Plant Species Evaluation Form

*Sedum divergens* Wats.

**CASCADE STONECROP**

**Family:** Crassulaceae  
(CNPS 2018)  
**PLANTS Symbol:** SEDI  
(USDA 2018)  
**Calif. Endemic:** No  
(CNPS 2018)

**Synonyms/Other Names:** *Sedum divergens* was described by Sereno Watson in 1882, on the basis of two specimens collected in 1880. The alternate name *Amerosedum divergens* (S. Watson) A. Löve and D. Löve was established in 2009, and is regarded as an illegitimate synonym. There also exists a homonym, *Sedum divergens* Greene (1888), which was changed to *Sedum forreri* Greene on the basis of priority.

**Identification Issues:** Among the herbaceous *Sedum* with stems glabrous, glaucous or papillate, and not bearing glandular hairs toward the base, and leaves widest below the middle, *Sedum divergens* can be distinguished by the following characteristics: the corolla is yellow or white, with free petals; leaves remain green and fleshy throughout the year; and bracts are elliptic to round, with convex surfaces. The most similar taxon, *Sedum lanceolatum*, has lanceolate bracts with flat surfaces. Difficulty will be encountered when the plants are not flowering, and when old leaves are not available for evaluation of senescence (Boyd and Denton 2017).

**Taxonomy:**

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Genera In Family: +- 33 genera, +- 1400 species: +- worldwide, especially dry temperate; many cultivated for ornamental. Note: Water-stressed plants often +- brown or +- red. Consistent terminology regarding leaves, bracts difficult; in taxa with rosettes (e.g., *Aeonium*, *Dudleya*, some *Sedum*), structures in rosettes are leaves, those on peduncles are bracts, and those subtending flowers are flower bracts; in taxa where inflorescence is terminal, rosette leaves may "become" bracts as stem rapidly elongates to form inflorescence. Seed numbers given per follicle.

Habit: Plant 5--12 cm, matted; ascending sterile shoots many; rosettes 0. Leaf: opposite, 3--8 mm, obovate to +- spheric, glabrous or fine-papillate, tip generally rounded. Inflorescence: generally 1--5 cm, 3--17-flowered. Flower: petals 5--7 mm, lance-oblung, acute or obtuse, mucronate, yellow; anthers yellow. Fruit: fused at base, 5--7 mm, spreading. Seed: +- 0.5 mm.

*eFlora Treatment Author:* Steve Boyd & Melinda F. Denton.

**Status:**

Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

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<th>State Listing</th>
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<th>S-rank</th>
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**Sedum divergens** Wats.

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Expanded abbreviations and citations: State Listing=California Endangered Species Act Listing (CDFW 2018b), Nevada Division of Forestry Fully Protected Plant Species (NAC 527) (NDF 2012), Oregon Department of Agriculture Listed Plants (ODA 2014); G-rank=Global Conservation Status (CDFW 2018a; NatureServe 2018); S-rank=Subnational (state or province-level) Conservation Status (CDFW 2018a; NatureServe 2018; NNHP 2017; ORBIC 2016); CRPR=California Rare Plant Rank (CNPS 2018); R5 FSS=USDA Forest Service Region 5 Regional Forester Sensitive Plant Species List (USDA 2013); NFP SM=Forest Service and Bureau of Land Management Northwest Forest Plan Survey and Manage Species (USDA 2001); CA BLM=California Bureau of Land Management Designated Sensitive Species (BLM 2010); SWAP=California State Wildlife Action Plan Status (CDFW 2015); NNHP=Nebraska Natural Heritage Program Status (NNHP 2017); NNPS=Nebraska Native Plant Society Status (NNHP 2017); ORBIC=Oregon Biological Information Center Status (ORBIC 2016); OCS=Oregon Conservation Strategy Species (ODFW 2016); IUCN=International Union for Conservation of Nature Red List Status (IUCN 2017).

**Distribution:** *Sedum divergens* occurs along the west coast of North America, from Alaska to British Columbia, Washington, Oregon, and northern California (CNPS 2018). Within California it is found in the Klamath Ranges bioregion, in Siskiyou County and Humboldt County (CNDDB 2017). National Forest Service-administered lands from this species is known include Klamath NF and Six Rivers NF (CCH 2017, CNDDB 2017).
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Locations within California:
Record numbers indicate sites that contain an individual, population, or groups of populations located within ¼ mile of each other, per the California Natural Diversity Database (CNDDDB 2017) definition of Element Occurrences (EOs) in California. Official EO numbers for plants in California are determined solely by the CNDDDB and are included within the Reference (Source) column for CNDDDB data. Duplicate records from the same site are given the same record number and included in red. The Population Info column includes total number of individuals and total number and size of populations/sub-populations when provided. Elevations provided in meters from source have been converted to feet. If not provided in original source, Land Manager information was obtained using the California Protected Areas Database (CPAD 2016) and Quad information was obtained using 24K Quads, SDE Feature Class (CDFG 2013). All other information is directly from the Reference (Source) unless additional citation is given.

Redacted for conservation purposes.
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**Distribution on National Forest System (NFS) Lands:**
(Please see Reference column of Locations table above for references pertaining to Record Numbers indicated on NFS lands.)

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<th>CNNDDB EOs</th>
<th>Non-CNNDDB Records</th>
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<th>Historic (not seen in past 20 yrs.)</th>
<th>Most Recent Obs.</th>
<th>EOs/Recs. (5 mile buffer)</th>
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**Demographic and Population Trends:** *Sedum divergens* is known from approximately 10 occurrences (Calflora 2017, CCH 2017, CNNDDB 2017). Of its 10 occurrences, only one contains information on population size; “about 100 plants observed in 1985”. There are no year-on-year demographic or population data available for California, nor for the remainder of the species’ range. Given a dearth of exploration, it is likely that additional occurrences exist (CNPS 2018); more field work is required.

**Life History:** *Sedum divergens* is a succulent, perennial herb favoring rocky alpine sites. It has been observed to bloom from July through September (CNPS 2018). *Sedum* species are known to be pollinated by an array of bees, beetles, and butterflies, as well as a limited number of fly...
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species (CPC 2018). Members of Section Gormania retain a generalist pollination syndrome, and are visited by the Hymenopteran families Apidae, Andrenidae, Megachilidae, Nomadidae, and Formicidae; the Dipteran families Bombylidae and Syrphidae; and the Coleopteran families Chrysomelidae and Mordellidae (Denton 1979). The principal pollinators for S. divergens are unknown, but likely include some or all of these groups.

Diversity: Sedum is the most species-rich and taxonomically problematic genus within Crassulaceae, encompassing about 420 species showing an immense diversity of form, much of it homoplastic, that makes it impossible to characterize the genus phenotypically. Crassulaceae are also difficult to preserve in herbaria, owing to their delicate structure and succulent tissues. A recent molecular phylogenetic analysis shows that the genus is grossly polyphyletic, but that there are some coherent higher-level taxa within Crassulaceae.

The majority of Sedum species fall within the tribe Sedeae, comprising the large Acre clade and a paraphyletic grade, the Leucosedum cluster. Below the genus level, some structure has been teased apart: subgenus Sedum has 320 species occurring mainly in Asia and the Americas, while subgenus Gormania contains 110 species distributed through Europe, the Mediterranean, and North America. Sedum divergens falls within the latter group (Nikulin et al. 2016).

Section Gormania is restricted to western North America, with taxa occurring on rocky outcrops between 55 and 3,700 meters in elevation. Species in this group form a ploidal series, beginning with a haploid number of fifteen; however, polyploidization alone is believed to be an effect of diversification, rather than the cause. The Klamath region is especially rich in taxa of Section Gormania, as physical isolation, substrate specialization and divergence in reproductive morphology has promoted diversification of narrow endemics. These recently evolved species are characterized by extensive vegetative reproduction, morphological variability, polyploid genomes, and self-incompatibility; relictual species in the same area are usually diploid, morphologically homogeneous, self-compatible and restricted to a single substrate type—mostly at lower elevations (Denton 1979).

Habitat: Sedum divergens occurs in alpine boulder and rock fields, at elevations between 1,600 and 2,330 meters (CNPS 2018). Taxa belonging to Sedum section Gormania frequently specialize on a single substrate type (Denton 1979); it is not known to what extent S. divergens is limited by edaphic conditions.

Habitat Status or Trend: Within California, this species occurs only within the Klamath Ranges bioregion. The Klamath region has played host to a remarkable diversification in plant species, as a consequence of its complex geology and long history of isolation (Whittaker 1960). The region is one of six globally important temperate forest biodiversity hotspots, having served as a climatic refugium during the Pleistocene. More than a century of land use (including logging, mining, grazing, and modification of fire regimes) has significantly altered much of the region. Only 28% of the old-growth forest remains, and ongoing human impacts continue to degrade wild communities, especially in mesic lowland and mid-elevation areas, mostly below the elevation range of S. divergens. The scale and speed of anthropogenic climate change might exceed the capacity of the Klamath region to provide refugia for taxa of low mobility and narrow ecological requirements, though careful management may partially mitigate this risk (Olson et al. 2012).
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**Capacity for the Species to Disperse:** As a recently-evolved member of Section *Gormania*, *Sedum divergens* is likely characterized by extensive vegetative reproduction and a low level of self-compatibility (Denton 1979). This mix of traits favors local persistence and colonization, while rendering long-distance dispersal via resistant diaspores somewhat less likely. No data exist to evaluate these hypotheses.

**Threats:** Threats to *Sedum divergens* populations within California are not well understood. Activities affecting other members of the genus—including fire suppression and collection for the horticultural trade—are likely to impact this species. Road construction and maintenance constitute additional impacts to *Sedum* species, as does off-road vehicle use (CNPS 2018). Due to recent poaching of *Dudleya* spp. off the north coast of California (CDFW News 2018; Krieger 2018), *Sedum divergens* might also be susceptible to poaching for decorative purposes, especially as a rare succulent species.

**Literature Cited**


[CDFG] California Department of Fish and Game. 2013. 24K Quads, SDE Feature Class. Index for 1:24,000-scale (24K), 7.5-minute by 7.5-minute, paper U.S. Geological Survey maps in California.


[CDF] California Department of Forestry and Fire Protection. 2009. 1:24,000 County Boundaries (cnty24k09_1_poly) [shapefile]. California Department of Forestry and Fire Protection, California Department of Fish and Game. Berkeley Library Geodata. Available at: https://geodata.lib.berkeley.edu/catalog/ark28722-s73w23 [10 December 2017].


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Persons Contacted:


Author(s) and Date:
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Aaron E. Sims, Rare Plant Botanist, California Native Plant Society, (916) 324-3816, asims@cnps.org. July 20, 2018.

Reviewer(s) and Date:
David Magney, Rare Plant Program Manager, California Native Plant Society, (916) 447-2677 ext. 205, dmagney@cnps.org. July 20, 2018.

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.

Additional Considerations at the Forest Level: Habitat amount and juxtaposition of both the species and habitat locations.