of Laysan, Kure, and Midway, all within the Northwestern Hawaiian Islands National Wildlife Refuge. This variety has not been seen since 1973. These islands are infrequently surveyed for plants, the last comprehensive survey being completed in the 1980s, so it is possible that the variety still exists and will be found with further survey efforts (Corn 1980; HHP 1991a1, 1991a2).

The major threats to *Cenchrus* agrimonioides var. agrimonioides are habitat degradation and/or destruction by feral pigs (Sus scrofa) (Oahu only), competition with alien plant taxa, and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing individuals. The Pahole Gulch population on Oahu is potentially threatened by trampling and fire from military activities and the Maui population is potentially threatened by goats and cattle (HHP 1994d1, 1994d8, 1994d11, 1994d12, 1994d14; R. Hobdy and C. Russell, pers. comms. 1994).

Cyanea grimesiana ssp. grimesiana was collected by Charles Gaudichaud-Beaupré in 1819 on Oahu while he was pharmaceutical botanist on the vessel Uranie (HHP 1989a, Rock 1919, Wagner et al. 1990). Gaudichaud later described this taxon and named it for the French Navy's head pharmacist (Thomas G. Lammers, Field Museum, pers. comm. 1994). Other published names considered synonymous with Cyanea grimesiana ssp. grimesiana include C. grimesiana var. İydgatei, C. grimesiana var. mauiensis, Č. grimesiana var. munroi, and C. lobata var. hamakuae (Lammers 1990). Currently, three subspecies are recognized—the extinct ssp. cylindrocalyx (Rock 1917); ssp. grimesiana; and the federally endangered ssp. obatae (St. John 1978a).

Cyanea grimesiana ssp. grimesiana, a member of the bellflower family (Campanulaceae), is a shrub 1 to 3.2 m (3.3 to 10.5 ft) tall. The leaves are pinnately divided, with 9 to 12 segments per side. The leaf blades are 27 to 58 cm (10.6 to 22.9 in.) long and 14 to 32 cm (5.5 to 12.6 in.) wide (across the segments). The inflorescence comprises 6 to 12 flowers. The calyx lobes, 10 to 44 mm (0.4 to 2 in.) long and 4 to 14 mm (0.2 to 0.55 in.) wide, are egg-shaped to lance-shaped and overlap at the base. The petals are purplish or greenish to yellowish white, often suffused or striped with magenta, and 55 to 80 mm (2 to 3 in.) long. The orange berries are 18 to 30 mm (0.7 to 1.2 in.) long. This species is distinguished from others in this endemic Hawaiian genus by the pinnately lobed leaf margins and the

width of the leaf blades. This subspecies is distinguished from the other two subspecies by the shape and size of the calyx lobes which overlap at the base (Lammers 1990).

Historically Cyanea grimesiana ssp. grimesiana was known from at least 40 populations located in the Waianae and Koolau mountains on Oahu, Wailau Valley and Puu Kahea on Molokai. central and northern Lanai, and scattered locations on Maui (HHP 1994e1 to 1994e39; Heidi Bornhorst, TNCH, and Steven Perlman, National Tropical Botanical Garden, pers. comms. 1992). Currently Cyanea grimesiana ssp. grimesiana is known from 15 populations on those 4 islands (HHP 1994e1, 1994e4, 1994e6 to 1994e8, 1994e14, 1994e15, 1994e26, 1994e27, 1994e34, 1994e36 to 1994e38; H. Bornhorst and S. Perlman, pers. comms. 1992; Art Medeiros, National Biological Service, pers. comm. 1994). On Oahu, the following populations are known from the Waianae Mountainsone population from Mt. Kaala NAR and three populations from Pahole NAR on State land, one population each from North Haleauau Gulch on the federally owned Schofield Barracks Military Reservation and North Kaluaa Gulch on private land. Two populations are known from Oahu's Koolau Mountains on State and private land (HHP 1994e1, 1994e4, 1994e8, 1994e14, 1994e15, 1994e34, 1994e38; H. Bornhorst and S. Perlman, pers. comms. 1992). On Molokai, one population is known from Kukuinui Ridge on State land and the other is within the State's Olokui NAR (HHP 1994e7, 1994e36). On Lanai, two populations are known from Kaiholena Gulch and an unnamed gulch south of Puhielelu Ridge, in the central portion of the island, both on private land (HHP 1994e27, 1994e37). On Maui, two populations are known from Iao Valley on private land and one population from Kipahulu Valley within Haleakala National Park (HHP 1994e6, 1994e26; A. Medeiros, pers. comm. 1994). The total current populations statewide consist of fewer than 400 individuals, with over 350 occurring in Kipahulu Valley on Maui (HHP 1994e1, 1994e4, 1994e8, 1994e14, 1994e15, 1994e34, 1994e38; H. Bornhorst and S. Perlman, pers. comms. 1992; A. Medeiros, pers. comm. 1994). Cyanea grimesiana ssp. grimesiana is typically found in mesic forest often dominated by 'ohi'a or 'ohi'a and koa, or on rocky or steep slopes of stream banks, and between 350 and 945 m (1,150 and 3,100 ft) elevation. Associated plant taxa include Antidesma sp. (hame), Bobea sp. ('ahakea), Psychotria sp. (kopiko),

*Xylosma* sp. (maua), and various native and alien ferns (HHP 1994e1, 1994e7, 1994e8, 1994e14, 1994e34, 1994e37; H. Bornhorst and S. Perlman, pers. comms. 1992).

The major threats to Cyanea grimesiana ssp. grimesiana are habitat degradation and/or destruction caused by wild and feral ungulates (axis deer (Axis axis), goats, and pigs) and competition with various alien plants. Potential overcollection, trampling by hikers and/or military activities, and fire threaten the Palikea population on Oahu. The Oahu populations are also threatened by landslides. The Kipahulu Valley population on Maui is threatened by competition with Cyathea cooperi (Australian tree fern) and various alien grasses (HHP 1994e1, 1994e7, 1994e34, 1994e37; H. Bornhorst and S. Perlman, pers. comms. 1992; A. Medeiros, pers. comm. 1994; Loyal Mehrhoff, U.S. Fish and Wildlife Service, pers. comm. 1995). Rats (Rattus spp.) are also a potential threat, since they are known to eat the fruits and girdle the stems of species in the bellflower family (Joel Lau, TNCH, pers. comm. 1994).

First collected by Chamisso between 1816 and 1817 in the "Sandwich Islands," *Cyperus trachysanthos* was described by William J. Hooker and G.A.W. Arnott in 1832 (Hillebrand 1888, Mill *et al.* 1988). This species has been maintained in the most recent treatment of Hawaiian members of the genus (Koyama 1990). The specific epithet refers to the rough or papery flowers.

Cyperus trachysanthos, a member of the sedge family (Cyperaceae), is a perennial grass-like plant with a short rhizome (underground stem). The culms (aerial stems) are densely tufted, obtusely triangular, 20 to 45 cm (8 to 18 in.) tall, sticky, and leafy at the base. The linear leaf blades are green, covered with a waxy coating, and somewhat leathery. The leaf sheath is yellowish brown and partitioned with nodes. The flower clusters are 5 to 9 cm (2 to 3.5 in.) long and 6 to 12 cm (2 to 5 in.) wide. Each flower head contains 10 to 30 pale yellowish brown spikelets, each of which contains 8 to 20 flowers. The glumes (small pair of bracts at the base of each spikelet) are broadly egg-shaped. The fruit is a dark brown, egg-shaped achene. This species is distinguished from others in the genus by the short rhizome, the leaf sheath with partitions at the nodes, the shape of the glumes, and the length of the culms (Koyama

Historically *Cyperus trachysanthos* was known from Niihau, Kauai, scattered locations on Oahu, Mauna Loa on Molokai, and Kaena on Lanai (HHP 1994f1 to 1994f15, HPCC 1993a).