

Postponed From Addition to CNPS Inventory on August 27, 2012

Rare Plant Status Review: *Arceuthobium abietinum* ssp. *wiensii*

Proposed New Add to Rank 1B.2, G5T2T3 / S2

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Background

Arceuthobium abietinum ssp. *wiensii* is a perennial, parasitic, dioecious herb in the Viscaceae family that is only known from the Klamath Ranges in northwestern California and southwestern Oregon. It was recently described by Mathiasen and Daugherty (2009) and is not included in *The Jepson Manual, Second Edition (TJM 2)* or *The Jepson Manual* (1993). However, *TJM 2* lists *A. abietinum* as a synonym of *A. campylopodum*, while *TJM 1993* includes *A. abietinum* only at the specific level. The *Flora of North America* treatment for Viscaceae is not yet available. *Arceuthobium abietinum* s.l. is treated as a synonym of *Arceuthobium campylopodum* in *TJM 2* based on molecular work by Nickrent et al. (2004). Nickrent et al. (2004) analyzed both nuclear and chloroplast genetic sequences of 42 New and Old World species of *Arceuthobium*. In their analysis, they found that the 14 species that are members of section *Campylopoda* were poorly differentiated genetically, with only a few substitutions separating named taxa. Nickrent et al. (2004) thus decided to lump these 14 taxa into *A. campylopodum*. They note that host-specificity may not be a reliable character for differentiating taxa, as there is often some overlap between taxa. For example, *A. californicum*, *A. monticola*, and *A. tsugense* ssp. *mertensianae* (now considered synonymous with *A. campylopodum* in *TJM 2*) can all be found growing on *Picea breweriana*, although no other species are known to infect *Abies* (*TJM 1993*). Nickrent et al. (2004) suggest that cross-pollination experiments would be helpful in determining if taxa within section *Campylopoda* are capable of hybridization and in determining which species merit taxonomic recognition, but very few of these have been conducted. Although Nickrent et al (2004) suggested the classification of *A. abietinum* to be treated under *A. campylopodum* based mostly on molecular data, Mathiasen and Daugherty (2009) reject their alternative classification and adopt the taxonomic treatment for *Aceuthobium* from Hawksworth and Wiens (1972, 1996), which distinguishes *A. abietinum* from *A. campylopodum* based on morphological and host range differences between these species.

Engelmann (1880) first described *Arceuthobium douglasii* var. *abietinum*, which was later treated as *Arceuthobium abietinum* by Hawksworth and Wiens (1970). Hawksworth and Wiens (1972) later named two formae speciales of this species: *A. abietinum* f.s. *concoloris*, which parasitizes white fir (*Abies concolor* vars. *concolor* and *lowiana*), and *A. abietinum* f.s. *magnificae*, which parasitizes red fir (*Abies magnifica* vars. *magnifica* and *shastensis*). Although the two formae speciales of *A. abietinum* cannot be distinguished by their morphology (and thus have not been treated as subspecies or varieties), they can be distinguished by host specificity. Inoculation experiments by Parmeter and Scharpf (1963) and field observations by Hawksworth and Wiens (1972) confirmed that *A. abietinum* f.s. *magnificae* does not infect red fir, while f.s. *concoloris*

does not infect white fir. However, since *Arceuthobium abietinum* ssp. *wiensii* infects both red fir (principal host) and white fir (occasional host), it is physiologically and genetically distinct from both of the special forms (Mathiasen and Daugherty 2009). *Arceuthobium abietinum* ssp. *wiensii* is also known to infect Brewer spruce (*Picea breweriana*, principal host) and rarely infects western white pine (Mathiasen and Daugherty 2009). Although morphological features are highly reduced in *Arceuthobium*, Mathiasen and Daugherty (2009) were able to differentiate it from the formae speciales based on several characters. Both male and female plants of ssp. *wiensii* are significantly smaller than the formae speciales, and have a different color (green-brown or red brown, compared to yellow-green or yellow in the formae speciales). Also, staminate flowers as well as fruits of ssp. *wiensii* are significantly smaller than those of the formae speciales (Mathiasen and Daugherty 2009). While these differences were statistically significant, there was a large degree of overlap in each character, making differentiation based on morphology alone difficult. *Arceuthobium abietinum* ssp. *wiensii* has been observed flowering in California from August to September.

Arceuthobium abietinum ssp. *wiensii* is found in lower montane coniferous forests, growing on *Picea breweriana*, *Abies concolor*, *Abies magnifica*, and rarely on *Pinus monticola*. It has been found between 1320 and 1680 meters.

There are only five known occurrences of *A. abietinum* ssp. *wiensii* in California. There are no records of it in the Consortium of California Herbaria, but Mathiasen and Daugherty (2009) as well as the Southwest Environmental Information Network (SEINet 2012) provide information on collections from both California and Oregon. Although collections from Bolan Mountain (*Mathiasen 0743* and *Mathiasen 0835*) are listed as occurring in Siskiyou County, California, they are actually from Josephine County, Oregon (R.L. Mathiasen pers. comm. 2012). All of the known occurrences are on U.S. Forest Service lands, and all of them have been documented recently. Stands of *Picea breweriana* in remote parts of northwestern California should be checked for additional populations (R.L. Mathiasen pers. comm. 2012).

There are only four known occurrences of *Arceuthobium abietinum* ssp. *wiensii* in Oregon. It is not yet ranked by NatureServe in either California or Oregon.

Forest fires and logging are probably the two biggest threats to *A. abietinum* ssp. *wiensii*. The Biscuit Fire in 2002 burned a large portion of its habitat in Oregon (R.L. Mathiasen pers. comm. 2012). *Picea breweriana* is not currently being logged, but populations growing on *Abies* could potentially be threatened by logging.

Based on the available information, CNPS and CNDDDB recommend that *Arceuthobium abietinum* ssp. *wiensii* be added to California Rare Plant Rank 1B.2. If current records in California are later found to be an under-representation of its actual distribution and frequency, it will be re-evaluated by CNPS at that time.

Recommended Actions

CNPS: Add to Rank 1B.2

CNDDDB: Add to G5T2T3 / S2

Please review the draft CNPS Inventory record below, respond Yes or No on the proposal to add this species to the Inventory and CNDDDB, and provide any edits/comments. If responding NO, please provide supporting information.

Draft CNPS Inventory Record

Arceuthobium abietinum (Engelm. ex Munz) Hawks. & Wiens ssp. *wiensii* Mathiasen & Daugherty

Wiens' dwarf mistletoe

Viscaceae

Rank 1B.2

Siskiyou, Trinity

Oregon

Blake Mountain (652D) 4012355, Chimney Rock (721C) 4112356, Deadman Point (737B) 4112384, Etna (701B) 4112248, Happy Camp (737C) 4112374.

Lower montane coniferous forest.

Perennial parasitic herb. Blooms August to September.

Known only from the Klamath Mtns. Potentially threatened by logging and frequent wildfires. Occurs on *Abies concolor* (occasional host), *Abies magnifica* (principal host), *Picea breweriana* (principal host), and *Pinus monticola* (rare host). Not in *TJM 2*. See *American Journal of Botany* 9(1):125-138 (2004) for alternative taxonomic treatment, and *Madroño* 56(2):118-126 (2009) for original description.