

(akole), *Dubautia* sp., *Freycinetia arborea*, *Hedyotis acuminata* (au), *Hedyotis terminalis*, *Metrosideros polymorpha*, *Myrsine lessertiana* (kolea lau nui), *Nothocestrum* sp. (aiea), *Perrottetia sandwicensis*, *Pipturus albidus*, *Pisonia umbellifera*, *Pouteria sandwicensis*, *Psychotria hathewayi* (kopiko), *Rumex* sp. (sorrel), *Selaginella arguscula* (lepelepe a moa), and *Streblus pendulinus* (aiai) (HINHP Database 2001; Lammers 1999; EDA, in litt. 2001).

The major threats to *Cyanea grimesiana* ssp. *obatae* are habitat degradation by feral pigs; competition from nonnative plant species such as *Ageratina riparia*, *Aleurites moluccana*, *Blechnum appendiculatum*, *Buddleia asiatica*, *Clidemia hirta*, *Christella parasitica* (NCN), *Lantana camara* (lantana), *Morella faya* (firetree), *Paspalum conjugatum*, *Passiflora suberosa*, *Psidium cattleianum*, *Rubus rosifolius*, *Schinus terebinthifolius*, *Setaria palmifolia*, and *Toona ciliata*; predation of seeds or fruits by introduced slugs; and extinction caused by naturally occurring events and/or reduced reproductive vigor due to the small number of extant individuals (HINHP Database 2001; Service 1998b; 59 FR 32932).

#### *Cyanea humboltiana* (Haha)

*Cyanea humboltiana*, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched shrub 1 to 2 m (3.2 to 6.6 ft) tall with woody stems and inversely egg-shaped to broadly elliptic leaves. The leaf edges are hardened and have shallow, ascending, rounded teeth. This species differs from others in this endemic Hawaiian genus by the downward bending flowering stalk and the length of the flowering stalk (Lammers 1999).

*Cyanea humboltiana* has been observed in flower from September through January. Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors (Service 1998b).

*Cyanea humboltiana* was known historically from 17 occurrences from the central portion to the southern end of the Koolau Mountains of Oahu. Currently, between 133 and 239 plants are known from 9 occurrences at Konahuanui summit, Moanalua-Kaneohe summit, Wailupe summit, Poamoho Trail, Opaeha Gulch, Maakua Gulch, Kaluanui, and Lulumahu Gulch. These occurrences are on Federal, private, State, city, and county lands (EDA Database 2001; GDSI 2001; HINHP Database 2001).

*Cyanea humboltiana* is usually found in wet *Metrosideros polymorpha*-*Dicranopteris linearis* lowland shrubland between 261 and 959 m (856 and 3,146 ft) elevation. Associated native plant species include *Acacia koa*, *Bobea elatior* (ahakea), *Broussaisia arguta*, *Cibotium chamissoi*, *Dubautia laxa*, *Hedyotis terminalis*, *Ilex anomala*, *Machaerina angustifolia* (uki), *Melicope* sp., *Phyllostegia* sp., *Psychotria mariniana* (kopiko), *Sadleria* sp., *Scaevola mollis* (naupaka kuahiwi), *Syzygium sandwicensis*, *Wikstroemia* sp., and ferns (HINHP Database 2001).

The major threats to *Cyanea humboltiana* are habitat degradation and/or destruction by feral pigs; potential predation by rats; competition with the nonnative plant species *Axonopus fissifolius* (narrow-leaved carpet grass), *Clidemia hirta*, *Erigeron karvinskianus*, *Psidium cattleianum*, and *Pterolepis glomerata*, and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of remaining occurrences. The Konahuanui summit occurrence is also threatened by trampling by hikers (HINHP Database 2001; Service 1998b; 61 FR 53089).

#### *Cyanea koolauensis* (Haha)

*Cyanea koolauensis*, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched shrub 1 to 1.5 m (3.5 to 5 ft) tall with woody stems and linear to narrowly elliptic leaves with a whitish underside. The leaf edges are hardened with shallow, ascending, rounded teeth. *Cyanea koolauensis* is distinguished from other species in this endemic Hawaiian genus by the leaf shape and width; the whitish green lower leaf surface; and the lengths of the leaf stalks, calyx lobes, and hypanthium (base of flower) (Lammers 1999).

*Cyanea koolauensis* has been observed in flower and fruit during the months of May through August. Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors (Service 1998b).

*Cyanea koolauensis* was known historically from 27 scattered occurrences throughout the Koolau Mountains on Oahu. Currently, 42 occurrences totaling fewer than 80 plants are known from the Waimea-Malaekahana Ridge to Hawaii Loa Ridge in the Koolau Mountains. These occurrences are on private, city, county, State, and Federal lands (EDA Database 2001; GDSI 2001; HINHP Database 2001).

*Cyanea koolauensis* is usually found on slopes, stream banks, and ridge crests in wet *Metrosideros polymorpha*-*Dicranopteris linearis* forest or shrubland at elevations between 163 and 959 m (535 and 3,146 ft). Associated native plant species include *Acacia koa*, *Antidesma platyphyllum*, *Bidens* sp., *Bobea elatior*, *Broussaisia arguta*, *Cibotium* sp., *Diplopterygium pinnatum*, *Dubautia* sp., *Hedyotis* sp., *Machaerina* sp., *Melicope* sp., *Pittosporum* sp., *Pritchardia martii* (loulou hiwa), *Psychotria mariniana*, *Sadleria* sp., *Scaevola* sp. (naupaka), *Syzygium sandwicensis*, or *Wikstroemia* sp. (HINHP Database 2001; Lammers 1999).

The major threats to *Cyanea koolauensis* are habitat destruction by feral pigs; potential impacts from military activities; trail clearing; potential predation by rats; competition with the aggressive nonnative plant species *Clidemia hirta*, *Heliocarpus popayanensis* (moho), *Psidium cattleianum*, and *Pterolepis glomerata*; trampling by hikers; 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; 61 FR 53089).

#### *Cyanea longiflora* (Haha)

*Cyanea longiflora*, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched shrub 1 to 3 m (3.5 to 10 ft) long with woody stems and elliptic or inversely lance-shaped leaves. Mature leaves have smooth or hardened leaf edges with shallow, ascending, rounded teeth. *Cyanea longiflora* differs from others in this endemic Hawaiian genus by the fused calyx lobes (Lammers 1999).

*Cyanea longiflora* has been observed in flower in February, April, and May and in fruit in August. Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors (Service 1998b).

*Cyanea longiflora* was known historically from five occurrences in the Waianae Mountains and six occurrences in the Koolau Mountains of Oahu. Currently, 4 occurrences with less than 217 individuals of this species are known on State, Federal, city, county, and private lands on Makaha-Waianae Kai Ridge, Makaha Valley, Kapuna Gulch, and Pahole Gulch in the Waianae Mountains (GDSI 2001; HINHP Database 2001; Service 1998b).

*Cyanea longiflora* is usually found on steep slopes, bases of cliffs, or ridge