

Ecological site R004AB201OR Foredune Scrub and Grassland

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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.

MLRA 4A Soil Temperature Regimes

Isomesic The mean annual soil temperature (measured at a depth of 20 inches) is 46 to 59 degrees F, and the difference between the mean winter and summer temperatures is less than 11 degrees. The seasonal soil temperatures and difference between the mean winter and summer temperatures are moderated by the proximity to the ocean and the effects of fog in summer.

Isofrigid The mean annual soil temperature (measured at a depth of 20 inches) is 32 degrees F to less than 46 degrees, and the difference between the mean winter and mean summer temperatures is less than 11 degrees. The seasonal soil temperatures and difference between the mean winter and summer temperatures are moderated by the proximity to the ocean and the effects of fog in summer. The temperatures are cooler than in surrounding lowlands because of the higher elevation and differences in slope and aspect.

MLRA 4A Soil Moisture Regimes

Udic The soil rooting zone is not dry in any part for more than 90 cumulative days in normal years. Soil moisture does not limit plant growth because of the fog in summer.

Aquic The soil is virtually free of dissolved oxygen due to saturation of the rooting zone. The soils are saturated for extended periods during the growing season and may be subject to long or very long periods of ponding and flooding.

Refer to Keys to Soil Taxonomy for complete definitions of the soil temperature and moisture regimes.

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.

Classification relationships

National vegetation classification: G498 Dune Grassland and Beach Group and Sand Dune Grassland Alliance Ecological Systems of Washington State community type: North Pacific Maritime Coastal Sand Dune and Strand Plant associations of the Oregon Dunes National Recreation Area: American Dunegrass Herbaceous Vegetation

Ecological site concept

This ecological site is on the western coastline of the Pacific Northwest, from southern Washington through central Oregon. Foredunes are tall, sandy ridges inland from coastal beaches. They are characterized by sandy, nutrient-poor soils that support a patchwork of vegetation tolerant of strong winds, droughty soil conditions, and salt spray. The soils generally are weakly developed and have limited available water capacity due to the sandy texture. The vegetation commonly is deeply rooted and mat forming, which provide a specialization for the wind and moving sand.

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.

The vegetation in this ecological site is well adapted to wind pruning, salt spray, low nutrient availability, and wind desiccation. Frequent natural disturbance from wind allows the dunes to fluctuate within an actively moving and establishing ecosystem. The most common species include American dunegrass (*Leymus mollis* spp. *mollis*), coastal sand verbena (*Abronia latifolia*), American searocket (*Cakile edentula* var. *edentula*), beach pea (*Lathyrus japonicus*), beach strawberry (*Fragaria chiloensis*), silver bur ragweed (*Ambrosia chamissonis*), seashore false bindweed (*Calystegia soldanella*), camphor tansy (*Tanacetum camphoratum*), beach knotweed (*Polygonum paronychia*), beach suncup (*Camissonia cheiranthifolia*), seashore lupine (*Lupinus littoralis*), and seashore bluegrass (*Poa macrantha*).

The most common natural disturbance is frequent movement of material by wind, which results in constant reshaping and blowouts of dunes. This ecological site is also subject to storm tidal surges. Unnatural disturbances include urban sprawl, off-road vehicle use, non-native species establishment, and intentional sand dune stabilization. Changes in climate, intentional stabilization of sand dunes, and establishment of non-native species may shift this ecological site to the Dune Forest (F04AB202OR) site.



Figure 1. Ecological sites of the coastal/beach zone in LRU B of MLRA 4A. 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) <i>Abronia latifolia</i> (2) <i>Cakile edentula ssp. edentula var. edentula</i>

Physiographic features

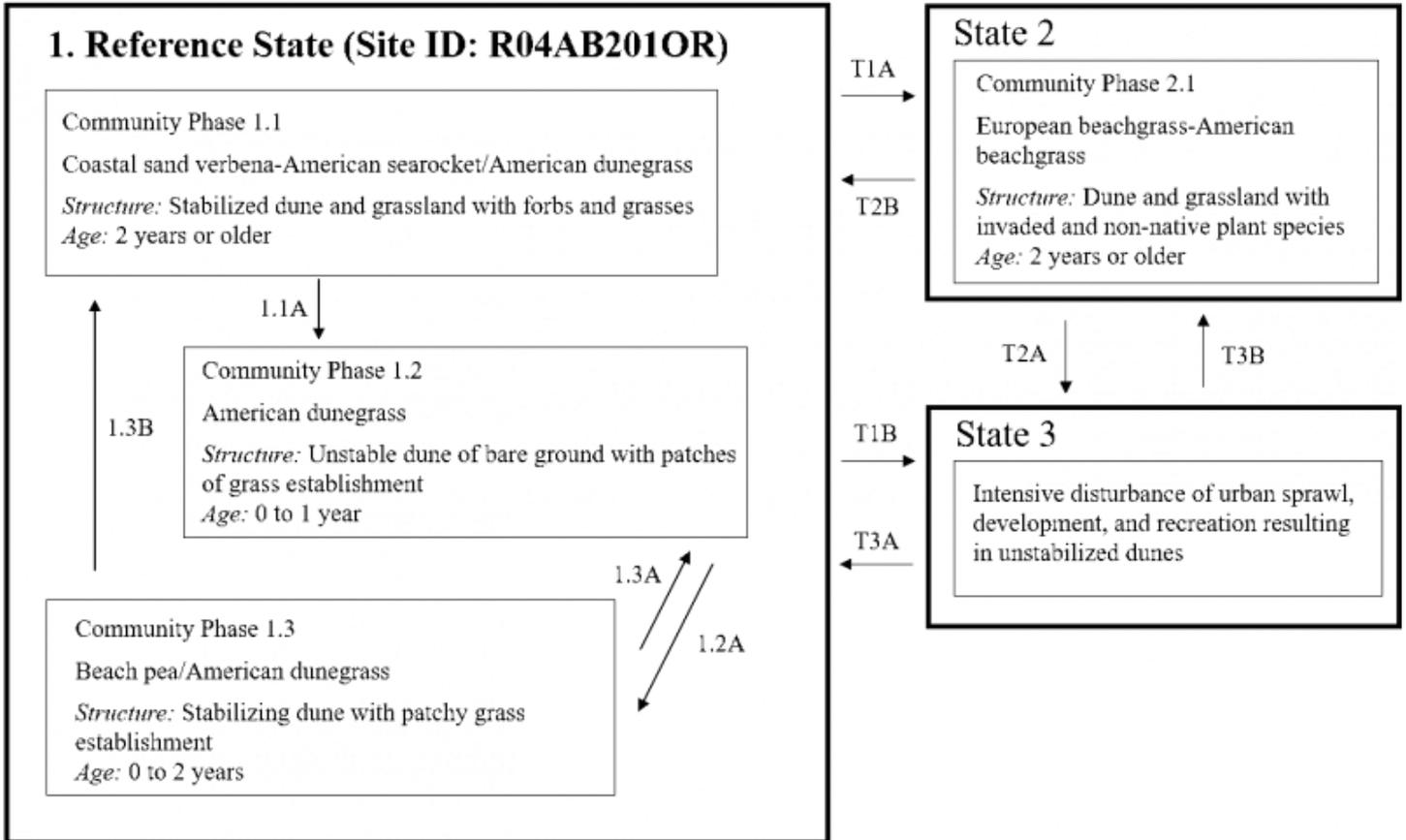
Climatic features

Influencing water features

Soil features

Ecological dynamics

State and transition model



Abronia latifolia-Cakile edentula var. edentula/Leymus mollis spp. mollis
Coastal sand verbena-American searocket/American dunegrass

→ Community Phase Pathway 1.X = Community Phase X#Y = Transition Pathway
1.XY = Pathway (ecological response to natural processes)

**State 1
Reference**

**Community 1.1
Coastal Sand Verbena, American Searocket, and American Dunegrass**



Structure: Stabilized dune and grassland with forbs and grasses The reference community is stabilized dunes that have exposed sand and established grass and forb vegetation. The dunes vary in size and maturity depending on the position on the landscape, prevailing winds, and position along the coastline. Bare ground may make up as

much as 70 percent of the landscape, but the total herb cover may be as much as 100 percent in some areas. The most common species include American dunegrass (*Leymus mollis* spp. *mollis*), coastal sand verbena (*Abronia latifolia*), American searocket (*Cakile edentula* var. *edentula*), beach pea (*Lathyrus japonicus*), beach strawberry (*Fragaria chiloensis*), silver bur ragweed (*Ambrosia chamissonis*), seashore false bindweed (*Calystegia soldanella*), camphor tansy (*Tanacetum camphoratum*), beach knotweed (*Polygonum paronychia*), beach suncup (*Camissonia cheiranthifolia*), seashore lupine (*Lupinus littoralis*), and seashore bluegrass (*Poa macrantha*). This community is influenced by frequent winds and sand dispersal. The vegetation is tolerant of routine inputs of salt spray and extreme drought in summer. It represents a lack of major disturbance and unnatural modifications. Depending on the amount of wind erosion, the vegetative cover may naturally fluctuate from sparse to full.

Community 1.2 American Dunegrass



Structure: Unstable dune of bare ground with patches of grass establishment Community phase 1.2 represents a dune that has been affected by a major disturbance and is at the initiation phase of regeneration. The vegetation is sparse emerging American dunegrass and patchy herbaceous cover. In some areas, forbs may develop before grasses. The unstable dune is highly susceptible to disturbances such as wind erosion, trampling, and drought. Minimizing human-caused disturbance is important to the vegetative recovery of the site. Monitoring for establishment of non-native species, primarily European beachgrass (*Ammophila arenaria*), is imperative for a successful native plant community.

Community 1.3 Beach Pea and American Dunegrass



Structure: Stabilizing dune with patchy grass establishment Community phase 1.3 represents a dune that is stabilizing and has a higher diversity of plant life. Forbs establish as the American dunegrass stabilizes and develops a well-established mat. Forbs such as beach pea, seashore false bindweed, and beach strawberry may be intermixed, and red fescue (*Festuca rubra*) may be among the grass community.

Pathway 1.1A Community 1.1 to 1.2



Coastal Sand Verbena,
American Searocket, and
American Dunegrass



American Dunegrass

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.

Pathway 1.2A Community 1.2 to 1.3



American Dunegrass



Beach Pea and American
Dunegrass

This pathway represents a transition toward dune stabilization as a result of increased plant diversity and cover.

Pathway 1.3B Community 1.3 to 1.1



Beach Pea and American
Dunegrass



Coastal Sand Verbena,
American Searocket, and
American Dunegrass

This pathway represents a transition toward dune stabilization as a result of increased plant diversity and cover.

Pathway 1.3A Community 1.3 to 1.2



Beach Pea and American
Dunegrass



American Dunegrass

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.

State 2 Invaded

Community 2.1 European Beachgrass and American Beachgrass

Structure: Dune and grassland with invaded and non-native plant species Community phase 2.1 represents an area

that has been susceptible to non-native species. European beachgrass (*Ammophila arenaria*) is an exotic grass that has been introduced to stabilize dunes. It is highly successful at building thick mats of vegetation very rapidly and can tolerate salt spray, wind erosion, and excessive drought. American beachgrass (*Ammophila breviligulata*) was planted along the Long Beach peninsula, and it has spread throughout the coastal zone (Roccio, 2015). A small remnant community of American dunegrass, seashore lupine, and coastal strawberry may be present. Other common non-native species include little hairgrass (*Aira caryophyllea*) and hairy cat's ear (*Hypochaeris radicata*).

State 3 Developed

This state represents a full departure from the native reference state as a result of human-caused disturbances. Off-road vehicle use, residential development, and roadway construction will increase the susceptibility to non-native species, restrict the movement of sand (necessary for healthy dunes), and reduce habitat.

Transition T1A State 1 to 2

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. This pathway 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 T1B State 1 to 3

This pathway represents human-influenced disturbance from urban sprawl or other development or from excessive use of recreational off-road vehicles. The stabilized dunes and habitat are diminished or completely lost.

Transition T2B State 2 to 1

This pathway represents restoration of the native plant community. It is extraordinarily difficult to successfully remove Scotch broom, gorse, European beachgrass, and American beachgrass once established. Native seed sources and extensive management and mitigation of brush and non-native species are needed to restore the community.

Transition T2A State 2 to 3

This pathway represents human-influenced disturbance from urban sprawl or other development or from excessive use of recreational off-road vehicles. The stabilized dunes and habitat are diminished or completely lost.

Transition T3A State 3 to 1

This pathway represents removal of man-made structures. Non-native seed disbursement is introduced (intentionally or unintentionally), which changes the reference community.

Transition T3B State 3 to 2

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

Additional community tables

Other references

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Approval

Kirt Walstad, 1/23/2025

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	05/07/2024
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:**
