

(HINHP Database 2000). *Pritchardia remota* is also present in a shadehouse on Laysan Island as seedlings, from seeds collected at Nihoa for outplanting on Laysan as part of identified recovery efforts for this species (Service 1998d).

*Pritchardia remota* is one of the few Hawaiian members of the genus that occurs in relatively dry climates like that found on Nihoa. Its distribution on Nihoa, however, may be related to availability of water since many individuals are found in valleys and near freshwater seeps (Service 1998d). In the *Pritchardia remota* coastal forest community, this species assumes complete dominance, creating a closed canopy and understory of thick layers of fallen fronds (Gagne and Cuddihy 1999). Native plants which occur nearby include *Chenopodium oahuense*, *Sesbania tomentosa* (ohai), *Sida fallax*, and *Solanum nelsonii*, (Service 1998d).

The threats to *Pritchardia remota* on Nihoa include competition with nonnative plants, potential introduction of rats and mice, possible herbivory by nonnative insect species, fire, human disturbances, a risk of extinction from naturally occurring events (such as landslides), and reduced reproductive vigor due to the small number of extant individuals (Service 1998d).

#### *Schiedea verticillata* (NCN)

*Schiedea verticillata*, a member of the pink family (Caryophyllaceae), is a perennial herbaceous species, which dies back to an enlarged root during the dry season. Stems, which can reach 0.4 to 0.6 m (1.3 to 2 ft) in length, are both upright or pendant (drooping). The stalkless leaves are fleshy, broad, and pale green and are usually arranged in threes. *Schiedea verticillata*, the only member of its genus to grow in the NWHI, is distinguished from other species in the genus by its exceptionally large sepals and (usually) three leaves per node (Wagner *et al.*, 1999).

*Schiedea verticillata* is a short-lived perennial. Dr. Steve Weller, University of California at Irvine, found that *Schiedea verticillata* produces more seeds and more nectar than any other species in its genus. It also has the highest degree of genetic diversity among individuals of any species in the genus (Service 1998d). This species' reproductive cycle may not be seasonal, since Conant (1985) has found many life stages simultaneously throughout the year. Her observations also indicate that individual plants flower, set seed, and disperse seed in a relatively short period of time. Pollination vectors, seed dispersal agents, specific environmental requirements, and limiting factors for

this species are unknown (Service 1998d).

All but one of the historic colonies of *Schiedea verticillata* are known to be extant on Nihoa. Colony locations and plant numbers appear to shift, but total numbers islandwide have remained relatively stable for several years. Seven colonies, containing a total of 497 individuals, were documented between 1980 and 1983 (HINHP Database 2000). In 1992, Service staff counted between 170 and 190 plants in 6 colonies. In 1996, a total of 359 plants, distributed in 10 colonies primarily on the western half of the island, were identified, with an occurrence of 13 plants on the east spur of the island near Tunnel Cave. Two previously unobserved colonies of 2 and 99 plants were located on the north cliffs above Miller's Valley. Other colonies included 24 plants at Dog's Head, 37 plants at Devil's Slide, 10 plants near Miller's Peak, a previously unknown occurrence of 62 plants on the ridge separating West and West Palm valleys, 80 plants near lower West Valley, 28 individuals near Pinnacle Peak, and 4 plants northeast of Pinnacle Peak (Service 1998).

*Schiedea verticillata* typically grows in rocky scree, soil pockets, and cracks in coastal cliff faces and in *Pritchardia remota* coastal mesic forest at elevations between 30 and 242 m (100 and 800 ft). Associated native plant taxa include *Eragrostis variabilis*, *Rumex albescens* (huahuako), *Tribulus cistoides* (nohu), and lichens (HINHP Database 2000).

The threats to *Schiedea verticillata* on Nihoa include competition with nonnative plant species, possible herbivory by nonnative insect species, potential introduction of rats and mice, human disturbances, a risk of extinction from naturally occurring events (such as rockslides), and reduced reproductive vigor due to the small number of individuals (Conant 1985; Service 1998d).

#### Multi-Island Species

##### *Cenchrus agrimonioides* (kamanomano)

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

Little is known about the life history of *Cenchrus agrimonioides*. It has been observed to produce fruit year round (Service 1999), but other information about its flowering, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors is generally unknown.

Historically, *Cenchrus agrimonioides* var. *agrimonioides* was known from Oahu, Lanai, Maui, and (in an undocumented report) the island of Hawaii (61 FR 53108; 65 FR 79192). *Cenchrus agrimonioides* var. *laysanensis* was historically known from Laysan and Midway Islands and Kure Atoll in the NWHI but has not been seen there since about 1980 (HINHP Database 2000; O'Connor 1999). It occurred on coastal sandy substrate in *Scaevola sericea*-*Eragrostis variabilis* scrub at an elevation of 5 m (16 ft). Morin and Conant (1998) report that *C. agrimonioides* var. *laysanensis* disappeared from Laysan before 1923, from Midway Atoll sometime shortly after 1902, and was last seen on Green Island (Kure Atoll) in about 1980. *Cenchrus agrimonioides* var. *laysanensis* has not been relocated during periodic monitoring on Laysan for more than 20 years and has not been seen on Midway during recent surveys in 1995 and 1999. It has not been seen on Kure Atoll for over 20 years, in spite of DOFAW's annual seabird surveys and a botanical survey conducted there as recently as 2001. In addition, no viable genetic material of this variety is known to exist. We believe that it is extremely unlikely that individual plants will be rediscovered on these three islands and atolls.

##### *Mariscus pennatifomis* (NCN)

*Mariscus pennatifomis* is a member of the sedge family (Cyperaceae). It is a short-lived perennial with a woody root system covered with brown scales. The stout, three-angled stems are between 0.4 and 1.2 m (1.3 and 4 ft) tall. This species differs from other members of the genus by its slightly concave, smooth stems; the length and number of spikelets (elongated flower-clusters); leaf width; and the length and diameter of stems. The two subspecies, *M. pennatifomis* ssp. *bryanii* and *M. pennatifomis* ssp. *pennatifomis*, are distinguished by the length and width of the spikelets; shape and length of the fruit; and color, length, and width of the glumes (scaly floral bracts) (Koyama 1990).

At the time *Mariscus pennatifomis* was listed in 1994 (59 FR 94559), we followed the taxonomic treatments in the *Manual of the Flowering Plants of Hawaii* (Wagner *et al.* 1990). Subsequent