

ferns, *Adenophorus* spp., *Cyanea* spp., *Dianella sandwicensis*, *Diospyros sandwicensis*, *Dodonaea viscosa*, *Doodia kunthiana*, *Euphorbia haeleeleana* (akoko), *Hedyotis* spp. (NCN), *Leptecophylla tameiameia*, *Microlepia strigosa*, *Nestegis sandwicensis* (olopua), *Pisonia* spp., *Psychotria hobbii* (kopiko), or *Pteralyxia kauaiensis* (kaulu) (59 FR 9304; K. Wood, pers. comm., 2001).

The major threats to this species are predation and/or habitat degradation by mule deer (*Odocoileus hemionus columbianus*), feral pigs, and goats; herbivory by rats and introduced slugs; fire; and competition with the nonnative plants *Cordyline fruticosa* (ti), *Lantana camara*, *Passiflora ligularis* (sweet granadilla), and *Passiflora tarminiana* (banana poka); and a risk of extinction from naturally occurring events, such as landslides or hurricanes, and/or reduced reproductive vigor due to the small number of existing individuals (Service 1995; 59 FR 9304).

#### *Delissea rivularis* (oha)

*Delissea rivularis*, a member of the bellflower family (Campanulaceae), is a shrub, unbranched or branched near the base, with hairy stems and leaves arranged in a rosette at the tips of the stems. This short-lived perennial species is distinguished from others of the genus by the color, length, and curvature of the corolla, shape of the leaves, and presence of hairs on the stems, leaves, flower clusters, and corolla (Lammers 1999).

Little is known about the life history of *Delissea rivularis*. Its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1998a).

Historically, *Delissea rivularis* was found at Waiakealoha Waterfall, Waialae Valley, Hanakoa Valley, and Kaholuamanu on the island of Kauai (61 FR 53070). Currently, this species is known from two occurrences with a total of 40 individuals. The occurrences are reported from Moaalele and Hanakapiai on State land within the Hono o Na Pali NAR (GDSI 2000; HINHP Database 2000; K. Wood, *in litt.* 1999).

*Delissea rivularis* is found on steep slopes near streams in *Metrosideros polymorpha*-*Cheirodendron trigynum* montane wet or mesic forest at elevations between 722 and 1,306 m (2,370 and 4,286 ft). Associated native plant species include *Boehmeria grandis*, *Broussaisia arguta*, *Carex* spp., *Coprosma* spp., *Dubautia knudsenii* (naenae), *Diplazium sandwichianum*,

*Hedyotis foggiana* (NCN), *Ilex anomala*, *Machaerina angustifolia*, *Melicope anisata* (mokihana), *Melicope clusiifolia*, *Pipturus* spp., *Psychotria hexandra*, or *Sadleria* spp. (amau) (61 FR 53070; K. Wood, pers. comm., 2001).

The major threats to this species are competition with the encroaching nonnative plant *Rubus argutus*; habitat destruction by feral pigs; predation by rats; and reduced reproductive vigor and a risk of extinction from naturally occurring events, such as landslides or hurricanes, due to the small number of remaining individuals (Service 1998a; 61 FR 53070).

#### *Diellia pallida* (NCN)

*Diellia pallida*, a member of the spleenwort family (Aspleniaceae), is a fern that grows in tufts of three to four light green, lance-shaped fronds along with a few persistent dead ones, and reproduces by spores, the minute, reproductive dispersal unit of ferns and fern allies. This short-lived perennial species differs from others of this endemic Hawaiian genus by the color and sheen of the midrib, the presence and color of scales on the midrib, and the frequent fusion of sori (a group or cluster of spore cases) (Wagner 1952, 1987).

Little is known about the life history of *Diellia pallida*. Its reproductive cycles, dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1995).

*Diellia pallida* was known historically from Halemanu on the island of Kauai. More recently additional occurrences have been found and currently, there is a total of six occurrences with 43 to 48 individuals in Mahanaloa and Kuia Valleys, Makaha Valley, Waimea Canyon, and Koaie Canyon, all on State-owned land including Kuia NAR, Na Pali-Kona Forest Reserve, and Puu Ka Pele Forest Reserve (GDSI 2000; HINHP Database 2000; 59 FR 9304; K. Wood, *in litt.* 1999).

This species grows on bare granular soil with dry to mesophytic leaf litter with a pH of 6.9 to 7.9 on steep talus slopes in lowland mesic forests at elevations between 445 and 1,027 m (1,460 and 3,371 ft). Associated native plant species include *Acacia koa*, *Alectryon macrococcus*, *Alphitonia ponderosa*, *Alyxia oliviformis*, *Antidesma platyphyllum*, *Asplenium* spp., *Carex meyenii*, *Diospyros hillebrandii* (lama), *Diospyros sandwicensis*, *Doodia kunthiana*, *Hedyotis knudsenii* (NCN), *Leptecophylla tameiameia*, *Metrosideros polymorpha*, *Microlepia strigosa*, *Myrsine lanaiensis* (kolea),

*Nestegis sandwicensis*, *Psychotria mariniana*, *Psydrax odorata* (alahee), *Pteralyxia kauaiensis*, *Rauvolfia sandwicensis* (hao), *Tetraplasandra kawaiensis* (ohe ohe), *Wilkesia gymnoxiphium* (iliau), or *Zanthoxylum dipetalum* (ae) (59 FR 9304; K. Wood, pers. comm., 2001).

The major threats to this species include competition with the nonnative plants *Aleurites moluccana* (kukui), *Cordyline fruticosa*, *Lantana camara*, *Melia azedarach* (Chinaberry), *Oplismenus hirtellus*, or *Stenotaphrum secundatum*; predation and habitat degradation by feral goats, pigs, and deer; fire; and a risk of 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).

#### *Dubautia latifolia* (koholapehu)

*Dubautia latifolia*, a member of the aster family (Asteraceae), is a diffusely branched, woody perennial vine with leaves that are conspicuously net-veined, with the smaller veins outlining nearly square areas. A vining habit, distinct petioles (leaf stalks), and broad leaves with conspicuous net veins outlining squarish areas separate this from closely related species (Carr 1982b, 1985, 1999a).

Individual plants of this species do not appear to be able to fertilize themselves. Since at least some individuals of *Dubautia latifolia* require cross-pollination, the wide spacing of individual plants (e.g., each 0.5 kilometer (km) (0.3 mile (mi)) apart) may pose a threat to the reproductive potential of the species. The very low seed set noted in plants in the wild indicates a reproductive problem, possibly asynchronous flowering or lack of pollinators. Seedling establishment and survival to juvenile stage is also rare. *Dubautia latifolia* experiences seasonal vegetative decline during the spring and summer, often losing most of its leaves. New growth and flowering occur in the fall, with fruits developing in November. Pollinators and seed dispersal agents are unknown (Carr 1982b; Service 1995).

Historically, *Dubautia latifolia* was found in the Makaha, Awaawapuhi, Waialae, Kawaiula, and Kahao Valleys of the Na Pali-Kona Forest Reserve, Nualolo Trail and Valley in Kuia NAR; Halemanu in Kokee State Park; along Mohihi Road in both Kokee State Park and Na Pali-Kona Forest Reserve, along the Mohihi-Waialae Trail on Mohihi and Kohua Ridges in both Na Pali-Kona Forest Reserve and Alakai Wilderness Preserve; and at Kaholuamanu on the