

potential impacts from military activities; and competition with nonnative plant species such as *Clidemia hirta*, *Leptospermum scoparium* (tea tree), *Paspalum conjugatum*, *Psidium cattleianum*, and *Pterolepis glomerata* (NCN) (HINHP Database 2001; Service 1998b; 61 FR 53089).

#### *Cyanea acuminata* (Haha)

*Cyanea acuminata*, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched shrub 0.3 to 2 m (1 to 6.6 ft) tall with inversely lance-shaped to narrowly egg-shaped or elliptic leaves. This species is distinguished from others in this endemic Hawaiian genus by the color of the petals and fruit and the length of the calyx (the outer of two series of floral leaves) lobes, flowering stalk, and leaf stalks (Lammers 1999).

*Cyanea acuminata* has been observed fruiting in February and November. Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors (Service 1998b).

Historically, *Cyanea acuminata* was known from 31 scattered occurrences in the Koolau Mountains of Oahu. Currently, fewer than 200 plants are known from 20 occurrences on private, city, county, State, and Federal lands on Puu o Kona, near South Kaukonahua Stream, in Halemano Gulch, Kawai Iki Gulch, near Poamoho Stream, on Schofield-Waikane Trail, Helemano-Punaluu summit ridge, Konahuanui, in Kamana Nui Valley, Pukele, in Makaua Gulch, on Niu-Waimanalo summit ridge, Waahila Ridge, Kaipapau, Puu Keahia Kahoe, Kaala, Kaluanui, Pia Gulch, Makaleha, and Maakua Gulch (EDA Database 2001; GDSI 2001; HINHP Database 2001).

*Cyanea acuminata* typically grows on slopes, ridges, or stream banks between 216 and 1,208 m (708 and 3,962 ft) elevation. The plants are found in *Metrosideros polymorpha*-*Dicranopteris linearis*, *Acacia koa*-*M. polymorpha* wet or mesic forest or shrubland, or *Diospyros sandwicensis*-*M. polymorpha* lowland mesic forest with one or more of the following associated native species: *Antidesma* sp. (hame), *Broussaisia arguta*, *Chamaesyce* sp., *Charpentiera* sp. (papala), *Cyrtandra* spp. (hai wale), *Diplazium sandwichianum*, *Dryopteris sandwicensis* (palapalaia), *Dubautia laxa*, *Freycinetia arborea* (ieie), *Hibiscus* sp. (aloalo), *Hedyotis* sp., *Ilex anomala*, *Labordia* sp. (kamakahala), *Machaerina* sp., *Melicope* spp., *Perrottetia sandwicensis*, *Phyllostegia* sp., *Pipturus*

*albidus*, *Pisonia* sp., *Psychotria* sp., *Sadleria* sp. (amau), *Syzygium sandwicensis*, *Touchardia latifolia* (olona), or *Wikstroemia* sp. (ohia ha) (HINHP Database 2001; Lammers 1999).

The major threats to *Cyanea acuminata* are habitat degradation and/or destruction by feral pigs; potential impacts from military activities; potential predation by rats (*Rattus rattus*); competition with the nonnative plant species *Ageratina adenophora* (Maui pamakani), *Aleurites moluccana*, *Clidemia hirta*, *Cordyline fruticosa* (ti), *Dioscorea* sp. (yam), *Erigeron karvinskianus* (daisy fleabane), *Musa* sp. (banana), *Passiflora suberosa*, *Rubus argutus*, and *Schinus terebinthifolius*; 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 crispa* (NCN)

*Cyanea crispa*, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched shrub with leaves clustered at the ends of succulent stems. It is distinguished from other species in this endemic Hawaiian genus by its leaf shape, distinct calyx lobes, and the length of the flowers and stalks of flower clusters (Lammers 1999).

*Cyanea crispa* was observed in flower in April 1930. It was more recently observed fruiting in June and September. Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors (Service 1998b; 59 FR 14482).

Historically, *Cyanea crispa* was known from scattered locations throughout the upper elevations of the Koolau Mountains of Oahu from Kaipapau Valley to Waialae Iki Ridge. This species is now known from Federal, State, city, county, and private lands in Hidden Valley, Palolo Valley, Kapakahi Gulch, Moanalua Valley, Wailupe, Koolau Summit Trail, Kawaipapa Gulch, Maakua Gulch, Kaipapa Gulch, Maunawili, and Pia Valley. There are a total of 11 occurrences containing a total of 56 individual plants (EDA Database 2001; HINHP Database 2001).

*Cyanea crispa* is found in habitats ranging from steep, open mesic forests to gentle slopes or moist gullies of closed wet forests and stream banks, at elevations between 56 and 959 m (184 and 3,146 ft). Associated native plant species include *Antidesma platyphylla*, *Boehmeria grandis* (akolea), *Broussaisia*

*argutus*, *Christella cyatheoides* (kikawaio), *Cibotium chamissoi*, *Cyrtandra* spp., *Diospyros* sp. (lama), *Dubautia* sp. (naenae), *Metrosideros polymorpha*, *Perrottetia sandwicensis*, *Pipturus albidus*, *Pisonia umbellifera* (papala kepau), *Psychotria* sp., or *Touchardia latifolia* (HINHP Database 2001; Service 1998b).

The major threats to *Cyanea crispa* are habitat alteration and predation by feral pigs; competition with the nonnative plant species *Arthrostemma ciliatum* (NCN), *Clidemia hirta*, *Psidium cattleianum*, *Psidium guajava*, *Pterolepis glomerata*, *Rubus rosifolius* (thimbleberry), *Schinus terebinthifolius*, *Setaria palmifolia* (palm grass), and *Zingiber zerumbet* (awapuhi); and extinction due to naturally occurring events and/or reduced reproductive vigor due to the small number of remaining individuals, their limited gene pool, and restricted distribution (Service 1998b; 59 FR 14482).

#### *Cyanea grimesiana* ssp. *obatae* (Haha)

*Cyanea grimesiana* ssp. *obatae*, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a shrub, usually unbranched, growing from 1 to 3.2 m (3.3 to 10.5 ft) tall with wide, deeply lobed leaves. This subspecies can be distinguished from the other two by its short, narrow calyx lobes that are not fused or overlapping (Lammers 1999).

*Cyanea grimesiana* ssp. *obatae* flowers and fruits year round, depending on rainfall. Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors (59 FR 32932).

Historically, *Cyanea grimesiana* ssp. *obatae* was known from the southern Waianae Mountains from Puu Hapapa to Kaaikukai. This taxon is known to be extant in Kaluaa Gulch, Ekahanui Gulch, North Palawai Gulch, and Pahole Gulch. The occurrences are on State and private lands. A total of 8 occurrences are known that contain 16 individuals (GDSI 2000; HINHP Database 2001; Lammers 1999).

*Cyanea grimesiana* ssp. *obatae* typically grows on steep, moist, shaded slopes in diverse mesic to wet lowland forests between 404 and 1,075 m (1,325 and 3,528 ft) elevation. Associated native species include *Acacia koa*, *Antidesma platyphyllum*, *Chamaesyce* sp., *Charpentiera obovata* (papala), *Cibotium chamissoi*, *Claoxylon sandwicense* (poola), *Coprosma* sp., *Cyanea membranacea* (haha), *Cyrtandra waianaeensis* (hahala), *Diplazium sandwichianum*, *Dryopteris unidentata*