

**Added to California Rare Plant Rank 1B.2 of the CNPS Inventory on  
January 30, 2018**

**Rare Plant Status Review: *Trifolium piorkowskii***

**Proposed Addition to California Rare Plant Rank 1B.2, G2 / S2**

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**Background**

*Trifolium piorkowskii* Rand. Morgan & A.L. Barber is an annual herb in the Fabaceae (Leguminosae) known only from a limited area in the Cascade Range foothills of eastern Shasta County, California. It was recently described by Morgan et al. (2014), and is therefore not included in *The Jepson Manual* (Isley 1993), nor *The Jepson Manual, Second Edition* (Vincent and Isley 2012). No revision of *Trifolium* has as of yet been published as part of the *Jepson eFlora* or *Flora of North America* series. *Trifolium piorkowskii* is named in memory of Jeffrey M. Piorkowski (1961-2006), in gratitude for many years of assistance and support, including his help in locating this and other rare clovers in California (Morgan et al. 2014). On November 11, 2016, *T. piorkowskii* was incorrectly Considered But Rejected from the CNPS Inventory based on the notion that it was not native in California, as all available vouchers at the time were from plants in cultivation. This was in error, and *T. piorkowskii* is actually known from five natural occurrences in California.

*Trifolium piorkowskii* is considered allied to the California Floristic Province endemic, *T. fucatum* Lindl. (Morgan et al. 2014), a clover of wetland or wetland margins in lowland areas of below 1100 meters (3600 feet) in elevation. The *T. fucatum* complex is a well marked clade within *Trifolium* Sect. *Involucrarium* Hook. ex Lojac. (Ellison et al. 2006). Most of the approximate 34 endemic California clovers are in this section (Group 1 in the *Jepson Manual, Second Edition Trifolium* key). Limited genetic (ITS) evidence places *T. piorkowskii* as sister to the closely related *T. depauperatum* complex, but it is much closer to *T. fucatum* in morphology, and therefore possibly an evolutionary link between the two groups (Randal Morgan pers. comm. 2016).

The defining morphological features of *T. piorkowskii* are flower, leaflet, and calyx features as given in the key below (from Morgan and Ellison 2016):

- 3a. Heads mostly >2 cm wide; flowers cream to yellow at anthesis; stipules hyaline; calyx tube 1-2 mm, with 10 veins, the calyx teeth  $\pm$ unlobed or with one lobe; leaflets orbicular to obdeltoid; ovules  $\pm$ 4; pods  $\pm$ dehiscent; seeds ~3mm, the coat roughened, dark brown to black, unmarked  
..... *Trifolium fucatum*
- 3b. Heads 1.5-2 cm wide; flowers white to pink at anthesis; stipules foliaceous; calyx tube 3-4 mm, with > 10 veins, calyx teeth regularly forked; leaflets oblanceolate, truncate or shallowly trilobed distally; ovules 2, pods indehiscent; seeds ~2.5 mm and coat smooth, spotted  
..... *Trifolium piorkowskii*

*Trifolium piorkowskii* occurs on shallow, clay rich soils which form over Pleistocene to Pliocene volcanic deposits originating from the western flank of present day Mt. Lassen. The soils at known sites for *Trifolium piorkowskii* are similar to those found on Tuscan Formation volcanics in the Cascade Range Foothills (CaRF) region (California Department of Water Resources 2014), and in general support a complex mosaic of vernal pools and native-dominated annual plant communities. It occupies habitat unlike that of any other *T. fucatum* segregates, occurring in vernal pools on volcanic flats, banks of intermittent or perennial watercourses flowing through open, rocky valley and foothill grasslands, often with scattered blue oaks (*Quercus douglasii*), or in ecotone zones with scattered chaparral and conifers at higher elevation (Moran et al. 2014). At one site, *T. piorkowskii* occurs in vernal pool terrain in association with *Juncus digitatus* (California Rare Plant Rank, CRPR, 1B.1) Element Occurrence (EO) 1 and at another with *Paronychia ahartii* (CRPR 1B.1) EO 47 (CNDDDB 2017). The ecological setting in which *Trifolium piorkowskii* has been documented suggests it may range south in the CaRF into Tehama County, where field surveys are suggested. *Trifolium piorkowskii* blooms in April and May (Morgan et al. 2014), and occurs at an approximate elevation of 160 to 680 meters (Consortium of California Herbaria 2017; Google Inc. 2017). Its flowers remain open for only one day, with the corolla tube becoming extremely inflated and retaining its shape as it dries (Morgan et al. 2014).

*Trifolium piorkowskii* is currently known from only approximately five occurrences. It was first collected in 1894 by *Milo S. Baker s.n.* (UC16516), a second time in 1905 (*A. A. Heller s.n.* UC631104), then not again until 1983 (*D. W. Taylor 10668*, JEPS101283 and *W. S. Lennon s.n.*, JEPS85561 and JEPS89024), with the last known collections from May of 2003 (Consortium of California Herbaria 2017). All of the five known occurrences are based on specimen records (see “Locations” section of the attached “NewAdd\_TrifoliumPiorkowskii” spreadsheet). The 1905 Heller collection is intermediate to *T. fucatum*. *Trifolium piorkowskii* occurs in regions that are relatively rural and sparsely populated (largely in parcels zoned as rural residential or agricultural). Three of the five known occurrences have been observed in the last 20 years (occurrences not ‘seen’ in the past twenty years are considered historical by the CNDDDB), but the two other locations are decidedly historic. The 1894 occurrence is considered extirpated, having been inundated by the Shasta Reservoir in 1941, and the 1905 occurrences has not been observed after having been searched for by Morgan and Piorkowski in 1995 and 1996 (Moran et al. 2014). The paucity of known records strongly suggests the proposed CRPR ranking, and Morgan et al. (2014) assessed the IUCN Red List category for *T. piorkowskii* as “Critically Endangered”. Seeds of *T. piorkowskii* have been collected from plants at the type locality (*Ahart 10151*) and the Ash Creek Road occurrence (*Morgan 4951*), and are deposited at UCSC with accession numbers T413 and T414, respectively (Morgan et al. 2014).

Threats to *Trifolium piorkowskii* are uncertain and unquantified; threat factors ascribed to associated CRPR plants at known locations include grazing, trampling, and vehicles. Volcanic landform plains in this geographic region are also actively surface mined (boulders used for decorative landscaping). Unlike many of its relatives, *T. piorkowskii*

doesn't appear to occur in habitats that are subject to severe grass competition, and subsequently does not likely depend on grazing or other forms of periodic soil disturbance for its survival (Morgan et al. 2014).

Based on the available information, CNPS and CNDDDB recommend adding *Trifolium piorkowskii* to CRPR 1B.2 of the CNPS Inventory. If knowledge on the distribution, threats, and rarity status of *T. piorkowskii* changes in the future, we will re-evaluate its status at that time.

### **Recommended Actions**

CNPS: Add *Trifolium piorkowskii* to CRPR 1B.2

CNDDDB: Add *Trifolium piorkowskii* to G2 / S2

### **Draft CNPS Inventory Record**

*Trifolium piorkowskii* Rand. Morgan & A.L. Barber

maverick clover

Fabaceae

CRPR 1B.2

Shasta

Tuscan Buttes NE (628A) 4012241, Oak Run (646A)\* 4012261, Redding (647C) 4012254

Chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland (mesic), vernal pools / volcanic clay, openings, often streambanks; elevation 160 to 680 meters.

Annual herb. Blooms April to May

Possibly threatened by grazing, trampling, vehicles, and mining. Similar to, and previously identified as, *T. fucatum*. See *Novon* 23(1):65-69 (2014) for original description.

### **Literature Cited**

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