18260

Hawai'i Dry Coastal Strand

BpS Model/Description Version: Aug. 2019

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| --- | --- | --- | --- |
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Vegetation Type

Shrubland

Map Zones

79

Geographic Range

This ecological system occurs on sandy coastlines on Midway Atoll, on the drier leeward side of the larger Hawaiian Islands all of the main Islands and on all sides of the smaller arid islands and atolls.

Biophysical Site Description

This is a coast line ecosystem that is restricted to the shoreline and the zone immediately back of it where sites are strongly influenced by surf, wind and salt spray. Substrates are variable, ranging from gentle to steep rocky, cobbly shores, derived from tuff or disintegrating lava or raised coral beds (limestone), and lava flows (basalt) to flat surf-pounded sandy beaches, some with adjacent dunes or low alkaline flats above the saturated zone and behind the high-tide mark. These are dry sandy shorelines, on the smaller islands and generally on the leeward side of the larger islands, that receive <1,200mm in yearly precipitation. This habitat is driven by low moisture and its proximity to the sea, with wind and salt spray and forces that create and maintain unconsolidated sand. This arid to moderately dry coastal strand ecological system occurs within the arid, very dry, and moderately dry zones (zones 1, 2, and 3) of the seven moisture zones developed for the Hawai'ian Islands by Price et al. (2007).

Vegetation Description

The dry strand vegetation varies largely with substrate but tends to be sparse and patchy. Stands include succulent herbs, low wind-sheared shrubs, grasslands, a mix of shrub and grass or taller shrublands. Native species that may be dominant locally include graminoids *Fimbristylis cymosa*, *Eragrostis variabilis*, or *Sporobolus virginicus*, or forbs *Boerhavia acutifolia*, *Boerhavia repens*, *Nama sandwicense*, and *Sesuvium portulacastrum*, or *Sida fallax* mats with *Jacquemontia ovalifolia* ssp. *sandwicensis* or *Scaevola sericea* shrub. Other shrubs, such as *Chamaesyce celastroides*, *Chenopodium oahuense*, *Gossypium tomentosum*, *Heliotropium anomalum*, *Lipochaeta* spp., *Myoporum sandwicense*, *Scaevola coriacea*, *Tetramolopium rockii*, *Tribulus cistoides*, and *Vitex rotundifolia*, may also dominate stands. Other common native dry strand species are *Capparis sandwichiana*, *Chamaesyce degeneri*, *Chamaesyce skottsbergii*, *Cocos nucifera*, *Cordia subcordata*, *Cyperus javanicus*, *Lycium sandwicense*, *Heliotropium curassavicum*, *Heteropogon contortus*, *Ipomoea pes-caprae*, *Nama sandwicense*, *Pandanus tectorius*, *Panicum fauriei*, *Panicum torridum*, *Pseudognaphalium sandwicensium*, *Sesbania* *tomentosa*, *Solanum nelsonii*, *Tetramolopium rockii*, *Vigna marina*, and *Waltheria indica* (Warshauer et al. 2008). Many species occur in both dry strand and wet-mesic strand, including *Chenopodium oahuense*, *Nama sandwicense*, *Panicum fauriei*, *Panicum torridum*, *Sesbania tomentosa*, *Tetramolopium rockii*, and *Waltheria indica* (Warshauer et al. 2008).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| SETO3 | *Sesbania tomentosa* | Oahu riverhemp |
| SCSE6 | *Scaevola sericea* | Beach naupaka |
| HEAN8 | *Heliotropium anomalum* | Polynesian heliotrope |
| SPVI3 | *Sporobolus virginicus* | Seashore dropseed |
| SCCO7 | *Scaevola coriacea* | Dwarf naupaka |
| CHCE | *Chamaesyce celastroides* | 'ekoko |
| PSSA8 | *Pseudognaphalium sandwicensium* | 'ena'ena |
| SONE2 | *Solanum nelsonii* | Nelson's horsenettle |

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

Disturbance Description

landslides, wind, salt spray, storm surge (major disturbance), salt to soils. Storm surges can scour soil off to bare lava/rock (box A), or can partially remove/kill vegetation and leave the bit of soil, and hence have more rapid recovery of the vegetation (box B).

Fire Frequency

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

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 is narrow linear zone is found along coast; likely not able to be mapped for LANDFIRE.

Adjacency or Identification Concerns

Issues or Problems

Native Uncharacteristic Conditions

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 | B | B | B | B | B | B | B | B | B | B |
| Herb | >1.0 | B | B | B | B | B | B | B | B | B | B |
| Shrub | 0-0.5 | C | C | C | C | C | C | C | C | C | C |
| Shrub | 0.5-1.0 | C | C | C | C | C | C | C | C | C | C |
| Shrub | 1.0-3.0 | C | C | C | C | C | C | C | C | C | C |
| Shrub | >3.0 | C | C | C | C | C | C | C | C | C | C |
| Tree | 0-5 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | C | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | C | 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 8 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| SCSE6 | Scaevola sericea | Beach naupaka | Upper |
| IPPE | Ipomoea pes-caprae | Bayhops | Upper |
| SPVI3 | Sporobolus virginicus | Seashore dropseed | Upper |

Description

Post-lava flow hitting the coast, veg is barren / sparse early successional.

*Maximum Tree Size Class*  
None

Class B 34 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| FICY | Fimbristylis cymosa | Tropical fimbry | Upper |
| HEAN8 | Heliotropium anomalum | Polynesian heliotrope | Upper |
| SIFA | Sida fallax | Yellow llima | Upper |
| JAOV2 | Jacquemontia ovalifolia | Oval-leaf clustervine | Upper |

Description

Post-lava flow hitting the coast, veg is barren / sparse early successional.

*Maximum Tree Size Class*  
None

Class C 58 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| FICY | Fimbristylis cymosa | Tropical fimbry | Upper |
| HEAN8 | Heliotropium anomalum | Polynesian heliotrope | Upper |
| SETO3 | Sesbania tomentosa | Oahu riverhemp | Upper |
| SONE2 | Solanum nelsonii | Nelson's horsenettle | Upper |

Description

On all substrates sand, cobble, rock, etc. Vegetation is more developed but still open shrubby/herbaceous.

Disturbances in this class include lava flows and wave surges. Wave surges result in exposure of bare rock and when they occur can impact large areas on coast. Other disturbances that affect this seral stage include landslides and moderate waves.

*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 | Late1:OPN | 40 |
| Late1:OPN | 41 | Late1:OPN | 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 |
| Wind or Weather or Stress | Early1:ALL | Early1:ALL | 0.05 | 20 | No | 0 |
| Optional 1 | Mid1:OPN | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Optional 2 | Mid1:OPN | Mid1:OPN | 0.004 | 250 | No | 0 |
| Wind or Weather or Stress | Mid1:OPN | Mid1:OPN | 0.02 | 50 | No | 0 |
| Optional 1 | Late1:OPN | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Optional 2 | Late1:OPN | Mid1:OPN | 0.004 | 250 | Yes | 0 |
| Wind or Weather or Stress | Late1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Late1:OPN | Mid1:OPN | 0.02 | 50 | Yes | 0 |

Optional Disturbances

Optional 1: Lava Flows

Optional 2: Landslides

References

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