of forbs, grasses, rushes, and sedges

This pathway represents a hydrological change or sedimentation that reduces the influence of tidal saltwater. This results in a mid to high marsh vegetative community that consists of species that are less salt tolerant.

Pathway 1.2A
Community 1.2 to 1.1

Pacific silverweed-Douglas aster/tufted hairgrass/Baltic rush-slough sedge Structure: Upland marsh vegetation of forbs, grasses, rushes, and sedges

Pickleweed-Pacific silverweed/saltgrass-seaside arrowgrass/Lyngbye's sedge-common threesquare Structure: Tidally influenced low marsh with forbs, grasses, and sedges

This pathway represents a transition to tidal flooding and restoration of the native community.

State 2

Community 2.1
Sedges-Rushes Structure: Hydrologically modified plant community of brackish water and freshwater emergent species

State 2 represents a community that has been restricted from frequent, long periods of tidal flooding. The hydrology has been limited to freshwater influences as a result of man-made modifications throughout the watershed. The soils become more acidic when diked or drained; therefore, the plant composition is altered. This community may be dominantly sedges and rushes, and it is more susceptible to infestation by non-native species.

State 3

Community 3.1
Spartina spp. Structure: Invaded and non-native plant community

State 3 represents a community phase that has been susceptible to non-native species. Cordgrass (Spartina spp.) is highly successful at colonizing disturbed environments very rapidly. This impairs the ability of native species to establish and compete for resources. Cordgrass invasion may also impact the habitat for local fauna.

Dominant plant species

- cordgrass (*Spartina*), grass

State 4

Community 4.1
Cropland or Pasture Structure: Cultivated cropland or pasture

State 4 represents a departure from the native plant community to establish and cultivate crops or pasture. The initial establishment requires intensive management that includes clearing, leveling, and installing drainage systems, dikes, and irrigation systems. Hydrologic changes from irrigation, drainage, erosion, and sedimentation impact the ecology of the site. A monoculture crop is susceptible to a variety of insects, pathogens, and weedy plant species.

Transition T1A
State 1 to 2

This pathway represents human-influenced hydrologic changes such as construction of dikes, levees, drainage structures, and dams. This increases freshwater inputs, decreases saline inputs, and reduces connectivity between the upland and wetland areas.

Transition T2A
State 1 to 3

This pathway represents a major disturbance from a massive tidal surge, an excessively damaging windstorm, or extended drought that removes most, if not all, of the existing vegetation. It also represents a transition from a native plant community to a non-native, invaded plant community. Non-native seed disbursement is introduced (intentionally or unintentionally), which alters the reference community.

Transition T3A
State 1 to 4

This pathway represents a transition from human-influenced hydrologic changes and cultivation of commercial crops or pasture.

Restoration pathway T1B
State 2 to 1

This pathway represents a hydrologic change to restore the tidally influenced native plant habitat.

Transition T1C
State 2 to 4

This pathway represents human-influenced hydrologic changes such as construction of dikes, levees, drainage structures, and dams to establish cultivated crops or pasture.

Restoration pathway T2B
State 3 to 1

This pathway represents restoration of the native plant community. Native seed sources and extensive management and mitigation of non-native species are needed to restore the community.

Transition T2C
State 3 to 4

This pathway represents human-influenced hydrologic changes such as the construction of dikes, levees, drainage structures, and dams to establish cultivated crops or pasture.

Restoration pathway T3B
State 4 to 1

This pathway represents restoration of the native plant habitat. Native seed sources and extensive management and mitigation of non-native species are needed to restore the community.

Additional community tables

Inventory data references

National vegetation classification: G499 Temperate Pacific Tidal Salt and Brackish Marsh Group
Ecological Systems of Washington State community type: Temperate Pacific Tidal Salt and Brackish Marsh
Plant associations of the Oregon Dunes National Recreation Area: Saltgrass-Pacific Silverweed Tidal Herbaceous Vegetation

Other references

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Contributors

Erin Kreutz
Erik Dahlke
Jason Martin
Marty Chaney

Approval

Kendra Moseley, 9/09/2020

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	05/02/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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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):**

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:**