

threatened with stochastic (i.e., random) extinction due to the small amount of habitat occupied by the species.

*Piperia yadonii* (Yadon's piperia) was first collected by Leroy Abrams in 1925 in open pine forest near Pacific Grove. At that time, it was identified as *Piperia unalascensi* (Morgan and Ackerman 1990), a polymorphic, wide-ranging species found from Alaska to Colorado, southern California, and northwestern Mexico. In the most recent treatment of the genus *Piperia*, James D. Ackerman (1977) segregated out several long-spurred taxa from the *P. unalascensis* complex, but attempted no analysis of the short-spurred forms. Subsequently, Morgan and Ackerman (1990) segregated out two new taxa from the *P. unalascensis* complex. One of these, *P. yadonii*, was named after Vernal Yadon, previous Director of the Museum of Natural History in Pacific Grove, Monterey County.

*Piperia yadonii* is a slender perennial herb in the orchid family (Orchidaceae). During the first few years of growth, the plant is visible only by its one or two lanceolate to oblanceolate basal leaves which die back each winter. In mature plants, the leaves are 10 to 15 cm (4 to 6 inches) long and 2 to 3 cm (0.8 to 1.2 inches) wide. After several years of vegetative growth, the plant sends up a single stem to 80 cm (31 inches) tall with flowers arranged in a dense narrow-cylindrical raceme. The flowers consist of three petal-like sepals and three petals, which together appear as one flower containing six tepals. The upper three tepals are basically green and the lower three white. The lowermost tepal is specialized into a lip that is narrowly triangular and is strongly decurved such that the tip nearly touches the spur of the flower (Morgan and Ackerman 1990). *Piperia yadonii* is sympatric with *P. elegans*, *P. elongata*, *P. michaelsii*, and *P. transversa*, but is distinguished from them by the shorter spur length, the particular pattern of green and white floral markings, and the earlier flowering time (R. Morgan, botanical consultant, Soquel, California, pers. comm., 1992).

*Piperia yadonii* is found within Monterey pine forest and maritime chaparral communities in northern coastal Monterey County from the Monterey Peninsula northeast to the Elkhorn Slough area. This plant occurs primarily on sandstone and sandy soils that are often poorly drained, though dry in summer when the plants are flowering (Morgan and Ackerman 1990). Six populations are clustered on the Monterey Peninsula; two are on Pebble Beach Company lands, two are on

DMFF lands, and two are in city parks in Pacific Grove and Monterey. Four populations are clustered generally between Prunedale and Elkhorn Slough; three of these are on privately owned lands, including one population on land managed by The Nature Conservancy (TNC) (Blohm Ranch), and one is on County property (Manzanita County Park). One small population is located at the northernmost corner of Fort Ord near Marina.

Recent surveys by Morgan indicate that the largest population, consisting of approximately 500 individuals, is scattered along a 2.1 km (1.3 mile) stretch of private road in Pebble Beach (Morgan, *in litt.*, 1992). One population, located in Long Valley between Prunedale and Elkhorn Slough, comprises approximately 150 individuals; the remaining populations range in size from a few individuals to fewer than 100 individuals (Morgan, *in litt.*, 1992).

*Piperia yadonii* was once more abundant on the Monterey Peninsula. Many historic collections were made from the Pacific Grove area, which has since been urbanized. It is also likely that the plant was previously more abundant in the Prunedale-Elkhorn Slough area; a lack of historical collections from this area is probably a reflection of the lower intensity of botanical collecting compared to the Monterey Peninsula area. Continued alteration and destruction of habitat due to urban and golf course development is currently the greatest threat to *P. yadonii*. Other threats include competition with non-native species, roadside mowing, and a proposed realignment of Highway 101 known as the Prunedale bypass. The small numbers of individuals and populations also make *P. yadonii* vulnerable to stochastic extinction.

*Potentilla hickmanii* (Hickmann's potentilla) was originally collected by Alice E. Eastwood in 1900 "near the reservoir which supplies Pacific Grove, [Monterey County] California, along the road to Cypress Point". The reference to a reservoir could refer to Forest Lake in Pebble Beach but more likely refers to the Pacific Grove reservoir (Ferreira 1992b). Eastwood (1902) described the species 2 years later, naming it after J. B. Hickman who was her guide on that collecting trip.

*Potentilla hickmanii* is a small perennial herb in the rose family (Rosaceae) that annually dies back to a woody taproot. The leaves are pinnately compound into generally six paired, palmately cleft leaflets each 2 to 8 mm (0.08 to 0.3 inches) long and 1 to 3 mm (0.04 to 0.1 inches) wide. Several

reclining stems 8 to 15 cm (3 to 6 inches) long support two to four branched cymes (flowering stems) each of which is one- to two-flowered. The flowers consist of 5 ovate to obtuse sepals 6 mm (0.23 inches) long; yellow obcordate petals 6 mm (0.23 inches) long and 5 mm (0.19 inches) wide; and 20 stamens (Abrams 1944, CNPS 1987). *Potentilla hickmanii* is separated from two other potentillas that occur on the Monterey Peninsula (*P. egedii* var. *grandis* and *P. glandulosa*) by a combination of its small stature, leaflet size and shape, and color of the petals.

Only three historical locations for the plant are known (CDFG 1992). A collection was made by Ethel K. Crum in 1932, apparently in the vicinity of Eastwood's original collection. Ferreira (1992b) surveyed the area surrounding the Pacific Grove reservoir in 1992, but found no *Potentilla hickmanii* plants or suitable habitat for the species. A second location was observed by E.C. Suttcliffe at Moss Beach near Half Moon Bay, San Mateo County, in 1933. This occurrence is presumed to be extirpated by urban development in the Half Moon Bay area.

*Potentilla hickmanii* is currently known from only one location, on the western Monterey Peninsula, in a meadow opening within Monterey pine forest. Loamy fine sandy soils support a meadow community of non-native grasses and several introduced and native herbs. A total of 24 individuals of *P. hickmanii* were located during 1992 surveys, 9 of which are within a small enclosure constructed by the Pebble Beach Company to protect the plants; the other 15 are located within 30 m (100 ft) of the enclosure (Ferreira 1992b). The Pebble Beach Company has maintained management responsibilities for the meadow, though ownership of the land has been transferred to the Del Monte Forest Foundation. *Potentilla hickmanii* is currently threatened with alteration of habitat resulting from recreational activities. The meadow, called Indian Village, is available for use by residents of Pacific Grove and has been developed as an outdoor recreational park. The extremely small numbers of individual plants and populations also make *P. hickmanii* vulnerable to stochastic extinction.

*Trifolium trichocalyx* (Monterey clover) is a member of the pea family (Fabaceae). The genus *Trifolium* is well-represented in North America, with approximately 50 species recognized in California (Munz 1959). Members of this herbaceous genus are characterized by the palmately three-foliate leaves (hence the name *Trifolium*) and flowers in spheroid or oblong heads.