18230

Hawai'i Montane-Subalpine Mesic Grassland

BpS Model/Description Version: Aug. 2020

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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 *Comprosma montana*, *Dubautia* spp., *Sophora chrysophylla*, *Vaccinium* spp., and *Styphelia tameiameiae*.

BpS Dominant and Indicator Species

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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PTAQ | Pteridium aquilinum | Western brackenfern | Upper |
| DENU6 | Deschampsia nubigena | 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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PTAQ | Pteridium aquilinum | Western brackenfern | Upper |
| DENU6 | Deschampsia nubigena | Alpine hairgrass | Upper |
| LUHA2 | Luzula hawaiiensis | Hawai’i woodrush | Lower |
| SASA9 | Sanicula sandwicensis | 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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