

and competition by encroaching nonnative plant species such as *Lantana camara* (lantana), *Leucaena leucocephala* (koa haole), and *Pluchea carolinensis* (sourbush); browsing by axis deer; soil erosion caused by feral ungulate grazing on grasses and forbs; and the small number of extant individuals, as the limited gene pool may depress reproductive vigor, or a single natural or man-caused environmental disturbance could destroy the only known existing occurrence. Fire is another potential threat because the area is dry much of the year (HINHP Database 2000; Service 1995; 56 FR 47686).

*Cyanea macrostegia* ssp. *gibsonii* (NCN)

*Cyanea macrostegia* ssp. *gibsonii*, a long-lived perennial and a member of the bellflower family (Campanulaceae), is a palm-like tree 1 to 7 m (3 to 23 ft) tall with elliptic or oblong leaves that have fine hairs covering the lower surface. The following combination of characters separates this species from the other members of the genus on Lanai: calyx lobes are oblong, narrowly oblong, or ovate in shape, and the calyx and corolla (petals of a flower) are both more than 5 mm (0.2 in) wide (Lammers 1999; 56 FR 47686).

Limited observations suggest *Cyanea macrostegia* ssp. *gibsonii* flowers during the month of July. Pollination vectors, seed dispersal agents, longevity of plants and seeds, specific environmental requirements, and other limiting factors are unknown (Service 1995).

*Cyanea macrostegia* ssp. *gibsonii* has been documented from the summit of Lanaihale and the upper parts of Mahana, Kaiholena, and Maunalei Valleys of Lanai. There are currently only two occurrences containing 74 individuals. One occurrence is located north of Lanaihale and the second occurrence is north of Puu Aalii (puu = summit or hill) on privately owned land (GDSI 2000; HINHP Database 2000; Lammers 1999; 56 FR 47686).

The habitat of *Cyanea macrostegia* ssp. *gibsonii* is lowland wet *Metrosideros polymorpha* (ohia) forest or *Diplopterygium pinnatum* (uluhe lau nui)-*M. polymorpha* shrubland between elevations of 738 and 1,032 m (2,421 and 3,385 ft). It has been observed to grow on flat to moderate or steep slopes, usually on lower gulch slopes or gulch bottoms, often at edges of streambanks, probably due to vulnerability to ungulate damage at more accessible locations. Associated vegetation includes *Antidesma platyphyllum* (hame), *Broussaisia arguta* (kanawao), *Cheirodendron trigynum* (olapa),

*Clermontia* sp. (oha wai), *Cyrtandra* sp. (haiwale), *Dicranopteris linearis* (uluhe), *Dubautia* sp. (naenae), *Freycinetia arborea* (ieie), *Hedyotis* sp. (NCN), *Ilex anomala* (kawau), *Labordia* sp. (kamakahala), *Melicope* sp. (alani), *Perrottetia sandwicensis* (olomea), *Pipturus albidus* (mamaki), *Pneumatopteris sandwicensis* (NCN), *Psychotria* sp. (kopiko), *Sadleria* sp. (amau), or *Scaevola chamissoniana* (naupaka kuahiwi) (HINHP Database 2000; Service 1995; Joel Lau, HINHP, pers. comm., 2001).

The threats to *Cyanea macrostegia* ssp. *gibsonii* are browsing by axis deer; competition with the nonnative plant *Hedychium gardnerianum* (kahili ginger); and the small number of extant individuals, as the limited gene pool may depress reproductive vigor, or any natural or man-caused environmental disturbance could destroy the existing occurrences (HINHP Database 2000; Service 1995; 56 FR 47686).

*Gahnia lanaiensis* (NCN)

*Gahnia lanaiensis*, a short-lived perennial and a member of the sedge family (Cyperaceae), is a tall (1.5 to 3 m (5 to 10 ft)), tufted, grass-like plant. This sedge may be distinguished from grasses and other genera of sedges on Lanai by its spirally arranged flowers, its solid stems, and its numerous, three-ranked leaves. *Gahnia lanaiensis* differs from the other members of the genus on the island by its achenes (seed-like fruits), which are 3.6 to 4.6 mm (0.14 to 0.18 in) long and purplish-black when mature (Koyama 1999).

July has been described as the "end of the flowering season" for *Gahnia lanaiensis*. Plants of this species have been observed with fruit in October. Pollination vectors, seed dispersal agents, longevity of plants and seeds, specific environmental requirements, and other limiting factors are unknown (Degener *et al.*, 1964; 56 FR 47686).

*Gahnia lanaiensis* is known from one occurrence containing 47 individuals on privately owned land along the summit of Lanaihale in the Haalelepaakai area and on the eastern edge of Hauola Gulch. The occurrence is found between 915 and 1,030 m (3,000 and 3,380 ft) in elevation. This distribution encompasses the entire known historic range of the species (GDSI 2000; HINHP Database 2000).

The habitat of *Gahnia lanaiensis* is lowland wet forest (shrubby rainforest to open scrubby fog belt or degraded lowland mesic forest), wet *Diplopterygium pinnatum*-*Dicranopteris linearis*-*Metrosideros polymorpha* shrubland, or wet *M. polymorpha*-*Dicranopteris linearis* shrubland at

elevations between 737 and 1,032 m (2,417 and 3,385 ft). It occurs on flat to gentle ridgecrest topography in moist to wet clay or other soil substrate in open areas or in moderate shade. Associated species include native mat ferns, *Coprosma* sp. (pilo), *Doodia* sp. (okupukupu laulii), *Hedyotis terminalis* (manono), *Ilex anomala*, *Leptecophylla tameiameia* (pukiawe), *Lycopodium* sp. (wawaeiole), *Sadleria* spp. (amau), *Scaevola* sp. (naupaka), or *Sphenomeris chinensis* (palaa) (Service 1995).

The primary threats to this species are the small number of plants and their restricted distribution, which increase the potential for extinction from naturally occurring events. In addition, *Gahnia lanaiensis* is threatened by habitat destruction resulting from the planned development of the island, and competition with *Leptospermum scoparium* (manuka), a weedy tree introduced from New Zealand, which is spreading along Lanaihale, but has not yet reached the area where *Gahnia* is found (HINHP Database 2000; Service 1995).

*Hedyotis schlechtendahliana* var. *remyi* (kopa)

*Hedyotis schlechtendahliana* var. *remyi*, a short-lived perennial and a member of the coffee family (Rubiaceae), is a few-branched subshrub from 0.6 to 6 m (2 to 10 ft) long, with weakly erect or climbing stems that may be somewhat square, smooth, and glaucous (with a fine waxy coating that imparts a whitish or bluish hue to the stem). The species is distinguished from others in the genus by the distance between leaves and the length of the sprawling or climbing stems, and the variety *remyi* is distinguished from *H. schlechtendahliana* var. *schlechtendahliana* by the leaf shape, presence of narrow flowering stalks, and flower color (Wagner *et al.*, 1999).

Pollination vectors, seed dispersal agents, longevity of plants and seeds, specific environmental requirements, and other limiting factors are unknown for *Hedyotis schlechtendahliana* var. *remyi* (Service 2001).

Historically, *Hedyotis schlechtendahliana* var. *remyi* was known from five locations on the northwestern portion of Lanaihale. Currently, this species is known from eight individuals in two occurrences on privately owned land on Kaiholeha-Hulupoe Ridge, Kapohaku drainage, and Waiapaa drainage on Lanaihale (GDSI 2000; HINHP Database 2000; 64 FR 48307).

*Hedyotis schlechtendahliana* var. *remyi* typically grows on or near ridge crests in mesic windswept shrubland