

Palikea Ridge (between Nanakuli and Lualualei), Puu Hapapa, Makua-Keaau Ridge, Halona, and Puu Kumakalii on Federal, State, city, and county lands. The 15 known occurrences contain 59 individuals (EDA Database 2001; GDSI 2001; HINHP Database 2001).

*Viola chamissoniana* ssp. *chamissoniana* typically grows on dry cliffs, rocky ledges, and steep slopes in mesic shrubland and cliff vegetation at elevations of 414 to 1,149 m (1,358 to 3,769 ft). Associated native species include *Artemisia australis*, *Bidens torta*, *Carex meyenii*, *Chamaesyce* sp., *Dodonaea viscosa*, *Dubautia* sp., *Eragrostis* sp., *Leptecophylla tameiameia*, *Lipochaeta tenuis*, *Metrosideros polymorpha*, *Peperomia* sp., *Rumex* sp., *Schiedea* sp., or *Sida fallax* (HINHP Database 2001; Service 1998b; 56 FR 55770).

The major threats to *Viola chamissoniana* ssp. *chamissoniana* are habitat degradation by feral goats and pigs; competition from the nonnative plant species *Ageratina adenophora*, *Ageratina riparia*, *Erigeron karvinskianus*, *Melinis minutiflora*, *Morella faya*, and *Schinus terebinthifolius*; fire; landslides; and a risk of extinction from naturally-occurring events and/or reduced reproductive vigor due to the small number of remaining individuals (HINHP Database 2001; Service 1998b; 56 FR 55770).

#### *Viola oahuensis* (NCN)

*Viola oahuensis*, a short-lived perennial member of the violet family (Violaceae), is usually an erect, unbranched subshrub 6 to 40 cm (2.4 to 16 in) tall. This species is distinguished from other Hawaiian members of the genus by the shape of the stipules (leaf bracts), the length of the leaf stalks, and the length and papery texture of the leaves (Wagner *et al.* 1999).

*Viola oahuensis* has been observed flowering in August and September. Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors (Service 1998b).

Historically, *Viola oahuensis* was known from 17 occurrences in the Koolau Mountains of Oahu, scattered over about a 37 km (23 mi) distance from Puu Kainapuaa to Palolo. The 18 extant occurrences, which total fewer than 200 individuals, are now found from the Kawainui-Koloa summit divide to the Waimalu-Koolau-poko divide on Federal, State, and private lands (EDA Database 2001; GDSI 2001; HINHP Database 2001).

*Viola oahuensis* is generally found on exposed, windswept ridges of moderate to steep slope in wet *Metrosideros polymorpha*-*Dicranopteris linearis* shrublands and *Metrosideros polymorpha* mixed montane bogs in the cloud zone from 415 to 959 m (1,361 to 3,146 ft) elevation. This species typically grows among wind-stunted *Antidesma* sp., *Bidens macrocarpa*, *Broussaisia arguta*, *Cibotium* sp., *Dubautia laxa*, *Hedyotis terminalis*, *Labordia* sp., *Machaerina* sp., *Melicope* sp., *Sadleria* sp., *Syzygium sandwicensis*, *Vaccinium* sp., or *Wikstroemia* sp. (HINHP Database 2001; Service 1998b; 61 FR 53089).

The primary threats to *Viola oahuensis* are habitat degradation and/or destruction by feral pigs; potential impacts from military activities; competition with the nonnative plants *Axonopus fissifolius*, *Clidemia hirta*, *Paspalum conjugatum*, *Psidium cattleianum*, and *Pterolepis* sp. (NCN); and risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of occurrences (HINHP Database 2001; Service 1998b; 61 FR 53089).

#### Multi-Island Species

*Adenophorus periens* (Pendent kihi fern)

*Adenophorus periens*, a member of the grammitis family (Grammitidaceae) and a short-lived perennial, is a small, pendent, epiphytic (not rooted on the ground) fern. This species differs from other species in this endemic Hawaiian genus by having hairs along the pinna margins, by the pinnae being at right angles to the midrib axis, by the placement of the sori on the pinnae, and by the degree of dissection of each pinna (Linney 1989).

Little is known about the life history of *Adenophorus periens*, which seems to grow only in closed canopy dense forest with high humidity. Its breeding system is unknown, but outbreeding is very likely to be the predominant mode of reproduction. Spores are dispersed by wind, possibly by water, and perhaps on the feet of birds or insects. Spores lack a thick resistant coat, which may indicate their longevity is brief, probably measured in days at most. Due to the weak differences between the seasons in the habitats where this species is found, there seems to be no evidence of seasonality in growth or reproduction. Additional information on reproductive cycles, longevity, specific environmental requirements, and limiting factors is not available (Linney 1989).

Historically, *Adenophorus periens* was known from Kauai, the Koolau Mountains of Oahu, Lanai, Maui, and the island of Hawaii. Currently, it is known from several locations on Kauai, Molokai, and Hawaii. This species is no longer extant on the island of Oahu. It was collected in 1909 on the west ridge of Palolo Crater and the west ridge of Palolo Valley (HINHP Database 2001).

*Adenophorus periens* grows epiphytically on trees in *Metrosideros polymorpha* and *Metrosideros rugosa* wet forests between 309 and 867 m (1,014 and 2,844 ft) elevation. Associated native plant species include *Cheirodendron* spp., *Cibotium* sp., *Dicranopteris linearis*, *Hedyotis terminalis*, *Machaerina angustifolia*, or *Syzygium sandwicensis* (HINHP Database 2001).

Nothing is known of the threats to *Adenophorus periens* on Oahu because the species was last collected there in 1909 (Service 1999; 59 FR 56333).

#### *Alectryon macrococcus* (Mahoe)

*Alectryon macrococcus*, a member of the soapberry family (Sapindaceae), consists of two varieties, *macrococcus* and *auwahiensis*, both trees with reddish-brown branches and leaves with one to five pairs of sometimes asymmetrical egg-shaped leaflets. On leaves of young *A. macrococcus* var. *macrococcus* plants, the underside of the leaf has dense brown hairs.

*Alectryon macrococcus* var. *auwahiensis* is only found on the island of Maui. The only member of its genus found in Hawaii, this species is distinguished from other Hawaiian members of its family by being a tree with a hard fruit 2.5 cm (1 in) or more in diameter (Wagner *et al.* 1999).

*Alectryon macrococcus* is a relatively slow-growing, long lived tree that grows in xeric to mesic sites and is adapted to periodic drought. Little else is known about the life history of this species. Flowering cycles, pollination vectors, seed dispersal agents, and specific environmental requirements are unknown (Service 1997).

Currently and historically, *Alectryon macrococcus* var. *macrococcus* occurs on Kauai, Oahu, Molokai, and Maui. On Oahu, there are a total of 82 occurrences containing around 300 individuals. These occurrences are found in Kapuna Gulch, Huliwai Gulch, Kaluaa Gulch, Ekahanui Gulch, Manuwai Gulch, Mohiaka Gulch, Makua Valley, Puu Ku Makalii, Nanakuli-Lualualei Ridge, Palikea Gulch, Makaha, Pahole Gulch, Makaleha Valley, Waianae Kai, Waieli Gulch, Kaluakaula Gulch, Kaaua Gulch, Puu Hapapa, Mikilua subdistrict, Kaaawa Gulch, and Napepeiaulelo