

elevations between 538 and 1,069 m (1,765 and 3,507 ft), in *Metrosideros polymorpha-Diospyros* spp. mesic forest and diverse mesic forest. Associated native plant species include *Myrsine* spp., *Psychotria* spp., and *Xylosma* spp. (HINHP Database 2000; Service 1998a; K. Wood, pers. comm., 2001).

The primary threats to *Ctenitis squamigera* are habitat degradation by feral pigs and goats, competition with nonnative plant species, especially *Psidium cattleianum* or *Schinus terebinthifolius*; fire; and extinction from naturally occurring events due to the small number of existing populations and individuals (Service 1998a).

Cyperus trachysanthos (puukaa)

Cyperus trachysanthos, a member of the sedge family (Cyperaceae), is a perennial grass-like plant with a short rhizome. The culms are densely tufted, obtusely triangular in cross section, tall, sticky, and leafy at the base. This species is distinguished from others in the genus by the short rhizome, the leaf sheath with partitions at the nodes, the shape of the glumes (bract below each flower), and the length of the culms (Koyama 1999).

Little is known about the life history of *Cyperus trachysanthos*. Its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999).

Historically, *Cyperus trachysanthos* was known on Niihau, Kauai, and scattered locations on Oahu, Molokai, and Lanai. It was last observed on Molokai in 1912 and on Lanai in 1919. Currently, this species is reported from Nualolo Valley on Kauai on State-owned land and west of Mokouia Valley on the privately owned island of Niihau. There is one known occurrence with about 300 individuals on the island of Kauai and an unknown number of individuals on Niihau (GDSI 2000; HINHP Database 2000).

Cyperus trachysanthos is usually found in wet sites (mud flats, wet clay soil, or wet cliff seeps) on seepy flats or talus slopes at elevations between 0 and 235 m (0 and 771 ft). *Talipariti tiliaceum* (hau) is often found in association with this species (Koyama 1999; 61 FR 53108; K. Wood, pers. comm., 2001).

On Kauai, the threats to this species are the loss of wetlands and a risk of extinction from naturally occurring events, such as landslides or hurricanes, due to the small number of populations. The threats on Niihau are unknown (Service 1999; 61 FR 53108).

Delissea undulata (NCN)

Delissea undulata, a member of the bellflower family (Campanulaceae), is an unbranched, palm-like, woody-stemmed perennial tree, with a dense cluster of leaves at the tip of the stem. One or two knob-like structures often occur on the back of the flower tube. The three recognized subspecies are distinguishable on the basis of leaf shape and margin characters: in *D. undulata* ssp. *kauaiensis*, the leaf blades are oval and have a flat margin with sharp teeth; in *D. undulata* ssp. *niihauensis*, the leaf blades are heart-shaped and have a flat margin with shallow, rounded teeth; and in *D. undulata* ssp. *undulata*, the leaf blades are elliptic to lance-shaped and have a wavy margin with small, sharply pointed teeth. This species is separated from the other closely related members of the genus by its large flowers and berries and broad leaf bases (Lammers 1990).

On the island of Hawaii, *Delissea undulata* ssp. *undulata* has been observed in flower and fruit (immature) in August and outplanted individuals have been observed in flower in July. Little else is known about the life history of *Delissea undulata*. Its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1996; 61 FR 53124).

Historically and currently, *Delissea undulata* ssp. *kauaiensis* is known only from Kauai. Currently, there is one known occurrence of three individuals on State-owned land in Kuia Valley within the Kuia NAR. *Delissea undulata* ssp. *niihauensis* was known only from Niihau, but has not been seen since 1865. *Delissea undulata* ssp. *undulata* was known from southwestern Maui and western Hawaii. Currently, this variety occurs only on the island of Hawaii (GDSI 2000; HINHP Database 2000; Lammers 1999; 61 FR 53124; K. Wood, in litt. 1999).

Delissea undulata ssp. *kauaiensis* occurs in dry or open *Acacia koa*-*Metrosideros polymorpha* mesic forests or *Alphitonia ponderosa* montane forest at elevations between 139 and 1,006 m (456 and 3,299 ft). Associated native species include *Diospyros sandwicensis*, *Dodonaea viscosa*, *Doodia kunthiana*, *Eragrostis variabilis*, *Euphorbia haeleeleana*, *Kokia kauaiensis*, *Microlepia strigosa*, *Panicum* spp., *Pleomele aurea*, *Psychotria greenwelliae*, *Psychotria mariniana*, and *Santalum freycinetianum* (K. Wood, pers. comm., 2001).

The threats to this subspecies on Kauai are feral goats, pigs, and cattle; small population size; competition with the nonnative plants *Delairea odorata* (German ivy) and *Passiflora tarminiana*; fire; introduced slugs; seed predation by rats and introduced game birds; and a risk of extinction due to random naturally occurring events, such as landslides or hurricanes (Service 1996).

Diellia erecta (asplenium-leaved diellia)

Diellia erecta, a short-lived perennial fern in the spleenwort family (Aspleniaceae), grows in tufts of three to nine lance-shaped fronds emerging from a rhizome covered with brown to dark gray scales. This species differs from other members of the genus in having large brown or dark gray scales, fused or separate sori along both margins of the pinna, shiny black midribs that have a hardened surface, and veins that do not usually encircle the sori (Degener and Greenwell 1950; Wagner 1952).

Little is known about the life history of *Diellia erecta*. Its reproduction cycles, dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999).

Historically, *Diellia erecta* was known on Kauai, Oahu, Molokai, Lanai, scattered locations on Maui, and various locations on the island of Hawaii. Currently, it is known from Molokai, Maui, and Hawaii and has recently been rediscovered on Kauai. On Kauai there is one known occurrence with 30 individuals in Kawaiiki Valley on State-owned land within the Na Pali-Kona Forest Reserve (Service 1999; HINHP Database 2000).

This species is found in brown granular soil with leaf litter and occasional terrestrial moss on north-facing slopes in deep shade on steep slopes or gulch bottoms in *Metrosideros polymorpha*-*Dicranopteris linearis* wet forest or *M. polymorpha* mixed mesic forest with *Acacia koa* and *Acacia koaia* as co-dominants, at elevations between 655 and 1,224 m (2,149 and 4,016 ft). Associated native plant species include *Asplenium aethiopicum* (NCN), *Asplenium contiguum* (NCN), *Asplenium macraei* (NCN), *Coprosma* spp., *Dodonaea viscosa*, *Dryopteris fusco-atra* (ii), *Dryopteris unidentata*, *Hedyotis terminalis*, *Leptecophylla tameiameia*, *Melicope* spp., *Microlepia strigosa*, *Myrsine* spp., *Nestegis sandwicensis*, *Psychotria* spp., *Syzygium sandwicensis*, or *Wikstroemia* spp. (HINHP Database 2000; Service 1999; K. Wood, pers. comm., 2001).

The major threats to *Diellia erecta* on Kauai are habitat degradation by pigs and goats; competition with nonnative