18190
Hawai'i Lowland Dry Grassland

BpS Model/Description Version: Aug. 2020

Update: 6/6/2018

Modelers		Reviewers	
Jim Jacobi	jim_jacobi@usgs.gov		
Sam Gon III	sgon@tnc.org		
Alison Ainsworth	aliainsworth@hotmail.com		

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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