JENNIFER R. SCHWARTZ (OR Bar No. 072978), *applicant for pro hac vice*
Email: jschwartz@wildearthguardians.org
WildEarth Guardians
P.O. Box 13086
Portland, OR 97213
Telephone: (503) 780-8281

LINDSAY K. LARRIS (CA Bar No. 254270)
llarris@wildearthguardians.org
WildEarth Guardians
2590 Walnut Street
Denver, CO 80212
Telephone: (310) 923-1465

Counsel for Plaintiff

VANESSA SHAKIB (CA Bar No. 287339)
Vanessa@vanessashakib.com
Shakib Law, PC
500 N. Brande Blvd. Ste. 2000
Glendale, CA 91203
Telephone: (818) 516-9532

Local Counsel for Plaintiff

IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA

WILDEARTH GUARDIANS, Plaintiff, vs. DAVID BERNHARDT, in his official capacity as U.S. Secretary of the Interior, and UNITED STATES FISH AND WILDLIFE SERVICE, Defendants.	Case No.: 2:19-cv-9473 **COMPLAINT FOR DECLARATORY AND INJUNCTIVE RELIEF** (Endangered Species Act, 16 U.S.C. § 1531 *et seq.*)

I. INTRODUCTION

1. This case challenges the United States Fish and Wildlife Service's ("Service") decision on August 15, 2019 not to list the Joshua tree as a threatened species under the Endangered Species Act ("ESA"). *See* 84 Fed. Reg. 41,694, at 41,697 (Aug. 15, 2019) ("12-Month Finding").

2. Joshua trees (*Yucca brevifolia* and *Yucca jaegeriana*) are long-lived, succulent plants endemic to the Mojave Desert. This distinctive plant derived its name from Mormon travelers who, upon seeing the limbs of the succulent branching upwards to heaven, named it after the biblical prophet Joshua, who raised his arms in prayer for guidance to the Promised Land.

3. The Joshua tree is an icon of the Southern California desert, with its namesake, Joshua Tree National Park, currently hosting millions of annual visitors. Since the area was elevated from a National Monument to a National Park in 1994, annual visitation has steadily risen, with more than 2.9 million visitors in 2018 alone. Tourists travel from across the world to hike, camp, and climb against the backdrop of these magnificent plants. Joshua trees have a beloved place in pop culture history as well, ranging from their feature on the cover of artist U2's album of the same name to serving as reliable extras in multiple films, television shows, and music videos over the past 50 years.

//

///

////

/////

//////

///////

////////

/////////

Figure 1. Joshua tree as featured on U2's 1987 album cover.[1]

4. Joshua trees' storied history dates back to the Pleistocene era, about 2.5 million years ago, when the trees existed alongside creatures such as the giant sloth and wooly mammoth. Despite the species' incredible longevity, climate change, along with other often related and synergistic threats (*i.e.* prolonged droughts, increasing fire, and habitat loss), are poised to eradicate Joshua trees from much of their current range by century's end. A recent scientific study indicated that, at the current rate of climate acceleration, only .02% of Joshua tree range will be left in Joshua Tree National Park by 2070 (Sweet *et al*., 2019).[2]

[1] Photograph by Joho345 - @U2, distributed under a Creative Commons Attribution 2.5 Generic license. No changes were made.

[2] Sweet, L.C., T. Green, J.G.C. Heintz, N. Frakes, N. Graver, J.S. Rangitsch, J.E. Rodgers, S. Heacox, and C.W. Barrows. 2019. Congruence between future distribution models and empirical data for an iconic species at Joshua Tree National Park. Ecosphere 10(6):e02763/ecs2.2763.

5. In light of these threats to the continued survival of the Joshua tree, on September 28, 2015, Guardians filed a petition under the ESA requesting that the Service list the Joshua tree as a threatened species.

6. On September 14, 2016, the Service issued a positive 90-day finding on Guardians' petition. 81 Fed. Reg. 63,160-63, 165 (Sept. 14, 2016). The Service concluded that Guardians' petition presented substantial scientific and commercial information indicating that listing the Joshua tree as a threatened species may be warranted. *Id.*

7. After a nearly two-year delay, the Service ultimately determined that the Joshua tree does not warrant listing as a threatened species under the ESA. 84 Fed. Reg. 41,694, at 41,697 (Aug. 15, 2019). In making this determination, the Service disregarded climate models showing the range of suitable habitat for the Joshua tree has contracted since the early 1900s due to increasing summer temperatures. The Service further summarily dismissed distribution models cited in Guardians' petition showing that up to 90 percent of Joshua tree habitat will likely become unsuitable for the trees by the end of this century without rapid action to address climate change.

8. Because the Service's "not warranted" listing decision is arbitrary, capricious, contrary to the best scientific and commercial data available, and otherwise not in accordance with the ESA, this Court should vacate that decision and remand it to the agency for a new decision that is consistent with governing law.[3]

II. JURISDICTION AND VENUE

9. This action is brought pursuant to the Endangered Species Act, 16

---

[3] In making its listing decision, the Service must rely upon the regulations set forth under the ESA at the time the petition was submitted and in effect at the time the final determination was made, not on the recently revised regulations that the Service promulgated on August 27, 2019 (84 Fed. Reg. 44,753, 44,976, & 45,020).

U.S.C. § 1540(g)(1)(C), which waives the Defendants' sovereign immunity. This Court has jurisdiction over this action by virtue of 28 U.S.C. § 1331 (federal question jurisdiction), 28 U.S.C. § 2201 (declaratory judgment), 16 U.S.C. § 1540(c) (actions arising under the ESA), and 16 U.S.C. § 1540(g) (citizen suit provision of the ESA).

10. This Court has the authority to review the Service's action(s) complained of herein and grant the relief requested, under the ESA's citizen suit provision, 16 U.S.C. § 1540(g), and the APA, 5 U.S.C. § 706 and may issue a declaratory judgment and further relief pursuant to 28 U.S.C. §§ 2201-02.

11. Venue is proper in this Court under 16 U.S.C. § 1540(g)(3)(A) and 28 U.S.C. § 1391(e).

12. All requirements for judicial review required by the ESA are satisfied. Guardians mailed a sixty-day notice of intent to sue letter to the Service on August 28, 2019, which was received Sept. 3, 2019. This letter notified the Service of Plaintiff's intent to file a civil action to rectify the legal violations described in the letter. More than sixty days have elapsed since the Service received Guardian's notice of intent to sue letter for violating the ESA.

III. PARTIES

13. Plaintiff, WILDEARTH GUARDIANS ("Guardians") is a non-profit, 501(c)(3) conservation organization based in Santa Fe, New Mexico. Guardians' mission is to protect and restore the wildlife, wild places, wild rivers, and health of the American West. It has approximately 231,000 members and supporters nationwide with a substantial number of members in Joshua tree habitat in the Southwestern United States. Guardians has an active endangered species protection campaign, with a geographic focus on flora and fauna endemic to the western United States. As part of this campaign, Guardians has repeatedly urged the Secretary to list imperiled species, including the Joshua tree, as threatened or endangered species pursuant to the ESA. Guardians filed its petition to list the

Joshua tree in September 2015. Guardians invested substantial organizational resources in preparing this petition and in submitting timely comments to the Service in response to the agency's September 2016 positive 90-day finding for the Joshua tree.

14. Guardians brings this action on behalf of itself and its adversely affected members. Guardians and its members derive scientific, aesthetic, recreational, and spiritual benefit from endangered and threatened species and their habitats. Guardians and its members frequently use and enjoy, and will continue to use and enjoy, the Joshua tree and its habitat for wildlife viewing and for recreational, aesthetic, and scientific activities. Guardians and its members are particularly concerned with the conservation of the Joshua tree and the ecosystems on which it depends for its survival. Guardians and its members have observed and photographed Joshua trees, made multiple visits to Joshua Tree National Park, and have ongoing interests in the Joshua tree and its habitat. Guardians and its members have future plans to visit and observe the Joshua tree and, in particular, to return to Joshua Tree National Park. Guardians' and its members' interests in observing, studying, and otherwise enjoying the Joshua tree is being, and, unless the relief requested in this complaint is granted, will continue to be irreparably harmed by defendants' arbitrary and capricious refusal to protect the Joshua tree under the ESA.

15. The legal violations alleged in this complaint cause direct injury to the aesthetic, conservation, recreational, inspirational, educational, and botanical preservation interests of Guardians and its members. These are actual, concrete injuries to Plaintiff, caused by Defendants' failure to comply with the ESA and its implementing regulations and policies. These injuries would be redressed by the relief requested in this complaint. Guardians has no other adequate remedy at law.

16. Defendant DAVID BERNHARDT is the Secretary of the U.S. Department of the Interior, and has the ultimate responsibility for implementation of the ESA. He is sued in his official capacity.

17. Defendant U.S. FISH AND WILDLIFE SERVICE is an agency of the federal government located within the U.S. Department of the Interior. The Secretary of the Interior has charged the Service with implementing and enforcing the ESA. 50 C.F.R. § 402.01(b). The Service is responsible for administering the ESA with respect to the Joshua tree, including species listing determinations under ESA Section 4.

IV. LEGAL BACKGROUND

18. Congress enacted the Endangered Species Act in 1973 to provide "a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved" and "a program for the conservation of such endangered species and threatened species." 16 U.S.C. § 1531(b). The statute contains an array of provisions designed to afford imperiled species "the highest of priorities," so that they can recover to the point where federal protection is no longer needed. *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 174 (1978). To benefit from these provisions, however, the Secretary of Interior, acting through the Service, must first list the species as either "threatened" or "endangered" pursuant to Section 4 of the ESA, 16 U.S.C. § 1533.

19. An "endangered species" is "any species which is in danger of extinction throughout all or a significant portion of its range ...." 16 U.S.C. § 1532(6). A "threatened species" is a species "which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1532(20).

20. In making decisions to list a species, the ESA requires the Secretary to determine whether the species is an endangered species or a threatened species because of any one or a combination of the following factors:

a. the present or threatened destruction, modification, or curtailment of its habitat or range;

b. overutilization for commercial, recreational, scientific, or educational purposes;

c. disease or predation;

d. the inadequacy of existing regulatory mechanisms; or

e. other natural or manmade factors affecting its continued existence.

16 U.S.C. § 1533(a)(1); 50 C.F.R. § 424.11(c).

21. The ESA provides for a species to be listed at the Secretary of the Interior's own initiative, or the public may submit a petition to the Secretary of the Interior to list a species which requires the Secretary to respond. 16 U.S.C. § 1533(b)(3). If the Service finds that a petition presents substantial scientific or commercial information indicating that a listing "may be warranted," the Service must commence a 12-month review of the petition and other relevant information. *Id*. A "may be warranted" determination must be published in the Federal Register and the Service must conduct a "status review" and solicit public comments for consideration in its final decision. *Id*. At the close of the 12-month status review period, the Service must determine whether the petitioned action is: (i) not warranted, (ii) warranted, or (iii) warranted but precluded by higher listing priorities. *Id*.

22. The Service must base its listing determinations "solely on the basis of the best scientific and commercial data available to [the agency] after conducting a review of the status of the species." *Id*. § 1533(b)(1)(A).

23. The Ninth Circuit Court of Appeals has held that "[t]he ESA's requirement that agencies use the best scientific and commercial data available means that agencies must support their conclusions with accurate and reliable data." *League of Wilderness Defenders/Blue Mt. Biodiversity Proj. v. Connaughton*, 752 F.3d 755, 763-64 (9th Cir. 2014). "[T]he Service may not

ignore evidence simply because it falls short of absolute scientific certainty." *Nw. Ecosystem All. v. U.S. Fish & Wildlife Serv.*, 475 F.3d 1136, 1147 (9th Cir. 2007). "Even if the available scientific and commercial data were quite inconclusive, [the Service] may—indeed must—still rely on it." *Sw. Ctr. for Biological Diversity v. Babbitt*, 215 F.3d 58, 60 (D.C. Cir. 2000). An agency's failure to draw rational conclusions from the evidence before it also constitutes arbitrary and capricious action. *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983); *see also Greater Yellowstone Coal., Inc. v. Servheen*, 665 F.3d 1015, 1030 (9th Cir. 2011) (affirming district court order setting aside the Service's decision to delist Yellowstone grizzly bears because "[t]he Rule did not articulate a rational connection between the data before it and its conclusion").

24. Listing a species as either threatened or endangered triggers the substantive and procedural requirements of other parts of the ESA. *See* 16 U.S.C. § 1536 (consultation and substantive conservation requirement imposed on federal agencies); *id.* § 1538 (prohibition on take by public and private entities).

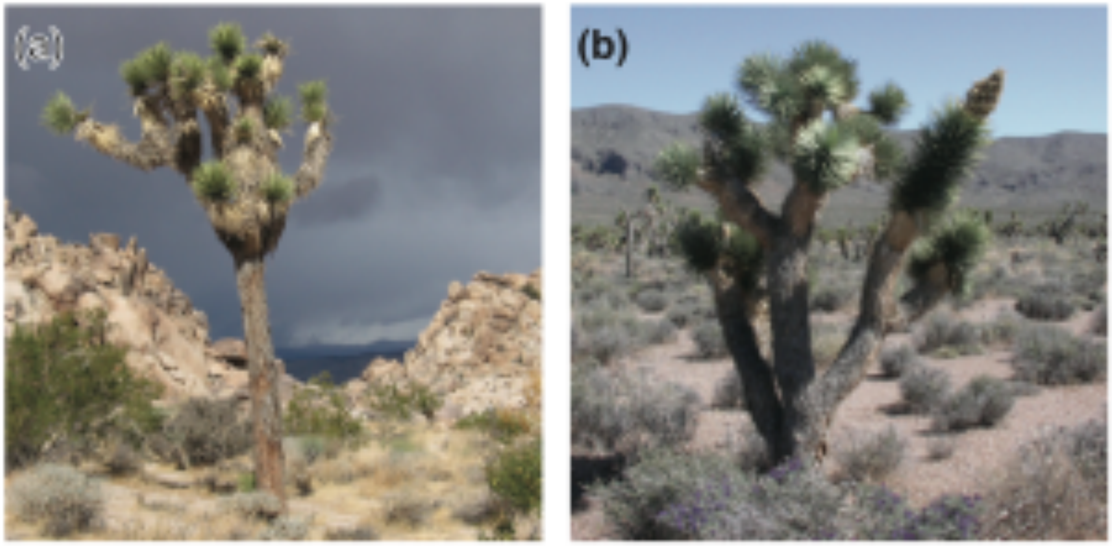
V. FACTS

The Joshua Tree

25. Joshua trees, with dagger-like leaves and sprawling zig-zagging branches, are long-lived, flowering evergreen trees that occur almost exclusively in the Mojave Desert with portions of a few populations extending into the Great Basin Desert to the north and the Sonoran Desert to the east.

26. The Joshua tree has long been considered a single species with two subspecies or varieties; the Service recently determined that *Yucca brevifolia* and *Yucca jaegeriana* are two distinct species, and accordingly treated them as two

separate listable entities. *See* 84 Fed. Reg. at 41,696.[4] The two species are geographically separated, genetically and morphologically distinguishable, and have different obligate pollinators.



[4] Guardians petitioned to list *Yucca brevifolia,* the full species, and requested that the Service also consider listing both *Y. b. brevifolia* and *Y. b. jaegeriana* separately, as either two subspecies or as distinct full species.

Figure 2. *Yucca brevifolia* (a), *Yucca jaegeriana* (b) (Godsoe *et al*., 2009), and the two species growing in sympatry in Tikaboo Valley, Nevada (bottom, *Y. brevifolia* on the left and *Y. jaegeriana* on the right. Image is reversed from its original orientation for consistency of presentation) (Starr *et al*., 2013).

27. The western Joshua tree (*Yucca brevifolia*), the larger of the two, can grow up to 70 feet tall, although trees over 40 feet are rare. Trunks are fibrous and the one- to two-inch-thick bark is soft and corklike. The lowest branches are usually six to ten feet above the ground with leaves 8 to 14 inches long.

28. The two species are distinguished not only by physical characteristics, but also by range. The western Joshua tree (*Yucca brevifolia*) occupies "plains and gravelly alluvial fans in the Mojavean Desert and just above it at 2,000 to 5,000 feet elevation [in] California from the Haiwee Reservoir south of Owens lake southward through the mountains along and in the Mojave Desert (but occasionally on the flats) to the Iron and Eagle mountains, Riverside County, and eastward to the Grapevine Mountains near Death Valley; Nevada from Goldfield, Esmerelda County, to Lincoln and Clark counties; southwestern Utah; Arizona south of the Colorado River in Mohave County and southeastward to southwestern Yavapai County" (Benson & Darrow, 1981) (green areas on map below).

29. The smaller, eastern Joshua tree (*Yucca jaegeriana*) occurs "on the hills and alluvial fans of the upper part of the Mojavean Desert at 2,500 to 4,500 feet elevation… [in] California east of Baker, to the Shadow, Kingston, Clark, and New York mountains in San Bernardino County; Nevada in Clark County; Arizona in northwesternmost Mohave County; southwesternmost Utah (Beaverdam Mountains)" (Benson & Darrow, 1981) (yellow areas on map below).

30. There are currently six regional populations of Joshua trees distributed across these expansive areas (U.S. Fish & Wildlife Service 2018). Two are of *Y. brevifolia* and three of *Y. jaegeriana*, with a sixth small hybrid population in Tikaboo Valley, Nevada. *Id*.

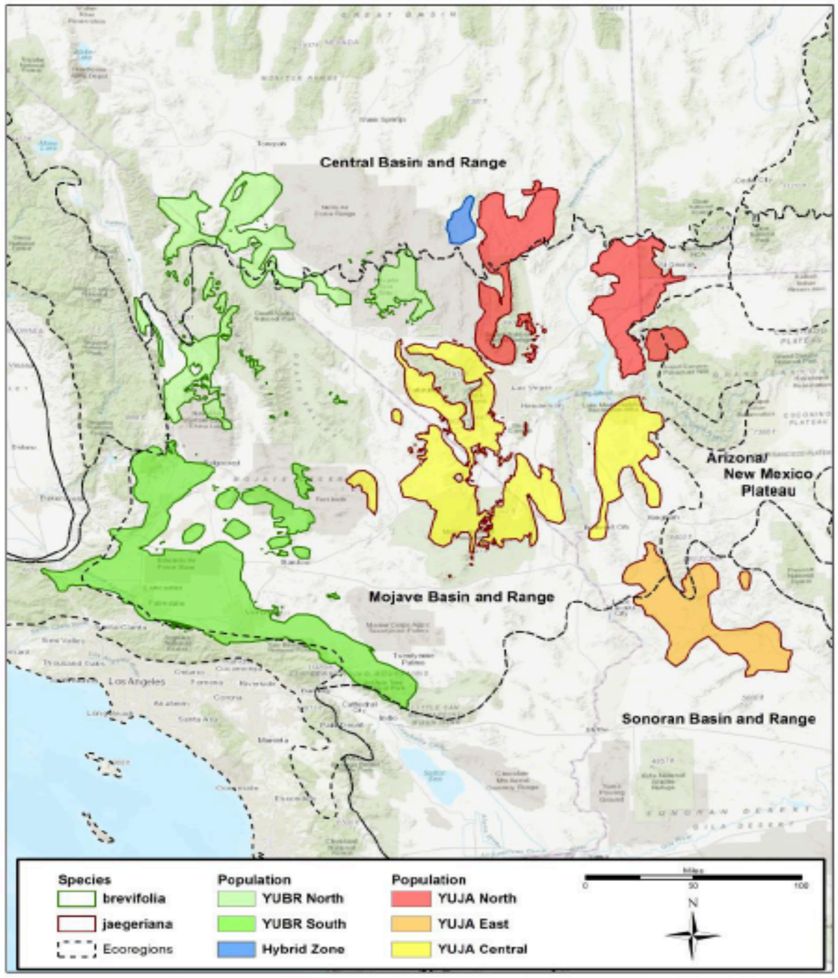


Figure 3. Joshua Tree Current Distribution. (Created by Tony Mckinney, U.S. Fish & Wildlife Service, Carlsbad Office).

31. Data on Joshua tree recruitment, survival, and abundance trends across the range of each species are lacking, but population dynamics are characterized by infrequent germination, slow growth, and long lifespans (~200 years). Joshua trees also take a long time to reach sexual maturity (up to 30 years).

32. Joshua trees reproduce sexually through pollination and seed production and sometimes asexually by rhizome growth. Joshua trees are fleshy-fruited species; fruits are borne in tight clusters at the ends of branches with mature fruits containing 30 to 50 seeds.

33. Joshua trees, similar to almost all yuccas, have an obligate pollination mutualism with yucca moths (Lepidoptera, Prodoxidae). Female moths carry pollen to Joshua tree flowers in specialized mouthparts, inject eggs into the floral ovaries using a bladelike ovipositor, and then actively apply pollen to the stigmatic surface to fertilize the flower. As a Joshua tree flower develops into a fruit, the moth eggs hatch and the emerging larvae eat a portion of the developing seeds. The moths are the sole pollinators of Joshua trees, and in turn, the Joshua tree seeds are the only food source for the moths (Pellmyr & Segraves 2003; Yoder *et al*. 2013). The conflict between the plant's interests (minimizing the number of seeds lost to feeding by the moth's larvae) and the moth's interests (producing as many larvae as possible) sets up a coevolutionary tug-of-war between plant and pollinator that has shaped the evolutionary history of each (Smith *et al*., 2009). The flowers of both *Yucca brevifolia* and *Yucca jaegeriana* are pollinated by each species' own distinct obligate moth pollinator.

34. Just as a portion of a Joshua tree's seed production goes to its pollinator, a large percentage of its seed production goes to its primary dispersers, various scatter-hoarding rodents, which are known to climb Joshua trees to remove the fruits for later consumption and/or to eat through the desiccated fruits in situ to reach the seeds (Lenz 2001). Once fruits are on the ground, numerous other species will dismantle the fruits and eat and/or cache the seeds.

35. Seeds cached by rodents are more likely to germinate than seeds left at the soil surface. However, the germination rate of cached seeds is still very low. One study showed only three out of 836 seeds found in caches remained there until they germinated in the spring and established seedlings (Vander Wall *et al*., 2006) (this may be a lower rate than usual as the cited study took place during a period of drought). Overall, seed dispersal of Joshua trees is generally considered quite limited, likely constraining the ability of the species to extend its range in response to changing conditions (Lenz 2001; Cole *et al*. 2011).

36. Other studies have shown that seedlings are also more likely to emerge under shrub cover, demonstrating the importance of "nurse plants" that can provide favorable microclimates for successful Joshua tree germination and protection from herbivory (Waitman *et al.*, 2012), (Bittingham & Walker, 2000), (Reynolds *et al*. 2012).

37. Once a seedling emerges, it faces a long, arduous path to adulthood, with high mortality rates until it exceeds 25 cm in height (approximately 10 inches) (Esque *et al*. 2015). Survival of seedlings requires periods of cool temperatures, little to no herbivory, summer rain, and some amount of yearly precipitation over a period of several years (U.S. Fish & Wildlife Service 2018).

38. Thus, despite being hardy desert plants, Joshua trees only thrive within a narrow range of environmental conditions. Although they can survive high temperatures, drought decreases survivorship and recruitment. Extreme cold events limit the distribution of Joshua trees, although they need a period of cold (minimum winter temperature of approximately 4° C (39° F)) to maximize growth, which may explain Joshua trees' restriction to higher, cooler sites at the Mojave Desert periphery.

39. Reynolds *et al*. (2012)[5] described the climate conditions supporting emergence and postulated that "there are fewer opportunities of emergence in the far western Mojave Desert, and under the current climate regime *Y. brevifolia* in that area may be most vulnerable to demographic change resulting from low and infrequent recruitment and may already have occurred." Subsequent studies (*e.g.*

---

[5] Reynolds, M. B. J., DeFalco, L. A., & Esque, T. C. (2012). Short seed longevity, variable germination conditions and infrequent establishment events provide a narrow window for *Yucca brevifolia* (Agavaceae) recruitment. American Journal of Botany 99(10), 1647-1654.

Sweet *et al*. 2019) have demonstrated that this demographic change due to low recruitment is already underway.[6]

40. Successful recruitment of Joshua trees thus requires a rare convergence of events including: fertilization by their unique pollinators; seed dispersal and caching by rodents; seedling emergence from a transient seed bank triggered by isolated late-summer rainfall; nurse plants; and an appropriate temperature range. Alignment of these convergent events likely results in the successful establishment of new seedlings only a few times in a century (Esque *et al*. 2015).[7]

Threats to the Joshua Tree's Continued Persistence

41. The delicate balance allowing Joshua trees to survive is being disrupted by several human-caused threats, chief among them climate change. Though there are no population number or trend estimates available for the Joshua tree, recent climate change modeling shows that suitable habitat for successful recruitment has likely already contracted since the early 1900s due to the +1° C (+1.8° F) change in mean high July temperatures since that time (Barrows & Murphy-Mariscal, 2012).[8]

---

[6] Though Sweet *et al*. (2019) had not been published before the Service issued its July 2018 Species Status Assessment for the Joshua tree, this critically important study was available before the Service issued the final listing decision challenged herein, and Guardians even sent the Service a letter with an attached copy of the study to ensure it was considered in the agency's final decision making.

[7] Esque, T. C., Medica, P. A., Shrylock, D. F., DeFalco, L. A., Webb, R. H., & Hunter, R. B. (2015). Direct and indirect effects of environmental variability on growth and survivorship of pre-reproductive Joshua trees, *Yucca brevifolia* Engelm. (Agavaceae). American Journal of Botany, 102(1), 85-91.

[8] Barrows, C. W., & Murphy-Mariscal, M. L. (2012). Modeling impacts of climate change on Joshua trees at their southern boundary: How scale impacts predictions. Biological Conservation, 152, 29-36.

42. Shifts and contractions in the Joshua tree's range resulting from climate change is the most serious threat to this species in the foreseeable future. According to multiple climate models, it appears that the zones of appropriate climate will shift drastically by the end of the 21st century, likely much faster than the Joshua trees can expand or shift their range. For example, Shafer *et al*. (2001)[9] examined potential changes in tree distribution using three potential models. "Under each of the future climate scenarios, [Joshua trees'] simulated potential range is fragmented and displaced northward and eastward." In a model of the potential impacts of doubled CO^2 concentrations on Joshua tree distribution, total area occupied decreased by 25%, the species persisted in only 24% of currently occupied cells, and "entire isolated populations were lost in the southeastern portion of the study area" (Dole *et al*., 2003).[10] Under the most severe climate scenario, there was a 90% or greater reduction in Joshua tree distribution by 2070 to 2099 in significant portions of the species range (Cole *et al*., 2011);[11] (Barrows & Murphy-Mariscal, 2012); (Sweet *et al*. 2019).

43. Joshua trees are particularly susceptible to climate change and prone to extinction because of their limited dispersal capabilities and dependence on obligate pollinators. As Lenz (2001)[12] explains:

---

[9] Shafer, S. L., Bartlein, P. J., & Thompson, R. S. (2001). Potential changes in the distributions of western North America tree and shrub taxa under future climate scenarios. Ecosystems, 4, 200-215.

[10] Dole, K., Loik, M., & Sloan, L. (2003). The relative importance of climate change and the physiological effects of CO2 on freezing tolerance for the future distribution of *Yucca brevifolia*. Global and Planetary Change, 36(137-146).

[11] Cole, K. L., Ironside, K., Eischeid, J., Garfin, G., Duffy, P. B., & Toney, C. (2011). Past and ongoing shifts in Joshua tree distribution support future modeled range contraction. Ecological Applications, 21(1), 137-149.

[12] Lenz, L. W. (2001). Seed dispersal in *Yucca brevifolia* (Agavaceae)—present and past, with consideration of the future of the species. Aliso: A Journal of Systematic and Evolutionary Botany, 20(2), 61-74.

> "During major and sudden climactic shifts, *Y. brevifolia* would be unable to 'jump' to distant sites where conditions might be more favorable… Even if the species were able to make sizeable geographical leaps, it would be constrained by the over-ruling fact that in a single generation it could move only the distance a pollinating moth can fly [380 feet]. The reasoning being that although successfully colonizing a new area and reproducing asexually, the plants without aid of the pollinating moth would be unable to reproduce sexually and therefore unable to permanently hold new territory…"

44. More recently, in determining potential natural expansion areas, Cole *et al*. (2011) looked at rates of migration discernable from paleontological data as well as from modern studies of seed dispersal by rodents. Such data reveals minimal actual northward range shift over the Holocene, corresponding to a migration rate of 2 meters a year. Similar migration rates could be calculated based on studies of rodent seed caching activity and Joshua tree generation time. Cole *et al*. (2011) postulated that their results "suggest that the species' migrational capacities have been ineffective following the extinction of Pleistocene megaherbivores that may have acted as seed vectors, especially the Shasta ground sloth."

45. Thus, the Joshua tree's ability to colonize new habitat at higher elevations or latitudes is extremely limited and no such range expansion is yet occurring, even as the lower elevation and southern edge of its range is contracting. Moreover, there are few safe refuges, as even the higher-elevation areas in which Joshua trees are projected to best be able to survive increasing temperatures and drier conditions are at great risk of more frequent and severe fire due to the prevalence of invasive non-native grasses. For example, over a third of the areas identified as refugia by Barrows and Murphy-Mariscal (2012) burned between 1967 and 2012, and half the refugia identified under a moderate warming scenario by Sweet *et al*. (2019) burned as of 2018.

46. Historically, wildfires in the Mojave Desert were small (*e.g.* lightning strike fires were typically confined to less than ten meters from the strike) and exceptionally rare (*e.g.* fire return intervals greater than 300 and 500 years). Recent studies, however, show that fire has significantly increased in both frequency and severity over the past few decades due to changing climatic conditions and prolific, highly flammable invasive annual grasses that provide increased fuel loads and more continuity to carry fire across open spaces between shrubs, affecting vast acreages. (U.S. Fish & Wildlife Service 2018).

47. Joshua trees, and their surrounding native scrub vegetation communities in the Mojave Desert, having not generally evolved with such fire, are not adapted to withstand its effects. *Id*. These studies show recent higher-intensity fires have resulted in significant, widespread mortality of Joshua trees. For instance, DeFalco *et al*. (2010),[13] in a study in Joshua Tree National Park, found that five years after a fire, 80% of burned Joshua trees in the study area had died, with smaller trees (<1 m tall) dying more rapidly. But perhaps more surprising, DeFalco *et al*. (2010) found that unburned trees also had high mortality rates during the same study period (1999-2004), with 26% of unburned trees also dying.

48. The high mortality recorded in this study is consistent with high mortality documented in other studies (U.S. Fish & Wildlife Service 2018). For example, Tagestad *et al*. (2016)[14] similarly observed that between "1976 and 2010 there were 227 fires in the Mojave Desert greater than 405 ha (1000 acres). These fires burned a total of 758,477 ha (1,874,230 acres) with most of the burned area

---

[13] DeFalco, L. A., Esque, T. C., Scoles-Sciulla, S. J., & Rodgers, J. (2010). Desert wildfire and severe drought diminish survivorship of the long-lived Joshua tree (*Yucca brevifolia*; Agavaceae). American Journal of Botany 97(2), 243-250.

[14] Tagestad J., M. Brooks, V. Cullinan, J. Downs, and R. Mckinley. 2016. Precipitation Regime Classification for the Mojave Desert: Implications for fire occurrence. Journal of Arid Environments 124:388–397.

occurring in the middle elevation zones receiving sufficient precipitation for growth of fuels." Notably, blackbrush, a critical nurse plant for Joshua tree seedlings, experienced exceptional rates of burning, as "areas identified as historical blackbrush communities have experienced more multiple fires than all the other communities combined." *Id.* Other indirect effects to Joshua trees from fire might include degraded seed bank, loss of aboveground vegetation that could serve as nurse plants to seedlings, and alteration in seed-caching rodent dynamics within Joshua tree stands (U.S. Fish & Wildlife Service 2018).

49. A series of small-scale studies in Joshua Tree National Park also shows the species' abundance is already likely declining from fire, drought and other climatic changes (Cornett (2014)).[15]

50. Regardless of whether Joshua tree abundance is already declining, it is virtually certain that abundance will decline in the foreseeable future. The southwestern United States is a climate change "hotspot," and the Joshua tree range may be close to the epicenter. With prolonged droughts projected to occur with greater frequency and intensity over the coming decades, future recruitment across ever-greater areas of the species' range will likely be precluded. Whether or not the species' pollinating moths will be able to keep pace with a changing climate is also questionable.

51. In addition to climate change and fire, the Joshua tree is threatened by habitat loss and degradation from other human activities. As noted, scientific evidence suggests that even in the portion of the species' range where management is most protective—Joshua Tree National Park—the impacts of climate change may be most severe. Other areas of federal land that are home to the species are

[15] Cornett, J. W. (2014). Population dynamics of the Joshua tree (Yucca brevifolia): Twenty-three-year analysis, Lost Horse Valley, Joshua Tree National Park. In R. E. Reynolds (Ed.), Not a Drop Left to Drink (pp. 71-73): California State University Desert Studies Center, 2014 Desert Symposium.

subject to poorly-regulated activities including off-road vehicle use, cattle grazing, power and pipeline rights-of-way and large-scale energy projects that consume or degrade habitat. And while much of the western Joshua tree's range is on federal public lands, over half the area encompassing the species' southern regional population is private land, with little protection from development. Under current growth projections, most of this unprotected habitat will either be lost or fragmented to the point where it reduces future genetic exchange and connectivity. Human-caused wildfires are also likely to affect more of the species' range as development continues to grow further into wildland areas (U.S. Fish & Wildlife Service 2018).

52. Absent rapid and substantial reductions in greenhouse gas ("GHG") emissions and protection of habitat, the Joshua tree will likely be extirpated from large portions of its range by the end of the century.

Petition History

53. On September 28, 2015, Guardians filed a petition requesting the Secretary list the Joshua tree (*Yucca brevifolia*) as "threatened" under the ESA. The Secretary and the Service received the petition on September 29, 2015. 81 Fed. Reg. 63,162 (Sept. 29, 2015).

54. On September 14, 2016, the Secretary issued a positive 90-day finding on Guardians' petition. 81 Fed. Reg. 63,160-165 (Sept. 14, 2016). The Secretary concluded that the petition presented substantial scientific and commercial information that Guardians' request to list the Joshua tree as a threatened species may be warranted based on Factors A and E under the ESA. *Id.*

55. Because Defendants rendered a positive 90-day finding, the Service was then obligated to proceed to the second step in the ESA listing process, completing a 12-month finding.

56. Defendants are required to complete a 12-month finding within 12-months of the receipt of a petition. 16 U.S.C. § 1533(b)(3)(B). Failing to meet this

mandatory deadline for the Joshua tree, the Service instead issued the 12-month finding challenged herein nearly three years later in August 2019.

The Service's 2019 Not Warranted Finding

57. In July, 2018 the Service published a Species Status Assessment that it said "provides an analysis of the overall species viability for the two species of Joshua tree." The 2018 assessment does not evaluate and apply section 4(a)(1) of the ESA's five threat factors (Factors A-E), 16 U.S.C. § 1533(a)(1).

58. In the assessment, the Service treats *Y. brevifolia* as comprised of two geographically separate populations: "YUBR South" and "YUBR North." (U.S. Fish & Wildlife Service 2018). The geographic area in which YUBR South is situated is comprised of 3.7 million acres, with just over 50% in private ownership, 48% federally owned, and just under 2% state, county and local owned. The Service estimates that 3,255,088 acres of this area is suitable for Joshua trees based on soils and other habitat factors. *Id.*

59. In contrast to the area of YUBR South, which is majority private land, the area of YUBR North is overwhelmingly (96%) federal land. The Service estimates that almost all of this area (1,941,701 acres) is currently suitable for Joshua trees. *Id.*

60. The Service treats *Yucca jaegeriana* as comprised of three regional populations: YUJA Central, YUJA North and YUJA East (U.S. Fish & Wildlife Service 2018). The Service estimated that nearly the entire range of these three populations, spanning a combined total of approximately 6.4 million acres, is currently suitable habitat for Joshua trees.

61. Importantly, one of the peer-reviewers of the 2018 Species Status Assessment sharply criticized this estimation of "suitable habitat" for Joshua trees as vastly overstated because the Service failed to account for climate change impacts that have already occurred in areas where the species is currently distributed (Smith 2018).

62. The Service itself also acknowledges that although regional Joshua tree populations are distributed over large areas, individual Joshua trees are not equally distributed and may occur in discrete patches that may not be connected to neighboring patches in terms of gene flow. The density of Joshua trees within each of the regional populations also varies dramatically. For instance, the assessment cites short-term demographic research of density in plots surveyed within Joshua Tree National Park (YUBA South population) that showed a range between 10 to 277 Joshua trees per acre. For the YUBR North population, density data from Death Valley National Park showed an ever greater range from 10 to 870 Joshua trees per acre (U.S. Fish & Wildlife Service 2018).

63. Due to the species' patchy distribution within its range, highly variable population density and lack of range-wide population surveys, a reliable estimate of Joshua tree population size is not available. *Id.* Similarly, no range-wide population trends have been documented. *Id.*

64. The 2018 assessment identified and discussed the following as primary threats or "stressors" to both species of Joshua tree: (1) wildfire and invasive plants, (2) changing climate trends (e.g., increased temperatures and longer, more frequent drought periods), (3) habitat loss, (4) herbivory, (5) overutilization, and (6) nitrogen enrichment from air pollution. As the assessment acknowledges, these factors are often related and synergistic. *Id.* As such, they may collectively threaten the Joshua tree's future viability.

65. The assessment also acknowledges that certain stressors are likely to disproportionately affect small-sized Joshua trees and young age-classes as they may be more vulnerable to wildfires, prolonged drought, and herbivory. *Id.*

66. In evaluating how climate change may affect the Joshua tree's viability, the Service used an upper "appropriate temperature range" for the species of 59ºC (138ºF). The same metric was used for all age classes, from seedlings to adults. This threshold was based on laboratory studies by Smith *et al.* (1983) in

which detached leaves were placed in hot water for an hour and then examined for heat damage. The agency did not explain how the temperature at which a severed leaf demonstrates cell damage in a lab is a comparable metric for estimating the maximum ambient temperature in which a Joshua tree can survive and successfully reproduce in the wild. The temperature used by the Service is higher than the hottest temperature (56.7°C; 134.1°F) ever measured on Earth. Notably, the highest lab air temperature that Smith *et al*. (1983) actually successfully reared Joshua trees was 45ºC (113ºF).

67. In further assessing the potential impact of climate change on the Joshua tree, the Service completely discounts multiple species distribution models discussed *supra*, ¶¶41-44, that show significant portions of the Joshua tree's ranges are likely to become unsuitable in the foreseeable future (by the end of this century). The Service dismissed the findings of these ecological niche models as likely "spurious." In lieu of deploying ecological niche modeling, the Service states it used a "scenario planning framework," citing to Star *et al*. (2016) for its rationale. In doing so, the Service acknowledges that "[r]ather than focusing only on the most likely predictions" it instead applied a less certain framework that allowed it to "retain flexibility."

68. "Habitat suitability modeling" (interchangeably referred to as "ecological niche modelling" or "species distribution modelling") is when "a statistical link is established between the locations where the target species has been observed and a series of variables describing the environmental conditions in those sites" (Aizpurua *et al*. 2015). "[E]cological niche modeling, which takes advantage of the rapidly growing body of accessible museum locality data and geographic information system-based climate layers, has become increasingly important in ecological and conservation-related research" (Searcy & Shaffer 2016). "[Species distribution models] relate the presence/absence records of species to relevant environmental variables and subsequently project modelled

relationships across geographical space using gridded layers of environmental data, producing a map indicating areas of potential species distribution" (Manzoor *et al.* 2018).

69. "[H]abitat suitability models have been shown to be highly predictive in determining climate niches for a variety of species" (Chai *et al.* 2016), even outperforming expert review in predicting where habitat might be found (Aizpurua *et al.* 2015).

70. In regards to Joshua tree distribution, Shafer *et al.* (2001), Dole *et al.* (2003), Cole *et al.* (2011), Barrows & Murphy-Mariscal (2012) and Sweet *et al.* (2019) use various types of ecological niche models or habitat suitability models to predict where suitable habitat for the Joshua tree will be located under various climate change scenarios.

71. Rather than employ the best available quantitative modelling, the Service instead uses two different potential climate scenarios to perform a "qualitative evaluation of the impact of climate change on the [Joshua tree's] current distribution" (U.S. Fish & Wildlife Service 2018). Indeed, the Service admits that its goal was simply to "present information related to future climate outcomes, not to evaluate quantitative assessments of climate change on future Joshua tree distribution." *Id.* The Service states this was its basis for not constructing its own ecological niche models. *Id.* But the Service did not *itself* need to model future distribution of Joshua trees, as this has already been done by multiple researchers, with Cole *et al.* (2011), Barrows and Murphy-Mariscal (2012) and Sweet *et al.* (2019) employing the most sophisticated of such efforts. Nowhere does the Service even acknowledge that such modeling efforts have been undertaken and reported in these studies.

72. In fact, one of the older studies (Pearson & Dawson, 2003) the Service cites as supporting its decision to disregard ecological niche models in evaluating the continued viability of the Joshua tree actually supports using such models in

situations like the present one. For instance, a literature review in Pearson and Dawson (2003) suggests that "bioclimatic models applied at the macro-scale are suitable for making broad predictions as to the likely impacts of climate change on the distribution of species" and that "applications of bioclimate envelope models for predicting distribution changes over the next century are most appropriate for species not expected to be able to undergo rapid evolutionary change over this timescale. This is most likely to be the case for long-lived species and poor dispersers" (Pearson & Dawson, 2003). Indeed, "extremely poor dispersers will occupy only those current distributional areas that remain suitable under future climates." *Id*. As described *supra*, ¶¶31, 43-44, the Joshua tree is both long-lived and a poor disperser.

73. Moreover, Pearson and Dawson (2003) supports using such models to guide policy decisions:

> In many cases, bioclimate envelope models provide perhaps the best available guide for policy making at the current time. They have been usefully employed to identify possible magnitudes of future changes to distributions, and to suggest which species, habitats and regions are most at risk from climate change.

74. The Service's reliance on Fitzpatrick and Hargrove (2009) to support its decision to ignore ecological niche models is also misplaced. Fitzpatrick and Hargrove (2009) states that the validity of forecasts of potential changes in distribution of species under climatic change "is subject to many widely acknowledged uncertainties." This paper raises the valid point that "[f]orecasting future distributions of species from current species-climate relationships is problematic because the observed distribution of a species alone provides no information about how the species might respond under novel environments." *Id.* The authors suggest addressing this potential problem by calibrating models "on the entire study area" and "indicat[ing] where extrapolation has occurred rather

than report[ing] a spurious projection." *Id*.

75. Thus, although the concerns raised by Pearson and Dawson (2003) and Fitzpatrick and Hargrove (2009) about the limitations of certain niche modeling efforts may be valid, Cole *et al*. (2011), Barrows and Murphy-Mariscal (2012) and Sweet *et al*. (2019) all employed the measures raised by these earlier authors to improve the accuracy of their modeling, including, most importantly, validating their models against the current distribution of the species. Pearson and Dawson (2003) also note that information on dispersal abilities should also be included in modeling where possible, a factor clearly addressed in Cole *et al*. (2011).

76. Furthermore, the Service itself never analyzed whether or not the ecological niche models cited in Guardians' petition (and those that were available to the agency at the time of its final decision), address the issues raised in Fitzpatrick and Hargrove (2009) or Pearson and Dawson (2003). Consequently, the Service failed to articulate a credible reason for wholly dismissing the predicted climate change impacts from this large body of current science.

77. In its assessment, the Service acknowledged that the adverse effects of wildfire "(i.e., direct mortality and diminished survival over time, degraded seed bank and diminished germination and recruitment) could magnify to broader population and species level impacts as increasingly larger patches of individuals are directly or indirectly affected by fire" (U.S. Fish & Wildlife Service 2018). Despite this acknowledgement, the Service then downplays the significance of these effects by estimating invasive grass cover and linking areas with high invasive grass coverage ratios (15-45%) as a proxy for increased fire frequency and severity. Based on this methodology, the agency estimated that approximately 1.4 percent of the YUBR South and 8.8 percent of the YUBR North current mapped distribution would be at risk in the next several decades. In contrast, Sweet *et al*. (2019) documented that half of the area of Joshua tree habitat in

Joshua Tree National Park identified as refugia for the species under Representative Concentration Pathway ("RCP") 4.5 had already burned in recent decades. The total recent burn area in the park represents well over 10% of the current range of the species in the park and such fires are likely to increase within Joshua Tree National Park and throughout the range of the species.

78. The Service simply assumes that because Joshua trees are currently distributed across broad geographic areas containing some variety of ecological settings that "both species have a high degree of flexibility to adapt to different environmental conditions, which may provide the capacity to withstand extreme environmental events." But the agency fails to explain how this assumption comports with the science before it, which as described *supra* indicates that Joshua tree recruitment is contingent upon a specific and narrow set of environmental conditions and that the plant's ability to shift its range in response to a changing climate is severely limited.

79. On August 15, 2019, the Service issued a "not warranted" determination on Guardians' petition to list the Joshua tree. *See* Fed. Reg. 84 at 41,697 (Aug. 15, 2019). The Service's August 2019 not warranted finding is based on the 2018 Species Status Assessment.

80. The Service concluded that neither species of Joshua tree warrant listing as a threatened species under the ESA. 84 Fed. Reg. at 41,697. The Service stated that "[b]ecause the two species are long-lived, have such large ranges and distributions, mostly occur on Federal land, and occupy numerous ecological settings, we have determined that future stochastic and catastrophic events would not lead to population- or species-level declines in the foreseeable future." *Id.*

FIRST CAUSE OF ACTION

(Violation of the ESA – Arbitrary and capricious finding that Joshua trees are not threatened based on the five threat factors)

81. Plaintiff hereby incorporates all preceding paragraphs.

82. Pursuant to section 4(a)(1) of the ESA, the Service is required to determine whether a species is threatened or endangered because of any of the following factors: (A) the present or threatened destruction, modification, or curtailment of the species' range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other man-made factors affecting the species' continued existence. 16 U.S.C. §§ 1532(20), 1533(a)(1); 50 C.F.R. § 424.11(c). These factors are listed in the disjunctive so any one or combination of them can be sufficient for a finding that a species qualifies as threatened or endangered.

83. In making its "not warranted" finding and deciding not to list either species of Joshua tree as threatened, the Service failed to carefully consider and adequately apply Section 4(a)(1)'s listing factors in accordance with the ESA and the implementing regulations.

84. Because the Service failed to adequately analyze and impermissibly dismissed significant threats to the Joshua tree's habitat from climate change, prolonged droughts, altered fire regimes, urban sprawl and other habitat loss/degradation its conclusions were arbitrary, capricious and not based on the best available science in violation of the ESA. 16 U.S.C. § 1533(a)(1), (a)(1)(A), (b)(1)(A); 5 U.S.C. § 706(2).

85. Consistent with the plain language of the ESA, even if the Service were correct that these stressors are not presently destroying, modifying, or curtailing a significant portion of either species' ranges, *Yucca brevifolia* and/or *Yucca jaegeriana* still warrant listing as "threatened" because the best scientific and commercial data available indicates that existing stressors are likely to destroy, modify and curtail significant portions of the species' ranges in the foreseeable future.

86. Second, given climate change is the greatest threat to the continued existence of the Joshua tree, the Service erroneously discounted and did not adequately consider how the lack of "existing regulatory mechanisms" to address this threat – on the international, national, state, and local level – may impact the Joshua tree and its habitat now and into the foreseeable future. The Service also failed to ensure the adequacy of existing regulatory mechanisms to prevent other acknowledged threats (habitat loss and degradation from increasing fire and invasive weeds, drought, development and other human activities). 16 U.S.C. § 1533(a)(1)(D).

87. Last, the Service failed to follow the best available science, disregarded record evidence, and unreasonably concluded that the Joshua tree is not threatened by "other natural or manmade factors affecting its continued existence," given the nexus between the identified stressors and each species' low germination and recruitment rates, limited dispersal capabilities, and dependence on a sole pollinator for sexual reproduction. 16 U.S.C. § 1533(a)(1)(E).

88. The Service's failure to adequately analyze the five threat factors, both individually and in combination with each other, when deciding not to list either species of Joshua tree violates the ESA and is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" and/or constitutes "agency action unlawfully withheld or unreasonably delayed." 5 U.S.C. §§ 706 (2)(A), 706 (1).

SECOND CAUSE OF ACTION

(Violation of the ESA – Arbitrary and capricious finding that Joshua trees are not threatened throughout a significant portion of their range)

89. Plaintiff hereby incorporates all preceding paragraphs.

90. In making its "not warranted" determination, the Service failed to carefully consider and adequately evaluate whether either species of Joshua tree is

at risk of becoming endangered within the foreseeable future throughout a "significant portion of its range." 16 U.S.C. § 1532(20).

91. The Service did not evaluate and consider, in the first instance, whether any of the geographical regions that the agency identified as containing distinct regional populations of Joshua trees, as delineated in the 2018 Species Status Assessment maps featured *supra* (i.e. YUBR South and YUBR North), represent "significant" portions of the species' ranges within the meaning of the ESA. 16 U.S.C. § 1532(20).

92. The evaluation of whether a portion of the species range is "significant" under the ESA involves a number of variables and factors, including (but not limited to) the size of the area, the percentage of the species' range, its biological and/or ecological importance to the species, unique factors and habitat conditions, its importance for maintaining connectivity amongst subpopulations and facilitating genetic exchange, and whether its loss would result in the loss of a unique or critical function of the species.

93. Because the Service failed to adequately consider and evaluate these "significance" variables and properly assess whether any of the geographical areas that contain a distinctly recognized regional Joshua tree population represent "significant" portions of either species' ranges, its determination that neither *Yucca jaegeriana* nor *Yucca brevifolia* is threatened violates the ESA and is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" and/or constitutes "agency action unlawfully withheld or unreasonably delayed." 5 U.S.C. §§ 706 (2)(A), 706 (1).

THIRD CAUSE OF ACTION

(Violation of ESA – failure to use best available science)

94. Plaintiff hereby incorporates all preceding paragraphs.

95. Pursuant to section 4(b)(1)(A) of the ESA, 16 U.S.C. § 1533 (b)(1)(A), the Service must make all listing determinations solely on the basis of

the best available science. Under the ESA, the Service cannot infer from a lack of data or uncertainty that the Joshua tree remains viable and not threatened or endangered.

96. In making its "not warranted" determination the Service wholly disregarded and ignored a multitude of ecological niche models (species distribution modeling), which currently represents the best available science on the future status of Joshua trees. The Service's speculation that the Joshua tree can likely adapt to increasing maximum temperatures by migrating to cooler or higher elevation areas of the desert is also unsupported by, and contrary to, the best available science.

97. The Service's failure to utilize the best available science when deciding not to list the Joshua tree violates the ESA and is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" and/or constitutes "agency action unlawfully withheld or unreasonably delayed." 5 U.S.C. §§ 706 (2)(A), 706 (1).

VI. REQUEST FOR RELIEF

THEREFORE, Guardians respectfully requests that the Court:

1. Declare that the Service acted arbitrarily and capriciously and violated the ESA in issuing the 12-Month Finding;

2. Set aside and remand the 12-Month Finding for further analysis and agency action consistent with this Court's decision;

3. Award Guardians its reasonable fees, costs, and expenses, including attorneys fees, associated with this litigation; and

4. Grant Guardians such further and additional relief as the Court may deem just and proper.

Respectfully submitted this 4th day of November 2019.

/s/ Jennifer Schwartz
JENNIFER R. SCHWARTZ (Oregon Bar No. 072978)
(*Pro Hac Vice application forthcoming*)
WildEarth Guardians
P.O. Box 13086
Portland, OR 97213
Telephone: (503) 780-8281
Email: jschwartz@wildearthguardians.org

/s/ Lindsay K. Larris
LINDSAY K. LARRIS (California Bar No. 254270)
WildEarth Guardians
2590 Walnut Street
Denver, CO 80212
Telephone: (310) 923-1465
Email: llarris@wildearthguardians.org

/s/ Vanessa Shakib
VANESSA SHAKIB (California Bar No. 287339)
Shakib Law, PC
500 N. Brande Blvd. Ste. 2000
Glendale, CA 91203
Telephone: (818) 516-9532
Email: Vanessa@vanessashakib.com