

Plant Species Evaluation Form

***Mertensia oblongifolia* (Nutt.) G. Don var. *amoena* (A. Nels.) L. Williams**

BEAUTIFUL SAGEBRUSH BLUEBELLS

Family: Boraginaceae
(CNPS 2017)

PLANTS Symbol: MEOB
(USDA 2017)

Calif. Endemic: No
(CNPS 2017)

Synonyms/Other Names: *Mertensia oblongifolia* var. *amoena* (A. Nelson) L.O. Williams was originally described as *Mertensia amoena* A. Nelson in 1900. It was later changed to *Mertensia bakeri* var. *amoena* (A. Nelson) A. Nelson in 1909. In 1932, the name was then changed to *Mertensia foliosa* var. *amoena* (A. Nelson) I.M. Johnst. The name *Mertensia oblongifolia* var. *amoena* (A. Nelson) L.O. Williams was then adopted in 1937 and has remained the same until this day.

Identification Issues: Hybridization among *Mertensia* taxa is common. Identification can be difficult, particularly in the Modoc Plateau region. A number of *Mertensia* taxa in addition to *M. oblongifolia* var. *amoena* occur in the Warner Mountains (*M. ciliata* var. *ciliata*, *M. ciliata* var. *stomatechoides*, *M. longiflora*, *M. cusickii*, *M. oblongifolia* var. *oblongifolia*, and *M. oblongifolia* var. *nevadensis* – CCH 2017). It is important to note that three separate varieties occur in the region of the Warner Mountains. All varieties of *Mertensia oblongifolia* produce many stems and have well developed basal leaves. *Mertensia oblongifolia* var. *amoena* is distinguish from sister taxa by the presence of hair on both abaxial and adaxial leaf surfaces. *Mertensia oblongifolia* var. *oblongifolia* strictly has adaxial leaf hair, and *M. oblongifolia* var. *nevadensis* has ± glabrous leaves (Kelley and Joyal 2017).

Taxonomy:

Unless otherwise cited, the following description is used with permission from the Jepson Herbarium. Jepson Flora Project (eds) 2017. *Jepson eFlora*, <http://ucjeps.berkeley.edu/eflora/>, accessed May 2017. Copyright © Regents of the University of California.

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.

Mertensia oblongifolia (Nutt.) G. Don var. *amoena* (A. Nels.) L. Williams

Species Description Stem: generally > 20 cm. Leaf: blade hairy both surfaces. Flower: corolla tube hairy inside. Chromosomes: 2n=48. 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).

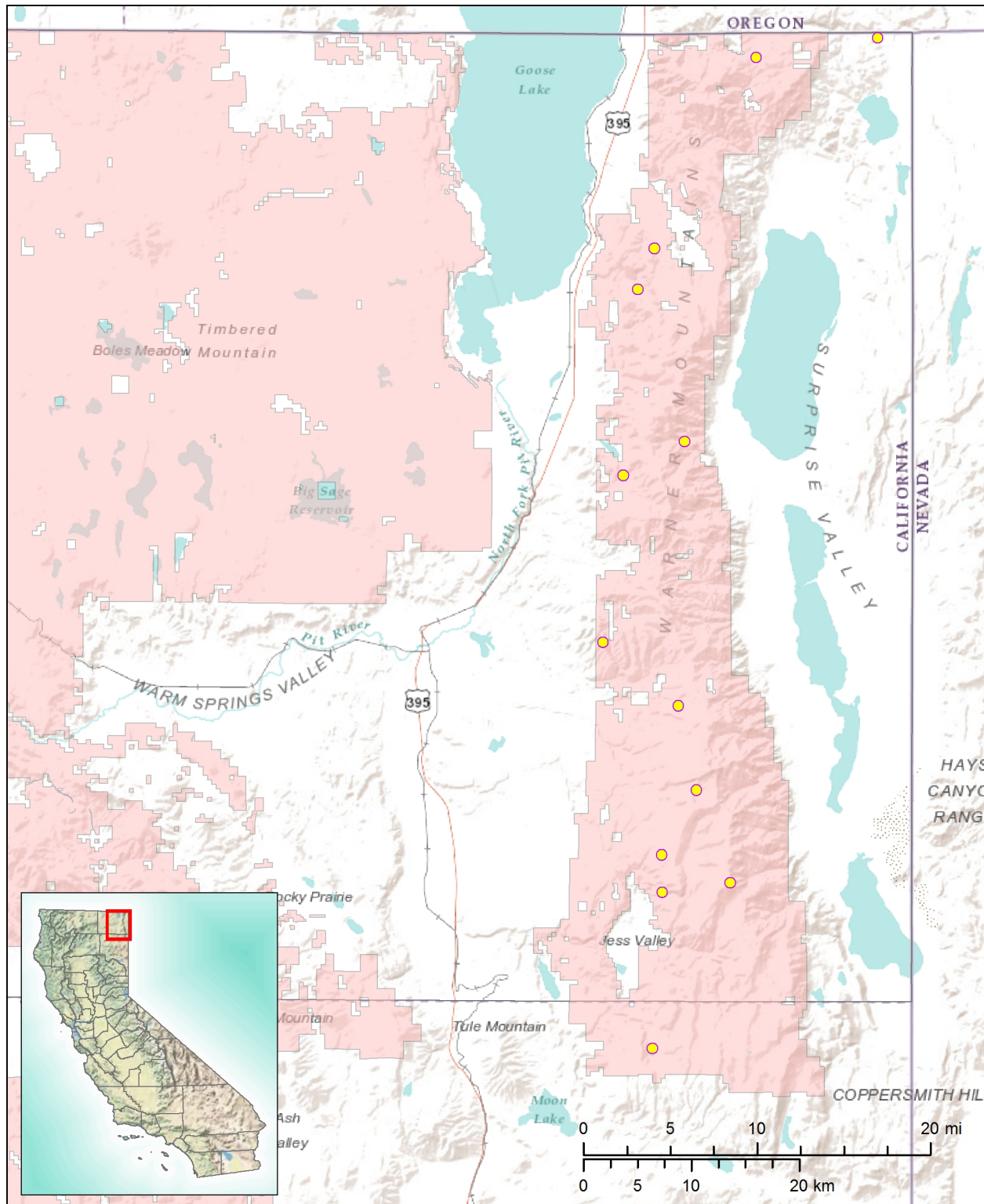
State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G5T5	CA: S2 NV: SNR OR: Not listed	2B.2	Not listed	Not listed	Not listed
SWAP: Not listed	NNHP: Do not track	NNPS: Not listed	ORBIC: Not listed	OCS: Not listed	IUCN: Not listed	

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: Western United States, from California to Washington in the west and Wyoming and Utah at the eastern end of its distribution. Plants within California are represented by 13 occurrences that are all within the Modoc NF (CCH 2017; CNPS 2017; CNDDDB 2017).

Descriptions indicate that it is rarely found in the northern Sierra Nevada (Kelley and Joyal 2017). This is supported by a single isolated record from El Dorado County (UCR175655, CCH 2017), but is not recognized in this work pending further verification of its identity, due to its large disjunction from all other verified records in the state. All vetted records within California are found in the Warner Mountains (CNDDDB 2017).

Mertensia oblongifolia (Nutt.) G. Don var. *amoena* (A. Nels.) L. Williams



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

Mertensia oblongifolia (Nutt.) G. Don var. *amoena* (A. Nels.) L. Williams

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	BLUE LAKE, WARNER MOUNTAINS.	Lassen	Jess Valley (4112023)	CNDDB, May 2017 (EO 1)	Unknown	NEEDS FIELDWORK. ONLY INFORMATION IS NOTE FROM GLENN CLIFTON, 1998.		Modoc NF	
2	PINE CREEK BASIN, 2 MILES SW OF WARREN PEAK, WARNER MOUNTAINS.	Modoc	Eagle Peak (4112032)	CNDDB, May 2017 (EO 2)	07-Jul-1929	NEEDS FIELDWORK.		Modoc NF	7000
2	Pine creek Basin.	Modoc	Eagle Peak (4112032)	CCH, Jan 2017 (CAS2215 07)	07-Jul-1929			Modoc NF	7598
3	PARKER CREEK, WARNER MOUNTAINS.	Modoc	Shields Creek (4112043)	CNDDB, May 2017 (EO 3)	13-Jun-1919	6000-7000 FEET. NEEDS FIELDWORK. LOCATION INFORMATION IS VAGUE, SOURCE MAY BE REFERRING TO NORTH, MIDDLE OR SOUTH FORK OF PARKER CREEK.		Modoc NF	7000

Mertensia oblongifolia (Nutt.) G. Don var. *amoena* (A. Nels.) L. Williams

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
3	Parker Creek.	Modoc	Shields Creek (4112043)	CCH, Jan 2017 (DS99317)	13-Jun-1919				
4	LASSEN CREEK.	Modoc	Sugar Hill (4112073)	CNDDB, May 2017 (EO 4)	Aug-1894	NEEDS FIELDWORK. ONLY SOURCE OF INFORMATION IS COLLECTION FROM 1894 BY AUSTIN.		Modoc NF	
5	LAKE CITY CANYON.	Modoc	Davis Creek (4112063)	CNDDB, May 2017 (EO 5)	Jun-1898	NEEDS FIELDWORK. LOCATION INFORMATION IS VAGUE.		Modoc NF	
5	Lake City Canyon	Modoc	Davis Creek (4112063)	CCH, Jan 2017 (UC24933)	30-Jun-1898			Modoc NF	
6	SURPRISE VALLEY ROAD, JUST S OF THE OREGON BORDER.	Modoc	Lake Annie (4112081)	CNDDB, May 2017 (EO 6)	02-Jun-1989	NEEDS FIELDWORK.		Modoc NF	5350
6	Surprise Valley Road, just S of the Oregon border, extreme NE corner of Modoc County, T48N R17E S32	Modoc	Lake Annie (4112081)	CCH, Jan 2017 (GH42007 9)	02-Jun-1989			BLM	

Mertensia oblongifolia (Nutt.) G. Don var. *amoena* (A. Nels.) L. Williams

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
7	0.5 MILE E OF MOONLIGHT MINES, MOUNT BIDWELL.	Modoc	Mt. Bidwell (4112082)	CNDDb, May 2017 (EO 7)	08-May-1992	NEEDS FIELDWORK. COLLECTION FROM "SAGEBRUSH NEAR SPRING, N SLOPE OF BIDWELL MOUNTAIN" (APPLGATE #7615) ALSO ATTRIBUTED TO THIS LOCATION.		Modoc NF	7980
7	N slope of Bidwell Mountain, Warner Mountains	Modoc	Mount Bidwell (4112082)	CCH, Jan 2017 (GH420080)	09-Jul-1932			Modoc NF	
8	Ridge W of Dry Creek.	Modoc	Shields Creek (4112043)	CCH, Jan 2017 (CAS301388)	21-Jun-1931			Modoc NF	6499
8	Ridge W of Dry creek	Modoc	Shields Creek (4112043)	CCH, Jan 2017 (GH420081)	21-Jun-1931			Modoc NF	
9	Clear Lake.	Modoc	Soup Creek (4112033)	CCH, Jan 2017 (CAS294011)	20-Jun-1941			Modoc NF	5801
9	Clear Lake.	Modoc	Soup Creek (4112033)	CCH, Jan 2017 (DS288019)	20-Jun-1941			Modoc NF	5801

Mertensia oblongifolia (Nutt.) G. Don var. *amoena* (A. Nels.) L. Williams

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
10	Between Joseph Creek Basin and Halls Meadow, W side of Warner Mts.	Modoc	Sugar Hill (4112073)	CCH, Jan 2017 (CAS794000)	28-May-1994			Modoc NF	6168
11	South Fork Davis Creek in the vicinity of the Plum Valley camp ground.	Modoc	Payne Peak (4112053)	CCH, Jan 2017 (CAS839669)	01-Jun-1989			Modoc NF	5643
12	Modoc Nat. Forest. Opening S of Soup Spring's Campground	Modoc	Soup Creek (4112033)	CCH, Jan 2017 (CHSC31508)	01-Jul-1980			Modoc NF	6801
13	W slope of Eagle Peak	Modoc	Eagle Peak (4112032)	CCH, Jan 2017 (HSC3706)	10-Jul-1965			Modoc NF	8002

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:	-	-	-	-	-	-	-	0
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	-	-	-	-	-	-	-	0
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	-	-	-	-	-	-	-	0
Modoc:	1,2,3,4,5,6,7,8,9,10,11,12,13	7	6	0	13	28-May-1994	-	13
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	-	-	-	-	-	-	-	0
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	-	-	-	-	-	-	-	0
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	7	6	0	13	N/A	0	13

Demographic and Population Trends: A total of thirteen occurrences are found within California. Each record is dated prior to 1995, with the earliest occurrence record dating to August of 1894. Exactly six of the seven (6/7, ~86%) occurrence records with population information declare that fieldwork is needed. Repeat visits are missing from each occurrence record.

Life History: *Mertensia oblongifolia* var. *amoena* is a perennial herb that blooms from April until July (CNPS 2017). Plants are generally less than 40 cm tall and develop from a fleshy caudex with a thick 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, this 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*. In addition, 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 oblongifolia* var. *amoena* 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 oblongifolia* var. *amoena* is a member of the central Rocky Mountain clade, and is among a lineage that underwent a westward migration after its arrival in the central 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. oblongifolia* var. *amoena* occurs largely throughout Columbia Plateau and northern Great Basin regions, extending to Washington, Wyoming, and

Utah in the north, to Nevada and northeastern California in the south where it is found in the Warner Mountains in sympatry with six additional *Mertensia* taxa (CCH 2017; Kelley and Joyal 2017; Nazaire et al. 2014).

Habitat: *Mertensia oblongifolia* var. *amoena* grows in meadows, seeps, and sagebrush scrub (CNPS 2017). It is also known to occur in open slopes, drier meadows, and vernal moist areas often in association sagebrush (Kelley and Joyal 2017). Reports also indicate that *M. oblongifolia* var. *amoena* grows along streams, rocky flats, and shaded north-facing slopes (CNDDDB 2017). Within California, reports indicate that *M. oblongifolia* var. *amoena* grows in sagebrush habitat among *Populus tremuloides*, *Purshia tridentata*, *Artemisia tridentata*, and *Eriogonum umbellatum* in the Warner Mountains (CNDDDB 2017). Reports from outside California indicate that it can be found growing with *Artemisia tridentata*, *Senecio integerrimus*, *Lupinus sulphureus*, and *Symphoricarpos oreophilus* (CPNWH 2017). It is worth noting that six additional *Mertensia* taxa occur in the Warner Mountains that may be found growing alongside *M. oblongifolia* var. *amoena*: *M. ciliata* var. *ciliata*, *M. ciliata* var. *stomatechoides*, *M. longiflora*, *M. cusickii*, *M. oblongifolia* var. *oblongifolia*, and *M. oblongifolia* var. *nevadensis* (CCH 2017).

Habitat Status or Trend: *Mertensia oblongifolia* var. *amoena* is represented by seven Element Occurrences (EOs) in California. An additional six records may represent new EOs in California and need to be reviewed for inclusion in the California Natural Diversity Database (CNDDDB). The majority of its records have not been seen or redocumented in many years. The most recent documented observation of this plant is from 1994 (CNDDDB 2017; CCH 2017). Four Element Occurrences are from the late 19th/early 20th century, all of which represent plants that have not been seen since the original observation. California populations represent the fringe of its distribution (CNDDDB 2017). Most occurrences are in or near the Warner Mountains, where it co-occurs with other *Mertensia* taxa (CNDDDB 2017; CCH 2017). Current trends and status of this taxon are undetermined.

Capacity for the Species to Disperse: Information on the dispersal capacity of *Mertensia oblongifolia* var. *amoena* 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: Direct threats to this taxon are unknown. There is no known literature or other sources of documented threats to this taxon.

Literature Cited

[BLM] Bureau of Land Management. 2010. Special Status Plants in California, Including BLM Designated Sensitive Species. February 8, 2010. Available at: <https://www.blm.gov/ca/dir/pdfs/2010/im/CAIM2010-008ATT2B.pdf> [accessed 25 May 2017].

[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.

[CDFW] California Department of Fish and Wildlife. 2015. California State Wildlife Action Plan, 2015 Update: A Conservation Legacy for Californians; Volume II, Appendix C: Species of Greatest Conservation Need. Gonzales, A. G. and J. Hoshi (eds.). Prepared with assistance from Ascent Environmental, Inc., Sacramento, CA. Available at: <https://www.wildlife.ca.gov/swap/final> [accessed 11 May 2017].

[CNDDDB] California Department of Fish and Wildlife, Natural Diversity Database. 2017. RareFind 5 [Internet application] and CNDDDB Maps and Data. Available at: <https://www.wildlife.ca.gov/Data/CNDDDB/Maps-and-Data> [Government Version, June 2017].

[CDFW] California Department of Fish and Wildlife, Natural Diversity Database. 2017a. Special Vascular Plants, Bryophytes, and Lichens List. Quarterly publication. 126 pp.

_____. 2017b. State and Federally Listed Endangered, Threatened, and Rare Plants of California. July 2017. Available at: <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109390&inline> [accessed 11 September 2017].

[CNPS] California Native Plant Society, Rare Plant Program. 2017. *Inventory of Rare and Endangered Plants of California* (online edition, v8-03 0.39). Website <http://www.rareplants.cnps.org> [accessed May 17, 2017].

[CPAD] California Protected Areas Database. 2016. Version 2016b1. GreenInfo Network. Available at: <http://www.calands.org/>.

[CCH] Consortium of California Herbaria. 2017. Data provided by the participants of the Consortium of California Herbaria. Regents of the University of California, Berkeley. Website <http://ucjeps.berkeley.edu/consortium/> [accessed 16 May 2017].

[CPNWH] Consortium of Pacific Northwest Herbaria. 2017. Data provided by the participants of the Consortium of Pacific Northwest Herbaria. University of Washington Herbarium. Website <http://www.pnwherbaria.org/data/search.php> [accessed 11 August 2017].

Forrest, J. R., J. E. Ogilvie, A. M. Gorischek, and J. D. Thomson. 2011. Seasonal change in a pollinator community and the maintenance of style length variation in *Mertensia fusiformis* (Boraginaceae). *Annals of Botany* 108(1): 1-12.

[IUCN] International Union for Conservation of Nature. 2017. The IUCN Red List of Threatened Species. Website <http://www.iucnredlist.org/> [accessed 26 May 2017].

Kelley, R. B. and E. Joyal. *Mertensia*. In Jepson Flora Project (eds.) 2017, *Jepson eFlora*. Website <http://ucjeps.berkeley.edu/eflora/> [accessed May 19, 2017].

Macior, L. W. 1978. Pollination ecology of vernal angiosperms. *Oikos* 30(3): 452-460.

Nazaire, M., X. Q. Wang, and L. Hufford. 2014. Geographic origins and patterns of radiation of *Mertensia* (Boraginaceae). *American Journal of Botany* 101(1): 104-118.

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Website <http://explorer.natureserve.org> [accessed 17 May 2017].

[NDF] Nevada Division of Forestry. 2012. NAC 527.010 List of fully protected species of native flora. April 2012. Available at: <https://www.leg.state.nv.us/NAC/NAC-527.html#NAC527Sec010> [accessed 12 May 2017].

[NNHP] Nevada Natural Heritage Program. 2017. Species Lists. Department of Conservation and Natural Resources. Available at: <http://heritage.nv.gov/species/lists.php> [accessed 25 May 2017].

[ODA] Oregon Department of Agriculture. 2014. Oregon listed and candidate plants - complete list. Native Plant Conservation Program. August 13, 2014. Available at: <https://data.oregon.gov/Natural-Resources/Oregon-listed-and-candidate-plants-complete-list/8s3k-ygh2> [accessed 25 May 2017].

[ODFW] Oregon Department of Fish and Wildlife. 2016. Oregon Conservation Strategy, Chapter 6: Strategy Species. Oregon Department of Fish and Wildlife, Salem, Oregon. PDF content last updated December 30, 2016. Available at: <http://oregonconservationstrategy.org/> [accessed 25 May 2017].

[ORBIC] Oregon Biodiversity Information Center. 2016. Rare, Threatened and Endangered Species of Oregon. Institute for Natural Resources, Portland State University, Portland, OR. 130 pp. Available at: <http://inr.oregonstate.edu/sites/inr.oregonstate.edu/files/2016-rte-book.pdf> [accessed 25 May 2017].

Pelton, J. 1961. An investigation of the ecology of *Mertensia ciliata* in Colorado. *Ecology* 42(1): 38-52.

Reeves, S. L. 2006. *Mertensia paniculata*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [9 August 2017].

Stevens, P. F. 2001. Angiosperm Phylogeny Website. Version 14, July 2017 [and more or less continuously updated since]. Website <http://www.mobot.org/MOBOT/research/APweb/>.

Turnbull, C. L., A. J. Beattie, and F. M. Hanzawa. 1983. Seed dispersal by ants in the Rocky Mountains. *The Southwestern Naturalist* 28(3): 289-293.

Tropicos. 2017. Missouri Botanical Garden. Website <http://www.tropicos.org> [accessed 16 May 2017].

[USDA] U.S. Department of Agriculture Forest Service, Pacific Southwest Region. 2013. Regional Forester Sensitive Species List. Available at: <http://www.fs.usda.gov/main/r5/plants-animals/plants> [accessed 9 May 2017].

[USDA] U.S. Department of Agriculture Forest Service and U.S. Department of Interior Bureau of Land Management. 2001. List of Survey and Manage Species in Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures; as amended by Annual Species Reviews 2001-2003. Available at: <https://www.blm.gov/or/plans/surveyandmanage/files/sm-fs-enc3-table1-1-dec2003wrtv.pdf> [accessed 12 September 2017].

[USDA] U.S. Department of Agriculture, Natural Resources Conservation Service. 2017. PLANTS Database. Website <http://plants.usda.gov/> [accessed 16 May 2017].

Persons Contacted:

Sanger, A., K. Bovee, D. Lepley, W. Boes, and H. Guenther. 2017. Lassen and Modoc National Forest botanists. Information submitted at Modoc/Lassen FS-SCC and IPA Workshop, Susanville, CA. 25-26 July 2017.

Taylor, D. Wm. 2017. Environmental contractor, Aptos, CA. Information submitted at Modoc/Lassen FS-SCC and IPA Workshop, Susanville, CA. 25-26 July 2017.

Author(s) and Date:

Steven Serkanic, Assistant Rare Plant Botanist, California Native Plant Society, (916) 447-2677 x218, sserkanic@cnps.org

Aaron Sims, Rare Plant Botanist, California Native Plant Society, (916) 324-3816, asims@cnps.org

January 16, 2018

Reviewer(s) and Date:

David Magney, Rare Plant Program Manager, California Native Plant Society, (916) 447-2677 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.