Plant Species Evaluation Form

Osmorhiza depauperata Phil.

BLUNT-FRUITED SWEET-CICELY

Family: Apiaceae (CNPS 2017)

PLANTS Symbol: OSDE (USDA 2017)

Calif. Endemic: No (CNPS 2017)

Synonyms/Other Names: *Osmorhiza depauperata* was first described by Rudolf Amandus Philippi in 1894. It was subsequently changed and incorrectly assigned the name *Washingtonia obtusa* J.M. Coult. & Rose in 1900 (*Washingtonia* = nom. cons. sensu Arecaceae). Two years later, in 1902, *W. obtusa* was changed to *Osmorhiza obtusa* (J.M. Coult. & Rose) Fernald. Sometime later this taxon was reassigned its original name that is currently in use today (Tropicos 2017).

Identification Issues: Members of the Apiaceae are generally regarded as difficult to identify. Fruit characters are essential for keying within the family and to the genus *Osmorhiza*. Ovary and fruit characters are helpful when keying within *Osmorhiza* and arriving at *O. depauperata* (Constance and Wetherwax 2017). This genus has linear to oblong fruit and serrate leaf segments. Other genera, like *Ligusticum* and *Tauschia*, have serrate leaf segments, but lack a linear and elongated fruit. Four additional species of *Osmorhiza* occur in the vicinity of the California *O. depauperata* distribution (Calflora 2017). The two most common species in this region are *O. berteroi* and *O. occidentalis*. *Osmorhiza depauperata* is distinguished from these common taxa by its long-tapered, beakless, bristly, and club-like fruit attached to spreading pedicels. *Osmorhiza berteroi* has spreading-ascending pedicels, and bristly and long-tapered fruit, which are beaked and more linear-fusiform than *O. depauperata*. *Osmorhiza occidentalis* has fruit that are glabrous and not long-tapered (Constance and Wetherwax 2017).

Taxonomy:

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Species In Genus: +- 10 species: America, eastern and southern Asia. Etymology: (Greek: sweet root)

Genus Description Habit: Perennial herb, +- glabrous to hairy; roots thick, clustered, licorice-scented. Stem: branched, leafy. Leaf: blade oblong to triangular-ovate, 2-pinnate or ternate-pinnate or 2--3-ternate, leaflets lanceolate to round. Inflorescence: umbels compound; bracts 0; bractlets 0--several, conspicuous; rays, pedicels few, spreading-ascending to spreading. Flower: calyx lobes 0; petals obovate, white, purple, or +- green-yellow (+- green-white), tips narrowed; disk occasionally present. Fruit: linear to oblong, cylindric to club-shaped, +- compressed side-to-side, bristly to glabrous; base obtuse or long-tapered into tail, tip tapered into beak or obtuse; ribs thread-like; oil tubes obscure; fruit axis divided in distal 1/2. Seed: face concave or grooved.

Species Description Habit: Plant 1.5--8 dm, generally sparsely short-hairy to glabrous. Leaf: petiole 3--20 cm; blade 4--12 cm wide, widely ovate to round, 2--3-ternate, leaflets 1.5--5 cm,

widely lanceolate to ovate, coarsely serrate to deeply cut. Inflorescence: peduncle 5--15 cm; bractlets generally 0; rays 2--5, 3--9 cm, spreading; pedicels 8--15 mm. Flower: corolla white; styles < 0.5 mm; ovary tip projection low- or depressed-conic; disk 0 or vestigial. Fruit: 10--18 mm, club-like; tail 3--8.5 mm; tip obtuse, beakless; ribs +- bristly. Chromosomes: 2n=22.

Status:

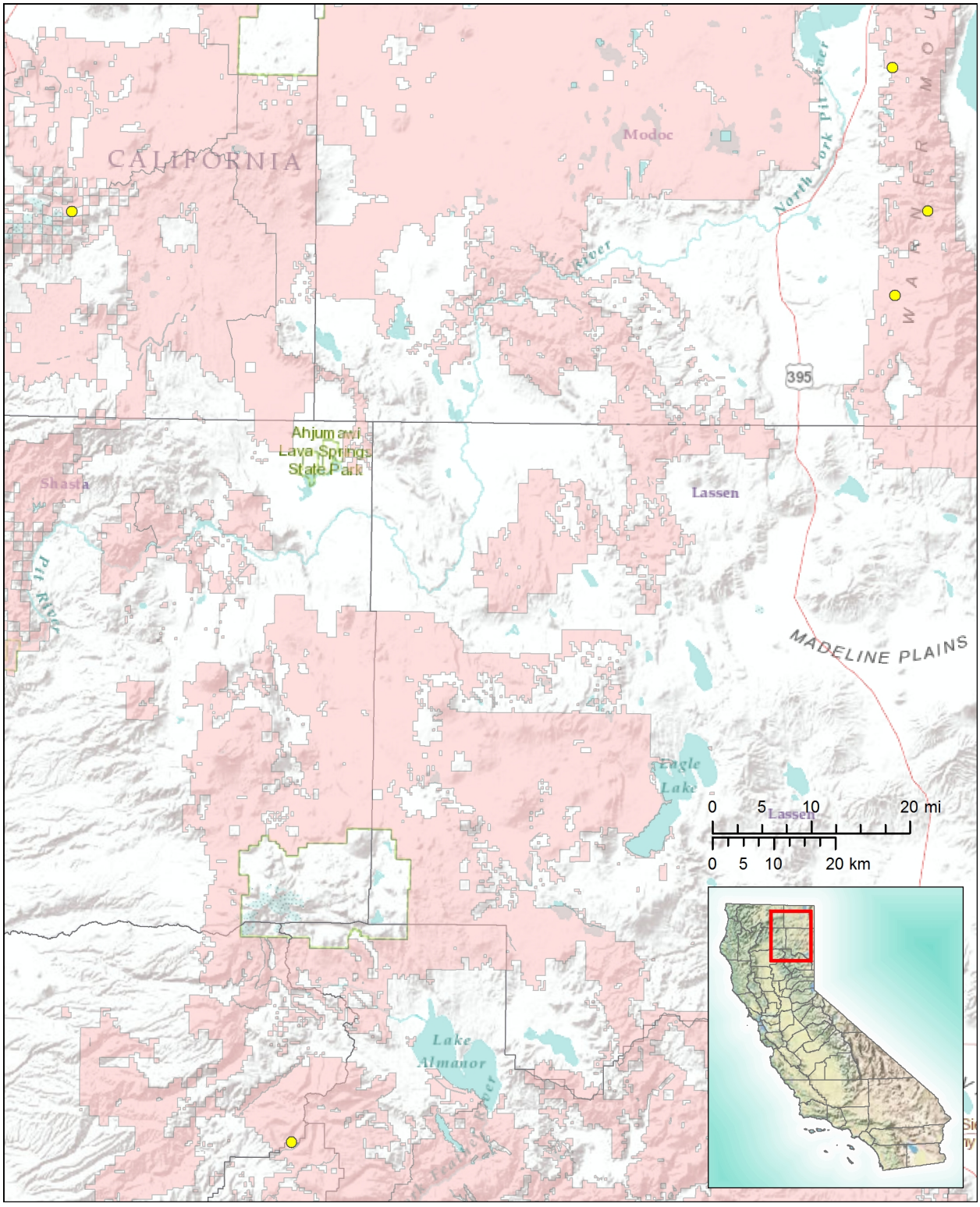
Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G5	CA: S1 NV: SNR OR: Not listed	2B.3	Not listed	Not listed	Not listed

NPPA:	SWAP:	NNHP:	NNPS:	ORBIC:	OCS:	IUCN:
Not listed	Not listed	Do not track	Not listed	Not listed	Not listed	Not listed

Expanded abbreviations and citations: State Listing=California Endangered Species Act Listing (CDFW 2017b), 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 Ranks (CDFW 2017a; NatureServe 2017); S-rank=Subnational (state or province-level) Conservation Status Ranks (CDFW 2017a; NatureServe 2017; NNHP 2017; ORBIC 2016); CRPR=California Rare Plant Rank (CNPS 2017); 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 2014); CA BLM=California Bureau of Land Management Designated Sensitive Species (BLM 2010); NPPA=Native Plant Protection Act Status (CDFW 2017b); SWAP=California State Wildlife Action Plan Status (CDFW 2015); NNHP=Nevada Natural Heritage Program Status (NNHP 2017); NNPS=Nevada 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: *Osmorhiza depauperata* occurs throughout the western United States and Canada (NatureServe 2017; CNPS 2017). There is also a disjunct distribution in southern South America (Constance and Wetherwax 2017). This taxon is restricted to five occurrences within California. Three occurrences are located in the Marble Mountains within the Modoc NF (CNDDB 2017; CCH 2017). A single occurrence is found in the Klamath NF north of Hemlock Lake (CCH 2017). An additional occurrence is found in the Lassen NF near Jonesville (CCH 2017). There is a sixth potential occurrence located in Sierra Valley within five miles of the border of Plumas NF (CCH 2017) that is approximately 65 air miles southeast of the nearest presumed legitimate record, and should be verified. A collection reported to be *O. depauperata* from Sonoma County (*L. S. Rose 40263*; CCH 2017) is well outside the known range of this species (occurring approximately 130 air miles southwest of the closest verified location of *O. depauperata* in California), and is therefore considered a possible misidentification of the common *O. berteroi* or another similar species.



Sources: *Distribution*: CCH 2017, CNDDB 2017. *Layers*: USDA Forest Service, Pacific Southwest National Forests: CPAD 2016. California counties: CDF 2009. *Basemaps*: California inset map: © 2013 National Geographic Society, i-cubed (Esri 2017a). Main map: Esri, DeLorme, USGS, NPS (Esri 2012) and Esri, USGS, NOAA (Esri 2017b).

Locations within California:

(Note: 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 (CNDDB) definition of Element Occurrences in California). Official Element Occurrence (EO) numbers for plants in California are determined solely by the CNDDB and are included within the Reference (Source) column for CNDDB 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 in meters from source were 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) column unless additional citation is given.)

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
1	DEEP CREEK, 3.4 MI BELOW SUMMIT OF WARNER MT.	Modoc	Payne Peak (4112053)	CNDDB, May 2017 (EO 1)	4-Jul-1946	NEEDS FIELDWORK.		Modoc NF	6000
1	Deep Creek 3.4 miles below summit, Warner Mountains	Modoc	Payne Peak (4112053)	CCH, Jan 2017 (GH424350)	4-Jul-1946			Modoc NF	
1	Deep Creek 3.4 mi below summit; Warner Mountain	Modoc	Payne Peak (4112053)	CCH, Jan 2017 (UC735038)	4-Jul-1946			Modoc NF	6001
1	Deep Creek 3.4 miles below summit, Warner Mountains	Modoc	Payne Peak (4112053)	CCH, Jan 2017 (NY1101728)	4-Jul-1946			Modoc NF	
2	PINE CREEK, ABOVE FITZHUGH SPRINGS, SE OF ALTURAS.	Modoc	Shields Creek (4112043)	CNDDB, May 2017 (EO 2)	24-Jun-1929	NEEDS FIELDWORK.		Modoc NF	6000

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
2	s and e Alturas (above Fitzhugh Springs, Pine Creek, Warner Mountains); Warner Mountains, Pine Creek	Modoc	Shields Creek (4112043)	CCH, Jan 2017 (JEPS5968)	24-Jun-1929			Modoc NF	6001
3	Plum Valley.	Modoc	Davis Creek (4112063)	CCH, Jan 2017 (CAS217543)	12-Jun-1934			Modoc NF	
4	Siskiyou Co.: Klamath National Forest, north slope of Rainbow Mountain, n of Hemlock Lake	Siskiyou	Rainbow Mountain (4112148)	CCH, Jan 2017 (UCD77894)	20-Jul-2001			Klamath NF	5620
5	Colby Mt. Lookout Rd. (26N57) 0.9 mi N of Humboldt Rd. at Jonesville.	Butte	Jonesville (4012114)	CCH, Jan 2017 (SEINET519222)	8-Jul-1998			Lassen NF	5121

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.)

National Forest System (NFS) lands	Record #s (from Locations table above)	CNDDB EOs	Non-CNDDB Records	Recent (seen in past 20 yrs.)	Historic (not seen in past 20 yrs.)	Most Recent Obs.	EOs/ Recs. (5 mile buffer)	Total Records on NFS lands
Angeles:	-	-	-	-	-	-	-	0
Cleveland:	-	-	-	-	-	-	-	0
Eldorado:	-	-	-	-	-	-	-	0
Inyo:	-	-	-	-	-	-	-	0
Klamath:	4	-	1	1	-	20-Jul-2001	-	1
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	5	-	1	-	1	8-Jul-1998	-	1
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	-	-	-	-	-	-	-	0
Modoc:	1, 2, 3	2	1	-	3	4-Jul-1946	-	3
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	-	-	-	-	-	-	-	0
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	-	-	-	-	-	-	-	0
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	2	3	1	4	N/A	0	5

Demographic and Population Trends: Population level information is lacking from the five occurrences reported in California. More fieldwork is needed in order to determine the ongoing trends among California populations of *Osmorhiza depauperata* (CNDDB 2017).

Life History: *Osmorhiza depauperata* is an herbaceous perennial that blooms from May until July (CNPS 2017). In a study on phenotypic plasticity of *O. depauperata* under a range of

moisture and light intensities and combinations, researchers found considerable differences in biomass allocations depending on the applied conditions. This highlighted the ability of *O. depauperata* to adjust to contrasting environmental scenarios depending on abiotic circumstances of a given habitat (drier conditions were associated with greater root biomass; lower light conditions demonstrated greater aboveground biomass) (Selzer et al. 2013). Embryo development is incomplete at the time of fruit maturity. Embryos must elongate before radicle emergence from the seed. Cold stratification is also necessary in order to break seed dormancy. Seed researchers refer to this combination of requirements as morphophysiological dormancy. Despite needing cold temperature, *O. depauperata* was found to exhibit greater germination rates at lower elevation. This is possibly due to the longer initial embryo length at lower elevations (Walck and Hidayati 2004).

Diversity: *Osmorhiza* represents a group of 10 species in the tribe Scandiceae of the Apiaceae (200-450 genera, ca. 3,000-3,700 species worldwide). The Scandiceae are a group of roughly 20 genera largely confined to southwest Eurasia. *Anthriscus, Chaerophyllum, Grammosciadium, Myrrhis, Scandix, Rhabdosciadium*, and *Osmorhiza* are dominant representatives of this tribe (Downie et al. 2000). *Osmorhiza* is primarily distributed in North America. *Osmorhiza* embodies a number of striking biogeographic disjunctions (Wen et al. 2002). Despite its morphological similarity to select eastern North American species, *Osmorhiza aristata* is sister to the rest of the genus and is entirely Asian in its distribution, suggesting an early dispersal event from North America to Asia (Wen et al. 2002). Two western North American species, *O. berteroi* and *O. depauperata*, both have disjunct distributions in eastern North America, Great Lakes region, and South America. *Osmorhiza berteroi* and *O. depauperata* do not share an immediate common ancestor, despite parallels between their disjunct distributions. Within species sequence similarity across all occurrences of both amphitropical taxa suggests recent long-distance dispersal events (Wen et al. 2002). Molecular phylogenies based on nuclear and plastid (maternally inherited) DNA are incongruent. Nuclear data (ITS1, ITS2, and 5.8S) suggest that *O. depauperata* shares a recent common ancestor (RCA) with *O. occidentalis* (76% bootstrap, 1,000 replicates). Combined plastid data (three cpDNA regions; ~2,900 bp) suggest *O. depauperata* shares a RCA with *O. mexicana* subsp. *bipatriata* (95% bootstrap, 500 replicates) (Wen et al. 2002; Yoo et al. 2002). This incongruence suggests hybridization or introgression between *Osmorhiza* taxa (Yoo et al. 2002).

Habitat: Within California, *Osmorhiza depauperata* is known only from Deep Creek in the Warner Mountains in lower montane coniferous forest (CNPS 2017). Other reports from California indicate that it may occur outside this area, with some collections from Siskiyou, Butte, and Sierra counties (CCH 2017). Reports from these California observations indicate that *O. depauperata* grows alongside *Pinus ponderosa*, *Salix* sp., and *Abies* sp. (CNDDB 2017). *Osmorhiza depauperata* also occurs in South America, Canada and throughout the western United States (NatureServe 2017). Observations and collections from regions of western North America, outside California, indicate that *O. depauperata* grows alongside *Sorbus scopulina, Carex geyeri, Hydrophyllum capitatum, Maianthemum racemosum, Circaea alpina, Populus tremuloides, Spiraea betulifolia, Amelanchier alnifolia, Prunus emarginata, Picea engelmannii, Artemisia tridentata var. vaseyana*, *Balsamorhiza* sp., *Angelica grayi, Ligusticum porteri,*

Polemonium pulcherrimum, Chamerion angustifolium, Pinus contorta, Lathyrus sp., *Phacelia hastata, Lithospermum ruderale, Paeonia brownii, Osmorhiza occidentalis, Salix melanopsis, Pseudotsuga menziesii, Abies lasiocarpa, Populus trichocarpa, Alnus incana, Physocarpus malvaceus, Disporum trachycarpum, Polygonum viviparum, Vaccinium scoparium, and Botrypus virginianus* (CPNWH 2017).

Habitat Status or Trend: Specific information about the status or trend of the habitat of *O. depauperata* within California is unknown. There are only two element occurrences in the CNDDB (2017), both of which indicate that fieldwork should be conducted to further investigate California occurrences. Both element occurrences are dated (last seen: 1929 and 1946, respectively). Updated records are necessary in order to determine risks and trends associated with this taxon. The Consortium of California Herbaria indicates there are records from as recent as 1998 and 2001. Albeit, these vouchers represent plants from Butte and Siskiyou counties (CCH 2017).

Capacity for the Species to Disperse: *Osmorhiza depauperata* is distributed in western North America, the Great Lakes region, northeastern North America, and a disjunct distribution in South America. Genetic sequence data from *O. depauperata* in North America and South America are similar enough to form a single clade with a recent common ancestor. The limited differentiation among widely distributed plants suggests recent long-distance dispersal events (Wen et al. 2002). The fruit ribs are bristly, suggesting an epizoochorous dispersal capacity of propagules (Williams and Guiues 1994; Constance and Wetherwax 2017).

Threats: Information about plants distributed within California is lacking. Records in the CNDDB (2017) are from 1929 and 1946; additional records from the Consortium of California Herbaria (CCH 2017) should be sought after and documented for potential threats.

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Persons Contacted:

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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.