

18160

Hawai'i Montane-Subalpine Mesic Forest

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
Jim Jacobi	jim_jacobi@usgs.gov		
Dawn Greenlee	Dawn_Greenlee@fws.gov		
Sam Gon III	sgon@tnc.org		

Vegetation Type

Forest and Woodland

Map Zones

79

Geographic Range

This forest ecological system occurs on mesic montane and subalpine slopes of Kaua'i, Maui and Hawai'i.

Biophysical Site Description

This ecological system occurs on mesic montane and subalpine slopes of Kaua'i, Maui and Hawai'i, from 900-2,000m (2,950-6,560ft) elevation. Stands are found in the mesic, seasonal precipitation zone between the dry leeward and wet windward climates. Sites are too dry to support rain forests, but do not experience extended periods of drought like the dry forests (Gagne and Cuddihy 1990). Annual rainfall is generally 1,000-2,500 mm, with some areas experiencing a distinct dry period. Substrates include deep volcanic ash soils and trachyte, rocky mucks, and silty loams derived from weathered 'a'ā lava (Gagne and Cuddihy 1990).

Vegetation Description

Vegetation is characterized by an open-to-dense, mostly evergreen tree layer 10-35m tall. There is often diverse subcanopy and tall shrub layers with lianas. *Metrosideros polymorpha*, *Acacia koa*, or *Nestegis sandwicensis* dominate or codominate with other trees (e.g., *Santalum*, *Sapindus*), often present such as *Coprosma* spp., *Ilex anomala*, *Melicope* spp., *Myoporum sandwicense*, *Myrsine* spp., *Nothocestrum breviflorum*, *Pipturus albidus*, *Pisonia brunoniana*, *Pittosporum* spp., *Psychotria hawaiiensis*, *Sapindus saponaria*, *Zanthoxylum hawaiiense*, and dryer forest species like *Chamaesyce celastroides*, *Sophora chrysophylla*, and *Myoporum sandwicense*. The understory is variable and may be dominated by sedges and ferns or shrubs. Tree ferns (*Cibotium* spp.) are typically much less prominent than in wet forest. Common shrubs include *Clermontia* spp., *Cyanea* spp., *Dodonaea viscosa*, *Hedyotis* spp., *Rubus hawaiiensis*, *Stenogyne* spp., and *Styphelia tameiameia*. Common ferns and fern allies present include *Dryopteris wallichiana*, *Microlepia strigosa*, *Nephrolepis cordifolia*, *Pelea* spp., *Sadleria* spp., and graminoids *Carex* spp., and *Uncinia uncinata*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
MEPO5	<i>Metrosideros polymorpha</i>	'ohi'a lehua
ACKO	<i>Acacia koa</i>	Koa

None

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ILAN	<i>Ilex anomala</i>	Hawai'i holly	Upper
MYS2	<i>Myrsine sandwicensis</i>	Kokea lau li'i	Mid-Upper
CORH	<i>Coprosma rhynchocarpa</i>	Woodland mirrorplant	Mid-Upper
DIS3	<i>Diplazium sandwichianum</i>	Hawai'i twinsorus fern	Low-Mid

Description

Disturbances in this class include lava flows. Other disturbances that effect this seral stage include mixed severity fire and storms.

Maximum Tree Size Class

None

Class D	12	Late Development 1 - Open
----------------	-----------	----------------------------------

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
EMPA	<i>Embelia pacifica</i>	Kilioe	Lower
DRWA	<i>Dryopteris wallichiana</i>	Alpine woodfern	Lower
PIBR3	<i>Pisonia brunoniana</i>	Australasian catchbirdtree	Mid-Upper
VIME	<i>Vicia menziesii</i>	Hawai'i vetch	Mid-Upper

Description

Disturbances in this class include lava flows. Other disturbances that effect this seral stage include mixed severity fire and storms.

Maximum Tree Size Class

None

Class E	60	Late Development 1 - Closed
----------------	-----------	------------------------------------

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CLPY2	<i>Clermontia pyralia</i>	Hamakua clermontia	Middle
MEVO	<i>Melicope volcanica</i>	Volcanic melicope	Mid-Upper
CYLE5	<i>Cyanea leptostegia</i>	Giant kokee cyanea	Mid-Upper
OCHA	<i>Ochrosia haleakalae</i>	Island yellowwood	Mid-Upper

Description

Disturbances in this class include lava flows. Other disturbances that effect this seral stage include mixed severity fire and storms.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:OPN	20
Mid1:OPN	21	Mid1:CLS	100
Mid1:CLS	101	Late1:CLS	200
Late1:OPN	201	Late1:CLS	230
Late1:CLS	201	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:ALL	Early1:ALL	0.001	1000	No	0
Optional 1	Mid1:OPN	Early1:ALL	0.001	1000	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.002	500	No	0
Wind or Weather or Stress	Mid1:OPN	Mid1:OPN	0.005	200	No	0
Optional 1	Mid1:CLS	Early1:ALL	0.001	1000	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.002	500	Yes	0
Wind or Weather or Stress	Mid1:CLS	Mid1:OPN	0.005	200	Yes	0
Optional 1	Late1:OPN	Early1:ALL	0.001	1000	Yes	0
Mixed Fire	Late1:OPN	Late1:OPN	0.002	500	No	0
Wind or Weather or Stress	Late1:OPN	Late1:OPN	0.005	200	No	0
Optional 1	Late1:CLS	Early1:ALL	0.001	1000	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.002	500	Yes	0
Wind or Weather or Stress	Late1:CLS	Late1:OPN	0.005	200	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.