Western North American Naturalist

Volume 70 | Number 2 Article 16

7-9-2010

First reports of *Draba pennellii* and *Draba pedicellata* (Cruciferae) in Utah, and new distribution records for *Draba kassii, Draba novolympica,* and *Hackelia ibapensis* (Boraginaceae).

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Western North American Naturalist 70(2), © 2010, pp. 255–257

FIRST REPORTS OF *DRABA PENNELLII* AND *DRABA PEDICELLATA* (CRUCIFERAE) IN UTAH, AND NEW DISTRIBUTION RECORDS FOR *DRABA KASSII, DRABA NOVOLYMPICA,* AND *HACKELIA IBAPENSIS* (BORAGINACEAE)

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ABSTRACT.—The discovery of *Draba pennellii* Rollins and *D. pedicellata* (Rollins & R.A. Price) Windham var. *pedicellata,* both previously known only from Nevada, is reported here from the Deep Creek Mountains of western Utah. The documentation of significant populations of *D. pennellii* and *D. pedicellata* var. *pedicellata* in Utah is important for accurate botanical inventories and floristic studies in both Utah and Nevada. New distribution records for *D. kassii* S.L. Welsh, *D. novolympica* Payson & St. John, and *Hackelia ibapensis* L.M. Shultz & J.S. Shultz are described, and the significance of these range extensions and new populations is discussed.

Key words: Draba pennellii, Draba pedicellata, Draba kassii, Draba novolympica, Hackelia ibapensis, *Utah, Deep Creek Mountains, Mt. Nebo, rare-species conservation.*

Draba pennellii Rollins and *Draba pedicellata* (Rollins & R.A. Price) Windham var. *pedicellata,* both previously considered to be strictly endemic to Nevada (Holmgren 2005), were discovered recently in the Deep Creek Mountains of western Juab and Tooele counties, Utah. *Draba pennellii* occurs profusely in the crevices of the quartzite cliffs of Birch Creek Canyon, approximately 9 km northwest of the town of Trout Creek, Utah. Melinda Woolf Harris and I found the plants in 2009 on accessible north- and south-facing cliffs between about 1900 and 2200 m in elevation near the canyon floor. *Draba pennellii* is found at elevations as high as 3600 m in Nevada (Holmgren 2005), so it is probable that the Deep Creek population extends up the high cliff faces of Birch Creek Canyon, which reach an elevation of 2734 m to the south and 3100 m to the north. Based on the large number of plants we observed and the considerable amount of appropriate but unsurveyed and mostly inaccessible habitat, it appears that the population likely consists of several thousand individuals. The nearest known population of *D. pennellii* is in the Schell Creek Range in White Pine County, Nevada (Holmgren 2005), approximately 62 km west-southwest of the Utah population reported here.

I discovered *D. pedicellata* var. *pedicellata* on dolomitic slopes, ledges, and crevices between 2980 and 3200 m in elevation near the head of Goshute Canyon, approximately 14 km due west-northwest of Callao, Utah. The population, which consists of several hundred individuals, occurs in the understory of a mature mixed stand of bristlecone pine (*Pinus longaeva*) and limber pine (*Pinus flexilis*). While young, the bright yellow flowers stand out sharply against the white dolomite substrates the plants grow on, but the plants become less obvious as the flowers fade to white. *Draba pedicellata* var. *pedicellata* is apparently limited in the Deep Creek Mountains to upper Goshute Canyon, the only area in the range where calcareous substrates are found at high elevations. The nearest known population of this taxon is in the Schell Creek Range of eastern Nevada (Holmgren 2005), approximately 85 km southwest of the Deep Creek population.

Given the known distributions of *D. pennellii* and *D. pedicellata* in the neighboring mountain ranges of Nevada, their occurrence in the ecologically and floristically similar Deep Creek Range in western Utah is not particularly surprising. Nonetheless, their discovery in significant numbers within the borders of Utah is important in determining the appropriate

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conservation status of these species and for accurate botanical inventories and floristic studies in both Nevada and Utah.

Draba kassii Welsh was described (Welsh 1986) from specimens collected in Goshute Canyon in the Deep Creek Mountains. Subsequent collections in the 1980s and 1990s expanded the known range of this striking species to neighboring Big Creek Canyon to the south, but it was not known to occur elsewhere. Published distribution and habitat data for the species (Holmgren 2005, Welsh 2008) indicate that it is limited to crevices in granite and quartzite cliffs and outcrops between 2100 and 2600 m elevation. However, while conducting fieldwork in the Deep Creek Range over the past 6 years, I have found that *D. kassii* is adapted to a broader range of elevations, substrates, and habitat types than previously known; and it is more widely distributed geographically than once thought.

Draba kassii is widely distributed on calcareous cliffs and ledges in upper Goshute Canyon, and it occurs with *D. pedicellata* on stabilized dolomitic scree slopes at elevations as high as 2900 m along the ridgeline north of Goshute Canyon. In spring 2009, Melinda Woolf Harris and I discovered a large population of *D. kassii* on the north-facing quartzite cliffs of Birch Creek Canyon, where it occurs with another Deep Creek endemic, *Hackelia ibapensis* L.M. Shultz & J.S. Shultz. Interestingly, *D. kassii* and *H. ibapensis* also co-occur in at least 2 other locations in the Deep Creek Range: one on the upper ridges of Indian Farm Creek Canyon and the other in Goshute Canyon.

The discovery of *D. kassii* and *H. ibapensis* in Birch Creek Canyon, approximately 16 km south-southwest of the closest previously known populations, significantly increases the known range and number of individuals of these narrow endemics. The potential habitat of these taxa on the sheer cliff faces of Birch Creek Canyon is extensive and mostly inaccessible without technical climbing equipment. As a result, the total number of individuals is unknown but almost certainly considerable. The presence of potentially large populations of *D. kassii* and *H. ibapensis* in Birch Creek Canyon has implications for the conservation status of these species. The finding of a new population of *H. ibapensis,* previously known only from 2 small populations, is particularly significant.

Draba novolympica Payson & St. John (= *D. paysonii* J.F. Macbr. var. *treleasii* [O.E. Schulz] C.L. Hitchc. [Al-Shehbaz and Windham 2007]) was previously known in Utah from a single population discovered in 1995 by Noel Holmgren and Michael Windham in the Deep Creek Mountains (N.H. Holmgren and M.D. Windham *12419*, NY, UT). In 2006, Melinda Woolf Harris and I discovered a second Utah population of the taxon on the summit ridge of Mt. Nebo at elevations between 3300 and 3635 m. The population essentially straddles the boundary line between Juab and Utah counties, Utah, near the southern end of the Wasatch Range. *Draba novolympica* probably escaped notice on Mt. Nebo until now by masquerading as the much more common *D. oligosperma,* with which it frequently co-occurs on limestone cliffs, ledges, and scree. At high elevations, both species share a remarkably similar dwarfed, pulvinate-caespitose habit, requiring a close examination of the leaf pubescence to conclusively distinguish one species from the other.

Geographic uncertainty about the location of the summit of Mt. Nebo probably also prevented an earlier discovery of *D. novolympica* there. Prior to the late 1970s, the southernmost of the 3 major peaks of Mt. Nebo was considered the highest point of the mountain, and the established trails likely to have been traveled by botanists lead to this peak. Modern surveys demonstrate, however, that the northernmost of the 3 peaks is the actual summit of the mountain. In July 2009, Melinda Woolf Harris and I visited the southern peak to search for *D. novolympica.* We found an abundance of *D. oligosperma* there, but we could not find *D. novolympica.* Although our survey was cut short due to an impending thunderstorm, this quick search suggests that *D. novolympica* is missing from the sections of Mt. Nebo where it would most likely have been collected until fairly recently.

Draba novolympica is common on ledges and scree slopes within approximately 1000 m of the Mt. Nebo summit, and it occurs again near the summit of North Peak (not to be confused with the northernmost of the 3 major peaks). The Mt. Nebo population extends the known range of *D. novolympica* in Utah approximately 183 km eastward. Additional populations of this taxon should be sought on appropriate habitat elsewhere in the Wasatch Range.

Voucher specimens for these new distribution records are deposited in the Utah Valley University Herbarium (UVSC): *Draba pennellii:* J.G. Harris and M.W. Harris *4897*, *4925*, *4932; Draba pedicellata* var. *pedicellata:* J.G. Harris *3145*, *4075*, *4096*, *4098*, *4105;* J.G. Harris and M.W. Harris *3334*, *3357;* J.G. Harris, M.W. Harris and R. Flake *4205a, 4205b; Draba kassii:* J.G. Harris and M.W. Harris *4924*, *4930; Draba novolympica*: J.G. Harris *4764*, *4940*, *4947*, *5258;* J.G. Harris and M.W. Harris *4349; Hackelia ibapensis:* J.G. Harris and M.W. Harris *4928*, *4933.* High-resolution images of these specimens, as well as photographs of living plants in the field, are available on the UVU Herbarium Virtual Herbarium web site: http://herbarium.uvu.edu/.

I thank my wife, Melinda Woolf Harris, for her sharp eyes and pleasant companionship during several of the forays into the field that led to the new botanical records described in this paper.

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Received 29 September 2009
Accepted 3 December 2009