

18040

Hawai'i Freshwater Marsh

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Modelers		Reviewers	
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Vegetation Type

Herbaceous Wetland

Map Zones

79

Geographic Range

This system occurs from sea level up to 500m (1,640ft) elevation on Laysan, Kaua'I, O'ahu, Moloka'I, Lana'i, Maui, and Hawai'i.

Biophysical Site Description

Freshwater marshes occur on the northwestern Hawai'ian islands and throughout the main islands as a mostly small-patch system confined to limited areas in floodplain or basin topography. This system occupies estuaries, surrounds open bodies of water, occurs in former ponds, and sometimes along streams and springs. Water levels in freshwater marshes fluctuate seasonally, but they usually retain standing water most of the year. Climate is variable depending on where the stand occurs, ranging from arid to very wet (zones 1-7) of the seven moisture zones developed for the Hawai'ian Islands by Price et al. (2007). Soils range from silty clays to deep gley mucks to loams and sand over less permeable subsoils.

Vegetation Description

Vegetation is dominated by emergent herbaceous bulrushes, sedges and grasses, including *Schoenoplectus maritimus* (= *Bolboschoenus maritimus*), *Cyperus* spp., and *Schoenoplectus* spp. In a few locations known to formerly support bodies of water on Hawai'i (Waimanu Valley) and O'ahu (Kawai Nui marsh and at Ka'au Crater), marsh vegetation is dominated by *Cladium mariscus* ssp. *Jamaicense* (= *Cladium jamaicense*). Ferns such as *Thelypteris interrupta* are present in all successional stages of this system.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
SCMA8	<i>Schoenoplectus maritimus</i>	Cosmopolitan bulrush
CAEC	<i>Carex echinata</i>	Star sedge
THIN2	<i>Thelypteris interrupta</i>	Willdenow's maiden fern
CYLA2	<i>Cyperus laevigatus</i>	Smooth flatsedge
CLMA10	<i>Cladium mariscus</i>	Swamp sawgrass

Species names are from the NRCS PLANTS database. Check species codes at <http://plants.usda.gov>.

Disturbance Description

Primary disturbances include wet terrace agriculture by Hawaiian natives, natural filling by erosion. Storm surges and floods also occur resulting in major disturbance of the substrate and the vegetation.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement				
Moderate (Mixed)				
Low (Surface)				
All Fires				

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Adjacency or Identification Concerns

This system interfaces with saline tidal marsh (Northern Polynesia Tidal Salt Marsh [CES412.224]) in windward estuaries, where species from both freshwater and saltwater marshes coexist.

Issues or Problems

This system does not include bogs. For some reason, many constituent species suffer taxonomic confusion (names are inconsistent, not agreed upon, etc.).

Native Uncharacteristic Conditions

Comments

Succession Classes

Mapping Rules

Upper Layer Lifeform	Height (m)	Canopy Cover (%)									
		0-10	11-20	21-30	31-40	41 - 50	51-60	61-70	71-80	81-90	91-100
Herb	0-0.5	A	A	A	A	A	A	B	B	B	B
Herb	0.5-1.0	A	A	A	A	A	A	B	B	B	B
Herb	>1.0	A	A	A	A	A	A	B	B	B	B
Shrub	0-0.5	B	B	B	B	B	UN	UN	UN	UN	UN
Shrub	0.5-1.0	B	B	B	B	B	UN	UN	UN	UN	UN
Shrub	1.0-3.0	B	B	B	B	B	UN	UN	UN	UN	UN
Shrub	>3.0	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	0-5	B	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	5-10	B	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	10-25	B	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	25-50	B	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	>50	B	UN	UN	UN	UN	UN	UN	UN	UN	UN

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and

broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

Description

Class A 16 Early Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CYLA2	Cyperus laevigatus	Smooth flatsedge	Upper

Description

This seral state is characterized by marginal herbaceous vegetation on open water body.

Maximum Tree Size Class

None

Class B 84 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
SCMA8	Schoenoplectus maritimus	Cosmopolitan bulrush	Upper
THIN2	Thelypteris interrupta	Willdenow's maiden fern	Upper

Description

Vegetation can be characterized as dense herbaceous exceeding in some instances 1m in height.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:OPN	0	Late1:CLS	100
Late1:CLS	101	Late1:CLS	999

Probabilistic Transitions

Disturbance Type	Disturbance occurs In	Moves vegetation to	Disturbance Probability	Return Interval (yrs)	Reset Age to New Class Start Age After Disturbance?	Years Since Last Disturbance
Wind or Weather or Stress	Early1:OPN	Early1:OPN	0.004	250	No	0

Wind or Weather or Stress	Late1:CLS	Early1:OPN	0.002	500	Yes	0
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