

hawaiiense (maua) (HINHP Database 2000; Service 1995; K. Wood, pers. comm., 2001).

The major threats to both varieties of *Lipochaeta micrantha* are habitat degradation by feral pigs and goats and competition with nonnative plant species such as *Erigeron karvinskianus*, *Lantana camara*, *Pluchea carolinensis*, or *Stachytarpheta australis*. The species is also threatened by extinction from naturally occurring events, such as landslides or hurricanes, and/or reduced reproductive vigor due to the small number of existing populations (HINHP Database 2000; Lorence and Flynn 1991; Service 1995).

Lipochaeta waimeaensis (nehe)

Lipochaeta waimeaensis, a member of the aster family (Asteraceae), is a low growing, somewhat woody, short-lived perennial herb. This species is distinguished from other *Lipochaeta* species on Kauai by leaf shape and the presence of shorter leaf stalks and ray florets (Gardner 1976, 1979; Wagner *et al.* 1990).

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

Lipochaeta waimeaensis has been known only from the original site of discovery along the rim of Kauai's Waimea Canyon on State-owned land. There are no more than 100 individuals (GDSI 2000; HINHP Database 2000).

This species grows on eroded soil on a precipitous, shrub-covered gulch in a diverse lowland forest at elevations between 44 and 460 m (145 and 1,509 ft) with *Artemisia australis*, *Chamaesyce celastroides*, *Dodonaea viscosa*, *Lipochaeta connata*, *Panicum* spp. (NCN), *Santalum freycinetianum*, or *Schiedea pergrulina* (NCN) (HINHP Database 2000; Wagner *et al.* 1999; K. Wood, pers. comm., 2001).

The major threats to *Lipochaeta waimeaensis* are competition from nonnative plants and habitat destruction by feral goats, whose presence exacerbates the existing soil erosion problem at the site. The single occurrence, and thus the entire species, is threatened by extinction from naturally occurring events, such as landslides or hurricanes, and/or reduced reproductive vigor due to the small number of existing individuals (59 FR 9304).

Melicope haupuensis (alani)

Melicope haupuensis, a member of the rue family (Rutaceae), is a small

long-lived perennial tree. Unlike other species of this genus on Kauai, the exocarp (outermost layer of a fruit) and endocarp (innermost layer of a fruit) are hairless and the sepals are covered with dense hairs (Stone *et al.* 1999).

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

For 62 years, *Melicope haupuensis* was known only from the site of its original discovery on the north side of Haupu Ridge on Kauai. This occurrence is now gone. The species is now known from four occurrences with a total of 13 individuals on State-owned land within the Alakai Wilderness Preserve, Na Pali Coast State Park, and Na Pali-Kona Forest Reserve in Kalahu, Awaawapuhi Valley, and Koaie Canyon (GDSI 2000; HINHP Database 2000; K. Wood, *in litt.* 1999).

Melicope haupuensis grows on moist talus slopes in *Metrosideros polymorpha*-dominated lowland mesic forests or *M. polymorpha*-*Acacia koa* montane mesic forest at elevations between 111 and 1,249 m (364 and 4,097 ft). Associated native plant species include *Antidesma platyphyllum* var. *hillebrandii*, *Bobea brevipes*, *Cheirodendron trigynum*, *Claoxylon sandwicense*, *Cryptocarya mannii* (holio), *Dianella sandwicensis* (ukiuki), *Diospyros hillebrandii*, *Diospyros sandwicensis*, *Dodonaea viscosa*, *Elaeocarpus bifidus*, *Hedyotis terminalis*, *Melicope anisata*, *M. barbiger* (uahiapale), *M. ovata* (alani), *Pleomele aurea*, *Pouteria sandwicensis*, *Pritchardia minor* (loulou), *Psychotria greenwelliae*, *Psychotria mariniana*, *Tetraplasandra waimeae* (ohetikoolā), or *Zanthoxylum dipetalum* (HINHP Database 2000; K. Wood, pers. comm., 2001).

Habitat degradation by feral goats and competition with invasive nonnative plant species are the major threats to *Melicope haupuensis*. In addition, this species may be susceptible to the black twig borer (*Xylosandrus compactus*). The existence of only 13 known trees constitutes an extreme threat of extinction from naturally occurring events, such as landslides or hurricanes, or reduced reproductive vigor (Hara and Beardsley 1979; HINHP Database 2000; Medeiros *et al.* 1986; 59 FR 9304).

Melicope quadrangularis (alani)

Melicope quadrangularis, a member of the rue family (Rutaceae), is a shrub or small tree. Young branches are generally covered with fine yellow fuzz

but become hairless with age. This species differs from others in the genus in having the following combination of characters: oppositely arranged leaves, only one or two flowers per cluster, cube-shaped capsules with fused lobes, and a deep central depression at the top of the fruit (Stone *et al.* 1999).

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

Melicope quadrangularis is known from the type locality in the Wahiawa Bog region of Kauai. One adult plant and two seedlings were discovered in 1991 by Ken Wood of NTBG on an east-facing slope of Wahiawa Ridge at 853 m (2,800 ft) on privately owned land. Subsequent exploration resulted in the location of a total of 13 individuals of this species. Although a survey after hurricane Iniki in 1992 did not relocate any individuals, it is hoped that there is a seed bank or that undiscovered individuals remain to be found (Stone *et al.* 1999).

Melicope quadrangularis grows in *Metrosideros polymorpha* diverse lowland wet forest that ranges from mesic to wet conditions at elevations between 608 and 1,593 m (1,995 and 5,228 ft). Associated native plant species include *Antidesma platyphyllum*, *Broussaisia arguta*, *Cheirodendron fauriei* (olapa), *Cibotium nealiae* (hapuu), *Cyrtandra pickeringii* (haiwale), *Dicranopteris linearis*, *Machaerina angustifolia*, *Machaerina mariscoides* (ahaniu), other *Melicope* spp., *Metrosideros waialealae* (NCN), *Psychotria hexandra*, *P. mariniana*, *P. wawrae* (kopiko), *Sadleria pallida*, *Scaevola gaudichaudiana* (naupaka kuahiwi), or *Syzygium sandwicensis* (K. Wood, pers. comm., 2001).

This species is threatened by nonnative plants and habitat disturbance by feral pigs; over-collecting for scientific purposes; extinction from naturally occurring events, such as landslides or hurricanes; and/or reduced reproductive vigor due to the dearth of individuals (Service 1994).

Munroidendron racemosum (NCN)

Munroidendron racemosum, a member of the ginseng family (Araliaceae), is a small tree with a straight gray trunk crowned with spreading branches. This long-lived perennial species is the only member of a genus endemic to Hawaii. The genus is distinguished from other closely related Hawaiian genera of the family by