

*Sacciolepis indica*; habitat destruction by feral pigs; and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of remaining individuals (HINHP Database 2001).

*Sanicula purpurea* (NCN)

*Sanicula purpurea*, a short-lived member of the parsley family (Apiaceae), is a stout herb, 8 to 36 cm (3 to 14 in) tall, arising from a massive perennial stem. This species is distinguished from others in the genus by the number of flowers per cluster and by the color of the petals (Constance and Affolter 1999).

Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors of *Sanicula purpurea* are unknown (Service 1999).

Historically and currently, *Sanicula purpurea* is known from Oahu and Maui. On Oahu, 5 occurrences totaling approximately 21 individuals are currently known from Kaukonahua-Kahana divide, Helemano-Punaluu divide, the summit between Aiea and Waimano, and North Kaukonahue-Punaluu on Federal, State, and private lands (EDA Database 2001; GDSI 2001; HINHP Database 2001).

*Sanicula purpurea* on Oahu typically grows in open *Metrosideros polymorpha* mixed montane bogs and windswept shrublands within the cloud zone between 415 and 959 m (1,361 and 3,146 ft) elevation. Associated native plant species include *Bidens* sp., *Cheirodendron* sp., *Dicanthelium koolauense*, *Gahnia beechyi*, *Leptecophylla tameiameia*, *Lycopodium* sp., *Machaerina angustifolia*, *Plantago pachyphylla* (laukahi kuahiwi), *Sadleria pallida*, or *Vaccinium* sp. (HINHP Database 2001; EDA, *in litt.* 2001).

The major threats to *Sanicula purpurea* on Oahu are habitat degradation by feral pigs, a risk of extinction due to random environmental events and/or reduced reproductive vigor due to the small number of existing occurrences, and competition with the nonnative plant species *Axonopus fissifolius* and *Clidemia hirta* (HINHP Database 2001; Service 1999; 61 FR 53108).

*Schiedea hookeri* (NCN)

*Schiedea hookeri*, a member of the pink family (Caryophyllaceae), is a sprawling or clumped, long-lived, perennial herb. This species is distinguished from others in this endemic Hawaiian genus by its open, hairy, and sometimes sticky

inflorescence and by the size of the capsules (Wagner *et al.* 1999).

Based on field and greenhouse observations, *Schiedea hookeri* has bisexual flowers. Mature fruits have been observed in June and August. A series of experimental self-pollinations, within-population crosses, and crosses among populations has demonstrated that *S. hookeri* experiences moderately strong inbreeding depression. These results indicate that reductions in population size could result in expression of inbreeding depression among progeny, with potentially deleterious consequences for the long-term persistence of this species. *Schiedea hookeri* appears to be an out-crossing species. Under greenhouse conditions, flowers do not set seed unless hand-pollinated. In the field, the species is presumed to be pollinated by insects, although none have been observed (a related species, *S. lydgatei* on Molokai, is apparently pollinated by native, night-flying moths). Individuals of *S. hookeri* appear to be long-lived, but there is no evidence of reproduction from seed under field conditions. Seedlings of *Schiedea* species occurring in mesic or wet sites are apparently consumed by introduced slugs and snails. In contrast, *Schiedea* occurring in dry areas produce abundant seedlings following winter rains, presumably because the drier sites have fewer nonnative predators. *Schiedea hookeri* differs considerably through its range in potential for clonal growth. Plants from Kaluakaula Gulch are upright and show little potential for clonal spread. In contrast, clonal growth has been detected for individuals at Kaluaua Gulch, where the growth form is decumbent and plants apparently root at the nodes (HINHP Database 2001; Service 1999; Weller and Sakai, unpublished data). No further information is available on flowering cycles, seed dispersal agents, longevity, specific environmental requirements, or limiting factors.

Historically, *Schiedea hookeri* was known from the Waianae Mountains of Oahu and a single fragmentary collection from Maui that may represent a different species. Currently, this species is known from 17 occurrences on Oahu containing between 328 and 378 individuals in East Makaleha, Makaha-Waianae Kai Ridge, Kaluakaula Gulch, between Kalaulula and Kanewai Streams, Kaluaua Gulch, north of Puu Ku Makalii, Waianae Kai, Makua-Makaha Ridge, between Kolekole Pass and Puu Hapapa, southwest of Puu Kaula, Palikea Gulch, Makaha, Kamaileunu Ridge, and Kahanahaiki on Federal, State, city, county, and private lands (EDA

Database 2001; GDSI 2001; HINHP Database 2001; Service 1999).

*Schiedea hookeri* is usually found on slopes, cliffs and cliff bases, rock walls, and ledges in diverse mesic or dry lowland forest, often dominated by *Metrosideros polymorpha*, *Diospyros sandwicensis*, or *Diospyros hillebrandii*, and at elevations between 208 and 978 m (682 and 3,208 ft). Associated plant species include *Acacia koa*, *Alyxia oliviformis*, *Antidesma pulvinatum*, *Artemisia australis*, *Bidens torta*, *Carex meyenii*, *Carex wahuensis*, *Charpentiera tomentosa*, *Dodonaea viscosa*, *Elaeocarpus bifidus*, *Eragrostis grandis*, *Hibiscus* sp., *Leptecophylla tameiameia*, *Melanthera tenuis*, *Pisonia sandwicensis*, *Pouteria sandwicensis*, *Psydrax odorata*, *Sida fallax*, or *Stenogyne* sp. (Service 1999).

The primary threats to *Schiedea hookeri* are habitat degradation and/or destruction by feral goats and pigs; competition with the nonnative plant species *Adiantum hispidulum*, *Ageratina adenophora*, *Ageratina riparia*, *Aleurites moluccana*, *Blechnum appendiculatum*, *Christella parasitica*, *Clidemia hirta*, *Cordyline fruticosa*, *Grevillea robusta*, *Heliocarpus popayanensis*, *Hyptis pectinata*, *Kalanchoe pinnata*, *Lantana camara*, *Melia azedarach*, *Melinis minutiflora*, *Panicum maximum*, *Passiflora suberosa*, *Pimenta dioica*, *Psidium cattleianum*, *Psidium guajava*, *Schinus terebinthifolius*, *Syzygium cumini*, and *Toona ciliata*; and predation by introduced slugs and snails. The Kaluakaula Gulch occurrence is also potentially threatened by fire and military activities (Service 1999).

*Schiedea nuttallii* (NCN)

*Schiedea nuttallii*, a long-lived perennial member of the pink family (Caryophyllaceae), is a generally hairless, erect subshrub. This species is distinguished from others in this endemic Hawaiian genus by its habit, length of the stem internodes, length of the inflorescence, number of flowers per inflorescence, and smaller leaves, flowers, and seeds (Wagner *et al.* 1999).

Flowers and fruits of *Schiedea nuttallii* are abundant in the wet season but can be found throughout the year. Plants located close to the Makua rim on Oahu have been under observation for 10 years, and they appear to be long-lived. Based on field and greenhouse observations, the species has bisexual flowers. *Schiedea nuttallii* appears to be an out-crossing species. Under greenhouse conditions, plants fail to set seed unless hand-pollinated, suggesting that this species requires insects for pollination. Seedlings of *Schiedea*