18190

Hawai'i Lowland Dry Grassland

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Herbaceous

Map Zones

79

Geographic Range

This lowland dry grassland ecological system occurs predominantly on leeward sides of all the main islands.

Biophysical Site Description

This lowland grassland ecological system mostly occurs on dry leeward sides of all the main islands. It also 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).This ecological system also includes coastal dry grasslands that occur beyond the immediate coastal effects of the sea with wind, salt spray and salinity. Elevations range from 10-1,000m (30-3,000ft). Annual precipitation is generally between 100-1,000mm. Substrates are variable. Ecologically stable *Heteropogon contortus* dominated stands may occur on dry lowland cliffs where woody plants cannot form dense canopy (Gagne and Cuddihy 1990).

Vegetation Description

Vegetation in this ecological system is characterized by native dry grass species such as *Heteropogon contortus* (*Pili*) which was fairly widespread. Other species include low scattered native shrubs such as *Sida fallax*, *Dodonaea viscosa*, *Tephrosia purpurea*, and *Waltheria indica*. Other native dry lowland grasslands were dominated by such species as *Eragrostis variabilis*, *Panicum* spp., *Fimbristylis* spp., and *Eragrostis grandis*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| HECO10 | *Heteropogon contortus* | Tanglehead |
| SIFA | *Sida fallax* | Yellow llima |
| DOVI | *Dodonaea viscosa* | Florida hopbush |
| WAIN | *Waltheria indica* | Uhaloa |
| ERVA | *Eragrostis variabilis* | Kawelu |
| FIMBR | *Fimbristylis* | Fimbry |
| PATO | *Panicum torridum* | Torrid panicgrass |
| ERGR | *Eragrostis grandis* | Large hawai'i lovegrass |

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

Disturbance Description

These stands were maintained and expanded by ancient Hawaiians by regular burning (Gagne and Cuddihy 1990). Woody plants invade in the absence of regular fire (Stone and Pratt 1994). There were likely extremely dry zones that would never be replaced by shrubs. *Heteropogon contortus* and *Heteropogon contortus* are fire-adapted grasses. Ecologically stable *Heteropogon contortus*-dominated stands may occur on dry lowland cliffs where woody plants cannot form dense canopies (Gagne and Cuddihy 1990).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement |  |  |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) | 21 | 100 |  |  |
| All Fires | 21 | 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

Large areas of very arid leeward zone would be occupied by this ecological system.

Adjacency or Identification Concerns

Lowland dry shrubland would be adjacent and form a mosaic in transition as would dry cliff systems. This dry grassland system grades into the dry coastal strand system near the leeward coasts. Coastal dry grasslands that are affected by immediate sea coast processes (salt spray and salinity) are classified in the dry coastal strand ecological system.

Issues or Problems

Today, many dry grasslands have been replace by exotic grass species such as *Cenchrus ciliaris*, *Andropogon virginicus*, *Cymbopogon refractus*, *Hyparrhenia hirtus*, *Pennesetum setaceum*, *Melinis repens*, or *Schizachyrium condensatum* or convert to exotic shrublands dominated by *Acacia farnesiana*, *Lantana camara*, *Leucaena leucocephala*, *Schinus terebinthefolius*, or *Prosopis pallida* (coastal only).

Native Uncharacteristic Conditions

Shrubs in this system seldom, if ever, achieve more than 20% 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 | A | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | B | B | B | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | B | B | B | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | B | B | B | 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 5 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SIFA | Sida fallax | Yellow llima | Upper |
| DOVI | Dodonaea viscosa | Florida hopbush | Upper |
| HECO10 | Heteropogon contortus | Tanglehead | Lower |
| WAIN | Waltheria indica | Uhaloa | Upper |

Description

Barren lava, cinder, or soil, slowly developing into open grassland. Sparse shrubs might be taller than grass, but grass is dominant cover.

*Maximum Tree Size Class*  
None

Class B 95 Late Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| HECO10 | Heteropogon contortus | Tanglehead | Middle |
| DOVI | Dodonaea viscosa | Florida hopbush | Upper |
| SIFA | Sida fallax | Yellow llima | Upper |
| WAIN | Waltheria indica | Uhaloa | Low-Mid |

Description

Open grassland of *Heteropogon*, with scattered shrubs (<20%).

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Late1:ALL | 50 |
| Late1:ALL | 51 | Late1:ALL | 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 | Late1:ALL | Early1:OPN | 0.001 | 1000 | Yes | 0 |
| Surface Fire | Late1:ALL | Late1:ALL | 0.05 | 20 | No | 0 |

Optional Disturbances

Optional 1: Lava Flow

References

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