

Plant Species Evaluation Form

Mertensia cusickii Piper

TOIYABE BLUEBELLS

Family: Boraginaceae
(CNPS 2017)

PLANTS Symbol: N/A
(USDA 2017)

Calif. Endemic: No
(CNPS 2017)

Synonyms/Other Names: *Mertensia cusickii* Piper was originally described in 1902. It was later given the name *Mertensia foliosa* fo. *cusickii* (Piper) I.M. Johnst. in 1932. It was later changed back to *Mertensia cusickii*, the name that is in use today (Tropicos 2017).

Identification Issues: Hybridization among *Mertensia* taxa is common. Identification can be difficult, particularly in the Modoc Plateau region. *Mertensia cusickii* co-occurs and hybridizes with its sister taxon *Mertensia umbratilis*. Despite its close proximity to the Modoc and Lassen region, *Mertensia umbratilis* does not occur in California. Field biologists should be aware of the potential of *M. cusickii* to intergrade with sister taxa. *Mertensia cusickii* is distinguished from *M. umbratilis* by the presence of a densely appressed vestiture on its leaves, pedicels, and calyx. Known hybrids between *M. cusickii* and *M. umbratilis* have the diagnostic vestiture of *M. cusickii* and the leaf morphology of *M. umbratilis* (Nazaire and Hufford 2014).

A number of additional *Mertensia* taxa occur in the Warner Mountains (*M. ciliata* var. *ciliata*, *M. ciliata* var. *stomatechoides*, *M. longiflora*, *M. oblongifolia* var. *amoena*, *M. oblongifolia* var. *oblongifolia*, and *M. oblongifolia* var. *nevadensis* – CCH 2017). *Mertensia cusickii* is distinguished from co-occurring congeners by a vestiture with sparse and spreading hairs. Co-occurring congeners are either glabrous or strigose (Kelley and Joyal 2017).

Taxonomy:

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Species In Genus: +- 50 species: North America, temperate Eurasia. **Etymology:** (F.C. Mertens, German botanist, plant collector, 1764--1831). **Note:** Hybrids common; identification sometimes difficult, especially in MP.

Genus Description Habit: Perennial herb, generally from taprooted, branched caudex; glabrous to spreading-hairy. **Stem:** +- erect. **Leaf:** cauline and generally basal, alternate, generally petioled, upper generally sessile. **Inflorescence:** generally panicle- or raceme-like cymes; bracts 0. **Flower:** calyx generally deep-lobed; corolla often +- cylindric or bell-shaped, blue, generally pink in bud, tube generally well developed, exceeding calyx, abruptly expanded at throat, with or without ring of inner hairs, appendages present or not; filaments often +- flat, generally attached +- below appendages, anthers included. **Fruit:** nutlets generally wrinkled, attached near or below middle.

Species Description Habit: Plant 3--5 dm from taprooted branched caudex, +- sparse-spreading-hairy. **Stem:** +- clustered. **Leaf:** basal generally few; cauline +- veiny, lower large, petioled, upper smaller, sessile. **Inflorescence:** panicle-like, open or +- dense. **Flower:** calyx 3--6 mm;

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corolla 10--16 mm, limb 0.8--1 × tube, tube > calyx, with ring of hairs inside near base, appendaged; filaments wide, flat, +/- = anthers; style +/- included. Note: Intermediate in morphology, ecology between "short" and "tall" bluebells. eFlora Treatment Author: Ronald B. Kelley & Elaine Joyal.

Status:

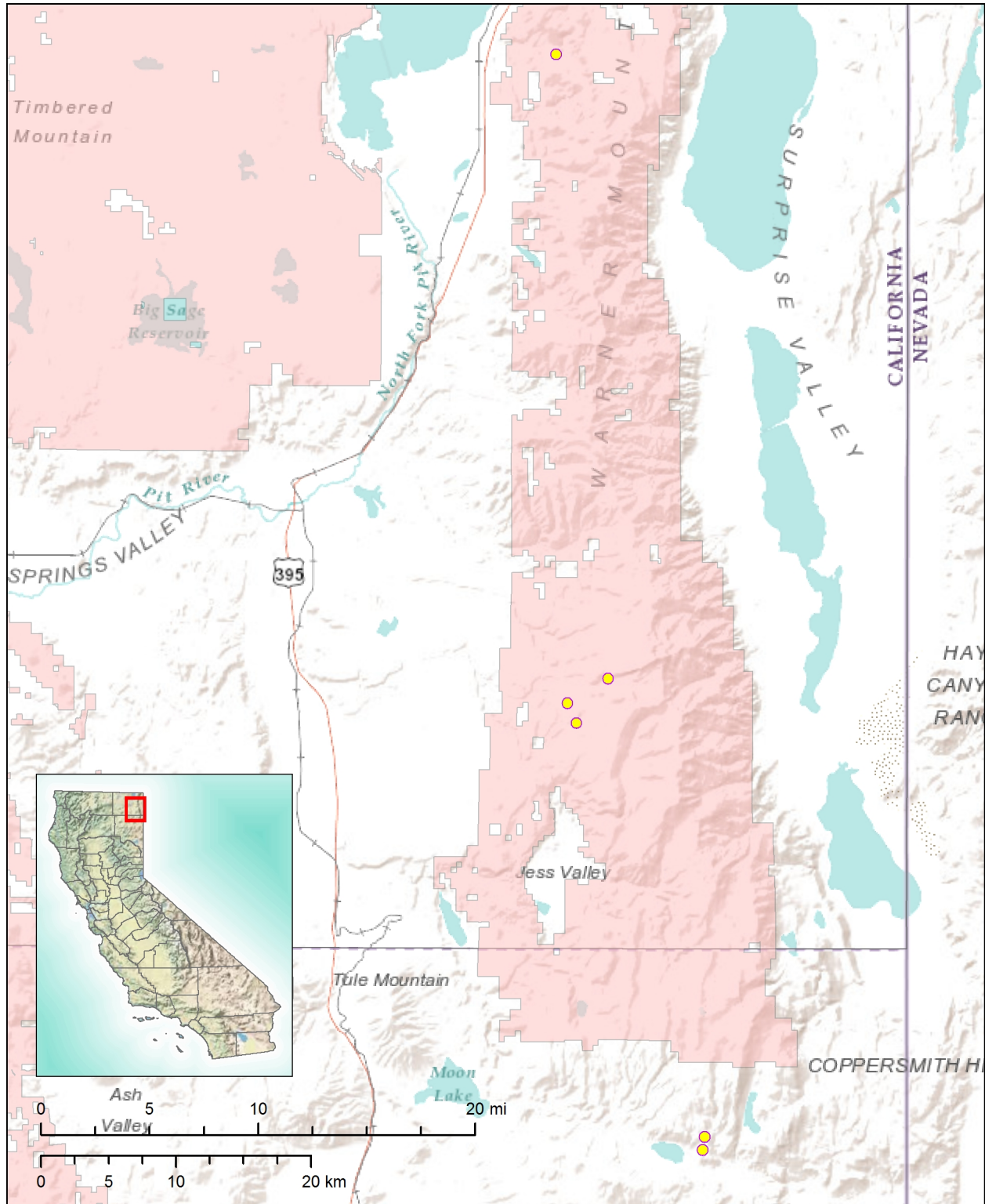
Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G4?	CA: S2 NV: S2 OR: Not listed	2B.2	Not listed	Not listed	Not listed
SWAP: Not listed	NNHP: Do not track	NNPS: M	ORBIC: Not listed	OCS: Not listed	IUCN: 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 (CDFW 2017a; NatureServe 2017); S-rank=Subnational (state or province-level) Conservation Status (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 2001); CA BLM=California Bureau of Land Management Designated Sensitive Species (BLM 2010); 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: Plants are found in the northern and central Basin and Range ecoregions within southeastern Oregon, southwestern Idaho, central Nevada, and northeastern California (Griffith et al. 2016; Kelley and Joyal 2017). Within California, *M. cusickii* is restricted to the vicinity of the Warner Mountains where six occurrences are found in Modoc and Lassen counties. Exactly five of six (5/6) occurrences are found within the Modoc NF. The remaining occurrence is found on BLM lands within five miles of the Modoc NF (CNDDDB 2017; CCH 2017; Calflora 2017).

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Basemap Sources: Main map: Esri, DeLorme, USGS, NOAA, NPS. California inset map: ©2013 National Geographic Society, i-cubed.

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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 (CNDDDB) definition of Element Occurrences in California). Official Element Occurrence (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 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	ABOUT 2 MI W OF BOOT LAKE.	Lassen	Boot Lake (4112012)	CNDDDB, May 2017 (EO 1)	6-Jul-94	NEEDS FIELDWORK.		BLM	6700
1	About 2 miles W of Boot Lake., T37N R16 E sec20	Lassen	Boot Lake (4112012)	Calflora, May 2017 (xr85180)	6-Jul-1994	1+ individuals		BLM	6421
2	W OFF SOUP SPRING LOOP, WARNER MTS.	Modoc	Soup Creek (4112033)	CNDDDB, May 2017 (EO 2)	17-Jun-1997	NEEDS FIELDWORK.		Modoc NF	6560
3	Warner Mountains. 11 km NW of Eagle Peak, Rock Spring	Modoc	Soup Creek (4112033)	CCH, Jan 2017 (UCR1657 07)	16-Aug-1989			Modoc NF	6611
4	Overlooking Mill Creek a little above Clear lake; Warner Mountains 15 miles E of Likely	Modoc	Soup Creek (4112033)	CCH, Jan 2017 (NY10842 04)	19-Jun-1959			Modoc NF	6499
5	Rock outcrops between roadhead and Pine Creek Basin, W side of Warner Mountains.	Modoc	Soup Creek (4112033)	CCH, Jan 2017 (CAS8399 45)	16-Jun-1990			Modoc NF	7087

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)	CNDDDB EOs	Non-CNDDDB 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:	-	-	-	-	-	-	-	0
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	-	-	-	-	-	-	-	0
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	-	-	-	-	-	-	-	0
Modoc:	2,3,4,5	1	3	-	4	17-Jun-1997	1	4
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	-	-	-	-	-	-	-	0
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	-	-	-	-	-	-	-	0
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	1	3	0	4	N/A	1	4

Demographic and Population Trends: There are a total of six occurrences in California. The most recent observation of *M. cusickii* is from 1997 near Soup Spring Loop in the Warner Mountains (CNDDDB 2017). Demographic and population level information is lacking for this taxon. Fieldwork is needed.

Life History: *Mertensia cusickii* is a perennial herb that blooms from June until July (CNPS 2017). Plants are 30-50 decimeters tall and develop from a branched caudiciform stem that is connected to a taproot (Kelley and Joyal 2017). *Mertensia paniculata* is a more common and

related species that also has a Pacific Northwest distribution. It has a similar growth form and also occurs in mesic habitats. *Mertensia paniculata* produces a caudex and is known to resprout after fire. It is also known to establish in burned soils from seed. Either from seed or resprouting, *M. paniculata* responds well after burn events. *Mertensia* taxa are reported to be pollinated by bees (Forrest et al. 2011; Reeves 2006; Macior 1978; Pelton 1961). One study documented that *Mertensia ciliata* was visited by multiple members of Hymenoptera (*Apis*, *Bombus Psithyrus*, *Colletes*, and *Osmia*) and a number of different members of Diptera (*Systoechus*, *Hylemya*, and *Paregle*). Nectar robbing was also observed by *Colletes* and *Osmia* bees. In addition, the study reported that lower elevation plants exhibited low seed production, despite abundant flowering. Insect damage and drought were cited as probable stressors and causes of low seed output in observed populations of *M. ciliata*. Individual *M. ciliata* plants have emerged from rhizomes that were buried by alluvium during flooding events (Pelton 1961). Another study highlighted that the Rocky Mountain species *Mertensia fusiformis* produces seeds with elaiosomes (lipid-protein bodies) that may be dispersed by ants. More data are needed to determine if *M. fusiformis* is a strict myrmecophyte (Turnbull et al. 1983). Obvious dispersal mechanisms for *Mertensia* taxa are lacking. Wrinkled nutlets may occasionally attach to mammals. Seeds are lightweight and produced at a height that is conducive to short dispersal by wind (Pelton 1961).

Diversity: *Mertensia cusickii* is a member of the Boraginaceae and is nested within the clade that is defined by the Cynoglossoideae (48 genera / 1,070 species; *Cynoglossum*, hound's tongue) (Stevens 2001). *Mertensia* represents ± 50 species of the 1,070 species known in the group (Kelley and Joyal 2017; Stevens 2001). The genus *Mertensia* is widely distributed in North America, Beringia, Asia, and circumboreal regions. Phylogeographic studies indicate origins in eastern Asia, and subsequent expansion by dispersal into North America through the Bering land bridge during the late Tertiary. Taxa are known to occur in alpine, montane, boreal, and mesic forested habitats. *Mertensia* exhibits considerable phylogeographic structure, with major clades corresponding to broad geographic territories - Asia, Beringia, Pacific Northwest, Rocky Mountains, respectively. Major clades within *Mertensia* represent geographically clustered radiations, and, in some cases, subsequent dispersal into adjacent regions. Biogeographic reconstructions of *Mertensia* indicate that North American taxa diversified from a widespread lineage that was distributed across Beringia and the Pacific Northwest during the late Miocene to early Pliocene. This radiation yielded groups of taxa in the central and southern Rocky Mountains, Great Basin-Columbia Plateau, Colorado Plateau, and Pacific Northwest. *Mertensia cusickii* is a member of the southern Rocky Mountain clade, and is among a lineage that underwent a westward migration after its arrival in the southern Rockies. In addition, divergence times associated with several North American clades coincide with Pleistocene glaciation activity. Glaciation activity likely influenced speciation rates in these lineages (Nazaire et al. 2014). Today, *M. cusickii* occurs in the southern Columbia Plateau and northern Great Basin regions, extending into northeastern California in the Warner Mountains where it occurs in sympatry with six additional *Mertensia* taxa (CCH 2017; Kelley and Joyal 2017; Nazaire et al. 2014).

Habitat: *Mertensia cusickii* grows in Great Basin scrub and lower montane coniferous forests (CNPS 2017). It is also known to occur along streamsides, dry-drainage bottoms, wooded slopes,

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and drying meadows (Kelley and Joyal 2017). Reports also indicate that *M. cusickii* grows along moist sagebrush slopes and wet meadow habitat at the tree line (CNDDDB 2017). Within California, reports indicate that *Mertensia cusickii* grows alongside *Erythranthe guttata*, *Verbascum* sp., *Ranunculus* sp., and *Poa pratensis* (CNDDDB 2017). Reports from outside California indicate that it grows with *Juniperus* sp. (Harney Co., OR) (CPNWH 2017). It is worth noting that six additional *Mertensia* taxa occur in the Warner Mountains (*M. ciliata* var. *ciliata*, *M. ciliata* var. *stomatechoides*, *M. longiflora*, *M. oblongifolia* var. *oblongifolia*, *M. oblongifolia* var. *amoena*, and *M. oblongifolia* var. *nevadensis*) that may be found growing alongside *M. cusickii* (CCH 2017).

Habitat Status or Trend: *Mertensia cusickii* is known in California from fewer than six occurrences. It is a fleshy plant that is distributed in regions of the state that are grazed. It is a California rank S2 and is considered imperiled therein (CNPS 2017).

Capacity for the Species to Disperse: Information on the dispersal capacity of *Mertensia cusickii* is lacking. A related species, *Mertensia fusiformis*, produces seeds with elaiosomes, and is possibly dispersed by ants (Turnbull et al. 1983). Wrinkled nutlets may occasionally attach to mammals. Seeds are lightweight and produced at a height that is conducive to short dispersal by wind (Pelton 1961).

Threats: *Mertensia cusickii* is threatened by grazing activity (CNPS 2017). Populations are impacted by cattle that seek shelter under woody vegetation (i.e. *Juniperus* spp.) (D. Taylor pers. comm. 2017).

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January 10, 2018

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ext. 205, dmagney@cnps.org. January 16, 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.