

island of Kauai. Currently, there are a total of 26 occurrences containing approximately 65 to 84 individuals on State-owned land in Kauahao Valley, Makaha Valley headwaters, Kuia Valley, Kawaiula Valley, Kumuwela Ridge, Awaawapuhi Valley, Waiakoali picnic area, Alakai picnic area, Honopu Trail, Nualolo Trail, Waieke Swamp, Noe Stream, Kumuwela Ridge, Mohihi Ditch, Mohihi-Waialae Trail, and Kaluahaulu Ridge in the Alakai Wilderness Preserve, Kokee State Park, Kuia NAR, Na Pali-Kona Forest Reserve, and Waimea Canyon State Park (Carr 1982b; GDSI 2000; HINHP Database 2000; K. Wood, *in litt.* 1999).

This species typically grows on gentle to steep slopes in well drained soil in semi-open or closed, diverse montane mesic forest dominated by *Acacia koa* and/or *Metrosideros polymorpha*, at elevations between 544 and 1,277 m (1,786 and 4,189 ft). Commonly associated native plant species are *Alphitonia ponderosa*, *Antidesma platyphyllum*, *Bobea* spp., *Claoxylon sandwicense* (poola), *Coprosma waimeae* (olena), *Cyrtandra* spp., *Dicranopteris linearis*, *Diplazium sandwicianum*, *Dodonaea viscosa*, *Elaeocarpus bifidus*, *Hedyotis terminalis*, *Ilex anomala*, *Melicope anisata*, *Nestegis sandwicensis*, *Pleomele aurea*, *Pouteria sandwicensis*, *Psychotria mariniana*, *Scaevola* spp. (naupaka), or *Xylosma* spp. (maua) (59 FR 9304; K. Wood, pers. comm., 2001).

The threats to this species include competition from the nonnative plants *Acacia mearnsii* (black wattle), *Erigeron karvinskianus* (daisy fleabane), *Hedychium* spp. (ginger), *Lonicera japonica* (Japanese honeysuckle), *Passiflora tarminiana*, *Psidium cattleianum*, or *Rubus argutus*; damage from trampling and grazing by feral pigs and deer; vehicle traffic and road maintenance; seasonal dieback; the small number of extant individuals; and restricted distribution (59 FR 9304).

Dubautia pauciflora (naenae)

Dubautia pauciflora, a member of the aster family (Asteraceae), is a somewhat sprawling shrub or erect small tree with narrowly lance-shaped or elliptic leaves clustered toward the ends of the stems. The tiny, two- to four-flowered heads distinguish this short-lived perennial species from its relatives (Carr 1985, 1999a).

Few details are known about the life history of any *Dubautia* species under natural conditions. Certain species produce viable seed when self-pollinated (self-fertile), although others fail to do so (self-infertile). Low pollinator numbers resulting in reduced

cross-pollination and consequently low numbers of viable seeds could explain the small population sizes. Because of their structure and small size, flowers of *D. pauciflora* are presumably pollinated by small generalist insects, although field observations are lacking. The bristle-like pappus (tuft of appendages that crowns the ovary or fruit) probably represents an adaptation for wind dispersal. Very little is known about the life cycle of this species, including growth rates, longevity of the plants, and number of years the plants remain reproductive (Carr 1985; Service 1994; 56 FR 47695).

Historically and currently, this species is found only on State (including the Lihue-Koloa Forest Reserve) and privately owned lands in the Wahiawa drainage on Kauai. There are four occurrences containing 42 individual plants (GDSI 2000; HINHP Database 2000).

These populations are found in *Metrosideros polymorpha-Dicranopteris linearis* lowland wet forest within stream drainages at elevations between 564 and 1,093 m (1,849 and 3,587 ft). Associated native plant species include *Antidesma platyphyllum*, *Broussaisia arguta*, *Cheirodendron* spp., *Dubautia laxa* (naenae pua melemele), *Embelia pacifica* (kilioe), *Hesperomannia lydgatei*, *Labordia waialealae* (kamakahala lau lii), *Melicope* spp., *Nothoperanema rubiginosa* (NCN), *Pritchardia* spp., *Psychotria* spp., *Sadleria* spp., *Scaevola mollis* (naupaka kuahiwi), *Syzygium sandwicensis*, or *Tetraplasandra* spp. (ohe ohe) (K. Wood, pers. comm., 2001).

The threats to this plant include direct competition with nonnative plant species such as *Melastoma candidum* or *Psidium cattleianum*, and potential threats from *Clidemia hirta*, *Cyathea cooperi*, *Deparia petersenii*, *Elephantopus mollis*, *Erechtites valerianifolia*, *Melaleuca quinquenervia*, *Oplismenus hirtellus*, *Paspalum conjugatum*, *Paspalum urvillei*, *Pluchea carolinensis*, *Rhodomyrtus tomentosa*, *Rubus rosifolius*, *Sacciolepis indica*, *Setaria parviflora*, *Stachytarpheta australis*, or *Youngia japonica*; trampling by feral pigs; landslides and erosion; restricted distribution; and hurricanes (Service 1994; 56 FR 47695).

Exocarpos luteolus (heau)

Exocarpos luteolus, a member of the sandalwood family (Santalaceae), is a moderately to densely branched shrub with knobby branches and leaves that are either minute scales or typical leaves. This short-lived perennial species is distinguished from others of the genus by its generally larger fruit

with four indentations and by the color of the receptacle and fruit (Wagner *et al.* 1999).

Little is known about the life history of *Exocarpos luteolus*. This species tends to grow at habitat edges where there is adequate light and is likely to be semi-parasitic. Flowering cycles, pollination vectors, seed dispersal agents, longevity, other specific environmental requirements, and limiting factors are unknown (Service 1995).

Historically, *Exocarpos luteolus* was known from three general locations on Kauai: Wahiawa Bog, Kaholuamanu, and Kumuwela Ridge. Currently, there is a total of nine occurrences containing approximately 75 individual plants. This species has a scattered distribution on State (Kuia NAR, Na Pali Coast State Park, Na Pali-Kona Forest Reserve, and Puu Ka Pele Forest Reserve) and privately owned lands and is reported from Pohakuao, the right fork and left fork of Kalalau Valley, Hipalau Valley, Koaie Canyon, Mahanaloa Valley, Kuia Valley, Poopooiki Valley, Nualolo Trail, Makaha Valley, and Haeleele Valley (GDSI 2000; HINHP Database 2000; K. Wood, *in litt.* 1999).

This species is found at elevations between 361 and 1,465 m (1,183 and 4,808 ft) in wet places bordering swamps or open bogs and on open, dry ridges in lowland or montane mesic *Acacia koa-Metrosideros polymorpha*-dominated forest communities with *Dicranopteris linearis*. Associated native plant species include *Bobea brevipes*, *Cheirodendron trigynum*, *Claoxylon sandwicense*, *Dianella sandwicensis*, *Dodonaea viscosa*, *Dubautia laevigata*, *Elaeocarpus bifidus*, *Hedyotis terminalis*, *Leptecophylla tameiameia*, *Melicope haupuensis*, *Peperomia* spp., *Pleomele aurea*, *Poa sandwicensis* (Hawaiian bluegrass), *Pouteria sandwicensis*, *Psychotria greenwelliae*, *Psychotria mariniana*, *Santalum freycinetianum*, or *Schiedea stellarioides* (Service 1995; 59 FR 9304; K. Wood, pers. comm., 2001).

The major threats to this species are feral goats and pigs; competition with the nonnative plants *Acacia mearnsii*, *Corynocarpus laevigata* (karakanut), *Erigeron karvinskianus*, *Morella faya* (firetree), or *Rubus argutus*; seed predation by rats; fire; and erosion (Service 1995; 59 FR 9304).

Hedyotis st.-johnii (Na Pali beach hedyotis)

Hedyotis st.-johnii, a member of the coffee family (Rubiaceae), is a succulent perennial herb with slightly woody, trailing, quadrangular stems and fleshy leaves clustered towards the base of the