

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT
AND LISTING PRIORITY ASSIGNMENT FORM
Joshua Tree**

SCIENTIFIC NAME(S): *Yucca brevifolia* and *Yucca jaegeriana*

COMMON NAME: Joshua tree

LEAD REGION: Region 8

ASSIST REGIONS: Regions 2 and 6

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DATE INFORMATION CURRENT AS OF: January 23, 2023

STATUS/ACTION

Species petitioned for listing which we have determined is not a listable entity

Species petitioned for listing which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

Non-listed species for which we have not received a petition but for which we have undertaken a species status assessment on our own initiative and which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

Listed species petitioned for delisting which we have determined does not warrant delisting

Listed species petitioned for downlisting which we have determined does not warrant downlisting

Listed species petitioned for uplisting for which we have made a warranted-but-precluded finding for uplisting (this is part of the annual resubmitted-petition finding)

Listed species petitioned for uplisting which we have determined does not warrant uplisting

New candidate

Continuing candidate

Date when the species first became a candidate (as currently defined):

Listing priority number change

Former LPN:

New LPN:

Candidate removal: Former LPN:

Taxon does not meet the Act's definition of "endangered species" or "threatened species" because it is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

Taxon does not meet the Act's definition of "endangered species" or "threatened species" because it is not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

Taxon does not meet the Act's definition of "species."

Taxon mistakenly included in past notice of review.

Taxon believed to be extinct.

Petition Information:

Non-petitioned

Petitioned; Date petition received: September 29, 2015

90-day "substantial" finding FR publication date; citation: September 14, 2016;
(81 FR 63160) (Service 2016, entire)

12-month "not warranted" finding FR publication date; citation:
August 15, 2019; (84 FR 41694) (Service 2019, entire)

PREVIOUS FEDERAL ACTIONS:

On September 29, 2015, we received a petition from Taylor Jones (representing WildEarth Guardians), requesting that *Yucca brevifolia* – either as a full species (*Y. brevifolia*) or as two subspecies (*Y. b. brevifolia*, and *Y. b. jaegeriana*) – be listed as threatened and, if applicable, critical habitat be designated. On September 14, 2016, we published a 90-day finding in the *Federal Register* (81 FR 63160) concluding that the petition presented substantial information indicating that listing the Joshua tree may be warranted. On August 15, 2019, we published a 12-month finding (84 FR 41694) concluding that listing either *Y. brevifolia* or *Y. jaegeriana* was not warranted. On November 4, 2019, WildEarth Guardians filed a complaint in the Central District of California challenging the analyses and listing decisions. The court vacated and remanded the listing decisions back to the Service (*WildEarth Guardians v. Haaland*, 2021 WL 4263831 (C.D. Cal. September 20, 2021)), ordering us to reconsider whether

the two species of Joshua tree should be listed under the Act.

The Service has reassessed its August 2019 12-month finding and revised the species status assessment report (SSA). This document complies with the September 20, 2021, court-ordered remand of the August 2019 “not warranted” 12-month findings for the two species of Joshua tree (*Yucca brevifolia* and *Y. jaegeriana*) and constitutes our new 12-month findings on the September 29, 2015, petition to list the Joshua tree species under the Act.

ANIMAL/PLANT GROUP, ORDER AND FAMILY:

Group: Flowering plants, Order: Asparagales, Family: Asparagaceae

BIOLOGICAL INFORMATION:

To assess the Joshua trees’ viability, we conducted a species status assessment (SSA) using the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–311). Briefly, resiliency is the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy is the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation is the ability of the species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate conditions, pathogens). In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al. 2018, p. 306). Using these principles, we identified the species’ ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species’ viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species’ life-history needs. The next stage involved an assessment of the historical and current condition of the species’ demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species’ responses to positive and negative environmental and anthropogenic influences. Throughout these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time.

The SSA report for the Joshua Tree (*Yucca brevifolia* and *Yucca jaegeriana*) – January 2023, Version 2 (SSA report) is a summary of the information we have assembled and the following is a summary of the key results and conclusions based on the SSA report and data evaluated. The SSA report (Service 2023, entire) is incorporated herein by reference. Excerpts of the SSA report are provided in the sections below. For more detailed information, please refer to the full SSA report.

Species Description

Joshua trees are long-lived plants that occur in desert regions of the southwestern United States including portions of California, Arizona, Nevada, and Utah, well beyond the Joshua Tree National Park in California. Joshua trees are found throughout the Mojave, Great Basin, and Sonoran Deserts. Joshua trees have generally been addressed in the literature as a single species; however, recent references have identified at least two varieties or subspecies (*Yucca brevifolia* var. *brevifolia* and *Y. b.* var. *jaegeriana*). We consider the two entities to be two distinct species, the western Joshua tree (*Yucca brevifolia*) and eastern Joshua tree (*Y. jaegeriana*) based on expert analysis and we treat them as two separate, listable entities. For the purposes of this analysis, we discuss both species together using the common name—Joshua tree(s)—when the discussion of information pertains to both species. Literature or conclusions specific to a single species are indicated by the species' scientific name, where applicable. The SSA report has additional detailed descriptive information on Joshua trees (*Y. brevifolia* and *Y. jaegeriana*) (Service 2023, entire).

Yucca brevifolia

Yucca brevifolia is a 16–40 feet (ft) (5–12 meters (m)) tall, evergreen, tree-like monocot. The leaves are between 7.5 and 14.6 inches (in) (19–37 centimeters (cm)) long and are clustered in rosettes at the branch ends. Branching only occurs following flowering events where one or more lateral shoots develop from the base of the inflorescence (cluster of flowers) (McKelvey 1938, p. 130; Simpson 1975, p. 32). The flowers on the inflorescence are nearly spherical with short, wide petals that curve over the tip of the pistil and occur in dense, heavy panicles. *Tegeticula synthetica*, a species of yucca moth, pollinates the flowers; and the resulting seed pods require mechanical action (e.g., a rodent) to open and for the seeds to be dispersed. In addition to sexual reproduction, the species can also reproduce asexually through basal resprouts, particularly when under stress. *Yucca brevifolia* is long-lived (100 to several hundred years old), with a generation time of 50 to 70 years.

Yucca jaegeriana

Yucca jaegeriana is a shorter (9–20 ft; 3–6 m), evergreen, tree-like monocot. *Yucca jaegeriana* has shorter leaves (less than 8.7 in (22 cm)) and shorter height to first branching at 2.3–3.3 ft (0.75–1.0 m) than *Y. brevifolia*, which results in a denser canopy (see figure 3-1 in the SSA report; McKelvey 1938, p. 138; Service 2023, p. 9). The flower is elongate with narrow petals that wrap around the pistil forming a corolla tube. *Tegeticula antithetica*, a species of yucca moth, pollinates the flowers. The variation in floral morphology, specifically style length, between *Y. brevifolia* and *Y. jaegeriana* is strongly correlated with the physical characteristics of its obligate moth pollinator due to coevolution with *Tegeticula antithetica* having a shorter ovipositor than the *Y. brevifolia* pollinator, *T. synthetica* (see figure 3-1 in the SSA report; Godsoe et al. 2009, p. 820; Yoder et al. 2013, p. 11; Service 2023, p. 9). The resulting seed pods require mechanical action (e.g., a rodent) to open and for the seeds to be dispersed. In addition to sexual reproduction, the species can also reproduce asexually through basal resprouts,

particularly when under stress. *Yucca jaegeriana* is long-lived (100 to several hundred years old), with a generation time of 50 to 70 years.

Hybrids

Hybrids occur in a smaller geographic area compared to the rest of the range, toward Joshua trees' northern limit, where the distribution of both species overlap, and are not reliably identifiable from morphological characteristics alone (Smith 2022, pers. comm.). The hybrid zone was not included in our assessment of viability for *Yucca brevifolia* and *Y. jaegeriana*, although that zone confers additional resiliency, redundancy, and representation to both species.

Taxonomy

Yucca brevifolia var. *jaegeriana* was determined to be a distinct species based on morphological and pollinator differences (Lenz 2007, p. 100) and restriction-site-associated DNA (RAD)-sequencing (Royer et al. 2016, p. 1730). These analyses concluded that *Y. b.* var. *jaegeriana* should be raised to specific rank (Lenz 2007, p. 97) and that it is genetically distinct from *Y. b.* var. *brevifolia* (Royer et al. 2016, p. 1736). Additionally, *Y. brevifolia* diverged at least 5 million years ago, possibly due to geographic separation by the Bouse Embayment (a Pliocene Era chain of lakes) (Smith et al. 2008a, p. 2682). As described above, the two taxa, and their obligate moth pollinators, come into contact and plant hybridization occurs in the Tikaboo Valley, Nevada, (Starr et al. 2013, p. 4; Royer et al. 2016, p. 136).

Based on these analyses (Lenz 2007, entire; Smith et al. 2008b, entire; Royer et al. 2016, entire), and correspondence between the Service and editors of the Jepson Manual (Wallace 2017, p. 2), we consider *Yucca brevifolia* var. *brevifolia* and *Y. b.* var. *jaegeriana* to be two distinct species, and we treat them as two separate listable entities: *Y. brevifolia* and *Y. jaegeriana*, respectively. For additional information on Joshua tree taxonomy, see section 3.2 of the SSA report (Service 2023, p. 9).

Habitat/Life History

Joshua trees occur in desert regions of the southwestern United States and are located on alluvial fans, plains, and bajadas throughout the Mojave, Great Basin, and Sonoran Deserts. Joshua trees occur throughout a wide range of vegetation communities between approximately 1,279 and 8,775 ft (390 and 2,675 m) elevation. Joshua trees are often the tallest plant on the landscape where they occur but are not typically dominant in terms of vegetation cover. Joshua trees are a slow growing, desert plant. Because they do not have growth rings, accurately determining the age of Joshua trees is difficult. The height of a Joshua tree divided by an estimate of growth per year is used to estimate age. Joshua trees can live for several hundred years, though a more common lifespan is about 150 years, and have a generation time of 50 to 70 years. They can reproduce via several mechanisms, have unique habitat and ecological needs, and can disperse through environmental and biological means. Joshua trees' life cycle includes