

Kure Atoll was discovered and named in 1827 by the captain of a Russian vessel. Between 1876 and 1936, Australian Copra & Guano Ltd. mined guano from Green Island and Sand Island, the two islands that make up Kure Atoll. Military bases were built on the islands during World War II, and a Loran C station with two 158 m (518 ft) high masts was operated until 1998. The towers are no longer on the islands. The airstrip built on Green Island is no longer usable, and landing is only possible by boat (Service 1998a).

Hawaiian Islands National Wildlife Refuge

The reefs and islets of the Northwestern Hawaiian chain from Nihoa Island through Pearl and Hermes Atoll are protected as the Hawaiian Islands National Wildlife Refuge (HINWR). The HINWR was established in 1909 to protect the large colonies of seabirds, which were being slaughtered for the millinery trade, and a variety of other marine organisms, including sea turtles and the critically endangered Hawaiian monk seal (*Monachus schauinslandi*), as well as to address the commercial exploitation of wildlife resources (Executive Order 1019). Within the refuge's boundaries are eight islands and atolls: Nihoa, Necker, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan, Lisianski, and Pearl and Hermes Atoll. There is no public or recreational use allowed at HINWR. Access is strictly regulated through a permit system because of the sensitivity of the organisms on these islands to human disturbance and the high risk of importation of nonnative plant and invertebrate species. For those who do access the refuge, strict quarantine procedures are in effect. Other than the refuge staff, only individuals conducting scientific research or undertaking natural history film recording have been granted official permission to visit the HINWR (E. Flint, pers. comm., 2002).

Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve

On December 4, 2000, President Clinton issued an Executive Order establishing the 33,993,594 ha (84 million ac) Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. This reserve includes the marine waters and submerged lands of the NWHI and covers an area approximately 2,222 km (1,200 nautical mi) long and 185 km (100 nautical mi) wide. The reserve is adjacent to State of Hawaii waters and submerged lands and the Midway Atoll NWR and includes the HINWR outside of State waters.

Discussion of Plant Taxa

Species Endemic to the Northwestern Hawaiian Islands

Amaranthus brownii (No Common Name (NCN))

Amaranthus brownii, a member of the amaranth family (Amaranthaceae), is an herbaceous annual with leafy upright or ascending stems, 30 to 90 centimeters (cm) (1 to 3 ft) in length. The slightly hairy, alternate leaves are long, narrow, and more or less folded in half lengthwise. The species is monoecious, with male and female flowers being found on the same plant. *Amaranthus brownii* can be distinguished from other Hawaiian members of the genus by its spineless leaf axils (the points between the stem and a leaf branch), linear leaves, and indehiscent (remaining closed at maturity) fruits (Wagner *et al.*, 1999).

The growing season for *Amaranthus brownii* extends from December to June or July. Conant (1985) reported finding plants in an early flowering stage in February and collected seed from dead plants during June. Phenology may vary somewhat from year to year, depending on rainfall and climatic factors. Pollination vectors, seed dispersal agents, specific environmental requirements, and limiting factors for this species are unknown (Service 1998d).

Amaranthus brownii is currently the rarest native plant on Nihoa (Conant 1985). When it was first collected in 1923, it was "most common on the ridge leading to Miller's Peak, but abundant also on the ridges to the east" (Herbst 1977). In 1983, the two known groups of colonies were separated by a distance of 0.4 km (0.25 mi) and contained a total of approximately 35 plants: one occurrence of about 23 plants near Miller's Peak and a second occurrence of approximately a dozen plants in three small groups in Middle Valley. No plants have been seen at either location since 1983, even though Service staff have surveyed for the species annually (Service 1998d). None of the surveys conducted since 1983 have been conducted in the winter months when this annual species is easiest to find and identify. Access to the island is particularly limited during the winter due to difficult and dangerous landing conditions (Cindy Rehkemper, Service, pers. comm., 2001).

Amaranthus brownii typically grows in shallow soil on rocky outcrops. It is found in fully exposed locations at elevations between 30 and 242 m (100 and 800 ft). Associated native plant taxa include *Chenopodium oahuense*

(aheahea), *Eragrostis variabilis* (kawelu), *Ipomoea indica* (koali awa), *Ipomoea pes-caprae* ssp. *brasiliensis* (pohuehue), *Panicum torridum* (kakonakona), *Scaevola sericea* (naupaka), *Schiedea verticillata* (NCN), *Sicyos pachycarpus* (kupala), *Sida fallax* (ilima), and *Solanum nelsonii* (akia) (Hawaii Natural Heritage Program (HINHP) Database 2000).

The threats to *Amaranthus brownii* on Nihoa include competition with the nonnative plant *Portulaca oleracea* (pigweed), alteration of substrate, fire, potential introduction of rats and mice, human disturbances, a risk of extinction from naturally occurring events (such as hurricanes), and reduced reproductive vigor due to the small number of extant individuals (Service 1998d).

Pritchardia remota (loulu)

Pritchardia remota, a member of the palm family (Arecaceae), is a tree 4 to 5 m (13 to 16 ft) tall with a ringed, wavy trunk about 15 cm (5.9 in) in diameter. The rather ruffled, fan-shaped leaves are approximately 80 cm (31 in) in diameter and somewhat waxy to pale green with a few tiny scales on the lower surface. The flowering stalks, which can be up to 30 cm (12 in) in length, are branched, and the flowers are arranged spirally along the hairless stalks. *Pritchardia remota* is the only species of *Pritchardia* on Nihoa and can be distinguished from other species in the genus by its wavy leaves; short, hairless inflorescences; and small, round fruits (Read and Hodel 1999; 61 FR 43178).

Pritchardia remota is a long-lived perennial, and populations on Nihoa have remained stable for several years. Conant (1985) reported finding plants with fruit and flowers in the spring and summer. Phenology may vary somewhat from year to year, depending on rainfall and climatic factors. Pollination vectors, seed dispersal agents, specific environmental requirements, and limiting factors for this species are unknown (Service 1998d).

Pritchardia remota occurs on Nihoa at elevations between 15 and 151 m (50 and 500 ft) and may have historically occurred on Laysan Island as well (Beccari and Rock 1921). Currently, *Pritchardia remota* is known from four colonies on Nihoa that are found along 0.2 km (0.1 mi) of the length of two valleys on opposite sides of the island, approximately 0.6 km (0.4 mi) apart. More than 680 plants, including seedlings, are found in West Palm Valley and at least 392 plants are found in East Palm Valley (HINHP Database 2000). A few individuals are also found at the bases of basalt cliffs on the steep outer slopes of each of the two valleys