

tapers toward the top, ending in a compact rosette of fleshy leaves. This short-lived perennial species is a member of a unique endemic Hawaiian genus with only one other species, *B. rockii* (pua ala), presently known only on Molokai, from which it differs by the color of its petals, its shorter calyx (sepals) lobes, and its longer flower stalks (Lammers 1999; 59 FR 9304).

Current reproduction is not thought to be sufficient to sustain populations of this species, with poor seedling establishment due to competition with nonnative grasses as the limiting factor. Pollination by native sphingid moths (Sphingidae family) is likely; however, pollination failure is common, due to either a lack of pollinators or a reduction in genetic variability. The flower structure appears to favor outcrossing (pollination between different parent plants). Some vegetative cloning has been observed and flower and leaf size appear to be dependent on moisture availability. Seeds of this species are undoubtedly dispersed by gravity. Although they may be blown for short distances, they are not adapted for wind dispersal, being ovoid to ellipsoid, smooth, and lacking any sort of wing or outgrowth (Service 1995; 59 FR 9304).

Historically, *Brighamia insignis* was known from the headland between Hoolulu and Waiahuakua Valleys along the Na Pali Coast on the island of Kauai, and from Kaali Spring on the island of Niihau. Currently, there are a total of four occurrences containing a total of about 42 to 62 individuals on the islands of Kauai and Niihau. It is reported on State land (Hono O Na Pali Natural Area Reserve (NAR)) and privately owned lands at Hoolulua and Waiahuakua Valleys, Haupu, and Keopaweo, and on the privately owned island of Niihau (GDSI 2000; HINHP Database 2000; Service 1995; Steve Perlman, NTBG, pers. comm., 2000).

Brighamia insignis is found at elevations between 0 and 748 m (0 and 2,453 ft) on rocky ledges with little soil or on steep sea cliffs in lowland dry grasslands or shrublands with annual rainfall that is usually less than 165 centimeters (cm) (65 inches (in)). Associated native plant species include *Artemisia australis* (ahinahina), *Chamaesyce celastroides* (akoko), *Eragrostis variabilis* (kawelu), *Heteropogon contortus* (pili grass), *Hibiscus kokio* (kokio), *Hibiscus kokio* ssp. *saintjohnianus* (kokio), *Lepidium serra* (anaunau), *Lipochaeta succulenta* (nehe), *Munroidendron racemosum* (NCN), or *Sida fallax* (ilima) (59 FR 9304; K. Wood, pers. comm., 2001).

The major threats to this plant are browsing and habitat degradation by

feral goats; human disturbance; fire; the introduced carmine spider mite (*Tetranychus cinnabarinus*); a risk of extinction from naturally occurring events, such as landslides or hurricanes, due to the small number of individuals; restricted distribution; reduced reproductive vigor; and competition from nonnative plant species such as *Ageratum conyzoides* (maile hohono), *Kalanchoe pinnata* (air plant), *Lantana camara*, *Melinis minutiflora*, *Psidium cattleianum* (strawberry guava), *Psidium guajava* (guava), *Setaria parviflora* (yellow foxtail), *Sporobolus africanus* (smutgrass), or *Stachytarpheta dichotoma* (owi) (59 FR 9304).

Chamaesyce halemanui (NCN)

Chamaesyce halemanui, a short-lived perennial member of the spurge family (Euphorbiaceae), is a scandent (climbing) shrub. It is distinguished from closely related species by its decussate leaves (arranged in pairs at right angles to the next pair above or below), persistent stipules (bract- or leaf-like structures), more compact flower clusters, shorter stems on cyathia (flower cluster), and smaller capsules (Koutnik 1987; Koutnik and Huft 1999; 57 FR 20580).

Little is known about the life history of *Chamaesyce halemanui*. Its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1995).

Historically, *Chamaesyce halemanui* was found in Kauhao and Makaha Valleys in the Na Pali-Kona Forest Reserve, Mahanaloa Valley in Kuia NAR, the Halemanu drainage in Kokee State Park, and Olokele Canyon on the island of Kauai. Currently, there are a total of nine occurrences, containing about 85 to 135 individuals, in Kuia Valley, Poopooiki Valley, Kauhao Valley, Kaha Ridge, Awaawapuhi Valley, Waipio Falls, Halemanu, and Kaluahaulu in the Kokee State Park, Kuia NAR, and Na Pali-Kona Forest Reserve on State-owned land (GDSI 2000; HINHP Database 2000; K. Wood, *in litt.* 1999; K. Wood, pers. comm., 2001).

Chamaesyce halemanui is typically found on the steep slopes of gulches in mesic *Acacia koa* forests at elevations between 556 and 1,249 m (1,825 and 4,097 ft). Associated native plant species include *Alphitonia ponderosa* (kauila), *Antidesma platyphyllum* (hame), *Asplenium* spp., *Bobea brevipes* (ahakea lau lii), *Carex meyenii*, *Carex wahuensis*, *Cheirodendron trigynum* (olapa), *Coprosma* spp., *Diospyros sandwicensis* (lama), *Dodonaea viscosa*,

Elaeocarpus bifidus (kalia), *Hedyotis terminalis*, *Kokia kauaiensis* (kokio), *Leptecophylla tameiameiae* (pukiawe), *Melicope haupuensis* (alani), *Metrosideros polymorpha*, *Microlepia strigosa* (palapalai), *Panicum nephelophilum*, *Pisonia* spp. (papala kepau), *Pittosporum* spp. (hoawa), *Pleomele aurea*, *Pouteria sandwicensis* (alaa), *Psychotria greenwelliae* (kopiko), *Psychotria mariniana* (kopiko), or *Santalum freycinetianum* (iliahii) (57 FR 20580; K. Wood, pers. comm., 2001).

The major threats to this species are competition from nonnative plants, such as *Lantana camara*, *Psidium cattleianum*, and *Stenotaphrum secundatum* (St. Augustine grass); habitat degradation by feral pigs; restricted distribution; small population size; increased potential for extinction resulting from naturally occurring events, such as landslides or hurricanes; and depressed reproductive vigor (57 FR 20580).

Cyanea asarifolia (haha)

Cyanea asarifolia, a member of the bellflower family (Campanulaceae), is a sparingly branched shrub. This short-lived perennial species is distinguished from others of the genus that grow on Kauai by the shape of the leaf base, the leaf width in proportion to the length, and the presence of a leaf stalk (Lammers 1999; 59 FR 9304).

Little is known about the life history of *Cyanea asarifolia*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1995).

Historically, *Cyanea asarifolia* was known only from along the bank of Anahola Stream on Kauai. Currently, two occurrences with approximately four or five individuals are reported from the headwaters of the Wailua River in central Kauai on State-owned land in the Lihue-Koloa Forest Reserve (GDSI 2000; HINHP Database 2000).

This species typically grows in pockets of soil on sheer wet rock cliffs and waterfalls in lowland wet forests at elevations between 182 and 1,212 m (597 and 3,976 ft). Associated native plant species include ferns, *Bidens* spp. (kookoolau), *Dubautia plantaginea* (naenae), *Hedyotis centranthoides* (NCN), *Hedyotis elatior* (awiiwi), *Lysimachia filifolia* (kolokolo kuahiwi), *Machaerina angustifolia* (uki), *Metrosideros polymorpha*, or *Panicum lineale* (NCN) (59 FR 9304; K. Wood, pers. comm., 2001).

The major threats to this species are a risk of extinction from naturally occurring events, such as hurricanes