

limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Bonamia menziesii* was known from Kauai, Oahu, Molokai, one location on West Maui, and the island of Hawaii. Currently, this species is known from Kauai, Oahu, Lanai, Maui, and Hawaii. On Maui, there are six occurrences containing a total of eight individuals on State (Kanaio NAR) and privately owned lands within the West Maui Mountains Watershed Partnership at Honokawai, Keokea, Haunauhane, and Kanaio (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; K. Wood, *in litt.* 1999).

Bonamia menziesii on Maui is found on a lava in mixed open dry forest, *Erythrina sandwicensis* (wiliwili) lowland dry forest, or in mesic mixed *Metrosideros polymorpha* forest containing one or more of the following associated native plant species: *Acacia koaia* (koaia); *Achyranthes splendens* (Maui hinahina ewa); *Alphitonia ponderosa*; *Alyxia oliviformis*; *Diospyros sandwicensis*; *Dodonaea viscosa*; *Lipochaeta rockii* (nehe); *Myoporum sandwicense*; *Nestegis sandwicensis*; *Nothoecstrum latifolium* (aiea); *Nototrichium* spp. (kului); *Pleomele auwahiensis*; *Pouteria sandwicensis*; *Osteomeles anthyllidifolia*; *Reynoldsia sandwicensis* (ohe); *Santalum ellipticum*; *Sicyos* spp. (anunu); *Sida fallax*; or *Xylosma hawaiiense*, at elevations between 184 and 906 m (604 and 2,971 ft) (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001; K. Wood, *in litt.* 1999).

The primary threats to this species on Maui are habitat degradation and possible predation by feral pigs, goats, axis deer, and cattle; competition with a variety of nonnative plant species, particularly *Bocconia frutescens* or *Lantana camara*; and an nonnative beetle (*Physomerus grossipes*) (Service 1999; 59 FR 56333).

Brighamia rockii (Pua ala)

Brighamia rockii, a long-lived perennial member of the bellflower family (Campanulaceae), grows as an unbranched stem-succulent with a thickened stem that tapers from the base. This species is a member of a unique endemic Hawaiian genus with only one other species, found on Kauai, from which it differs by the color of its petals, its longer calyx (fused sepals) lobes, and its shorter flower stalks (Lammers 1999).

Observations of *Brighamia rockii* have provided the following information: The reproductive system is protandrous, meaning male flower parts are produced before female parts, in this case,

separated by several days; only five percent of the flowers produce pollen; very few fruits are produced per inflorescence; there are 20 to 60 seeds per capsule; and plants in cultivation have been known to flower at nine months of age. This species has been observed in flower during August. Little else is known about the life history of *B. rockii*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (HINHP Database 2001; Service 1996b; 57 FR 46325).

Historically, *Brighamia rockii* ranged along the northern coast of East Molokai and may possibly have grown on Lanai and Maui. Currently, it is only extant on Molokai (HINHP Database 2001; Lammers 1999; Service 1996b; 57 FR 46325; K. Wood, *in litt.* 2000).

Brighamia rockii occurs in rock crevices on steep sea cliffs, often within the spray zone, in coastal dry to mesic forests and shrublands between 0 and 195 m (0 and 640 ft). Associated plant species include *Diospyros sandwicensis*, *Psydrax odorata* (alahee), *Osteomeles anthyllidifolia*, and *Scaevola taccada* (naupaka kahakai) (Service 1996b; 57 FR 46325; J. Lau, pers. comm., 2001).

Nothing is known of the threats to *Brighamia rockii* on the island of Maui (Service 1996b; 57 FR 46325).

Cenchrus agrimonioides (Kamanomano, =sandbur, agrimony)

Cenchrus agrimonioides is a short-lived perennial member of the grass family (Poaceae) with leaf blades that are flat or folded and have a prominent midrib. There are two varieties, *C. agrimonioides* var. *laysanensis* and *C. agrimonioides* var. *agrimonioides*. They differ from each other in that var. *agrimonioides* has smaller burs, shorter stems, and narrower leaves. This species is distinguished from others in the genus by the cylindrical to lance-shaped bur and the arrangement and position of the bristles (O'Connor 1999).

Little is known about the life history of *Cenchrus agrimonioides*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown. This species has been observed to produce fruit year-round (Service 1999; 61 FR 53108).

Historically, *Cenchrus agrimonioides* var. *agrimonioides* was known from Oahu, Lanai, the south slope of Haleakala and Ulupalakua on Maui, and (in an undocumented report) the island of Hawaii. Historically, *C. agrimonioides* var. *laysanensis* was known from Laysan, Kure, and Midway,

all within what is now the Northwestern Hawaiian Islands National Wildlife Refuge, but has not been seen since 1973. This variety was never known from Maui. Currently, *C. agrimonioides* var. *agrimonioides* is known from Oahu and Maui. On Maui, this variety is known from one occurrence on State-owned land (Kanaio NAR) at Ukumehame and Kanaio, East Maui, containing an unknown number of individuals (Corn 1980; HINHP Database 2001; Service 1999; 61 FR 53108).

Cenchrus agrimonioides var. *agrimonioides* is found in mid-elevation dry forest or *Pleomele-Diospyros* forest associated with *Alyxia oliviformis*, *Dodonaea viscosa*, *Osteomeles anthyllidifolia*, or *Santalum ellipticum* at elevations between 471 and 1,091 m (1,544 and 3,579 ft) (HINHP Database 2001; Service 1999; 61 FR 53108; R. Hobdy, pers. comm., 2001).

The major threats to the only known occurrence of *Cenchrus agrimonioides* var. *agrimonioides* on Maui are competition with nonnative plant species, browsing and habitat degradation by goats and cattle and a risk of extinction from naturally occurring events and/or reduced reproductive vigor caused by the small number of existing individuals (Service 1999; 61 FR 53108).

Centaurium sebaeoides (Awiwi)

Centaurium sebaeoides is an annual herb in the gentian family (Gentianaceae) with fleshy leaves and stalkless flowers. This species is distinguished from *C. erythraea* (bitter herb), which is naturalized in Hawaii, by its fleshy leaves and the unbranched arrangement of the flower cluster (Wagner *et al.* 1999).

Centaurium sebaeoides has been observed flowering in April. Flowering may be induced by heavy rainfall. Occurrences are found in dry areas, and plants are more likely to be found following heavy rains. Little else is known about the life history of this plant. Its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 56 FR 55770).

Historically and currently, *Centaurium sebaeoides* is known from Kauai, Oahu, Molokai, Lanai, and Maui. On Maui, there are 3 occurrences of this species, with a total of more than 50 individuals, on State and privately owned lands at Kahakuloa Head, Lahoole, and Kupaa Gulch (HINHP Database 2001; Service 1999; Wagner *et al.* 1999; 56 FR 55770).