

crests in mesic *Acacia koa*-*Metrosideros polymorpha* lowland forest usually between 221 and 1,191 m (725 and 3,906 ft) elevation. Associated native plant species include *Antidesma* sp., *Cibotium* sp., *Coprosma* sp., *Dicranopteris linearis*, *Psychotria* sp., *Schiedea* sp., or *Syzygium sandwicensis* (HINHP Database 2001; Lammers 1999).

The major threats to *Cyanea longiflora* are habitat degradation and/or destruction by feral pigs; potential impacts from military activities; potential predation by rats; competition with the nonnative plant species *Psidium cattleianum* and *Rubus arguta*; potential fire; and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of remaining, widely dispersed occurrences (HINHP Database 2001; Service 1998b; 61 FR 53089).

Cyanea pinnatifida (Haha)

Cyanea pinnatifida, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a shrub, usually unbranched, growing from 0.8 to 3.0 m (2.6 to 10 ft) tall, with deeply lobed leaves. This species differs from other members of the genus on Oahu by its leaves, which are deeply cut into two to six lobes per side. The only other member of the genus on Oahu with lobed leaves has 9 to 12 lobes per side (Lammers 1999).

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

Historically, *Cyanea pinnatifida* was known from the central Waianae Mountains. The last known wild individual died in August 2001 (HINHP Database 2001; Lammers 1999; Trae Menard, TNCH, pers. comm., 2001). Currently, this species is known only from individuals under propagation at the University of Hawaii's Lyon Arboretum and the National Tropical Botanical Garden (G. Koob, pers. comm., 2002).

Cyanea pinnatifida typically grows on steep, wet, rocky slopes in diverse mesic forest between 450 and 881 m (1,476 and 2,890 ft) elevation. Associated native plant species include *Canavalia* sp. (awikiwiki), *Diplazium sandwichianum*, *Pipturus albidus*, *Pisonia sandwicensis* (aulu), *Pisonia umbellifera*, *Psychotria* sp., *Strongylodon ruber* (nunuiwi), and native ferns (HINHP Database 2001; Lammers 1999).

The major threats to *Cyanea pinnatifida* are competition from the

nonnative plant species *Aleurites moluccana*, *Blechnum appendiculatum*, *Clidemia hirta*, *Passiflora suberosa*, *Psidium cattleianum*, *Psidium guajava*, and *Toona ciliata*; habitat degradation by feral pigs; predation by slugs; and trampling by humans on or near trails (Service 1998b; 56 FR 55770).

Cyanea st-johnii (Haha)

Cyanea st-johnii, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched shrub with a woody stem 30 to 60 cm (12 to 24 in) long and lance-shaped to inversely lance-shaped leaves. The leaf edges are thickened, are smoothly toothed, and curl under. This species is distinguished from others in this endemic Hawaiian genus by the length of the leaves, the distinctly curled leaf margins, and the petal color (Lammers 1999).

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

Cyanea st-johnii was known historically from 11 occurrences in the central and southern Koolau Mountains of Oahu. Currently, 57 plants are known from 7 occurrences at Waimano Trail summit to Aiea Trail summit, the summit ridge crest between Manana and Kipapa Trails, between the summit of Aiea and Halawa trails, Summit Trail south of Poamoho Cabin, and Wailupe-Waimanalo summit ridge. These occurrences are found on city, county, private, and State lands, as well as lands under Federal jurisdiction (GDSI Database 2000; HINHP Database 2001).

Cyanea st-johnii typically grows on wet, windswept slopes and ridges between 415 and 959 m (1,361 and 3,146 ft) elevation in *Metrosideros polymorpha* mixed lowland shrubland or *Metrosideros polymorpha*-*Dicranopteris linearis* lowland shrubland. Associated native plant species include *Alyxia oliviformis*, *Antidesma* sp., *Bidens macrocarpa* (kookoolau), *Broussaisia arguta*, *Chamaesyce clusiifolia* (akoko), *Cibotium* sp., *Dubautia laxa*, *Freycinetia arborea*, *Hedyotis* sp., *Labordia* sp., *Machaerina angustifolia*, *Melicope* sp., *Psychotria* sp., *Sadleria pallida* (amau), *Scaevola mollis*, or *Syzygium sandwicensis* (HINHP Database 2001).

The major threats to *Cyanea st-johnii* are habitat degradation and/or destruction by feral pigs; potential predation by rats; predation by slugs and snails; competition with the nonnative plant species *Andropogon*

virginicus (broomsedge), *Axonopus fissifolius*, *Clidemia hirta*, and *Sacciolepis indica* (Glenwood grass); and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of remaining occurrences and individuals. The plants between the summit of Aiea and Halawa Trail are also threatened by trampling by hikers (HINHP Database 2001; Service 1998b; 61 FR 53089).

Cyanea superba (NCN)

Cyanea superba, of member the bellflower family (Campanulaceae) and a short-lived perennial, is morphologically very different from its closest relatives. It grows to 6 m (20 ft) tall and has a terminal rosette of large leaves; each rosette is 50 to 100 cm long (20 to 40 in) and 10 to 20 cm (4 to 8 in) wide atop a single, unbranched trunk (Lammers 1999).

The flowering season of *Cyanea superba* varies from year to year depending on precipitation. It ranges from late August to early October. Generally, flowering is at its peak in early to mid-September. Fruits have been known to mature in two to five months, depending on climatic conditions (Service 1998b). Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors.

Historically, *Cyanea superba* was collected from the gulches of Makaleha on Mt. Kaala in the Waianae Mountains of Oahu. Currently, there are no natural occurrences and an outplanted population of 140 individuals on State and Federal lands in the Waianae Mountains (EDA Database 2001; GDSI 2001; HINHP Database 2001; Service 1998b; K. Kawela, pers. comm., 2003, M. Keir, pers. comm., 2001).

Cyanea superba grows in the understory on sloping terrain on well drained rocky substrate within mesic forest between 232 and 872 m (761 and 2,860 ft) in elevation with one or more of the following associated native species: *Diospyros* sp., *Hedyotis terminalis*, *Metrosideros polymorpha*, *Nestegis sandwicensis*, *Pisonia brunoniana* (papala kepau), *Psychotria* sp., and *Xylosma* sp. (HINHP Database 2001).

The major threats to *Cyanea superba* are degradation of its habitat due to competition with the nonnative plant species *Aleurites moluccana*, *Melinis minutiflora*, *Psidium cattleianum*, and *Schinus terebinthifolius*; wildfires generated in the nearby military firing range; habitat degradation by feral pigs;