

Added to CRPR 1B.2 on 2021-05-14

Rare Plant Status Review: *Sedum sanhedrinum***Proposed Addition to California Rare Plant Rank 1B.2, G2 / S2**

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This species review is being expedited through a challenge cost share agreement between the California Native Plant Society and the USDA Forest Service, Pacific Southwest Region. Aside from being advanced as part of this agreement, the process, content, and information provided herein is not altered, modified, or developed differently in any way or form compared to other status reviews developed by CNPS.

Background and Taxonomy

Sedum sanhedrinum Berger is a perennial herb in the Crassulaceae endemic to California and known from the High North Coast Ranges bioregion of Colusa, Glenn, Lake, Mendocino, and Tehama counties (Zika et al. 2018, CCH1 2021, CCH2 2021). It is not included in *The Jepson Manual* (Denton 1993), *Jepson eFlora* (Boyd and Denton 2012) or *Flora of North America* (Ohba 2009). Some of the populations currently included in *Sedum sanhedrinum* were previously placed in *Sedum obtusatum* subsp. *retusum* by Denton (1982). In her work on *Sedum* section *Gormaniana*, Denton broadly circumscribed *Sedum obtusatum* subsp. *retusum*, including populations from southwestern Oregon through the Klamath region and North Coast Ranges to Hull and Sanhedrin mountains at elevations of 426 to 228 m (Denton 1982). The type of *S. obtusatum* subsp. *retusum* is based on the name *Gormaniana retusa* Rose which has a type collection from Sanhedrin Mountain in Mendocino County (A. A. Heller s.n., US, NY) (Denton 1982).

In their recent paper on *Sedum* section *Gormaniana* of western North America, the members of the Carex Working Group examined populations belonging to section *Gormaniana* and redefined species limits (Zika et al. 2018). They circumscribed *S. obtusatum* subsp. *retusum* much more narrowly, restricting it to the High North Coast Ranges bioregion of California, and raised it to the level of species. In raising subspecies *retusum* to the level of species, the Carex Working Group could not use the name *Sedum retusum*, as that name refers to a different entity in the genus. This problem was remedied in 1930 by Berger, who published the name *Sedum sanhedrinum* based on the Heller type specimen from Sanhedrin Mountain (Denton 1982, Zika et al. 2018).

In their work on *Sedum*, both Denton and the Carex Working Group emphasized visiting populations in the field and the study of living material (Denton 1982, Zika et al. 2018). The characters that separate *Sedum* species, such as corolla color, petal orientation, inflorescence orientation, and leaf color, shape, and orientation, are best seen in fresh material, and many herbarium collections are difficult to identify (Zika et al. 2018). *Sedum sanhedrinum* can be separated from the other members of section *Gormaniana* by its combination of dense rosettes with large rosette leaves, stout vertical stem, ascending, oblong/obovate stem leaves that are reduced upwards, capitate inflorescences with dense flowers, erect, pale yellowish-white to orange-yellow petals, and usually yellow (rarely dull orange-red) anthers (Zika et al. 2018).

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As currently circumscribed, *S. sanhedrinum* has a high-elevation distribution in the southern and central part of the High Inner Coast Ranges bioregion. The only other member of section *Gormaniana* that partially overlaps the distribution of *S. sanhedrinum* is *S. flavidum*. Many of the specimens in California herbaria identified as *S. obtusatum* subsp. *retusum* should be referred to more northern or lower elevation species such as *S. kiersteadiae*, *S. citrinum* (CRPR 1B.2), *S. oregonense*, *S. patens*, *S. paradisum* (CRPR 1B.3 under the name *S. obtusatum* subsp. *paradisum*), or *S. laxum* (Zika et al. 2018). The taxon most closely resembling *S. sanhedrinum* is *S. paradisum* subsp. *paradisum* which differs in having ascending petals (rather than erect) and erect immature flowering stems (rather than nodding).

The name *Sedum sanhedrinum* refers to the type collection locality of Sanhedrin Mountain (Berger 1930).

Ecology

Sedum sanhedrinum grows on rocky slopes, ridgelines, talus, boulder fields, and rocky creek banks in chaparral, lower montane coniferous forest, and upper montane coniferous forest at elevations of 1415–2285 m (CCH2 2021, Zika et al. 2018). The moisture level of the sites is usually dry to very dry, with plants growing in full sun or, less commonly, in light shade. Substrates include metamorphic, metasedimentary, metabasalt, serpentinite, gabbro, chert, and schist (Zika et al. 2018, CCH2 2021, CPNWH 2021). Associates include *Pinus ponderosa*, *Pseudotsuga menziesii*, *Abies concolor*, *A. magnifica*, *Quercus durata*, *Q. vacciniifolia*, *Q. garryana*, *Q. kelloggii*, *Arctostaphylos* spp., *Ceanothus cordulatus*, *Eriogonum* spp., *Penstemon* spp., *Elymus* spp., *Cheilanthes gracillima*, and *Polystichum imbricans* (CCH2 2021, CPNWH 2021).

Distribution and Abundance

According to Zika et al. (2018), *Sedum sanhedrinum* is restricted to Glenn, Lake, Mendocino, and Tehama counties. It may also occur in Colusa County; there are two records that need confirmation of their identification (highlighted in pink in the location table) that were collected from the summits of Snow and Goat Mountains in Colusa County, close to known Lake County records (CCH1 2021). These specimens need to be examined by an expert to confirm they are *S. sanhedrinum* and not *S. flavidum* (Zika 2021 pers. comm.). The populations of *S. sanhedrinum* range from the Yolla Bolly Mountains in the north to Goat Mountain in the south, all in the High North Coast Ranges bioregion (Zika et al. 2018, CCH1 2021, CCH2 2021). Most specimens of *Sedum* section *Gormaniana* in California herbaria have not been examined and identified using the key provided by Zika et al. (2018), and some collections, especially those identified as one of the subspecies of *S. obtusatum* and collected from appropriate elevations and counties, may actually be *S. sanhedrinum* (CCH2 2021). We assembled location records from four sources for this account: the Zika et al. (2018) paper; a spreadsheet of *Sedum* section *Gormaniana* species locations compiled by the Carex Working Group (CWG 2016); online specimen data for specimens identified as *S. sanhedrinum* and *S. obtusatum* (CCH1 2021, CCH2 2021, CPNWH 2021); and Calflora (2021) observations of *S. obtusatum*. Specimen records and observations of *S. obtusatum* were only included in the location spreadsheet if they were collected from high

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elevation (greater than 1415 m) in appropriate counties at confirmed locations of *S. sanhedrinum*. Online records from Del Norte, Humboldt, Siskiyou, and Trinity counties were not evaluated for inclusion.

There are 21 estimated occurrence records of *S. sanhedrinum*, of which eight are historical (not seen since prior to 2001) and 13 are recent (Zika et al 2018, CWG 2016, CCH1 2021, CCH2 2021, CPNWH 2021). Seventeen of the records are located on National Forest lands, with 16 on the Mendocino National Forest and one on the Shasta-Trinity National Forest. Four records are located on land of unknown ownership. Of the 17 National Forest records, four records are located in Wilderness Area: two records on Snow Mountain (#s 5 and 6) are in the Snow Mountain Wilderness, one record on Hull Mountain (#9) is in the Yuki Wilderness, and one record on Mount Linn (#20) is in the Yolla Bolly-Middle Eel Wilderness. In addition, two records are on the border of Wilderness Area: record #15 on Sanhedrin Mountain is on the border of the Sanhedrin Wilderness and record #8 on Hull Mountain is on the border of the Yuki Wilderness. Six recent records have population size estimates: #1 (51 – 100 plants); #4 (320 plants); #9 (200 plants); #12 (75 plants); #18 (5 plants); and #19 (112 plants). Other recent occurrences were not explored exhaustively or censused by the Carex Working Group, but they often appeared to have small populations (Wilson 2021 pers. comm.).

Record #1 is the only Glenn County location for *S. sanhedrinum* cited in the paper by Zika et al. (2018): *Wilson & Otting CWG-230* collected from a large rock formation called [Little] Bear Rock, west of Tar Flat. This location also has several Calflora observations made by Ryan O'Dell in 2018 under the name *S. obtusatum* subsp. *retusum*. This location is actually in Mendocino County, just over the border from Glenn County. We examined two specimens of *S. obtusatum* ssp. *retusum* from Glenn County with no elevation. One is from Plaskett Meadows (DAV126708, *Witham 539*) and the other from St. Johns Mtn (DAV148850, *Dickinson 217*). Neither of these collections is *S. sanhedrinum*, and they are most likely *S. flavidum* which is known from Plaskett Meadows (Zika et al. 2018). The Dickinson collection is included in the list of locations in pink, because its location (St. John's Mountain) is a likely location for *S. sanhedrinum* in the High North Coast Ranges bioregion; however, the elevation of the collection site (which is not specified) must be lower on the mountain. Therefore, the existence of *S. sanhedrinum* in Glenn County is not yet confirmed.

Status and Threats

The name *Sedum sanhedrinum* does not have any conservation status in California or elsewhere. The name *Sedum obtusatum* var. *retusum*, a nomenclatural synonym of *Sedum sanhedrinum*, has a global ranking of G4 and a varietal ranking of T4 (apparently secure) (NatureServe 2021). However, as circumscribed by Ohba, *S. obtusatum* var. *retusum* has a geographic distribution that ranges from southern Oregon south to Snow Mountain, as well as a broad elevational range; this circumscription is much broader than that of *S. sanhedrinum* (Ohba 2009, Zika et al. 2018).

Sedum sanhedrinum occurs near or at the summits of the mountains where it occurs. This means that as the climate of California warms due to climate change, this species cannot adjust its range upward in elevation (Anacker et al. 2013). In addition, in 2020 this species was in the path of the largest wildfire in California history (the August Complex fire). An important threat to this

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species is increased fire occurrence due to climate change (Fried et al. 2004). *Sedum* species likely do not respond well to fire, and the heat of the fire can kill entire populations (Kierstead 2021 pers. comm.). Approximately 15 of the 24 records were within the boundaries of the 2021 August Complex fire, and field work is needed to discover the fate of the populations.

Summary

Based on the available information, CNPS and CNDDDB recommend adding *Sedum sanhedrinum* to California Rare Plant Rank 1B.2 of the CNPS Inventory. If knowledge on the distribution, threats, and rarity status of *S. sanhedrinum* changes in the future, we will re-evaluate its status at that time.

Recommended Actions

CNPS: Add *Sedum sanhedrinum* to CRPR 1B.2

CNDDDB: Add *Sedum sanhedrinum* to G2 / S2

Draft CNPS Inventory Record

Sedum sanhedrinum Berger

Sanhedrin Mountain stonecrop

Crassulaceae

CRPR 1B.2

Colusa, Glenn?, Lake, Mendocino, Tehama

Quads: Fouts Springs (3912236), Potato Hill (3912237), St. John Mtn. (3912246), Sanhedrin Mtn. (3912351), Hull Mountain (3912258), Plaskett Ridge (3912268), Newhouse Ridge, (3912371), Mendocino Pass (3912278), Buck Rock (3912288), South Yolla Bolly (4012217), Tomhead Mtn. (4012227)

Chaparral, upper montane coniferous forest, lower montane coniferous forest / openings, rocky, talus, rock crevices, serpentinite, gabbroic, metamorphic; elevation 1415-2285 meters.

Perennial herb. Blooms May to July

Possibly threatened by fire. Previously included in *Sedum obtusatum* subsp. *retusum*. See *Phytotaxa* 368: 1–61 (2018) for taxonomy.

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[CWG] Carex Working Group. 2016. Excel spreadsheet of *Sedum* section *Gormaniana* population locations created by the Carex Working Group (V18 Dec 2016 – final determinations). Carex Working Group, Corvallis, Oregon.

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[CCH2] Consortium of California Herbaria Portal 2. 2021. Data provided by the participants of the Consortium of California Herbaria and the California Phenology Thematic Collections Network (CAP-TCN). Regents of the University of California, Berkeley and Cal Poly, San Luis Obispo. Website <http://www.cch2.org/portal/index.php> [accessed March 2021].

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