18180

Hawai'i Lowland Mesic Shrubland

BpS Model/Description Version: Aug. 2020

Update: 6/6/2018

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Jim Jacobi | jim\_jacobi@usgs.gov |  |  |
| Darren Johnson | darren\_johnson@tnc.org |  |  |
| Sam Gon III | sgon@tnc.org |  |  |

Vegetation Type

Shrubland

Map Zones

79

Geographic Range

This system occurs on all of the main islands except Ni'ihau and Kaho'olawe.

Biophysical Site Description

Dry lowland shrublands occur mostly on the leeward side of all the main islands except Ni'ihau and Kaho'olawe, and are found between 10-1,000m in elevation. These shrublands are generally less than two meter in height. These shrublands occur on open gentle slopes to steep ridges of dissected slopes. Rainfall is 500-1,500mm, mostly restricted to the winter months, with summers hot and dry. Soils vary from silty loams to relatively unweathered pâhoehoe lava. This lowland ecological system occurs over a broad moisture range within the arid, very dry, moderately dry, and seasonally mesic zones (zones 1, 2, 3 and 4) of the seven moisture zones developed for the Hawai'ian Islands by Price et al. (2007).

Vegetation Description

Vegetation has an open to closed canopy, up to 3m (10ft) in height, with varying herbaceous undergrowth. Gagne and Cuddihy (1990) recognize five native communities: Ōhi‘a (*Metrosideros polymorphora*) Shrubland, Pūkiawe/‘A‘ali‘i (*Styphelia*/*Dodoneae*) Shrubland, ‘Ūlei (*Osteomeles*) Shrubland, Nehe (*Lipochaeta*) Shrubland and Iliau (*Wilkesia*) Shrubland. Constituents include *Dicranopteris*, *Metrosideros*, *Dodonaea*, *Styphelia*, *Vaccinium*, *Osteomeles*, *Sphenomeris*, *Korthalsella*, *Cocculus*, *Chamaesyce* spp., *Scaevola gaudichaudiana*, *S. gaudichaudii*, *Cladonia* (lichen), *Pittosporum* spp., *Dianella*, *Carex*, *Gahnia*, *Luzula*, *Lobelia yuccoides*, *Sadleria*, *Wikstroemia*, and *Eragrostis variabilis*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| MEPO5 | *Metrosideros polymorpha* | 'ohi'a lehua |
| STTA | *Styphelia tameiameiae* | Pukiawe |
| OSAN | *Osteomeles anthyllidifolia* | Hawai'i hawthorn |
| LIPOC2 | *Lipochaeta* | Nehe |
| WIKST | *Wikstroemia* | False ohelo |
| SCGA2 | *Scaevola gaudichaudiana* | Mountain naupaka |
| LOYU | *Lobelia yuccoides* | Panaunau |
| ERVA | *Eragrostis variabilis* | Kawelu |

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

Disturbance Description

Fire from lava or other sources, but not frequent, due to mesic setting, except during drought periods. Not a zone often used by Hawaiians for pili grass production (too moist), nor used for agriculture.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement |  |  |  |  |
| Moderate (Mixed) | 51 | 100 |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 51 | 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

Occupies a large band below mesic forest and above lowland dry systems.

Adjacency or Identification Concerns

Adjacent to dry shrubland, lowland mesic forest.

Issues or Problems

Native Uncharacteristic Conditions

Trees when they occur seldom, if ever, exceed 25% 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 | A | A | A | A | A | A |
| Herb | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Herb | >1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0-0.5 | A | A | B | B | B | B | B | C | C | C |
| Shrub | 0.5-1.0 | A | A | B | B | B | B | B | C | C | C |
| Shrub | 1.0-3.0 | A | A | B | B | B | B | B | C | C | C |
| Shrub | >3.0 | A | A | B | B | B | B | B | C | C | C |
| Tree | 0-5 | C | C | C | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | C | C | C | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | C | C | C | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | C | C | C | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | C | C | C | 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 2 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| MEPO5 | Metrosideros polymorpha | 'ohi'a lehua | Upper |
| SACY3 | Sadleria cyatheoides | Amaumau fern | Upper |
| OSAN | Osteomeles anthyllidifolia | Hawai'i hawthorn | Upper |
| SIFA | Sida fallax | Yellow llima | Upper |

Description

Starting conditions open substrate of lava or soil, to early mixed shrubs and ferns.

*Maximum Tree Size Class*  
None

Class B 16 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| HECO10 | Heteropogon contortus | Tanglehead | Middle |
| MEPO5 | Metrosideros polymorpha | 'ohi'a lehua | Upper |
| STTA | Styphelia tameiameiae | Pukiawe | Upper |

Description

Open to closed mix of shrubs and grasses dominant, with shrubs eventually displacing grasses.

*Maximum Tree Size Class*  
None

Class C 82 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| MEPO5 | Metrosideros polymorpha | 'ohi'a lehua | Upper |
| STTA | Styphelia tameiameiae | Pukiawe | Upper |
| DOVI | Dodonaea viscosa | Florida hopbush | Upper |
| OSAN | Osteomeles anthyllidifolia | Hawai'i hawthorn | Upper |

Description

Closed shrubland with grasses and forbs not prominent, some scattered trees, especially on boundary with adjacent lowland forest types; grass cover typically <10%.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Mid1:CLS | 20 |
| Mid1:CLS | 21 | Late1:CLS | 30 |
| Late1:CLS | 31 | 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 1 | Mid1:CLS | Early1:OPN | 0.001 | 1000 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.02 | 50 | No | 0 |
| Optional 1 | Late1:CLS | Early1:OPN | 0.001 | 1000 | Yes | 0 |
| Mixed Fire | Late1:CLS | Mid1:CLS | 0.02 | 50 | Yes | 0 |

Optional Disturbances

Optional 1: Lava Flows

References

Gagne, W.C., and L.W. Cuddihy. 1990. Vegetation. Pages 45-114 in: W.L. Wagner, D.R. Herbst, and S.H. Sohmer, editors. Manual of the Flowering Plants of Hawaii. 2 Volumes. University of Hawaii Press, Honolulu.

Mueller-Dombois, D., and F.R. Fosberg. 1998. Vegetation of the tropical Pacific islands. Springer-Verlag, New York. 733 pp.

NatureServe. 2008. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: September 3, 2008 ).

Price, J.P., S.M. Gon III, J.D. Jacobi, and D. Matsuwaki. 2007. Mapping plant species ranges in the Hawaiian Islands: Developing a methodology and associated GIS layers. Hawai'i Cooperative Studies Unit. Technical Report HCSU-008. Pacific Aquaculture and Coastal Resources Center (PACRC), University of Hawai'i, Hilo. 58 pp., includes 16 figures and 6 tables.

Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1999. Manual of the flowering plants of Hawaii. Revised edition. Volumes 1 and 2. University of Hawaii Press and Bishop Museum Press, Honolulu. 1919 pp.

Western Ecology Working Group of NatureServe. No date. International Ecological Classification Standard: International Vegetation Classification. Terrestrial Vegetation. NatureServe, Boulder, CO.