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RE: Notice of Intent to Sue for Violations of the Endangered Species Act Concerning "Not Warranted" Listing Decision for Joshua Trees (*Yucca brevifolia* and *Yucca jaegeriana*)

Dear Secretary Haaland and Director Williams,

In accordance with the 60-day notice requirement of the Endangered Species Act ("ESA"), 16 U.S.C. § 1540(g), you are hereby notified that WildEarth Guardians ("Guardians") intends to bring a civil action against you in your official capacities and the U.S. Fish and Wildlife Service (collectively the "Service") for violating Section 4 of the ESA, 16 U.S.C. § 1533, in connection with the Service's decision that Joshua trees (*Yucca brevifolia* and *Yucca jaegeriana*) do not warrant listing as threatened species. *See* Endangered and Threatened Wildlife and Plants; Petition Finding for Joshua Trees (*Yucca brevifolia* and *Y. jaegeriana*). 88 Fed. Reg. 14536 (March 9, 2023); 16 U.S.C. §§ 1533(a)(1); 1533(b)(2); 1533(a)(3)(A). In light of the wealth of information showing Joshua trees are imperiled by climate change, wildfire, habitat loss and degradation, the Service's decision to deny the species ESA protections was arbitrary, capricious, and otherwise not in accordance with law. 16 U.S.C. § 1533.

I. Relevant Background

A. Joshua Trees

Despite being long-lived, hardy desert plants, Joshua trees only thrive within a narrow range of environmental conditions. Though they can survive high temperatures, drought decreases survivorship and recruitment. Extreme cold events limit their distribution, but they also need a period of cooler minimum winter temperature to maximize growth. Scientists postulate that these limiting factors likely explain why the species is restricted to the Mojave's slightly

cooler, mid-elevation zone. But this mid-elevation zone has been compromised by invasive grasses, which are more frequently carrying uncharacteristically large fires across the ecosystem. *Every* peer-reviewed species distribution/bioclimatic model for the Joshua tree that has been published in the last two decades predicts that climate change (increasing temperatures and prolonged droughts) will deprive this desert icon of the environmental conditions that it requires to successfully germinate and reach adulthood across 90 to 99.8% of its current range by century's end under the most likely greenhouse gas (GHG) concentration scenarios. In other words, the species will be functionally extinct throughout most of its range as climate change will preclude future generations of Joshua trees from establishing themselves on the landscape.

Photo of a Joshua tree, released under a Creative Commons license by Bernard Gagnon.

Long considered a single species with two subspecies or varieties, the Service, in its 2018 Joshua Tree Species Status Assessment ("2018 SSA"), recognized Joshua trees as comprised of two distinct, and thus separately listable, species: *Yucca brevifolia* and *Yucca jaegeriana*. The two species are geographically separated, genetically and morphologically distinguishable, and each rely on their own unique and specially evolved obligate pollinator (a "Yucca moth") for sexual reproduction.

Joshua trees are characterized by infrequent germination, slow growth, and long lifespans (~200 years). They also take a long time to reach sexual maturity (up to 30 years). Though each species of Joshua tree depends on a single species of yucca moth to reproduce sexually, Joshua trees sometimes reproduce asexually by rhizome growth. Overall, successful recruitment requires a rare convergence of events: fertilization by unique pollinators; seed dispersal and caching by rodents; seedling emergence triggered by isolated late-summer rainfall; nurse plants (*i.e.* vegetation like shrubs that provide favorable microclimates for successful germination and protection from herbivory); and appropriate seasonal temperature ranges. Studies suggest successful establishment of new Joshua tree seedlings happens only a few times in a century.

Joshua trees are limited to desert grasslands and shrublands in portions of southeastern California, southern Nevada, northwestern Arizona, and southeastern Utah. Though there are no range-wide population number or trend estimates and Joshua tree densities vary widely across their occupied ranges, recent studies and climate modeling indicates 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.

The primary threats affecting the Joshua tree's ability to successfully reproduce, germinate, and survive are climate change (*e.g.*, increasing temperatures and prolonged drought), more frequent and severe wildfires largely fueled by the proliferation of invasive grasses, habitat loss and degradation, and herbivory. These factors are often related and synergistic, and – in combination with the species' naturally low germination rates, slow growth and extremely limited dispersal capability – collectively threaten the Joshua tree's future persistence.

B. The Endangered Species Act and Joshua trees

Congress enacted the ESA in 1973 with the goal of protecting and recovering species that are in danger of extinction or are likely to become so within the foreseeable future. In the words of the statute, its purpose is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved," and "to provide a program for the conservation of such endangered species and threatened species[.]" 16 U.S.C. § 1531(b). In the seminal case on the ESA, *Tennessee Valley Authority v. Hill*, the Supreme Court confirmed that it is "beyond doubt that Congress intended endangered species to be afforded the highest of priorities." 437 U.S. 153, 174 (1978).

To achieve the goal of conserving threatened and endangered species, section 4 of the ESA requires the Secretary of the Interior to determine whether a species is threatened or endangered; to designate critical habitat for threatened and endangered species; and to promulgate and implement a recovery plan for listed species. 16 U.S.C. §§ 1533(a)(1), (a)(3), (f). Under the statute, a species is "endangered" if it is "in danger of extinction throughout all or a significant portion of its range[,]" and it is "threatened" if it is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." *Id*. §§ 1532(6), (20). The ESA requires the Service to "determine whether any species is an endangered species or a threatened species" because of "any" of the following five factors:

> (A) the present or threatened destruction, modification, or curtailment of … [the species'] 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.

Id. § 1533(a)(1), (b)(1)(A); 50 C.F.R. § 424.11(c). The Service is required to evaluate these factors "solely on the basis of the best scientific and commercial data available to [her] after conducting a review of the status of the species[.]" *Id*. § 1533(b)(1)(A). *See also Nw. Ecosystem Alliance v. U.S. Fish & Wildlife Serv.*, 475 F.3d 1136, 1147 (9th Cir. 2007) ("The ESA instructs

the Service to make its determinations 'solely on the basis of the best scientific and commercial data available[.]'") (quoting 16 U.S.C. § 1533(b)(1)(A)).

Courts interpreting these statutory provisions have repeatedly held that an agency's failure to utilize the best available science in making a listing determination is arbitrary and unlawful. *See, e.g., Ctr. for Biological Diversity v. Zinke*, 900 F.3d 1053, 1060 (9th Cir. 2018). An agency's failure to draw rational conclusions from the evidence before it also constitutes arbitrary action. *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co*., 463 U.S. 29, 43 (1983). The Service's listing and delisting actions have frequently been held arbitrary on these specific grounds. For instance, the Ninth Circuit vacated the Service's delisting rule for the threatened grizzly bear because "[t]he Rule did not articulate a rational connection between the data before it and its conclusion[.]" *Greater Yellowstone Coal., Inc. v. Servheen*, 665 F.3d 1015, 1030 (9th Cir. 2011). Further, even if "the Service relied on the best available science, [if] it did not interpret that science rationally[,]" then the Service acted arbitrarily and capriciously. *Crow Indian Tribe v. United States*, 343 F. Supp. 3d 999, 1019 (D. Mont. 2018), *aff'd in part, remanded in part on other grounds*, 965 F.3d 662 (9th Cir. 2020) (holding that the "Service's determination [wa]s arbitrary and capricious because it [wa]s both illogical and inconsistent with the cautious approach demanded by the ESA"). The requirement to use the best-available science—and the obligation of a reviewing court to overturn any decision that fails to do so—is therefore clear in the language of the Act and is also well established in ESA case law.

Guardians first filed its petition to list the Joshua tree in September 2015 and submitted timely comments to the Service in response to the agency's September 2016 positive 90-day finding. After a nearly two-year delay, the Service ultimately determined that neither species of Joshua tree warranted 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 that 90 to 99 percent of the Joshua tree's current range will be rendered climatically unsuitable for the species by the end of this century under the most likely greenhouse gas concentration scenarios. Consequently, Guardians challenged the Service's 2019 negative finding in federal district court, arguing that the agency had arbitrarily: 1) concluded that Joshua trees are not threatened by climate change in light of the best available science, 2) dismissed and downplayed threats from more frequent and severe fires, 3) concluded the cumulative effects of climate change, wildfires, habitat loss and degradation, along with the species' naturally low germination rates and limited dispersal capacity did not threaten Joshua trees, 4) that *Y. brevifolia* is not threatened throughout any significant portion of its range given the aforementioned cumulative and synergistic threats facing the species in its southern range, and 5) assessed whether the lack of existing regulatory mechanisms for addressing climate change threaten Joshua trees.

In September 2021, the federal district court agreed with Guardians on all counts, holding that the Service had acted arbitrarily and in violation of the ESA by: (1) disregarding or otherwise cherry-picking the findings of the available species distribution models in concluding that climate change did not threaten Joshua trees throughout significant portions of their ranges, (*e.g.*, on the one hand disregarding the substantial loss of habitat projected by all five climate models while pointing to portions of those same studies showing that climate change is also projected to create *new* areas of suitable habitat northward at higher elevations); (2) ignoring evidence showing Joshua trees' limited dispersal capacity will prevent the species from

migrating to areas that are outside its current range that are predicted to have future suitable climates; (3) concluding wildfires did not pose a significant threat to Joshua trees when the best available science shows that this is a substantial threat throughout the Mojave; (4) concluding that a 41.6% loss of *Y. brevifolia*'s habitat from development was insignificant because it was not a complete loss; (5) failing to rationally explain whether the forecasted climate change-driven loss of 90-99.8% of *Y. brevifolia*'s habitat constituted a "significant portion of the [species'] range"; and (6) failing to account for the inadequacy of existing regulatory mechanisms pertaining to climate change in concluding that existing regulatory mechanisms were adequate to protect Joshua trees. *WildEarth Guardians v. Haaland, et. al.*, 561 F. Supp. 3d 890 (C.D. Cal. 2021).

II. Once again, the Service has acted arbitrarily and unlawfully in denying ESA protections to Joshua trees.

The scientific information before the Service overwhelmingly demonstrates that Joshua trees face significant threats to their continued existence in the foreseeable future such that listing both *Y. brevifolia* and *Y. jaegeriana* as threatened species under the ESA is warranted. The Service's 12-month "not warranted" finding for Joshua trees and the analysis therein violates the ESA and its implementing regulations in multiple respects, including by: (1) failing to use the best available science; (2) improperly relying on scientific uncertainty as evidence that listing the species is not warranted; (3) arbitrarily shortening the timeframe used for its "foreseeable future" determination; (4) failing to properly analyze whether the species is threatened in a significant portion of its range; and (5) otherwise failing to properly consider and apply the five listing factors and conduct a proper listing analysis.

Despite Guardians' 2021 legal victory demonstrating the numerous faults with the Service's 2019 "not warranted" decision, the agency has once again failed to heed the ESA's best available science mandate. But the case for listing Joshua trees has only grown stronger since Guardians submitted its 2015 petition. For example, species distribution models continue to become increasingly sophisticated as they build on the work of prior models and incorporate fine-scale field data to verify modeling projections, such as the work of Sweet *et al*. (2019). A staggering amount of additional Joshua tree habitat has also burned in the past few years, such as with the large 2020 Dome fire that killed an estimated 1.3 million Joshua trees in an area projected to be climate refugia. And early this year the State of California proposed the Western Joshua Tree Conservation Act because the legislature recognizes that "[t]he impacts of climate change are occurring now with more intensity and frequency than previously anticipated, and development, aridification, and the effects of climate change, including drought and wildfire, are threatening the western Joshua tree and could threaten other species in the future." Nevertheless, the Service continues to disregard and misconstrue the science and the facts to avoid granting federal ESA protections for Joshua trees. Because the ESA expressly forbids such conduct, Guardians will pursue litigation in federal court to resolve the matter if the Service does not remedy the violations of law outlined in this letter within sixty days.

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A. The Service's "not warranted" finding runs counter to the best available science.

Pursuant to Section 4(b)(1)(A), 16 U.S.C. § 1533(b)(1)(A), the Service's implementing regulations, and the Service's 2011 policy on scientific integrity, the Service must make all listing decisions "solely on the basis of the best available scientific and commercial data available." The Service failed to do so when again deciding not to list the Joshua tree.

For example, there is a massive disconnect from what the best available science predicts in terms of climate change impacts to Joshua trees and the Service's ultimate conclusion that climate change does not threaten the species ability to persist in the foreseeable future. On the one hand, the Service's 2023 SSA acknowledges that all the available "bioclimatic models" agree "that much of the range of both species will be climatically unfavorable and unlikely to support suitable climatic conditions due to increased temperatures, decreased precipitation, or a general increase in drought stress" by the end of the century (2070-2099). The 2023 SSA further acknowledges that these models represent "the best available information on how climate change may affect Joshua trees' distribution in the future." SSA, 80. The 2023 SSA also expressly acknowledges:

> Under a lower emission scenario approximating RCP 4.5[1], 66 to 80 percent of Joshua trees' distribution is projected to be climatically unfavorable at the end of the century, and 20 to 44 percent of the range is anticipated to provide climatically favorable conditions in climate refugia where all the species needs (e.g., sufficient pollinators, survival, and appropriate recruitment conditions to maintain population abundance) are projected to be met. Under a high emission scenario approximating RCP 8.5 at the end of the century, approximately 90 to 99 percent is projected to be climatically unfavorable, with 1 to 10 percent of the distribution potentially providing climate refugia.

SSA, 80. According to the Service, these "two future scenarios provide a spectrum of the best available information regarding potential habitat loss and degradation, existing regulatory mechanisms, and beneficial conservation measures expected to occur during this period [i.e., a timeframe of 80 years, until the end of the century (2070 to 2099)." SSA, xiii. Therefore, the Service recognizes that the best available science predicts that Joshua trees will not have the environmental conditions necessary to successfully reproduce, germinate, and then reach a

[1] The 2023 SSA explains that "[a]ll data considered were based on Representative Concentration Pathway (RCP) greenhouse gas concentration scenarios adopted by the Intergovernmental Panel on Climate Change (IPCC) with the exception of invasive grass cover. Both RCP 4.5 and RCP 8.5 were selected because they provide a plausible range of future conditions considering the potential for both near-term mitigation (RCP 4.5) and continued increases in greenhouse gas emissions (RCP 8.5)." SSA, xiii. Specifically, the Service explains that its Scenario I modeled future conditions as a continuation of current threats under an approximate 5.4°F (3°C) increase (RCP 4.5) in average temperature. Scenario II modeled an increase in threats under an approximate 9°F (5°C) increase (RCP 8.5) in average temperature.

mature, reproductive stage, *i.e.*, persist as a species, throughout 90 to 99.8% of their current range by century's end under the most likely GHG concentration scenarios.[2]

Additionally, the 2023 SSA further recognizes that wildfire and development are also projected to destroy much of the "climate refugia" modeled within the Joshua tree's current range. For instance, the 2023 SSA states that under Scenario II up to 18% of the only 1 to 10% of climate refugia projected to remain is likely to be lost from wildfire. In fact, large percentages of areas that are modeled as climate refugia have already burned (*e.g.*, approximately half of the refugia within Joshua Tree National Park that Sweet *et al*. (2019) mapped have already burned in recent decades). Further, over **2 million acres** of *Y. brevifolia's* habitat is also projected to be lost from urban development and large-scale renewable energy projects. SSA, 53-54, 102-103. And though most of this habitat loss from development is forecasted to occur within areas that are projected to be climatically unsuitable for Joshua trees by century's end anyway, the Service expects some additional loss of modeled climate refugia.

In short, the Service's conclusion that climate change does not independently, or cumulatively (when combined with other key stressors like wildfire and development), threaten the Joshua tree's ability to persist throughout all or a significant portion of its range in the foreseeable future is contrary to the best available science and thus arbitrary and capricious in violation of the ESA.

B. The Service improperly relied on uncertainty in finding Joshua trees do not warrant listing as threatened species.

The Service cannot deny ESA protections for a species by insisting on conclusive evidence or greater scientific certainty than the best available science can provide. *Defenders of Wildlife v. Jewell*, 176 F.Supp.3d 975, 1002 (D. Mont. 2016); *Building Indus. Ass'n of Superior Cal. v. Norton*, 247 F.3d 1241, 1246 (D.C. Cir. 2001) (Congress directed the Service to consider the best scientific information "'*available*,' not the best scientific data *possible*.'") (emphasis original). Protecting threatened species – in addition to endangered species that are already on the verge of extinction – reflects the ESA's policy of "institutionalized caution." *E.g.*, *Greater Yellowstone*, 665 F.3d at 1030. Indeed, the term "likely" in the definition of a "threatened" species holds its ordinary meaning, as in more likely than not. *See e.g.*, 84 Fed. Reg. 45020, at 45021 (August 27, 2019) (the Service noting in its preamble to the 2019 ESA regulations that this is consistent with the agency's long-standing interpretation and previous judicial opinions); *see also In re Polar Bear*, 709 F.3d 1, 14-15 (D.C. Cir. 2013); *Alaska Oil & Gas Ass'n v. Pritzker*, 840 F.3d 671, 684 (9th Cir. 2016). Point being, the Service must protect imperiled species *before* they are "conclusively headed for extinction." *Defenders of Wildlife v. Babbitt*, 958 F. Supp. 670, 679-80 (D.D.C. 1997). Yet, once again, the Service has failed to take action to proactively protect Joshua trees despite all indications that they are on the path to extinction.

[2] It is important to note that Barrows & Murphy (2012) modeled a 90-98% loss of suitable habitat under the less extreme or "highly mitigated" climate scenario RCP 4.5/Scenario I, which correlates to a 5.4°F/3°C increase in mean summer temperature, and not the RCP 8.5/Scenario II as the 2023 SSA incorrectly states at page 106 (compare to SSA, p. 82). According to Sweet el. al. (2019) the RCP 8.5/Scenario II represents the "business-as-usual" climate scenario.

The Service's own analysis plainly relies upon the large body of scientific literature documenting the Joshua tree's biological needs at all life stages and expressly recognizes that the six available bioclimatic models represent "the best available information on how climate change may affect Joshua trees' distribution in the future." SSA, 80. Nevertheless, the Service then insists on more definitive information regarding the species precise tipping point and claims the best available models cannot reliably forecast the species future distribution at the end of the century. 88 Fed. Reg. at 14542 (justifying its divergence from what the available models forecast because of the so-called lack of information on the species "physiological thresholds"); *id*. (stating there is "high uncertainty" about "how long adult trees may persist in modeled climatically unfavorable conditions at the end of century."); *id*. at 14558 ("While modeling predicts a large decline in climatically favorable habitat, we project that habitat loss will be localized in these modeled areas due to uncertainties in the species' response…")

The Service's insistence on greater scientific certainty than the best available information can provide is unreasonable. Ample scientific data exists that establishes the Joshua tree's vulnerabilities at early life stages, its needs for successful recruitment, and explains how increasing temperatures and prolonged drought conditions will preclude future generations from establishing themselves on the landscape. Indeed, the Service also recognizes that several recent studies have already observed decreases in population size, tree vigor, and recruitment in *Y. brevifolia's* southern range from climatic changes, *e.g.*, increasing temperatures and droughts, that have occurred over the last half-century. In summary, the best available information confirms: Joshua trees already do not occur in the hottest and driest portions of the Mojave at lower elevations; the Joshua trees' historical range contracted northward along the southern edge of its Pleistocene range as climates warmed at the start of the Holocene; since the middle of the Holocene period (approximately 8,000 years-before-present) Joshua trees have been largely restricted to the Mojave's mid-elevation zone; under either RCP 4.5 or RCP 8.5, over the coming decades climate change will transform the vast majority of the Mojave's mid-elevation zone into a largely barren landscape that resembles the lowest elevation areas now with only small pockets of "climate refugia" that are at high-risk of being destroyed by invasive grass-fueled wildfires (much of which has already burned); and Joshua trees lack the dispersal capability to shift their range to cooler, higher elevations in time to avoid this forecasted loss of suitable habitat. Thus, it is simply irrational for the Service to conclude that Joshua trees are not threatened from climate change because it allegedly lacks information on the species' "physiological thresholds." Nor can the Service justify its not warranted listing decision on not knowing precisely when already established adult trees will keel over and die. This is a red herring; the real issue is whether those mature trees will be able to successfully reproduce and replace themselves. The best available science shows they will not.

Contrary to the Service's listing decision, "definitive conclusions" or knowing precisely how a species will respond to specific threats are not required. And imposing such a high standard will deprive many species facing significant future threats from climate change – like Joshua trees – from obtaining the protective status they deserve. Indeed, this is precisely one of the reasons the Ninth Circuit and federal district courts have invalidated the Service's decisions to deny or remove ESA protections for similarly imperiled species.

For instance, in *Greater Yellowstone Coalition* the Ninth Circuit determined that the Service acted arbitrarily and capriciously in dismissing the impact of whitebark pine declines

because "the specific response of grizzly bears to declines in whitebark cone production [was] . . . uncertain" when "considerable data—demonstrating a relationship between pine seed shortages, increased bear mortality, and decreased female reproductive success"—all pointed to potential impacts. 665 F.3d at 1023, 1028-30. Similarly, in denying ESA protections for the climate threatened wolverine, the district court in *Defenders of Wildlife v. Jewell* held:

> [T]he Service's stance here borders on the absurd—if evidence shows that wolverines need snow for denning purposes, and the best available science projects a loss of snow as a result of climate where and when wolverines den, then what sense does it make to deny that climate change is a threat to the wolverine simply because research has yet to prove exactly why wolverines need snow for denning? There is near universal agreement that wolverines require deep snow for reproductive denning purposes.

Defenders of Wildlife v. Jewell, 176 F. Supp. 3d at 1004.

Consequently, the Service violated the ESA by insisting on more definitive information regarding the Joshua tree's precise tipping point when its own analyses are replete with references to numerous studies documenting the species' needs and the negative effects of increasing temperatures and prolonged drought conditions on those biological requirements. To the extent there are uncertainties, as is generally the case in any scientific field, in this context the Service must "explain why the uncertainty . . . favors not listing" the species in light of the available evidence. *See Zinke*, 900 F.3d at 1072-75 ("it is 'not enough for [the Service] to simply invoke 'scientific uncertainty' to justify its action'"). "Even if the available scientific commercial data were quite inconclusive, [the Service] may—indeed must—still rely on it." *Sw. Ctr. for Biological Diversity v. Babbit*, 215 F.3d 58, 60-61 (D.C. Cir. 2000); *Pritzker*, 840 F.3d at 681 (the "ESA does not require . . . ironclad evidence").

C. The Service arbitrarily shortened the timeframe for its "foreseeable future" determination.

The Service improperly defined the "foreseeable future" timeframe for determining future conditions for Joshua trees to 2040-2069, only 17-47 years from the present. 88 Fed. Reg. at 14542. Such determination is contrary to the best available science, contrary to the Service's own analyses (the 2018 and 2023 SSAs) in which it analyzed all key threats (climate change, wildfire and development) through the end of the century (2070 to 2099), and contrary to law.

As noted *supra*, the ESA requires the Service to list Joshua trees as "threatened" if "the best scientific and commercial data" demonstrates that the species "is *likely* to become endangered within the *foreseeable future*." 16 U.S.C. §§ 1532(20) 1533(a)(1), (b)(1)(A) (emphasis added). And the Service interprets "likely" in accordance with its common meaning, *i.e.*, more likely than not. *See In re Polar Bear*, 709 F.3d 1, 14-15 (D.C. Cir. 2013); *Pritzker*, 840 F.3d at 684. Further, the Service interprets "foreseeable future" on a case-by-case basis using a threat specific evaluation of the best available data. *Pritzker*, 840 F.3d at 682. As the Service itself explains, the term "foreseeable future" extends to the range of time for which it can make "reliable predictions." 88 Fed. Reg. at 14542 (further explaining: "Reliable" does not mean "certain"; it means sufficient to provide a reasonable degree of confidence in the prediction.

Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.").[3] Further, as the Ninth Circuit affirmed in *Pritzker,* the Services need not quantitatively demonstrate the magnitude of threats facing a species—agreeing with NMFS that agencies need not predict a population reduction, define an extinction threshold, nor establish the likelihood of reaching the threshold. *Pritzker*, 840 F.3d at 684. As such, the Service may not dismiss a risk of extinction that may be reasonably forecasted by the best available science.

The Service's entire discussion of how and why it allegedly shortened its definition of the foreseeable future to this truncated timeframe reads as a series of convoluted and contradictory assertions. First, as previously noted, the Service recognizes that climate change is the leading threat to the species and that the available bioclimatic models are the best available information for predicting how climate change will affect the species' distribution in the future. Here, *every* peer-reviewed, bioclimatic model published to date has been able to reliably forecast impacts from climate change to Joshua trees through the end of the century (2070 to 2099). Notably, despite using different modeling methods and datasets, all these published models reach the same conclusion: there will be substantial climate-related decline in suitable area for Joshua trees across the Mojave by 2099 if not well before. The IPCC's global climate models, as used to develop both the bioclimatic models for Joshua trees and the Service's own Future Scenarios I and II, also predict climate trends out to 2100 and are generally considered the best available science on this topic and have been upheld by the Ninth Circuit as a valid basis for making listing decisions. *Pritzker*, 840 F. 3d at 679; *Alaska Oil and Gas Ass'n v. Ross*, 722 Fed. Appx. 666, 668 (9th Cir. 2018); *Alaska Oil & Gas Ass'n. v. Jewell*, 815 F. 3d at 558-59. In one sentence, the Service's listing decision seems to acknowledge these facts, stating climate change is the one threat for which it *does* have reliable information through the end of the century. 88 Fed. Reg. at 14542. But then, just a paragraph later, the Service claims that the available models cannot "reasonably forecast the magnitude of the species' response or future distribution at the end of the century." *Id*. This conclusory assertion is contrary to the best available science.

Further, both the Service's 2023 SSA and 2018 SSA show that the best available science addresses how *each* of the Joshua tree's primary threats (climate change, fire, and development) are likely to impact the species by century's end—not just climate change as the Service then claims in its listing decision. The Service has failed to provide a reasonable explanation for now

[3]The Service similarly recognized in a 2009 Solicitor Memorandum (M-Opinion 37021), "[t]he Secretary's analysis of what constitutes the foreseeable future for a particular listing determination must be rooted in the best available data that allow predictions into the future, and the foreseeable future extends only so far as those predictions are reliable. 'Reliable' does not mean 'certain'; it means sufficient to provide a reasonable degree of confidence in the prediction, in light of the conservation purposes of the Act." M-Opinion 37021 at 13. The Solicitor's Memo goes on to explain that these predictions can be in the form of extrapolation of population or threat trends or an assessment of how future threats will affect a species. *Id*. at 1. Such predictions are reasonable if they are "grounded in data and logic" as opposed to blind speculation. *Id*. at 8.

abandoning this science-backed approach and instead narrowly defining the foreseeable future out only 17-47 years, to 2040-2069 in its 2023 listing decision. 88 Fed. Reg. at 14542.

Generically stating that "the species' response to projected climate change becomes more uncertain the further out we project because we lack information on physiological thresholds" fails to provide a reasonable explanation for the Service's decision to shorten the timeframe for its foreseeable future determination. *See Ctr. for Biological Diversity v. Haaland*, 998 F.3d 1061, 1070 (9th Cir. 2021) ("Simply reiterating generic uncertainty that was known at the time of the prior finding does not meet the agency's burden to explain its change in position. This is particularly so here, because even projections with some degree of uncertainty can have value in the ESA listing process.").

The Service's choice to shorten the timeframe for its foreseeable future determination was also arbitrary in light of the Joshua tree's life-history characteristics, such as the species' long lifespan (~200 years), infrequent germination, slow growth, long time to reach sexual maturity (up to 30 years), and the significant vulnerabilities its faces during the early life stages. The Service's listing decision even acknowledges that "[d]ata that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors." 88 Fed. Reg. at 14542.

Additionally, any degree of uncertainty that exists only concerns the timing and magnitude of the threat, not the underlying threat itself. This is an important distinction: "Uncertainty regarding the speed and magnitude" of adverse impacts does not invalidate the underlying data or logic or reasonableness of the prediction itself. *Ross*, 722 Fed. Appx. at 668. Indeed, in promulgating the 2019 regulations, the Service explicitly said it would not "arbitrarily dismiss reliable aspects of various climate change predictions or projections (*e.g.*, directionality) even if other aspects (*e.g.*, rate of change) have greater levels of uncertainty." 84 Fed. Reg. at 45,032. Yet this is precisely what the Service did here.

Last, to the extent the Service interprets its new, 2019 rule defining "foreseeable future" in a manner that conflicts and deviates from the ESA and the 2009 Solicitor's Opinion, *e.g.*, by demanding more definitive information on a species' response to climate change than the best available science can provide, that interpretation as applied to the Joshua tree is arbitrary, capricious and in conflict with the ESA. The ESA does not require this level of specificity, a quantification of losses, or even establishment of an extinction date or threshold. *Pritzker*, 840 F. 3d at 684. This point is also consistent with the Service's recent proposal to either rescind the 2019 definition of the "foreseeable future" at 50 C.F.R. § 424.11 or revise that definition to simply state: "The term foreseeable future extends as far into the future as the Services can reasonably rely on information about the threats to the species and the species' responses to those threats." 88 Fed. Reg. 40764, 40766 (June 22, 2023). "Quite simply, the Service cannot demand a greater level of scientific certainty than has been achieved in the field to date." *Defenders*, 176 F. Supp. 3d at 1003.

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D. The Service failed to properly analyze whether the Joshua tree is threatened in a significant portion of its range.

As discussed previously, the ESA defines a species as "threatened" if it 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(6), (20) (emphasis added). Though the ESA does not define "significant portion of its range" the Ninth Circuit has held that if a species is "expected to survive" in an area that is much smaller than its historic range, the Service must "develop a rational explanation for why the lost and threatened portions of a species' range are insignificant before deciding not to designate the species for protection." *Zinke*, 900 F.3d at 1064 (citing *Defenders of Wildlife v. Norton*, 258 F.3d 1136, 1145 (9th Cir. 2001); *Tucson Herpetological Soc'y*, 566 F.3d at 876-77). As it did in its 2019 listing decision, the Service again fails to rationally explain why the forecasted loss of 90 to 99.8% of the Joshua tree's current range does not constitute a "significant portion of the [species'] range." *See WildEarth Guardians*, 561 F. Supp. 3d at 904.

First, the Service's 2023 listing decision arbitrarily concludes: "While modeling predicts a large decline in climatically favorable habitat, we project that habitat loss will be localized in these modeled areas due to uncertainties in the species' response and because modeled climatically unfavorable habitat does not equate to an immediate loss of occupied habitat or a potential range contraction between 2040 and 2069." 88 Fed. Reg. at 14558. But as already noted, the Service's reliance on uncertainty regarding the Joshua tree's so-called physiological thresholds in order to dismiss the predictive findings from the best available climate models and reach a completely contrary conclusion—*i.e.*, that climate change driven habitat loss will only be "localized"—is wholly unfounded. It was also arbitrary for the Service to dismiss the projected loss of 90 to 99.8% of suitable habitat (or even its own projected loss of approximately 66 to 88.6% of suitable habitat between 2040 and 2069) because not all existing adult trees will "immediately" die off during that timeframe. Whether some adult trees are still standing, *i.e.*, "occupying" that habitat, is irrelevant to the Joshua tree's ability to persist as a species. The best available science shows that those already established adult Joshua trees will gradually be dying off, but no longer able to successfully reproduce, in the vast portions of their range that become climatically unsuitable over the coming decades. Therefore, the determinative factor for the species' long-term viability is whether those adult trees will be able to replace themselves; again, the best available science has answered that question in the negative. Climate change will preclude successful recruitment of new generations and the species will be functionally extirpated outside the small pockets of remaining climate refugia by century's end. The district court rejected the Service's similar reasoning in its 2019 listing decision, because "listing a species as threatened does not require a complete loss: 'The Service need not wait until a species' habitat is destroyed to determine that habitat loss' may endanger the species." *WildEarth Guardians*, 561 F. Supp. 3d at 904 (quoting *Pritzker*, 840 F.3d at 683). And as the Ninth Circuit also explained in *Pritzker*, the ESA is "concerned with protecting the future of the species, not merely the preservation of existing [members of that species]." *Pritzker*, 840 F.3d at 683 (quoting *Alaska Oil & Gas Ass'n v. Jewell*, 815 F.3d 544, 555 (9th Cir. 2016)).

Second, the Service's assertion that Joshua trees are not threatened in any significant portion of their range because the species allegedly doesn't have a "different status" in the lower elevations of its range than the rest of its range also misses the mark. 88 Fed. Reg. at 14558,

14559. Here, the Service seems to be unlawfully interpreting the "significant portion of its range" clause. The issue is whether the projected loss of a portion of the species' range is significant enough to warrant listing: be it a 66.8%, 88.6% or 99.8% habitat loss, the Service must rationally explain whether that loss constitutes a "significant portion of the range." *Zinke*, 900 F.3d at 1064; *Tucson Herpetological Soc'y*, 566 F.3d at 876-77; *WildEarth Guardians*, 561 F. Supp. 3d at 904. Once again, the Service failed to do so.

Finally, the best available science demonstrates that threats to *Y. brevifolia* are concentrated in its southern range. According to the 2023 SSA, YUBR South is currently comprised of 2,288,162 acres of occupied habitat. Under Scenario II, a projected total of 879,656 acres of this "analysis unit" will be lost to urban development by century's end (representing a greater than 50% change over current conditions). SSA, 103. The SSA also states that most large-scale energy projects are slated for this analysis unit, with up to 260,000 additional acres of *Y. brevifolia's* total range projected to be developed for renewable energy projects. *Id*. Further, at least 9% (195,108 acres) of YUBR South has already been destroyed or degraded as Joshua tree habitat from fires occurring since 1960. SSA, 105. These burned areas are quickly recolonized by invasive grasses and are at high risk of reburning. As such, the Service predicts that up to 18% of the projected climate refugia – the meager 20,000 acres that are expected to still meet the species' biological requirements – may burn in high severity fires that result in high Joshua tree mortality. SSA, 120. Thus, even were the Service to find the forecasted loss of 90 to 99.8% *Y. brevifolia's* habitat "unreliable," the combined threats of development and fire are projected to consume and destroy large swaths of *Y. brevifolia's* southern range. But again, there is simply no rational explanation for why this substantial projected loss constitutes an insignificant portion of the species' range.

E. The Service otherwise failed to properly consider and apply the five listing factors and conduct a proper listing analysis.

The Service reached a multitude of arbitrary findings that fall within the ESA's listing factors (A), (D), and (E). 16 U.S.C. § 1533(a)(1); 50 C.F.R. § 424.11(c). Chief among these arbitrary findings is that the Joshua tree does not warrant listing as threatened under either factor (A) ("the present or threatened destruction, modification, or curtailment of its habitat or range"), or factor (E) ("other natural or manmade factors"), due to the substantial projected loss of suitable habitat from climate change, or from the combined and cumulative threats of climate change, wildfire, and development, because some adult trees will still "occupy" this unsuitable habitat at century's end. The Service failed to apply the best available science in reaching this finding because "occupancy" does not demonstrate the species' viability—adult trees will simply be dying off and unable to replace themselves in this unsuitable habitat, *i.e.* functionally extinct. Overall, the Service improperly dismissed, misinterpreted and misapplied the best available science on threats from climate change, fire, habitat loss and degradation and cumulative threats.

Finally, the Service failed to sufficiently analyze the inadequacy of existing regulatory mechanisms to address the primary threats to Joshua tree, particularly climate change (factor D). Simply stating that the Clean Air Act and California's climate policies will help to reduce GHG emissions in the U.S., *see* 88 Fed. Reg. at 14544, falls short of demonstrating that existing regulatory mechanisms are robust enough to actually mitigate the threat climate change poses to Joshua trees such that listing the species as threatened is not warranted under this factor. Here,

the best available science, including the IPCC's most reports, reveal that existing regulatory mechanisms such as the Clean Air Act and California's climate policies are indeed inadequate to address the threats to Joshua tree from climate change. *See WildEarth Guardians*, 561 F. Supp. 3d at 905 (the Service cannot simply base its determination that existing regulatory mechanisms are adequate on its determination that threats to Joshua tree do not warrant its listing).

Conclusion

As set forth above, the Service acted arbitrarily and unlawfully in determining that Joshua trees are not threatened. The Service's 2023 listing decision is not premised on the best available science. The Service failed to rely on the best available scientific information in determining that climate change and other threats will not significantly impact Joshua trees in the foreseeable future. The Service also failed to draw rational conclusions from the scientific information before it. If the Service does not retract its not-warranted finding and issue a proposed rule listing Joshua trees as threatened within 60 days of the receipt of this letter, WildEarth Guardians intends to institute legal action to challenge the Service's determination in federal district court.

Sincerely,

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