

Bidens pilosa, *Cynodon dactylon* (Bermuda grass), *Panicum maximum*, and *Prosopis pallida* (kiawe); habitat disturbance by off-road vehicles or by grazing cattle; continued development and habitat degradation; fire; small occurrence size; and fragmentation, trampling, and other impacts from humans and introduced mammals (HINHP Database 2001; 57 FR 27863).

Melicope pallida (Alani)

Melicope pallida, a long-lived perennial member of the citrus family (Rutaceae), is a tree with grayish white hairs and black, resinous new growth. The species differs from other members of the genus by the resinous new growth, leaves folded and in clusters of three, and fruits with separate carpels (Stone *et al.* 1999).

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

Melicope pallida is currently and historically known from Kauai and Oahu. On Oahu, it is currently known from the Waianae Mountains within TNCH's privately owned Honouliuli Preserve on State and private lands. There is a single occurrence with a single individual (GDSI 2001; HINHP Database 2001).

Melicope pallida usually grows on steep rock faces in lowland dry or mesic forests at elevations of 234 to 841 m (768 to 2,758 ft). Associated native plant species include the endangered *Abutilon sandwicense*, *Acacia koa*, *Alyxia oliviformis*, *Bobea elatior*, *Cibotium* sp., *Dryopteris* sp. (NCN), *Metrosideros polymorpha*, *Pipturus albidus*, *Psychotria mariniana*, *Sapindus oahuensis*, *Syzygium sandwicense*, *Tetraplasandra* sp., *Wikstroemia oahuensis*, or *Xylosma hawaiiense* (HINHP Database 2001; 59 FR 09304).

The major threat to *Melicope pallida* on Oahu is competition from nonnative plants, especially *Andropogon virginicus*, *Clidemia hirta*, *Psidium cattleianum*, *Pterolepis glomerata*, and *Toona ciliata*. A potential threat to *M. pallida* is the black twig borer, which is known to occur in areas where this species grows and to feed on members of the genus *Melicope*. Additional threats to *M. pallida* are fire, habitat degradation by feral pigs, and a high risk of extinction due to naturally caused events and/or reduced reproductive vigor due to the solitary existing individual on Oahu (HINHP Database 2001; 59 FR 09304).

Nototrichium humile (Kului)

Nototrichium humile, a short-lived perennial member of the amaranth family (Amaranthaceae), is an upright to trailing shrub with branched stems to 1.5 m (5 ft) long. This species is distinguished from the only other species in the genus by the size and hairiness of its inflorescence (Wagner *et al.* 1999).

Nototrichium humile is found on and at the base of rock cliffs and talus slopes in areas in partial shade. Plants have been observed flowering after heavy rain, but flowering is generally heaviest in the spring and summer. Fruits mature a few weeks after flowering. In cultivation, this species is known to live for more than a decade (Service 1998b). Little else is known about its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors.

Historically and currently, *Nototrichium humile* is known from Oahu and Maui. Currently, on Oahu, it is found in Kapuhi Gulch, Pahole Gulch, Kealia, Kahanahaiki, Kaluakauila Gulch, along Makua-Keau Ridge to Makaha-Waianae Kai Ridge, and Nanakuli, where it occurs on Federal, State, city, county, and private lands. There are a total of 25 occurrences containing between 775 and 995 individuals on Oahu (EDA Database 2001; GDSI 2001; HINHP Database 2001).

Nototrichium humile typically grows at elevations of 185 to 806 m (607 to 2,644 ft) on cliff faces, gulches, stream banks, or steep slopes in dry or mesic forests often dominated by *Sapindus oahuensis* or *Diospyros sandwicensis*. Associated native species include the endangered species *Abutilon sandwicense*, *Alyxia oliviformis*, *Antidesma pulvinatum*, *Artemisia australis*, *Bidens cervicata* (kookoolau), *Canavalia* sp., *Carex wahuensis*, *Charpentiera* sp., *Dodonaea viscosa*, *Elaeocarpus bifidus*, *Erythrina sandwicensis*, *Eugenia reinwartiana*, *Hibiscus* sp., *Melanthra tenuis*, *Metrosideros polymorpha*, *Myoporum sandwicense*, *Myrsine lanaiensis*, *Nestegis sandwicensis*, *Peperomia* sp., *Pisonia umbellifera*, *Pleomele* sp., *Pouteria sandwicensis*, *Psydrax odorata*, *Rauvolfia sandwicensis*, *Reynoldsia sandwicensis*, *Sicyos* sp., *Stenogyne* sp., *Streblus pendulinus*, or *Syzygium sandwicensis*, (HINHP Database 2001; Service 1998b; 56 FR 55770).

On Oahu, the major threats to *Nototrichium humile* are habitat degradation by feral goats and pigs; potential impacts of military activities;

competition from the nonnative plant species *Adiantum hispidulum*, *Ageratina adenophora*, *Aleurites moluccana*, *Blechnum appendiculatum*, *Buddleia asiatica*, *Caesalpinia decapetala*, *Coffea arabica*, *Cordyline fruticosa*, *Ficus microphylla*, *Grevillea robusta*, *Hyptis pectinata*, *Kalanchoe pinnata*, *Lantana camara*, *Leucaena leucocephala*, *Melia azedarach*, *Melinis minutiflora*, *Montanoa hibiscifolia*, *Oplismenus hirtellus*, *Panicum maximum*, *Passiflora suberosa*, *Pimenta dioica*, *Psidium cattleianum*, *Psidium guajava*, *Rivina humilis*, *Schefflera actinophylla*, *Schinus terebinthifolius*, *Spathodea campanulata*, *Syzygium cumini*, *Triumfetta semitriloba* (Sacramento bur), and *Toona ciliata*; road building and maintenance; and fire (HINHP Database 2001; Service 1998b; 56 FR 55770).

Peucedanum sandwicense (Makou)

Peucedanum sandwicense, a short-lived perennial and a member of the parsley family (Apiaceae), is a parsley-scented, sprawling herb. Hollow stems arise from a short, vertical, perennial stem with several fleshy roots. This species is the only member of the genus on the Hawaiian Islands (Constance and Affolter 1999).

Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown for this species (Service 1995b).

Historically and currently, *Peucedanum sandwicense* is known from Molokai, Maui, and Kauai. Discoveries in 1990 extended the known distribution of this species to Oahu. On Oahu, there are a total of 4 occurrences containing 51 individual plants on State, city, and county lands in Keau Valley, Puu Kawiwi, Waianae Kai, and Kamaileunu Ridge (GDSI 2001; HINHP Database 2001).

Peucedanum sandwicense grows on cliffs, slopes, and ridges in *Metrosideros polymorpha* lowland mesic forest between 395 and 977 m (1,296 and 3,205 ft) elevation and is associated with native species such as *Artemisia australis*, *Carex meyenii*, *Dianella sandwicensis*, *Dodonaea viscosa*, *Eragrostis* sp., *Lepidium bidentatum* var. *o-waihiense*, *Melanthra integrifolia* (nehe), *Osteomeles anthyllidifolia*, *Peperomia remyi* (alaala wai nui), *Pittosporum halophilum* (hoawa), *Plechranthus parviflorus*, *Plumbago zeylanica*, *Portulaca lutea* (ihi), *Reynoldsia sandwicensis*, *Santalum ellipticum* (iliahialoe), *Scaevola sericea* (naupaka kahakai), *Schiedea globosa* (NCN), *Senna gaudichaudii*, and *Sida*