

Ecological site group 16-1

Ecological Site Group 1

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Key Characteristics

None specified

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.

Climate

This is a three state model, with two community phases in State 1, three community phases in State 2, and two community phases in State 3. The ecological sites included in this group include R016XA001CA and R016XB001CA.

Vegetation dynamics

This is a three state model, with two community phases in State 1, three community phases in State 2, and two community phases in State 3. The ecological sites included in this group include R016XA001CA and R016XB001CA.

Major Land Resource Area

MLRA 016X
California Delta

Stage

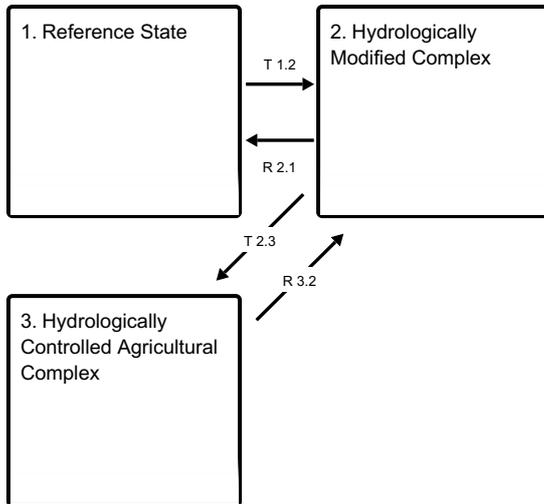
Provisional

Contributors

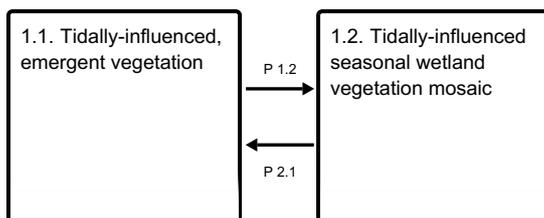
Curtis Talbot

State and transition model

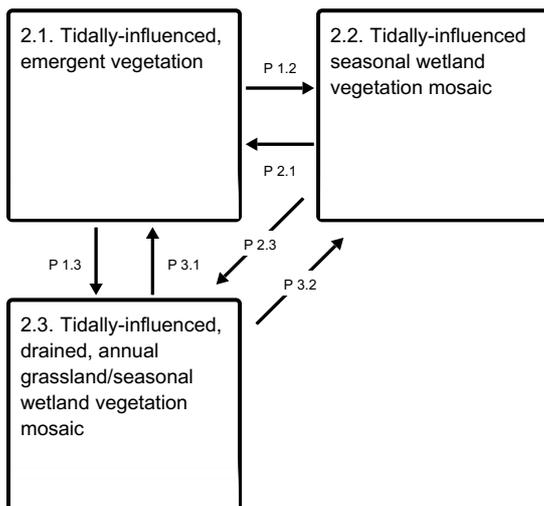
Ecosystem states



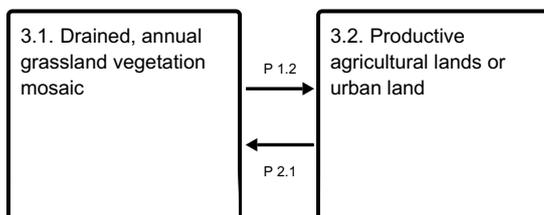
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1 Reference State

The species composition of the two community phases of the reference state are poorly documented in relation to the site and are better understood at the scale of the land resource unit (LRU) as a diverse mosaic of both marsh and riparian forest vegetation types. Through the influence of both tidal and riverine hydrology, these soils represent both the immediate depositional zone of upstream sediments as well the plant communities most likely to be controlled by high water table influences. This reference state consists two community phases, 1.1 which represents a recently disturbed, inundated and/or deposited soil dominated by pioneering emergent wetland

vegetation, and community phase 1.2 representing a less recently disturbed and more diverse mosaic of herbaceous wetland communities. Not surprisingly, this vegetation of community phase 1.2 represents the continuous accumulation of organic material in the soil from onsite vegetation contributions leading to the histosol classification of the representative soils. While most of the LRU has been subjected to significant hydrologic alteration, echoes of these two community phases remain observable in areas which were deemed too economically difficult to reclaim for agricultural purposes or where such efforts to reclaim the land failed and the preexisting hydrology exerted itself.

Community 1.1

Tidally-influenced, emergent vegetation

California bulrush and cattail are clearly dominant species appearing in uniform stands or in a mosaic. Minor species are common but having irregular distribution.

Community 1.2

Tidally-influenced seasonal wetland vegetation mosaic

Willows and cottonwood species codominant with cattail and bulrush in semi-concentric patterns with willows at the drier extents of perennial wetland areas. Spaces between ponded areas frequently near-monotypic dominance by cattail with occasional extensive stands of willows and/or limited stands of cottonwood trees.

Pathway P 1.2

Community 1.1 to 1.2

Incidental and elevation of soils adjacent to sediment laden surface waters following regular tidal submersion and sediment contributions from upstream sources.

Pathway P 2.1

Community 1.2 to 1.1

Reorientation of surface hydrology via short-interval flood event.

State 2

Hydrologically Modified Complex

This state represents a partially controlled hydrology with notably drier soil conditions than historic conditions afforded by the application of levees and in some cases dewatering by pumping or marginally effective gravity drainage. It generally occurs side-by-side with State 3 in the form of fringe areas or blocks between actively cultivated fields or restored areas approaching some semblance of the reference state. The condition of these areas include some retention of natural topography and native vegetation. There is potential in any State 2 community phase to restore conditions to the Reference State by removing artificial barriers to hydrology and other more superficial dewatering efforts. Due to the complexity of water flow regulation within the LRU, areas of approximate historic elevation and proximity to natural water flows present the highest opportunity for successful restoration to the Reference State. Restoration of this state in some cases presents unique complications for adjacent land management objectives which may be influenced by altered hydrology.

Community 2.1

Tidally-influenced, emergent vegetation

California bulrush and cattail are clearly dominant species while giant reed (*Arundo*) or *Phragmites australis* is recognized as a problem in some areas contiguous to this ecological site and the LRU primarily along levees.

Community 2.2

Tidally-influenced seasonal wetland vegetation mosaic

Willows and cottonwood species codominant with cattail and California bulrush in semi-concentric patterns with willows at the drier extents of perennial wetland areas. Spaces between ponded areas frequently near-monotypic

dominance by cattail with occasional extensive stands of willows and/or limited stands of cottonwood trees. Alternately, shrub species such as wild rose and blackberry (native and introduced) may occupy areas with historically limited water and may be consistent with slugs of somewhat coarser soils deposited following higher flow events.

Community 2.3

Tidally-influenced, drained, annual grassland/seasonal wetland vegetation mosaic

This is the standout community phase which differentiates this state as distinct from the Reference State. It is characterized by interspersed stands of Mediterranean climate-adapted upland vegetation indicative of dewatering of higher elevation portions of the landscape otherwise punctuated by perennial wetland and to a much lesser degree freshwater marsh vegetation types at the lower elevations. Presence of the upland vegetation portion of the mosaic may pulse over time due to water table fluctuations this community phase with increases during prolonged periods of limited water availability and reduced extents following consecutive years of “surplus” soil water availability. Deep-rooted invasive perennial species such as pepper weed frequently are a problem within the soil moisture transition between pure annual grassland and wetland habitats proper.

Pathway P 1.2

Community 2.1 to 2.2

Incidental and elevation of soils adjacent to sediment laden surface waters following regular tidal submersion and sediment contributions from upstream sources.

Pathway P 1.3

Community 2.1 to 2.3

Isolation by levee or dike, dewatering by pumping and gravity.

Pathway P 2.1

Community 2.2 to 2.1

Reorientation of surface hydrology via short-interval flood event.

Pathway P 2.3

Community 2.2 to 2.3

Isolation by levee or dike, draining and pumping of subsurface water.

Pathway P 3.1

Community 2.3 to 2.1

Wetland enhancement involving reduced pumping of subsurface waters. Hydrology of adjacent land would likely be effected by this treatment.

Pathway P 3.2

Community 2.3 to 2.2

Wetland enhancement involving reduced pumping of subsurface waters. Hydrology of adjacent land would likely be effected by this treatment.

State 3

Hydrologically Controlled Agricultural Complex

This is the representative state with over 90% of the ecological site in agriculture production. Based on ground and surface water management and other agronomic inputs, this state is considered to produce the most biomass of any of the three states. This state represents the highest degree of alteration of the ecological site primarily through hydrologic alteration in the form of diversions and successful conversion to agricultural production. As a result of the

historic reclamation practice of installing levees and the burning of the organic soil surface coupled with cultivation effects on carbon mineralization of organic accumulations, some of the historic soils have lost enough diagnostic organic matter content and subsequently have been classified as mollisols. Restoration of the ecological site when in State 3 is substantially more complex, primarily due to the agricultural resources at stake. Typically held as some of the most productive land in California, restoration efforts within State 3 require very careful planning especially where land ownership is complex. Additionally, some island areas of this ecological site have elevations significantly lower than flanking waterbodies and in such cases, the possibility of an open body of water occurring where the island exists is of substantial concern in some cases.

Community 3.1 Drained, annual grassland vegetation mosaic

Absence of management following the near total alteration of surface and subsurface hydrology facilitates dominance by Mediterranean climate-adapted annual grassland communities with near exclusive dominance by introduced grass species. Some perennial invasive species such as pepper weed may persist in lowland areas where water collects and soil moisture conditions favor dominance.

Community 3.2 Productive agricultural lands or urban land

This community phase is characterized by the highest degree of land use for the ecological site. Vegetation and soils actively managed for agricultural production or has been developed for transportation or structural purposes.

Pathway P 1.2 Community 3.1 to 3.2

Agricultural crop production (or urban development).

Pathway P 2.1 Community 3.2 to 3.1

Abandonment of agricultural operations.

Transition T 1.2 State 1 to 2

Installation of upstream dams; installation of dikes and other water control structures; burning and leveling of organic soils; filling in of low elevation channels and ponds; pumping of subsurface waters. Partial drainage of the ecological site with modified flood regime leading to longer periods without flooding and more pronounced drying of higher elevations of the ecological site.

Restoration pathway R 2.1 State 2 to 1

Reduced dewatering of surface and ground waters, reintroduction of low relief topography, revegetation measures. Removal of barriers to natural hydrology in areas of the ecological site higher than the mean water table elevation.

Transition T 2.3 State 2 to 3

Advanced preparation for agricultural production including ground water management, land leveling and soil aeration. Levee construction and artificial drainage combined with cultivation and/or development.

Restoration pathway R 3.2 State 3 to 2

Increase water table elevation, reestablish low elevation topographic relief, revegetate with native species

composition. Removal of barriers to natural hydrology in areas of the ecological site higher than the mean water table elevation combined with de-levelling of the site.

Citations