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Hawai'i Montane-Subalpine Mesic Grassland

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Vegetation Type

Herbaceous

Map Zones

79

Geographic Range

This grassland ecological system is restricted to montane and subalpine slopes of Haleakala, Maui (Kaplapawili and Kuiki) and Mauna Loa (Kahuku tract), Hawai'i.

Biophysical Site Description

This ecological system occurs on cool windward subalpine slopes of East Maui and Mauna Loa, Hawai'i. Elevation ranges from 2,100m on Maui and 1,680-1,980m on Hawai'i. Sites are relatively mesic as annual rainfall is generally 1,300-2,500mm. Soils can be shallow over rock, or much deeper ash deposits, retaining moisture.

Vegetation Description

Vegetation is characterized by moderate to dense bunchgrass layer (<1m tall) dominated by *Deschampsia nubigena* with *Pteridium aquilinum* var. *decompositum* frequently codominate (Gagne and Cuddihy 1990). Other herbaceous species include *Carex* spp., *Uncinia* sp. cf. *uncinata*, *Ranunculus* spp., *Luzula hawaiiensis*, *Plantago* spp., and *Sanicula sandwicensis*. Scattered shrubs may be also present such as *Comptosia montana*, *Dubautia* spp., *Sophora chrysophylla*, *Vaccinium* spp., and *Styphelia tameiameia*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
DENU6	<i>Deschampsia nubigena</i>	Alpine hairgrass
PTAQ	<i>Pteridium aquilinum</i>	Western brackenfern
LUHA2	<i>Luzula hawaiiensis</i>	Hawai'i woodrush
CAMA9	<i>Carex macloviana</i>	Thickhead sedge
SASA9	<i>Sanicula sandwicensis</i>	Hawai'i blacksnakeroot

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

Disturbance Description

Natural fires extremely rare, though evidence via charcoal layers of past fire at Kalapawili; associated with lava flows on Hawai'i Island, and lightning throughout range, storms might expand range by opening tree canopy in adjacent forest and forming new alluvial pans, taking system back to primary succession

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement				
Moderate (Mixed)				
Low (Surface)	506	100		
All Fires	506	100		

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

This system is usually patchy in Kahuku, but forming a subalpine band on windward Maui.

Adjacency or Identification Concerns

This system forms a complex mosaic with adjacent shrublands.

Issues or Problems

In today's setting, several exotic species are common in disturbed stands.

Native Uncharacteristic Conditions

Shrubs in this system seldom, if ever, achieve more than 10% canopy closure.

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	B	B	B	B	B	B
Herb	0.5-1.0	A	A	A	A	B	B	B	B	B	B
Herb	>1.0	A	A	A	A	B	B	B	B	B	B
Shrub	0-0.5	B	B	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	0.5-1.0	B	B	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	1.0-3.0	B	B	UN	UN	UN	UN	UN	UN	UN	UN
Shrub	>3.0	B	B	UN	UN	UN	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	3	Early Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PTAQ	<i>Pteridium aquilinum</i>	Western brackenfern	Upper
DENU6	<i>Deschampsia nubigena</i>	Alpine hairgrass	Upper

Description

Disturbances in this class include fresh ashfall and fresh alluvial pan of fine volcanic material formed by flood.

Maximum Tree Size Class

None

Class B	97	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PTAQ	<i>Pteridium aquilinum</i>	Western brackenfern	Upper
DENU6	<i>Deschampsia nubigena</i>	Alpine hairgrass	Upper
LUHA2	<i>Luzula hawaiiensis</i>	Hawai'i woodrush	Lower
SASA9	<i>Sanicula sandwicensis</i>	Hawai'i blacksnakeroot	Lower

Description

Disturbances in this class include fresh ashfall and fresh alluvial pan of fine volcanic material formed by flood.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:OPN	0	Late1:CLS	15
Late1:CLS	16	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
Optional 1	Early1:OPN	Early1:OPN	0.001	1000	No	0
Optional 2	Early1:OPN	Early1:OPN	0.01	100	No	0
Optional 2	Late1:CLS	Early1:OPN	0.001	1000	Yes	0
Optional 1	Late1:CLS	Early1:OPN	0.001	1000	Yes	0
Surface Fire	Late1:CLS	Late1:CLS	0.002	500	No	0

Optional Disturbances

Optional 1: Ash Deposit

Optional 2: Outwash

References

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