Species: *Sedum rubiginosum* Zika & B. L. Wilson,  
Mt. Tedoc stonecrop

**Photos Source:** CalPhotos 2021

**Photo Credits:** Top left: Barbara Wilson; bottom left: Julie Kierstead; right and bottom center: Steve Matson.
### Status

Table 1 summarizes the current status of this species or subspecies/variety by various ranking entities and defines the meaning of the status.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Status</th>
<th>Status Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>NatureServe CA(^a)</td>
<td>G1</td>
<td>G1: Critically Imperiled — At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.</td>
</tr>
<tr>
<td></td>
<td>S1</td>
<td>S1: Critically Imperiled — Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the nation or state/province.</td>
</tr>
</tbody>
</table>
| California Rare Plant Rank\(^b\)      | 1B.2   | 1B: Plants rare, threatened, or endangered in California and elsewhere.  
0.2: Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)  
This taxon was added to the *CNPS Inventory of Rare and Endangered Plants of California* in 2021. |
| California State Listing\(^c\)        | Not listed |
| USDA Forest Service\(^d\)             | Not listed |
| USDI FWS\(^e\)                        | Not listed |
| USDI BLM\(^f\)                        | Not listed |
| NatureServe OR\(^g\)                  | Not present |
| Oregon State Listing\(^h\)            | Not present |
| NatureServe NV\(^i\)                  | Not present |
| Nevada State Listing\(^j\)            | Not present |

\(^a\) California Natural Diversity Database, California Dept. of Fish \\& Wildlife [CNDDB 2021, 2021a]  
\(^b\) California Native Plant Society [CNPS 2021]  
\(^c\) California Department of Fish and Wildlife [CDFW 2021]  
\(^d\) US Forest Service Region 5 Forester’s List [USDA 2013] and Pacific NW Survey and Manage [USDA \\& BLM 2014]  
\(^e\) US Department of Interior Fish and Wildlife Service [USFWS 2021]  
\(^f\) US Department of Interior Bureau of Land Management [BLM 2020]  
\(^g\) Oregon Biodiversity Information Center [ORBIC 2019]  
\(^h\) Oregon Department of Agriculture [ODA 2018]  
\(^i\) Nevada Natural Heritage Program [NNHP 2021]  
\(^j\) Nevada Division of Forestry [NDF 2012]  

Note: Individual State Heritage Programs (CNDDB, ORBIC, NNHP) represent NatureServe and contain more up-to-date ranks for their state than NatureServe Explorer.
Distribution, abundance, and population trend on the planning unit

Table 2 summarizes the distribution and frequency of this species or subspecies/variety within National Forest System Lands in California. Table 4 in Appendix 1 lists all known occurrences of this species or subspecies/variety within California. Individual occurrences are defined as sites that contain an individual, population, or groups of populations of the plant that are located more than 1/4 (0.25) of a mile apart from each other as defined by the CNDDB.

<table>
<thead>
<tr>
<th>National Forest System (NFS) lands in California</th>
<th>Record #s (from Table 4)</th>
<th>CNDDB EO</th>
<th>Non-CNDDB Records</th>
<th>Recent (seen in past 20 years)</th>
<th>Historical (not seen in past 20 years)</th>
<th>Most Recent Obs. Date</th>
<th>Total Records on NFS lands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shasta-Trinity:</td>
<td>2, 3</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>24-Jun-2014</td>
<td>2</td>
</tr>
<tr>
<td>Totals:</td>
<td>N/A</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>N/A</td>
<td>2</td>
</tr>
</tbody>
</table>

1 1909.12 Chapter 10, Section 12.53, components 2, 3, and 4.
Species Account: *Sedum rubiginosum*

**Sources:**
- Baselayers: 2013 National Geographic Society, i-cubed, Esri, Garmin, NOAA, NPS, USGS.
Sources: Distribution: CNDDB 2021, Kierstead 2021 pers. comm., Zika 2021 pers. comm. Baselayers: 2013 National Geographic Society, i-cubed, Esri, Garmin, NOAA, NPS, USGS.
Mt. Tedoc stonecrop was last updated in the CNDDB on 30 July 2021 (CNDDB 2021), and therefore all Calflora, CCH, and/or NRIS records prior to this date are assumed to have already been reviewed and entered into the CNDDB for this plant. Accordingly, only records from Calflora, CCH, and/or NRIS reported after this date have been reviewed for potential new or updated occurrence information and are included in Table 4 in Appendix 1 as applicable.

Mt. Tedoc stonecrop is endemic to a narrow zone of western Tehama County in the vicinity of Tedoc and Little Red mountains in the southern portion of the Klamath Ranges (KR) bioregion (Zika et al. 2018, CNDDB 2021). There are currently only three known location records for this species (Table 4). Two of the records are located on the Shasta-Trinity National Forest, and one is on land of unknown ownership; none occur in Wilderness Area. Population sizes at all three locations are estimated at approximately 200 individuals (CNDDB 2021, Kierstead 2021 pers. comm., Zika 2021 pers. comm.). The population at location record #2 was visited twice in three years, but it was only censused on the second visit. The population at location record #1 was visited four times in eight years, and the population numbers remained stable during that time.

**Brief description of natural history and key ecological functions**

Mt. Tedoc stonecrop is a perennial leaf succulent with glaucous basal leaves in dense rosettes (Zika et al. 2018); it blooms from June to July (CNPS 2021). This species grows in open lower and upper montane coniferous forest at elevations of 1350–1500 m (CNPS 2021). Its microhabitat is on gentle to steep rocky slopes or talus in full sun or partial shade (Zika et al. 2018). The substrate where this species grows is dry, reddish peridotite or serpentinite (ultramafic) bedrock exposures (Zika et al. 2018, CNDDB 2021, Dean et al. 2021). Associates include *Pinus jeffreyi*, *P. sabiniana*, *Calocedrus decurrens*, *Quercus vacciniifolia*, *Arctostaphylos patula*, *Garrya congdonii*, *Aspidotis densa*, *Elymus elymoides*, *Eriogonum libertini* (CRPR 4.2), *E. nudum*, *Eriophyllum lanatum*, *Galium bolanderi*, *Sabulina rosei* (CRPR 4.2), *Packera greenei*, *Phacelia corymbosa*, *Pyrola picta*, *Streptanthus barbatus*, *S. drepanoides* (CRPR 4.3), and *S. tortuosus* (Zika et al. 2018, CCH2 2021, CNDDB 2021, CNPS 2021, CPNWH 2021).

The cosmopolitan genus *Sedum* has approximately 420 species (Nikulin et al. 2016). Mt. Tedoc stonecrop is part of section *Gormania*, a group of species that grow in Oregon and California and with highest species diversity found in the Klamath Ranges (Zika et al. 2018). Mt. Tedoc stonecrop can be separated from the other members of section *Gormania* by its combination of usually dense rosettes with glaucous, ob lanceolate leaves with cuneate bases and obtuse tips; relatively densely overlapping stem leaves; narrow, dense, cylindrical or ellipsoidal, panicle-like inflorescences with up to 152 flowers; corollas with yellow, strongly spreading petals that have reddish or pinkish markings at the base; and red anthers (Zika et al. 2018). It is most similar to *S. kiersteadiae*, a species of the Klamath and Cascade Ranges that has loose rosettes with internodes easily visible, relatively loosely overlapping stem leaves, and less dense inflorescences (with up to 54 flowers). The two species do not overlap in distribution; *Sedum*
Species Account: *Sedum rubiginosum*  

2021-11-14

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*kiersteadiae* occurs approximately 45 miles to the north of Mt. Tedoc stonecrop (Zika et al. 2018, CCH2 2021, Dean et al. 2021).

All species of *Sedum* section *Gormania* are drought-adapted succulents that reproduce both asexually (through the production of rhizomes, stolons, and leaf rosettes) and sexually through the production of flowers; their large inflorescences of bisexual flowers produce copious nectar to attract pollinators (Shahani 2007, Zika et al. 2018). Pollinators and floral visitors in *Sedum* include bees (bumblebees, mason bees, leaf-cutter bees, sweat bees), flies, and butterflies (Shahani 2007, CPC 2021). In the species of section *Gormania*, the first flowers that open in an inflorescence are protandrous, producing pollen before the stigmas are receptive, which promotes outcrossing (Denton 1982). As the season progresses, flowers produce pollen concurrent with stigma receptivity (Denton 1982). All tested taxa within section *Gormania* are more-or-less self-compatible, allowing for insect-mediated self-pollination (Denton 1982, Zika et al. 2018). However, in field studies of one member of section *Gormania*, *Sedum laxum* subsp. *laxum*, it was found that the plants had low levels of self-compatibility, and the germination rate of seeds produced by outcrossed flowers was significantly higher than the germination rate of seeds produced by selfed flowers (Shahani 2007). In section *Gormania*, flowers that are produced later in the season are sometimes cleistogamous (i.e. they do not open, and self-pollination occurs without insect mediation); how much these flowers contribute to overall seed production is unknown (Zika et al. 2018). The fruits of all species of section *Gormania* are uniform with each flower producing five narrow follicles that dehisce on one side by a single suture; each follicle releases numerous, small, narrowly-winged seeds (Denton 1982). Seeds most likely are wind- or animal-dispersed. It is unknown whether nectar volume or production of cleistogamous flowers is affected by environmental factors such as drought or decreased snowpack (Zika et al. 2018).

**Overview of ecological conditions for recovery, conservation, and viability**

This species is restricted to a small area of western Tehama County, California. Only one location has an occurrence ranking in the CNDDB (2021): record #3 is rated “good.” Principal current and future threats to Mt. Tedoc stonecrop are from off highway vehicles (OHVs), horticultural collectors, and climate change (Zika et al. 2018, CNDDB 2021, Kierstead 2021 pers. comm.). Off highway vehicles are an increasing threat in western Tehama County in the habitat of this species. Though the Forest does not promote off-road or off-trail OHV use, illegal activity is common, user-created trails cut through stonecrop-occupied barrens, and law enforcement is inadequate to remedy the situation (Kierstead 2021 pers. comm.). Stonecrop habitat is heavily roaded, as its openness encouraged use for road corridors to access timber in adjacent habitats. Although the National Forest road system has been reduced, and some roads through serpentine are being decommissioned, stonecrops have not readily recolonized these disturbed areas (Kierstead 2021 pers. comm.).

Climate change threats to Mt. Tedoc stonecrop include increased temperatures, decreased rainfall, and increased fire frequency. Warming and drying trends associated with climate change may be deleterious to summer survival of this species, as it grows in areas of extended summer

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3 1909.12 Chapter 10, Section 12.53, components 7, 9, 10, 11 and 12, as appropriate.
drought (Kierstead 2021 pers. comm.). Adverse effects are difficult to predict but would most likely involve responses to changes in temperature and rainfall patterns, which could affect seed germination, plant longevity, and pollinator services (Scaven and Rafferty 2013, Gremer et al. 2020). All stonecrops are drought-adapted succulents that produce copious nectar to attract pollinators, and the effect of drought on nectar production in stonecrops is not yet understood (Zika et al. 2018). Increased fire occurrence due to climate change (Fried et al. 2004) could be deleterious as well. The heat of fire has the potential to kill entire populations, and this species could be impacted by fire lines bulldozed along the serpentine slopes it occupies (Kierstead 2021, pers. comm.). In 2021, the McFarland fire reached both Little Red Mountain and Tedoc Mountain, and fire lines were created close to the populations of Mt. Tedoc stonecrop; impacts to this species will need to be assessed in the future (Kierstead 2021 pers. comm.). Lastly, if the climate envelope for this species moves north or uphill, no suitable habitat in the Klamath Ranges is accessible. The known populations occupy the highest elevations in the southern extent of the Rattlesnake Creek Terrane geologic feature. This means that as the climate of California warms due to climate change, Mt. Tedoc stonecrop cannot adjust its range upward in elevation (Anacker et al. 2013). Higher elevations to the south in the Yolla Bolly Wilderness Area are not serpentine (Kierstead 2021 pers. comm.). Seed collection for *ex situ* seed banking of this species is recommended and has not yet been carried out (CPC 2021).

**Taxonomy**

Table 3 summarizes this species or subspecies/variety’s name status in key literature.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Name Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNDDDB and CNPS</td>
<td><em>Sedum rubiginosum</em> Zika &amp; B. L. Wilson</td>
</tr>
<tr>
<td><em>Jepson eFlora</em></td>
<td>Not yet treated</td>
</tr>
<tr>
<td><em>Flora of North America</em></td>
<td>Not treated</td>
</tr>
<tr>
<td>USDA NRCS* PLANTS</td>
<td>Not yet treated</td>
</tr>
</tbody>
</table>

*a Natural Resources Conservation Service [NRCS 2021]*

**Synonymy**: There are no synonyms listed for this name (Tropicos 2021).

**Jepson eFlora link (JEPS 2021)**: This species has not yet been included in the Jepson eFlora, as it is a recently described taxon (Zika et al. 2018; JEPS 2021). The information in this morphological description is taken from Zika et al. (2018):

Flowering stem nodding or bent in bud, 6–28.5 cm tall, often glaucous; rosettes dense, 1.4–12 cm diam, internodes not visible. Rosette leaves oblanceolate, cuneate, 9–72 × 5.5–20.5 mm. Stem leaves ascending, slightly glaucous, at least when young, 8.5–26 × 3–10 mm, relatively densely overlapping. Inflorescences 4.5–18 × 2.5–6.5 cm, narrowly cylindrical or ellipsoidal. Flowers 26–152 per inflorescence, 5-merous, 8–12 mm diam., erect or spreading, calyx green, brown, or red, 2.5–3.4 × 2.4–4.1 mm, sepal apex acute to obtuse, petals 5.0–7.8 mm long, pale to medium yellow, sometimes fading to white, midvein orange to red or pink (especially in bud),

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4 1909.12, Chapter 10, Section 12.53, component 1.
apices or bases often orange to pinkish or reddish, especially with age, stamens 10, when fresh shorter to longer than petals, filaments white to green or pale yellow, aging red, fresh anthers oblong, 1.1–1.45 × 0.5–0.65 mm, orange to dark red, aging red, orange, brown, or black, papillose at 20×. Fruit of 5 dark brown erect follicles, 5.2–9.2 mm, with erect to slightly curved style remnant forming a narrow beak 1.2–3.5 mm, follicles fused 1.7–3.0 mm at base, containing 9–26 seeds per follicle. Seeds 0.8–1.3 × 0.3–0.5 mm (including stipe).

**Type locality:** Tehama County, SE of Tedoc Mountain (*P. F. Zika 25522*, WTU) (Zika et al. 2018).

**Key literature**


**Literature cited**


Species Account: *Sedum rubiginosum* 2021-11-14


Species Account: *Sedum rubiginosum*  


**Persons Contacted**


**Author(s) and Date:**

Ellen A. Dean, California Native Plant Society, Associate Rare Plant Botanist, 18 September 2021; revised 14 November 2021.

**Reviewer(s) and Date:**

Aaron E. Sims, California Native Plant Society, Rare Plant Program Director, 29 September 2021; Julie Ann Kierstead, USDA Forest Service Region 5, Ecosystem Planning, 11 October 2021.
**Formatting:** Form is set up as 508 compliant. Please use the “styles” if further formatting is necessary.

**Purpose:** This is to maintain the best available science on a species that could be used by the Forest Service in a variety of functions. Specifically, there would be additional steps and evaluations to determine whether or not this species would be considered a Species of Conservation Concern under the 2012 Planning Rule or a Sensitive Species under the 1982 Planning Rule.
Appendix 1: Known Occurrences

Table 4. Known Occurrences of Mt. Tedoc stonecrop within California (NRIS, CNDDDB, Calflora/CCH databases).

REDACTED FOR CONSERVATION PURPOSES
Appendix 2: Additional Considerations at the Forest Level

<This section, including the next 5 subheadings, would be filled out by Forest Service botanists.>

<Forest Name>

Geographic distribution within the Forest
A. Scarce or isolated
B. Patchy or gaps
C. Contiguous

<Select a geographic distribution rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>

Abundance of the species on the Forest
A. Rare – current abundance is low enough that stochastic and other factors could lead to potential imperilment.
B. Uncommon – current abundance is large enough that demographic stochasticity is not likely to lead to rapid local extinction, but, in combination with highly variable environmental factors, could pose a threat.
C. Common – current abundance is large enough that species persistence is not threatened by demographic stochasticity in combination with environmental variation.
D. Insufficient information to draw inferences about criterion.

<Select a species abundance rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>

Population trend on the Forest
A. Significant downward or suspected downward population trend.
B. Stable population.
C. Upward population trend.
D. Insufficient information to draw inferences about criterion.

<Select a population trend rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>

Habitat trend on the Forest
A. Decline in habitat quality or quantity.
B. Stable amounts of suitable or potential habitat, relatively unchanged habitat quality.
C. Improving habitat quality or increasing amounts of suitable or potential habitat.
D. Insufficient information to draw inferences about criterion.

<Select a habitat trend rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>
Vulnerability of habitat on the Forest

A. Substantial modification of habitat has occurred or is anticipated with conditions departing from expectations based on NRV, and/or habitat is impacted by modern stressors such as drought, climate change, high intensity wildfire and wildfire suppression disturbances, loss of natural openings due to historical wildfire suppression, nonnative invasive species, water impoundments and diversions, and recreation, etc.

B. Habitat modification is likely to result in ecological patterns similar to the range of historical conditions, but is being impacted by modern stressors.

C. Habitat resilient, changes are similar in frequency and intensity to those expected from NRV, and modern stressors not significant.

D. Insufficient information to draw inferences about criterion.

<Select a habitat vulnerability rank and provide references or cite ‘specialist expertise, <name>’ where appropriate.>

Additional Forest specific information related to the SCC determination

<This section is provided for Forest botanists to add additional Forest specific information that is not captured in the section above, if necessary. Provide a narrative description here of the additional relevant information. State “No additional information” if this section is not used.>