

Ecological site R016XA004CA Island Sandhills

Accessed: 09/22/2026

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): 016X–California Delta

16 – California Delta Most of this area is in the California Trough Section of the Pacific Border Province of the Pacific Mountain System. A small part at the west edge of the area is in the California Coast Ranges Section of the same province and division. This MLRA was originally the conjoined flood plain along the Sacramento and San Joaquin Rivers. As sediment from these rivers built up in San Pablo Bay, a delta formed, creating many streams that divide this nearly level area into “islands.” Strong levees and drainage systems are needed to protect the islands from flooding. Elevation of the islands ranges from below sea level to slightly above sea level. This area is underlain by interbedded marine, estuarine, and fine-grained non-marine sediments transported to the delta by the Sacramento and San Joaquin Rivers as they flowed into San Pablo Bay. As the sediments built up, a delta formed and freshwater mixed with brackish water in marshes and on flood plains. As the marsh vegetation became covered with new sediments, the organic matter content in the soils built up to very high levels. When drained and exposed to the air, these peaty soils oxidize and shrink and then subside. Land resource unit (LRU) 016XA is the eastern portion of the MRLA and is distinguished from the western LRU 016B by lesser influence of river hydrology and salt water upon the ecological sites.

Classification relationships

Using the December 2010 draft EPA ecoregion level IV: 7j, Delta polygon mostly closely overlaps with MLRA 16. MLRA 16 mostly aligns with the USFS (1997) ecological subsection 262AI, Great Valley, Delta.

Ecological site concept

This ecological site occurs on gently rolling low-elevation and mostly stable sandhills, primarily on islands and influenced by water table fluctuations and minor salt accumulation and vertical migration within the surface soil horizons. Vegetation potential includes saltgrass (*Distichlis spicata*) and other salt tolerant species such as coyote brush (*Baccharis pilularis*) and salt fat hen (*Atriplex patula*) but current dominant species typically are Bermuda grass and annual grasses.

Associated sites

R016XA001CA	Tidally-Influenced, Freshwater 016XA001 occurs in a coarse mosaic with this site occupying low lying pockets between stable dunes and extending to the historic water's edge.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Baccharis pilularis</i> (2) <i>Atriplex triangularis</i>

Herbaceous	(1) <i>Distichlis spicata</i>
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Physiographic features

This site occurs on ancient low-relief sand dunes extending from off-shore dunes and into the Delta floodplain. Unlike the inland dunes, this site is more obviously influenced by the water table by virtue of elevation and proximity to Delta waters. Some small extents of the site may occur below sea level as a result of subsidence of adjacent organic soils (016XA001).

Table 2. Representative physiographic features

Landforms	(1) Dune
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Rare to occasional
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None to occasional
Elevation	0 m
Slope	0 – 10 %
Ponding depth	0 – 10 cm
Water table depth	50 – 100 cm
Aspect	Aspect is not a significant factor

Climatic features

Soil moisture as influenced by water table fluctuations augment precipitation which is typically 100% rain as it is for the entire MLRA.

Table 3 Representative climatic features

Frost-free period (average)	290 days
Freeze-free period (average)	340 days
Precipitation total (average)	330 mm

- (1) ANTIOCH PUMP PLT #3 [USC00040232], Antioch, CA

Influencing water features

Soil features

The soils associated with this ecological site are very deep and developed from alluvium and eolian deposits derived from mixed sources.

Surface textures are sand, loamy sand, and fine sandy loam. Subsurface textures are sand, loamy sand, and fine sandy loam. Electrical conductivity of the soil (EC) is less than 4 d/Sm throughout. There is weak discontinuous calcium carbonate and silica cementation present but is not a root limiting horizon.

These soils are poorly drained with slow to rapid permeability. The high water table is root limiting for crops. Much of the areas' water table has been manipulated. In un-drained areas roots are limited by the water table occurring from approximately 20 inches and extending to about 40 inches below the surface throughout the year, and are saturated with water within a depth of 20 inches for 4 to 12 months a year. The soil moisture regime is aquic and the soil temperature regime is thermic.

The soils that are correlated to this ecological site are the Piper soils in map unit Ph (Coarse-loamy, mixed (calcareous), thermic Typic endoaquents) and Piper soils in map units Pd and Pe (Sandy, mixed, thermic Typic Psammaquents). The soils identified as Piper in this site do not meet the current criteria of the Piper series (Keys to Soil Taxonomy 12th Edition).

This ecological site has been correlated with the following mapunits and soil components in MLRA 16 CA013; Contra Costa County soil survey area, California

Pd; Piper sand; Piper

Pe; Piper loamy sand; Piper

Ph; Piper fine sandy loam; Piper

Table 4. Representative soil features

Parent material	(1) Eolian deposits – granite (2) Alluvium – sandstone (3) Alluvium – granite
Surface texture	(1) Sand (2) Sandy loam (3) Fine sandy loam
Family particle size	(1) Sandy
Drainage class	Poorly drained
Permeability class	Moderate
Soil depth	150 – 180 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

Available water capacity (0-101.6cm)	7.62 – 18.29 cm
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 20
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

This ecological site historically would be represented by a complex series of comparatively high relief stable dunes in a mosaic pattern with 016XA001. Well sorted, discontinuously weakly cemented wind-deposited sands largely of granitic origin (Sierra Nevada) are the hallmark of the ecological site along the southern fringe of the western part of the LRU. Much of this site was historically occasionally inundated but due the high water table and capillary action of the sands, some salts have accumulated in the soil surface horizon and this site was able to support large amounts of saltgrass. Shrub species distribution across the site was likely largely dictated by the relative depth of the high water table. This site is of limited extent covering just 1% of the LRU near the city of Oakley, predominantly on Bethel and Jersey islands.

Almost all of this ecological site has been substantially altered from its pre-gold mining era conditions. This is largely due to levee construction and direct conversion to production agriculture. Most extents of the site not currently in agricultural production have been developed. Some areas retain the topography of low relief transverse dunes but most of it has been partially leveled for Bermuda grass production. Areas without active management or grazing are dominated by annual grasses, most notably ripgut brome which grows to only a moderate height, presumably due to salts in the soil and the resulting water stress on the plants.

Coyote brush, salt fat hen and lupine were historically the most likely shrub components on this site although coyote brush currently occurs only incidentally. Other shrubs and trees present in the mosaic are more likely associated with the sister site 016XA001 on the lowest portions of the mosaic with willows frequently accompanied by cattails and blackberry there.

Currently, pumping of groundwater is necessary to keep much of the site from continuous inundation as a result of subsidence. It is assumed here that much of the subsidence associated with the ecological site has been in conjunction with the 016XA001 portion of the mosaic; surficial losses of organic matter, while comparatively trivial in quantity, are assumed to have occurred on nearly the entire ecological site due to historic tillage and land levelling efforts.

State and transition model

Figure 5. STM016XA004

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Other references

USDA, NRCS NASIS

Contra Costa Soil Survey (1977)

Piper series official series description.

Contributors

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Acknowledgments

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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	
Approved by	
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:
