

**ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM**

Plant Abstract

Element Code: PMAGA0B072

Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Yucca jaegeriana* (McKelvey) L. W. Lenz.

COMMON NAME: Joshua tree

SYNONYMS: *Yucca brevifolia* subsp. *jaegeriana* (McKelvey) Hochstätter, *Yucca brevifolia*

FAMILY: Agavaceae

AUTHOR, PLACE OF PUBLICATION: Lenz, 2007, *Aliso* 24: 99.

TYPE LOCALITY: California. San Bernardino Co., 30 April 1932, vicinity Shadow Mountains.

TYPE SPECIMEN: A: S. D. McKelvey 2732.

TAXONOMIC UNIQUENESS: Until recently, Joshua trees were considered one species, *Yucca brevifolia*, with some authorities recognizing two varieties (var. *brevifolia* and var. *jaegeriana*) (Hess and Robbins 2003). However, recent evaluation of genetics, morphological structure, and pollinator differences has concluded that *Y.b.* var. *jaegeriana* is distinct from *Y.b.* var. *brevifolia* and should be raised to specific rank (Lenz 2007, Royer et al. 2016). Smith et al. (2008) concluded that the species diverged at least 5 million years ago. Based upon this information, the U.S. Fish and Wildlife Service has decided these taxa constitute two distinct species. Hybridization between *Y. brevifolia* and *Y. jaegeriana* does occur at the zone of overlap in the Tikaboo Valley of Nevada (Starr et al. 2012, Royer et al. 2016). There are 9 genera in Agavaceae, and 28 species of *Yucca* in the United States.

DESCRIPTION: Evergreen, xerophytic, monocot tree-like agave, 9-20 feet (3-6 m) tall. Plants with stem or stemless, generally branching below 1 m, dichotomous branching until flowering, irregular afterwards, branches slender, many; leaves 10-20mm, green, rigid, with a thick cuticle; flowers narrowly campanulate, greenish-white, swollen at the base, petals recurved at the tips; fruit a capsule, ellipsoid, tapered at the tip, fleshy at first, becoming indehiscent and spongy. Relatively shallow, fibrous root system, becoming more extensive following germination. (Lenz 2001, Lenz 2007, USFWS 2018).

AIDS TO IDENTIFICATION: Shorter in height than *Y brevifolia* with shorter leaves and shorter height to first branching. Flowers of *Y. jaegeriana* are elongate, while flowers of *Y. brevifolia* are nearly spherical.

ILLUSTRATIONS:

Color photos (USFWS 2018)

TOTAL RANGE: In the Sonoran Desert, the historical range may have encompassed La Paz, Maricopa, Pinal, Yuma, and Pima counties in Arizona; Imperial and Riverside counties in California; mainland Mexico; and northern Baja California, Mexico (Figure 3). The Joshua tree's historical range contracted northward along the southern edge of its range as climates warmed at the start of the Holocene (Cole et al. 2011), but this contraction may have been offset by a northern range expansion (Smith et al. 2011). Extinction of the North American megafauna (potential primary dispersers of Joshua tree) occurring at the beginning of the Holocene Epoch, along with Holocene climate change, has been proposed as a mechanism to explain a southern range contraction for Joshua tree (Cole et al. 2011). It is difficult to determine when Joshua tree diverged into two distinct species but it was at least 5 million years ago (Smith et al. 2008).

The contemporary boundary of the Joshua tree range is similar to its Holocene (~8,000 years ago) boundary but much more contracted than the Pleistocene boundary (between 22,000 and 11,700 years ago; Cole et al. 2011). The current range of Joshua tree extends from northwestern Arizona to southwestern Utah west to southern Nevada and southeastern California.

Yucca jaegeriana also occurs almost exclusively in the Mojave Desert. A small portion of its northern range falls with the Great Basin Desert and a small portion of its eastern range falls within the Sonoran Desert in Arizona (FWS 2018).

RANGE WITHIN ARIZONA: Unevenly distributed in western Arizona. Occurs in Maricopa, Mohave, and Yavapai counties.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Arborescent. Dichotomous branching.

PHENOLOGY: Flowering occurs from late winter to spring; flowering does not occur every year. Flowering can take up to 30 years from the seedling stage (Esque et al. 2015). Once flowering occurs, the flowering branch stops growing and two or three branches develop from just below the inflorescence (Simpson 1975). This branching then occurs on the new branches after each successive flowering.

BIOLOGY: Joshua trees reproduce both sexually through seed production and asexually by rhizome growth, though rhizome growth is most often observed in *Y. brevifolia*. The obligate yucca moth *Tegeticula antithetica* pollinates *Y. jaegeriana* in a classic example of mutualism. Seed dispersal may be carried out by ungulates or rodents, especially antelope ground squirrels and kangaroo rats, which cache seeds in the soil, facilitating germination

(Lenz 2001). Seeds germinate and emerge between September and May, depending on conditions, and requiring nurse plants. Emergence is likely highest when soil moisture is high and soil temperature is warm (Reynolds et al. 2012). Germinability rates decline rapidly, and germination rates in field trials range from 3.2 percent to 14.8 percent, suggesting potentially low seedling recruitment rates (USFWS 2018). Seedlings are sensitive to herbivory and variation in precipitation and temperature. Adult Joshua trees (flowering, multi-branched individuals) can live over 100 years and have high year-to-year survival. Adults are more likely to survive periods of drought, wildfires, or herbivory than are juveniles or seedlings (Delfalco et al. 2010). Growth is slow, averaging 1.5 in (3.8 cm) per year, and generation time is estimated to be between 50 and 70 years (Gilliland et al. 2006, Esque et al. 2015).

HABITAT: Alluvial fans, plains and bajadas. Occupies a wide range of habitats. In Arizona, they are found in the Sonoran Basin and Range province (USFWS 2018).

ELEVATION: 600 - 2200 m (1,900-7,200 ft) (USFWS 2018).

EXPOSURE: Precipitation at *Y. jaegeriana* sites is distributed, for the most part, evenly throughout the year (Lenz 2007).

SUBSTRATE: Variable. Occurs on flats, mesas, bajadas, and gentle slopes. Found on a wide variety of soil types, but most commonly on old alluvia of igneous origin with silty, loamy, or sandy soils that retain moisture (Hunning and Peterson 1973).

PLANT COMMUNITY: They are components within a broad range of plant communities, ranging from Sonoran Desert and Mojave Desert communities to higher elevation (Yellow pine) communities. Associated species include: *Larrea tridentata*, *Yucca elata*, *Cylindropuntia acanthocarpa*, *Prosopis velutina*, *Yucca schidigera*, *Carnegiea gigantea*, *Fouquieria splendens*, and *Parkinsonia microphylla*.

POPULATION TRENDS: Unknown. Climate change has been implicated and successfully modeled as a threat to Joshua tree recruitment, establishment and overall survival, due to a variety of factors including increased average temperatures and a changing fire regime (Center for Biological Diversity 2019). This species has undergone a range-wide distribution contraction in the past 12,000 years; current modeling suggests that while suitable habitat is available for northward dispersal, the lack of dispersal mechanisms, rising temperatures and past and current dispersal rates may prevent this from occurring (Cole et al. 2011).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: Not warranted (USFWS 2019)
STATE STATUS: BLM Sensitive
Salvage Restricted (ARS, ANPL 1999)
[Salvage Restricted (ARS, ANPL 1993)]

OTHER STATUS: None

MANAGEMENT FACTORS: Threats to *Y. jaegeriana* include altered fire regimes and invasive annual grasses; climate trends such as increased temperatures, drought, and precipitation timing; habitat loss from development, grazing, OHV use;

PROTECTIVE MEASURES: Both species of Joshua tree were recently (CBD 2019) petitioned to be federally listed in California; FWS found that listing was not warranted (USFWS 2019). However, the western Joshua tree (*Yucca brevifolia*) was recently given temporary status under the California Endangered Species Act, while the California Game and Fish Committee reviews the petition.

SUGGESTED PROJECTS: Monitor current populations.

LAND MANAGEMENT/OWNERSHIP: BLM – Arizona Strip Field Office, Kingman Field Office, Lake Havasu Field Office; State – State Trust Land; NPS – Lake Mead National Recreation Area, Grand Canyon-Parashant National Monument; private.

SOURCES OF FURTHER INFORMATION

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MAJOR KNOWLEDGEABLE INDIVIDUALS:**ADDITIONAL INFORMATION:**

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