# ARIZONA GAME AND FISH DEPARTMENT
# HERITAGE DATA MANAGEMENT SYSTEM

**Plant Abstract** **Element Code:** PDBRA1N1R0
**Data Sensitivity:** No

## CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

**NAME:** *Physaria kingii* subsp. *kaibabensis*
**COMMON NAME:** Kaibab Bladderpod
**SYNONYMS:** *Lesquerella kaibabensis, Physaria kaibabensis*
**FAMILY:** Brassicaceae

**AUTHOR, PLACE OF PUBLICATION:** Rollins, R.C. 1982. Contr. Gray Herb. 211:107-113.

**TYPE LOCALITY:** Pleasant Valley, Kaibab Plateau. 18.6 mi. south of Jacob Lake on Highway AZ 67.

**TYPE SPECIMEN:** Gray Herbarium. R.C. and K.W. Rollins (79191) 8 June 1979.

**TAXONOMIC UNIQUENESS:** *Physaria* is a genus with 35 species and 22 varieties or subspecies found mostly in the western United States (NatureServe 2018).

The taxonomy of *Lesquerella kaibabensis* (Rollins 1982) to *Physaria kingii* subsp. *kaibabensis* underwent a number of revisions between 2002 and 2007. In 2002 (Al-Shehbaz and O'Kane), the majority of the genus *Lesquerella* were merged into the genus *Physaria*. The change from *L. kaibabensis* to *P. kaibabensis* was published in 2004 (Holmgren). Finally, in 2007 (O'Kane) assigned the Kaibab Bladderpod as one of two subspecies of *Physaria kingii* (*P. k.* subsp *kaibabensis* and subsp *utahensis*).

However, the acceptance and treatment of this taxonomy has not been consistent. The status is summarized well in NatureServe (2018): Flora North America vol. 7 moves taxa formerly in the genus *Lesquerella* to *Physaria*. Kartesz (1999) recognizes *L. kingii* and several infraspecific taxa, but treats *L. utahensis* and *L. kaibabensis* as distinct species. Flora North America vol. 7 recognizes *Physaria kingii*, recognize the same infraspecific taxa but also consider 'utahensis' and 'kaibabensis' as subspecies of *P. kingii*. In other words, because Flora North America vol. 7 lumps two species into P. kingii, it has a broader circumscription than *L. kingii*.

Minnaert-Grote (2014) conducted a phylogenetic and systematics review of *Physaria kingii* using molecular (both nuclear and chloroplast DNA sequences), morphological, geographical and ecological data. As expected, the study revealed the close relationships between *P. kingii* subspp. *kaibabensis* and *wardii*, as well as *P. arizonica*. Hybridization and retrogression have occurred, and the hybrid *Physaria kingii* subsp. *kaibabensis* x *Physaria arizonica* was

recognized. Moreover, morphological variations seen among both species and within populations are likely resultant from phenotypic plasticity.

**DESCRIPTION:** Plants decumbent to ascending; Trichomes with only 3-5 primary branches, which are forked with ascending tips. Basal leaves: blade margins entire. Racemes not usually secund, hardly elongated in fruit. Fruiting pedicels (divaricate-ascending), straight or slightly sigmoid. Petals cream-white or white. Fruits as wide as or longer than wide, apex rounded-acute; valves glabrous inside; septum complete; ovules 10-14 per ovary; style 1-2 mm. (Flora of North America).

**AIDS TO IDENTIFICATION:** The Flora of North America provides a detailed key to 88 species of *Physaria* and the seven subspecies of *P. kingii*. Characteristics used to define subspecies *kaibabensis* in the key include fruits that are as wide or longer than wide, with rounded-acute apices and valves glabrous on the inside; fruiting pedicels *not* recurved (divaricate-ascending or +/- erect, straight or sigmoid); petals cream white or white, and styles 1-2 mm. The subspecies occurs only on the Kaibab Plateau. There are other very similar subspecies also found on the Kaibab Plateau that occasionally have cream-white or white petals (more usually yellow), but the styles are 4+ mm long.

Another key is presented in Minnaert-Grote 2014.

**ILLUSTRATIONS:**

Herbarium Mounts:
http://swbiodiversity.org/seinet/taxa/index.php?taxon=Physaria%20kingii%20subsp.%20kaibabensis#

Photos of plant with flowers, fruit and habitat: Minnaert-Grote 2014, Figures 27-30, pp. 92-95, and Arizona Rare Plant Committee 2001.

**TOTAL RANGE:** Kaibab Plateau, Coconino County, Arizona, south of Highway 89A.

**RANGE WITHIN ARIZONA:** See "**Total Range**."

## SPECIES BIOLOGY AND POPULATION TRENDS

**GROWTH FORM:** Herbaceous Perennial.

**PHENOLOGY:** Flowering in June.

**BIOLOGY:** Spence (2006) noted during his surveys that many plants were infested with a small green beetle larva which had burrowed into the seeds and destroyed them. He

estimated that 10-15% of the seeds were lost. Although no adult beetles were observed, he suspected some kind of bruchid beetle.

**HABITAT:** On limestone-clay knolls with a high percentage of exposed rock on the surface, within open windswept meadows (pseudo-alpine fellfield). Meadows of the Kaibab Plateau probably functioned as Pleistocene refugia for this and other endemic species (Phillips 1999).

**ELEVATION:** 7215 - 8,855 feet (2200 - 2700 m). Minnaert-Grote 2014.

**EXPOSURE:** All

**SUBSTRATE:** Sandy/loam with exposed limestone. Rocky limestone soils.

**PLANT COMMUNITY:** Subalpine Grassland Meadows

**POPULATION TRENDS:** There are 15 known collections on the North Kaibab, centered around Pleasant Valley, but extending from near Moquitch Point in the north, to The Basin, north of Phantom Canyon, in the south. Many of these occurrence records merely note that the plant was observed. However, a couple of sites note that the species was abundant or common, but in later years relatively few were found when revisited. Records from two sites where the species was found in 1986 note that it was not found again when revisited in 2006. No explanation was offered. One population was essentially lost when the main road was widened.

In 2006, John Spence reported the Kaibab Bladderpod appeared to be common only on the main part of Pleasant Valley, with smaller outlying populations. He considered the plant to be abundant at the type locality (with an estimated 60 plants per square meter). Many of the individuals were small and non-flowering, suggesting recent recruitment. Two other locations he sampled were estimated at 10-12 plants per square meter.

During a Plant Diversity meeting held by the AGFD HDMS program in 2012, John Spence stated there were 30-40 locations on the North Kaibab with the type location Pleasant Valley location containing about a million plants (projected from 594 plants counted along a transect). They occurred in about every open clearing.

Overall, the Kaibab Bladderpod seems to be common to even abundant within its rather restricted range. The fact that some of the populations were not found during revisits is concerning, and this condition merits further monitoring.

## SPECIES PROTECTION AND CONSERVATION

**ENDANGERED SPECIES ACT STATUS:** None (USDI, FWS 1996)
[Category 2 USDI, FWS 1985]

**STATE STATUS:** None
**OTHER STATUS:** Forest Service Sensitive (USDA, FS Region 3 1990, 1999, 2013)

**MANAGEMENT FACTORS:** Most of habitat in parks adjacent to Highway AZ 67. Plant occurs on shoulder of Highway AZ 67 in Pleasant Valley, and one population was essentially lost during road widening (see Additional Information below). Kaibab Bladderpod does not seem to compete well with grass. Given the extremely limited range on the North Kaibab Plateau, the plant might be vulnerable to catastrophic events and/or climate change.

**CONSERVATION MEASURES TAKEN:** Kaibab National Forest has prohibited all off-road traffic in meadows adjacent to Highway AZ 67. Forest Plan establishes that livestock utilization in these meadows shall not exceed 30% (however, utilization probably exceeded this level in most years). Current status of these conservation measures needs to be verified.

**SUGGESTED PROJECTS:** Periodic monitoring should be continued and re-visits to known populations made to determine if these populations are still extant. Given the existence out outlying populations found at Moquitch Point and The Basin, the exploration for new populations should continue. Surveys should be conducted in June when the plants are in flower.

**LAND MANAGEMENT/OWNERSHIP:** USFS - Kaibab National Forest, North Kaibab Ranger District and USNPS – Grand Canyon National Park.

## SOURCES OF FURTHER INFORMATION

**REFERENCES:**

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**MAJOR KNOWLEDGEABLE INDIVIDUALS:**

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**ADDITIONAL INFORMATION:**

Fletcher (1987) made the following recommendations for the re-alignment of Highway AZ 67. "Road expansion through Pleasant Valley should be done on the west side of AZ 67. Maintain existing crushed limestone shoulders. Do not seed road shoulders in Pleasant Valley except with forb seeds collected in Pleasant Valley. Do not seed with grass. Replace the shoulder on the west side of the road with chipped limestone. Do not locate road turnouts or recreational use attractants in Pleasant Valley. Unfortunately, few of these recommendations were followed. Fletcher also viewed "these meadows as Pleistocene refugia, which may help explain the large number of endemic species and ecotypes they contain."

**Revised:** 1991-12-02 (JGH)
1992-05-21 (BGP)
1992-09-14 (BKP)
2001-12-24 (SMS)
2018-12-12 (BDT)

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