

A.37 BUTTE COUNTY GOLDEN CLOVER (*TRIFOLIUM JOKERSTII*)

A.37.1 Legal and Other Status

Butte County golden clover, also called Jim’s clover, currently has no status under the federal Endangered Species Act (ESA) or under the California ESA (DFG 2011).



photo courtesy Robert E. Preston, PhD

The California Native Plant Society (CNPS) includes Butte County golden clover on list California Rare Plant Rank 1B.2 (formerly List 1B.2): Plants Rare, Threatened, or Endangered in California and Elsewhere (CNPS 2010).

A.37.2 Species Distribution and Status

A.37.2.1 Range and Status

Butte County golden clover is known from nine occurrences, all in Butte County, within the Oroville and Shippee quadrangles near Table Mountain (CNDDDB 2007). Butte County golden clover was first described in the botanical literature in 1998 subsequent to a revision of the *Trifolium barbigerum* (bearded clover) species group (Vincent and Morgan 1998). It is not included in the current edition of the Jepson Manual (Hickman 1993) but is recognized by the



Jepson Flora Project and the California Native Plant Society as a distinct species (Baldwin and Erter 2007, CNDDDB 2007).

A.37.2.2 Distribution and Status in the Plan Area

Butte County golden clover is endemic to and reported from 18 occurrences in the Plan Area (see Figure A.37-1, *Butte County Golden Clover Modeled Habitat and Recorded Occurrences*). It is found on a mix of public and private lands near Table Mountain, a significant topographical feature in the area with a unique volcanic geology and associated flora.

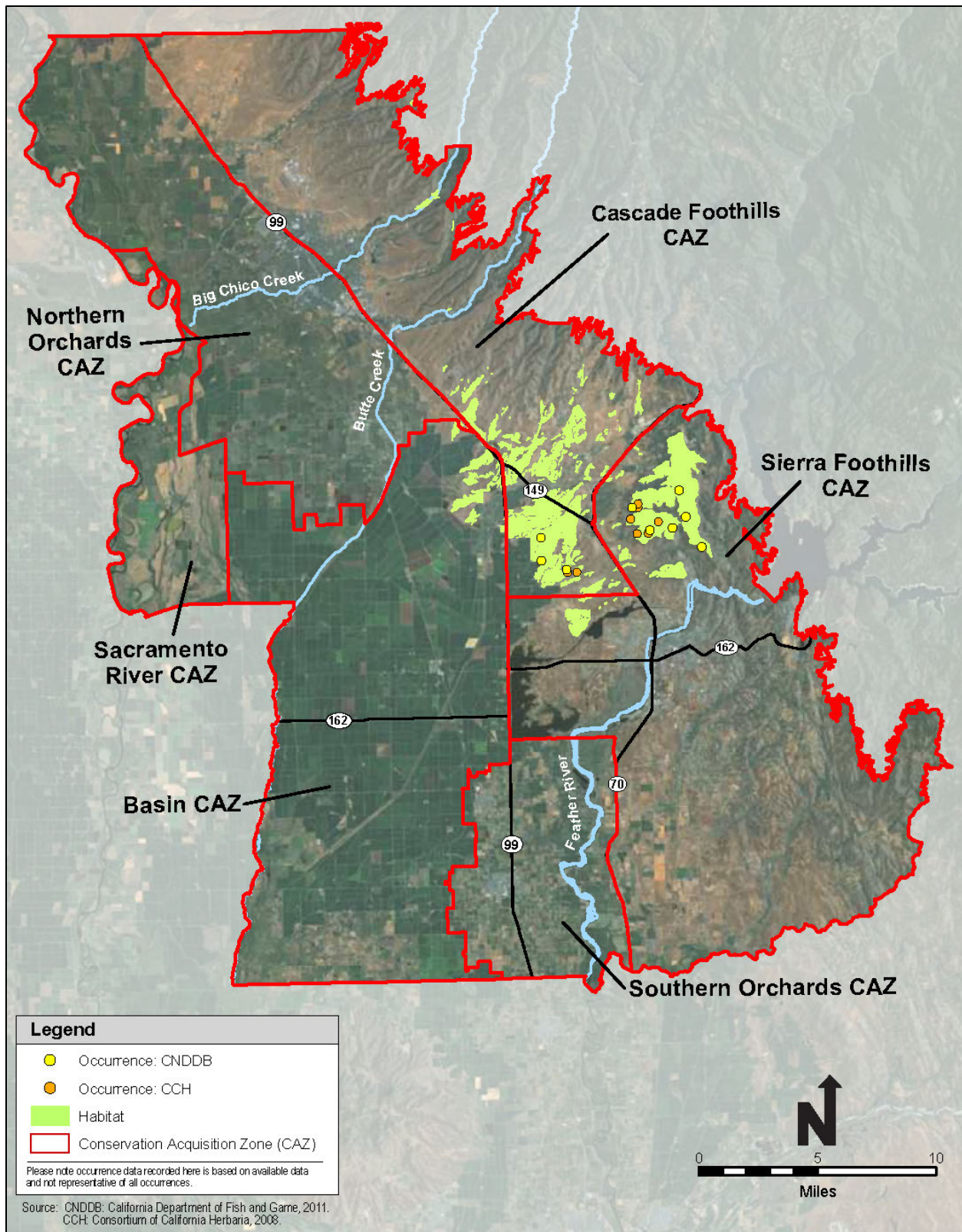


Figure A.37-1. Butte County Golden Clover Modeled Habitat and Recorded Occurrences

Three California Natural Diversity Database (CNDDDB) occurrences (nos. 2, 3 and 6) are found on the North Table Mountain Ecological Reserve, managed by the Department of Fish and Game for botanical resources and hunting. These occurrences are considered in good (no. 3 and no.6) and excellent condition (no. 2). Occurrences nos. 2 and 3 contained several thousand individual plants at last census, and no. 6 contained less than 100. Similarly, occurrence no. 8 is on public land managed by the Bureau of Land Management, in excellent condition, and contained several thousand plants within four colonies at recent census. One occurrence was found at a private game reserve (no. 11), and one on a PG&E substation (no. 1). The remainder (nos. 7, 9, and 10) are on unspecified private lands near Table Mountain and were documented by a vernal pool monitoring team in 2001 (CNDDDB 2007).

A.37.3 Habitat Requirements and Special Considerations

Little has been reported on specific habitat requirements of Butte County golden clover. It is found within valley and annual grassland communities containing vernal pools, typically inhabiting the swales surrounding pools, margins of the pools, or banks of ephemeral streams. Elevation ranges from 180 to 1,300 feet. Site-specific soil conditions are not documented, but the parent material is volcanic basalt flow throughout the species' range.

Like most vernal pool plants, Butte County golden clover is a low-growing, annual species (i.e., germinates, grows, produces seed, and dies within one year) that is well-adapted to the Sacramento Valley's Mediterranean-type weather patterns, with its cool, wet winters and hot, dry summers (Zedler 1990). Butte County golden clover is probably a fairly recent endemic, likely having evolved from more common species (probably bearded clover) during recent climatic and geologic changes to survive extreme fluctuation in water availability between winter-spring inundation and spring-summer drought.

Plants associated with Butte County golden clover include numerous annual graminoids and forbs that typically prefer wet or mesic habitat or are vernal pool specialists. Rushes include toad rush (*Juncus bufonius*, native) and the rare Red Bluff dwarf rush (*J. leiospermus* var. *leiospermus*, native). Other documented occurring species include native herbs Hartweg's checkerbloom (*Sidalcea hartwegii*), annual checkerbloom (*Sidalcea calycosa*), common vernal pool allocarya (*Plagiobothrys stipitata* var. *micranthus*), bracked popcornflower (*Plagiobothrys brateatus*), Austin's popcornflower (*Plagiobothrys austinae*), common meadowfoam (*Limnanthes douglasii*), peppergrass (*lepidium nitidum*), white-headed navarretia (*Navarretia leucocephala*), goldfields (*Lasthenia* spp.), cowbag clover (*Trifolium depauperatum*), white-tipped clover (*Trifolium variegatum*), seep monkeyflower (*Mimulus guttatus*), butter and eggs (*Triphysaria eriantha*) rough-fruited allocarya (*Plagiobothrys trachycarpus*), common blennosperma (*Blennosperma nanum*), which are all annuals. Documented invasive annual Mediterranean grasses include barley (*Hordeum marinum*) and Italian ryegrass (*Lolium multiflorum*) (Hickman 1993, Calflora 2007, CNDDDB 2007).

A.37.4 Life History

The life history of Butte County golden clover has not been studied in detail. Flowering occurs in mid-spring (late March–May). Conditions necessary for germination and dispersal are unknown; congeners are typically pollinated by bees, and wind pollination is not effective. At least some species of *Trifolium* are self-incompatible. Many vernal pool species have limited dispersal abilities; although this taxon is not strictly a vernal pool species, it may share this characteristic (Zedler 1990).

Demographics and population dynamics of this species are unknown. Genetic variability in some vernal pool annuals is high even at small scales (less than 10 meters) (Elam 1998); this may also be true for Butte County golden clover.

A.37.5 Threats

Most known occurrences of Butte County golden clover are within existing preserves; thirteen of eighteen known occurrences are protected at North Table Mountain Ecological Preserve and Dove Ridge Conservation Bank. Due to its limited distribution, the threats to Butte County golden clover are primarily limited to potential development of habitat. Potential threats to Butte County golden clover are road widening projects and competition from invasive grasses that cause thatch build-up.

A.37.6 Relevant Conservation Efforts

Active conservation measures for Butte County golden clover have been limited or not well documented. Several occurrences of the species are found on actively managed, protected lands, however.

A.37.7 Species Habitat Suitability Model

A.37.7.1 Habitat

Butte County golden clover habitat includes areas with suitable soil types in the following BRCP mapped land cover types:

- Grassland;
- Grassland with vernal swale complex; and
- Blue oak savanna.

Vernal pools that may support Butte County golden clover habitat may also occur as inclusions in mapped ranchettes—open and disturbed ground land cover types. These inclusions were not mapped because they did not meet the mapping criteria for vernal pool, altered vernal pool, and grassland with vernal swale complex land cover types.

The following soil survey map units support Lovejoy Basalt and Tuscan Formation-derived soil series that are considered to be suitable soil types for Butte County golden clover present within the Plan Area: Redtough-Redswale-Anita, gravelly duripan (305), Durixeralfs-Typic Petraquepts complex (321), Rock outcrop, Lovejoy basalt (340), Eley-Beatsonhollow-Campbellhills-Rock outcrop complex (341), Cherotable-Eley complex (346), and Flagcanyon taxadjunct-Durixeralfs-Duraquerts complex (677).

A.37.7.2 Assumptions

Butte County golden clover is found within valley and annual grassland communities containing vernal pool, typically inhabiting the swales surrounding pools, margins of the pools, or banks of ephemeral streams (CNDDDB 2007). Elevation ranges from 165 to 1,265 feet (50 to 385 meters) (CNDDDB 2007). Site-specific soil conditions are not documented, but the parent material is basalt or volcanic mudflow throughout the species range (CNDDDB 2007). Given these habitat preferences, suitable habitat is defined as the grassland, grassland with vernal swale complex, blue oak savanna, vernal pool, and altered vernal pool land cover types, when present on suitable shallow soils with underlying basalt or volcanic mudflow bedrock. Suitable habitat for the plant was selected by intersecting these selected land cover types with selected soil map units.

The Natural Resources Conservation Service (NRCS) Soil Survey for Butte County was used to select suitable soils within the Plan Area (NRCS 2006). Soils that support Butte County golden clover are defined as shallow soils with underlying basalt or volcanic mudflow bedrock. To determine suitable soil map units, the California Natural Diversity Database was used to initially identify the relationship between golden clover occurrences and soil units based on known historical and extant occurrences of the species (CNDDDB 2007). Physical and chemical characteristics (e.g., soil depth, parent material) were used to both verify these selected soils, and to identify additional suitable soils within the Plan Area (NRCS 2006). Generally, shallow soils with underlying bedrock composed of the Lovejoy Basalt and specific soils on the Tuscan Formation were considered suitable. All soils were cross-referenced with existing research on the plant. NRCS staff was consulted to confirm that appropriate soils were chosen in the Plan Area (Conlin pers. comm.).

A.37.8 Recovery Goals

A recovery plan has not been prepared for Butte County golden clover because it is not federally listed as threatened or endangered.

A.37.9 References

Literature Cited

Baldwin, B. G. and B. Ertter, eds. 2007. *Jepson Interchange Project: Index to California Plant Names*. Available: <http://ucjeps.berkeley.edu/interchange.html>. Accessed: February 2, 2007.

- Barry, S. J. 1998. Managing the Sacramento Valley Vernal Pool Landscape to Sustain the Native Flora. Pages 236–240 in *Ecology, Conservation, and Management of Vernal Pool Ecosystems: Proceedings from a 1996 Conference*, edited by C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren, Jr., and R. Ornduff. Sacramento: California Native Plant Society.
- Calflora. 2007. Berkeley, California: The Calflora Database. Available: <http://www.calflora.org/>. Accessed February 1, 2007.
- Consortium of California Herbaria. 2008. Butte County golden clover occurrence locations. Available: <http://ucjeps.berkeley.edu/consortium/>
- CNDDDB (California Natural Diversity Database). 2007. RareFind. January. California Department of Fish and Game Natural Heritage Division.
- CNDDDB (California Natural Diversity Database). 2011. California Department of Fish and Game, Natural Heritage Division.
- CNPS (California Native Plant Society). 2010. Inventory of Rare and Endangered Plants (online, 8th edition). Sacramento: California Native Plant Society. Available: <http://www.cnps.org/inventory>. Accessed: April 12, 2012.
- DFG (California Department of Fish and Game). 2011. Special Vascular Plants, Bryophytes, and Lichens List, Natural Diversity Database. Available: <http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPPlants.pdf>. Accessed May 19, 2011.
- Elam, D. R. 1998. Population Genetics of Vernal Pool Plants: Theory, Data, and Conservation Implications. Pages 180–189 in *Ecology, Conservation, and Management of Vernal Pool Ecosystems: Proceedings from a 1996 Conference*, edited by C. W. Witham, E. T. Bauder, D. Belk, W. R. Ferren, Jr., and R. Ornduff. Sacramento: California Native Plant Society.
- Hickman, J. C., ed. 1993. *The Jepson Manual*. Berkeley: University of California Press.
- Marty, J. T. 2005. Effects of Cattle Grazing on Diversity in Ephemeral Wetlands. *Conservation Biology* 19:1626–1632.
- NRCS (Natural Resources Conservation Service). 2006. *Soil Survey of Butte Area, California, Parts of Butte and Plumas County*.
- USFWS (U.S. Fish and Wildlife Service). 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*. Portland, OR.
- Vincent, M. A. and R. Morgan. 1998. *Trifolium jokerstii* (Leguminosae, Papilionideae), a New Species from Butte County, California. *Novon* 8:91–93.

Zedler, P. 1990. Life Histories of Vernal Pool Vascular Plants. Pages 123–146 in *Vernal Pool Plants: Their Habitat and Biology, Studies from the Herbarium* No. 8, edited by D. H. Ikeda and R. A. Schlising. California State University, Chico.

Personal Communications

Andrew Conlin, Soil Scientist. USDA - Natural Resources Conservation Service (NRCS).
December 4, 2008 – phone conference with Drs. Paul Cylinder and Letty Brown.