

*Tetraplasandra oahuensis* (ohe mauka); or *Vaccinium* spp. (ohelo). In addition, *Clermontia samuelii* ssp. *samuelii* is found in wet *Metrosideros polymorpha* and *M. polymorpha*-*Cheirodendron trigynum* forest containing one or more of the following native plant species: *Broussaisia arguta*; *Carex alligata*; *Cibotium* spp.; *Clermontia arborescens* ssp. *waihiiae* (oha wai nui); *Clermontia* spp. (oha wai); *Diplazium sandwichianum*; *Dubautia* spp.; *Hedyotis hillebrandii*; *Hedyotis* spp. (NCN); *Melicope* spp.; *Rubus hawaiiensis* (akala); or *Vaccinium* spp. (HINHP Database 2001; Service 2001; 64 FR 48307; R. Hobdy pers. comm., 2001; K. Wood, *in litt.* 2000).

Threats to *Clermontia samuelii* ssp. *hanaensis* include habitat degradation and destruction by feral pigs (*Sus scrofa*) and competition with nonnative plant species such as *Hedychium coronarium* (white ginger), *Hedychium gardnerianum* (kahili ginger), *Juncus* spp. (NCN), *Paspalum urvillei* (vasey grass), *Paspalum conjugatum* (Hilo grass), or *Tibouchina herbacea* (glorybush). In addition, two extremely invasive nonnative plant species, *Miconia calvescens* (velvet tree) and *Clidemia hirta* (Koster's curse), are found in nearby areas and may invade this habitat if not controlled. The habitat of *Clermontia samuelii* ssp. *samuelii* was extensively damaged by pigs in the past, and pigs are still a major threat to the populations on State-owned lands. The occurrence within the National Park has been fenced, and pigs have been eradicated. However, due to the large populations of pigs in adjacent areas, the park occurrences must constantly be monitored to prevent further ingress. Competition with nonnative plant species such as *Holcus lanatus* (velvet grass) and *Juncus planifolius* (NCN) is also a major threat to this subspecies. In addition, rats (mainly black rats (*Rattus rattus*)) and slugs (mainly *Milax gagates*) are known to eat leaves, stems, and fruits of other members of this genus and therefore are a potential threat to both subspecies (Service 2001; 64 FR 48307; K. Wood, *in litt.* 2000).

*Cyanea copelandii* ssp. *haleakalaensis* (Haha)

*Cyanea copelandii* ssp. *haleakalaensis*, a short-lived perennial member of the bellflower family (Campanulaceae), is a vine-like shrub with sprawling stems and tan latex (sap). This subspecies is differentiated from *C. c.* ssp. *copelandii* by its shorter elliptical leaves. The species differs from others in this endemic Hawaiian genus by the vine-like stems and the

yellowish flowers that appear red caused by the covering of hairs (Lammers 1999; Service 2001).

Little is known about the life history of *Cyanea copelandii* ssp. *haleakalaensis*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 2001; 64 FR 48307).

Historically, *Cyanea copelandii* ssp. *haleakalaensis* was reported from the windward side of Haleakala and from Waikamoi to Kipahulu Valley. Currently, this species is known from 5 occurrences with a total of 204 individuals on Federal and privately owned land within the East Maui Watershed Partnership in Haiku Uka, the ridge above Kuhiwa Valley, and Kipahulu Valley within Haleakala National Park and Hanawi Natural Area Reserve (NAR) (GDSI 2001; HINHP Database 2001; Lammers 1999; Service 2001; Warshauer 1998; 64 FR 48307).

*Cyanea copelandii* ssp. *haleakalaensis* is found on stream banks or wet scree (a sloping mass of rocks at the base of a cliff) slopes or in forest understory in montane wet or mesic forests dominated by *Acacia koa* (koa) and *Metrosideros polymorpha* at elevations between 616 and 1,411 m (2,021 and 4,630 ft). Associated species include *Broussaisia arguta*, *Cibotium* spp., *Hedyotis acuminata* (au), *Perrottetia sandwicensis* (olomea), and *Psychotria hawaiiensis* (kopiko ula) (HINHP Database 2001; R. Hobdy, pers. comm., 2001; Service 2001; 64 FR 48307).

The major threats to this species are habitat degradation and destruction by feral pigs; competition with several nonnative plant species; rats; slugs; human activities; and potential extinction caused by random environmental events due to small occurrence sizes (Service 2001; 64 FR 48307).

*Cyanea glabra* (Haha)

*Cyanea glabra*, a member of the bellflower family (Campanulaceae), is a short-lived, perennial shrub, with the leaves of juvenile plants deeply pinnately lobed, while those of the adult plants are more or less entire and elliptical. This species is differentiated from others in this endemic Hawaiian genus by the size of the flower and the pinnately lobed juvenile leaves (Lammers 1999; Service 2001).

Little is known about the life history of *Cyanea glabra*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and

limiting factors are unknown (Service 2001; 64 FR 48307).

Historically, *Cyanea glabra* has been reported from West Maui and on Haleakala, East Maui. Currently, this species is known from a single occurrence of 12 individual plants on privately owned land in Kauaula Valley (GDSI 2001; HINHP Database 2001; 64 FR 48307).

*Cyanea glabra* is found on soil and rock stream banks in wet lowland forests dominated by *Acacia koa* and *Metrosideros polymorpha*, at elevations between 413 and 1,572 m (1,355 and 5,156 ft). Associated native plants include *Boehmeria grandis* (akolea), *Cheirodendron trigynum*, *Christella cyatheoides* (kikawaio), *Cibotium* spp., *Clermontia kakeana* (ohai wai), *Coprosma* spp. (pilo), *Diplazium* spp. (NCN), *Dodonaea viscosa* (aalii), *Dubautia plantaginea* (naenae), *Perrottetia sandwicensis*, *Pipturus albidus* (mamaki), *Psychotria* spp. (kopiko), *Sadleria* spp. (amau), *Touchardia latifolia* (olona), and *Xylosma hawaiiense* (maua) (Service 2001; 64 FR 48307; Joel Lau, HINHP, pers. comm., 2001; HINHP Database 2001; R. Hobdy, pers. comm., 2001).

The threats to this species are slugs; habitat degradation and destruction by feral pigs; flooding; competition with several nonnative plant species; rats; the two-spotted leafhopper (*Saphonia rufofascia*); and extinction caused by random environmental events caused by the small number of individuals in the only remaining occurrence (Service 2001; 64 FR 48307).

*Cyanea hamatiflora* ssp. *hamatiflora* (Haha)

*Cyanea hamatiflora* ssp. *hamatiflora*, a short-lived perennial member of the bellflower family (Campanulaceae), is a palm-like tree with tan colored latex. This subspecies is differentiated from the other listed subspecies (*C. hamatiflora* ssp. *carlsonii*) by its longer calyx lobes and shorter individual flower stalks. This species is separated from others in this endemic Hawaiian genus by fewer flowers per inflorescence and narrower leaves (Lammers 1999; Service 2001).

Little is known about the life history of *Cyanea hamatiflora* ssp. *hamatiflora*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 2001; 64 FR 48307).

Historically, *Cyanea hamatiflora* ssp. *hamatiflora* was known from the windward side of Haleakala, stretching from Puu o Kakae to Manawainui. Currently, this species is known from 9