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Via web

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Public Comments Processing

Attn: FWS-R4-ES-2018-0062

U.S. Fish and Wildlife Service, MS: BPHC

5275 Leesburg Pike

Falls Church, VA 22041-3803

Re: U.S. Fish and Wildlife Service's Proposal to Remove the Nashville crayfish (*Faxonius shoupi* / *Orconectes shoupi*) from the Federal List of Endangered and Threatened Wildlife

On behalf of the Southern Environmental Law Center, Cumberland River Compact, Harpeth Conservancy, Tennessee Chapter Sierra Club, and Tennessee Scenic Rivers Association, we submit these comments to express our opposition to the proposal of the U.S. Fish and Wildlife Service (Service) to remove the Nashville crayfish (Nashville crayfish or crayfish) from the federal list of endangered and threatened wildlife (Delisting Proposal).¹ As the Service has committed to extending, or re-opening, the comment period for the Delisting Proposal after January 27, we do not intend this initial comment to represent the entirety of our opposition to the Delisting Proposal.² Rather, this comment highlights a few of the most egregious deficiencies in the Delisting Proposal, in order to express, as early as possible, the urgent need for the Nashville crayfish to retain its status as endangered under the Endangered Species Act.

I. Background

The Nashville crayfish is found only in Mill Creek and its tributaries.³ As such, the species is only found on the edge of the most populous, and fastest-growing, city in the state of Tennessee.⁴ The Nashville crayfish was initially listed as endangered because of a basic fact of

¹ *Endangered and Threatened Wildlife and Plants; Removal of the Nashville Crayfish from the Federal List of Endangered and Threatened Wildlife*, 84 Fed. Reg. 65,098-65,112 (Nov. 26, 2019). (Delisting Proposal); <https://www.regulations.gov/docket?D=FWS-R4-ES-2018-0062>.

² **Att. 1**, Email from Amanda Garcia (SELC) to Lee Andrews (FWS) (Jan. 24, 2020). The Service committed to a public hearing and comment period extension in response to a January 9, 2019 letter from the Southern Environmental Law Center, Cumberland River Compact, and Mill Creek Watershed Association expressing that, due to the Service's failure to upload vital documents to the public Delisting Proposal docket until 43 days after posting the Delisting Proposal, the Service must extend the comment period in order to allow the public to develop informed comments. **Att. 2**, Comment letter submitted to FWS by SELC *et al.* requesting comment period extension for delisting of Nashville crayfish (Jan. 9, 2020).

³ Delisting Proposal, 65,098.

⁴ **Att. 3**, Samuel Stebbins, *Viva Las Vegas, here's the fastest growing cities in each state and Sin City is among them*, USA TODAY (Apr. 22, 2019), <https://www.usatoday.com/story/money/2019/04/22/the-fastest-growing-city-in-each-state/39362311/> (Nashville as fastest-growing city in Tennessee in 2019).

its existence: it is a little animal, living in one little watershed, right next to a very big city. The Nashville crayfish's range is highly restricted; because it has so little room for retreat, any threats to that range are disproportionately detrimental to the species' chance of survival.

On November 26, 2019, the Service proposed to remove the Nashville crayfish from the federal list of endangered and threatened wildlife. To justify delisting a species, the Service generally shows two things. First, the species' population and dispersal must have increased to, or at least stabilized at, a point where the threat of stochastic events like catastrophic toxic spills is reasonably mitigated.⁵ Second, there must be sufficient mechanisms in place, or enough overall habitat improvement, to ensure that removing the species from the Endangered Species Act's protection wouldn't immediately drive the species back to the brink.⁶ The Service has not met its burden with respect to either showing.

The Service determined that the Nashville crayfish was endangered 34 years ago, in 1986. The factors which led to its listing—an extremely limited geographic range suffering from water quality deterioration due to extensive and growing development—remain just as relevant today as three decades ago. As in 1986, the Nashville crayfish's range is limited to the Mill Creek watershed, “[t]he lower watershed lies within the highly urbanized Nashville,” and even the uppermost segment remains “degraded by organic enrichment and ha[s] very poor water quality.”⁷ As in 1986, the crayfish's “restricted range makes it very vulnerable to a single catastrophic event, such as a chemical spill.”⁸ And, as in 1986, “there is currently no State law that provides *specific protection* for the species' habitat.”⁹

In the Delisting Proposal, the Service does not even attempt to assert that any of these threats have been ameliorated—it cannot, since the threats have only grown worse. Development and the accompanying water quality deterioration continue apace throughout the crayfish's limited range, which both damages the crayfish's habitat and increases the chance of catastrophic spills. Climate change exacerbates this threat, with most analyses predicting increased precipitation and flooding in central Tennessee, further magnifying the risks of toxic spills or the introduction of other pollutants into the waterways from stormwater runoff. Though there are more water quality protections in place now than in 1986, as a result of regulatory additions to the Clean Water Act, state laws about baitfish, and voluntary conservation efforts by private parties, none of these would specifically protect the Nashville crayfish, or its habitat, from the relentless pace of development and construction in Davidson and Williamson Counties. And even these inadequate protections are under threat, as the Environmental Protection Agency has recently released a new rule severely cutting back Clean Water Act protection for small streams that lack consistent flow—a common characteristic of headwaters and small tributaries.¹⁰

⁵ **Att. 4**, Dale D. Goble, *The Endangered Species Act: What We Talk About When We Talk About Recovery*, 49 NAT. RESOURCES J. 1, 17–18 (2009).

⁶ *Id.*

⁷ **Att. 5**, *Endangered and Threatened Wildlife and Plants; Determination of Endangered Species Status for the Nashville Crayfish (Orconectes shoupi)*, 51 Fed. Reg. 34,410-11.

⁸ *Id.*

⁹ *Id.* (emphasis added).

¹⁰ **Att. 6**, U. S. Environmental Protection Agency, *Final Rule: The Navigable Waters Protection Rule*, <https://www.epa.gov/nwpr/final-rule-navigable-waters-protection-rule> (awaiting publication in the Federal Register); **Att. 7**, K. M. Fritz, B. R. Johnson, and D. M. Walters, *Field Operations Manual for Assessing the*

The Service attempts to justify ignoring all of these threats by pointing to the Nashville crayfish's resilience and hardiness. The data that the Service uses to conclude that the crayfish population is resilient, however, is incomplete and badly out-of-date; it simply does not provide enough information for the sweeping conclusions the Service draws in the Delisting Proposal about species stability. Without better data, the Service's conclusion that that crayfish population is viable is unreasonable.

Even assuming, despite the lack of convincing data, that the Nashville crayfish population is stable, it does not necessarily follow that the species will remain stable in the future. A stable population in a highly restricted area next to a major urban center is still inherently vulnerable to stochastic events like prolonged droughts or catastrophic spills, since there are no other geographically distinct populations to buffer the impact. Furthermore, the Endangered Species Act has been protecting the Mill Creek watershed for the past three decades; it is completely plausible—indeed, likely—that Mill Creek would be in even worse condition if the Nashville crayfish had not been listed as endangered. Absent stronger evidence that the crayfish population is both currently viable, and also able to withstand the increasing threats surrounding it absent the Act's protection, any decision to take the Nashville crayfish off the endangered species list is premature and unfounded.

II. Legal standard

The Endangered Species Act is “the most comprehensive legislation for the preservation of endangered species ever enacted by any nation,” and represents a commitment “to halt and reverse the trend toward species extinction, whatever the cost.” *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180-84 (1978). A species is “endangered” if it “is in danger of extinction throughout all or a significant portion of its range.” 16 U.S.C.A. § 1532(6).¹¹ A species must be placed on the endangered species list if the Service determines that it is endangered or threatened by any one, or a combination of, the following factors:

- (1) The present or threatened destruction, modification, or curtailment of its habitat or range;
- (2) Overutilization for commercial, recreational, scientific, or educational purposes;
- (3) Disease or predation;
- (4) The inadequacy of existing regulatory mechanisms; or
- (5) Other natural or manmade factors affecting its continued existence.

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

Hydrologic Permanence and Ecological Condition of Headwater Streams, EPA/600/R-06/126, U.S. Environmental Protection Agency, Office of Research and Development, Washington DC (2006), 13 (“Headwater streams are narrower, shallower, have higher drainage density, and are more likely to dry than larger streams and rivers.”).

¹¹ A species is “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.A. § 1532(20).

To be delisted, the Service must, “after conducting a status review based on the best scientific and commercial data available,” make a determination that the species is extinct, does not meet the definition of a species, or “does not meet the definition of an endangered or threatened species.” 50 C.F.R. § 424.11(e). To make this determination, the Service must “consider the same factors and apply the same standards” as those used in listing a species. *Id.*

III. The threats which caused the Nashville crayfish to be listed in the first place have only become more serious in the past three decades, and will be exacerbated by climate change in the next 25 years.

A. Habitat destruction

The Service acknowledges that “[t]he primary risk factor affecting the status of the Nashville crayfish is development in the Mill Creek watershed that results in destruction or alteration of habitat,” and this threat was “a primary factor in [its] decision to list the species in 1986.”¹² Increased development “leads to increased impervious cover, which in turn often leads to water quality deterioration,” such as “siltation, stream alteration, and urban runoff (particularly of phosphorus).”¹³ Additionally, “[d]evelopment often results in removal of riparian vegetation and canopy cover over the stream that may result in bank collapse.”¹⁴ Based on the Nashville crayfish’s most recent 5-year-review, which recommended changing the status of the crayfish from “endangered” to “threatened,”¹⁵ the Service completed a Species Status Assessment (Assessment).¹⁶ The Assessment acknowledged large projected increases in land development and impervious surface coverage in the Mill Creek watershed by 2040.¹⁷

Development in the Nashville area has only increased in intensity since 1986. The Service itself notes that between 2010 and 2013, the population of Davidson County grew by 5.1 percent, and the population of Williamson County by 8.6 percent.¹⁸ In a 2016 study on the impact of climate change on vulnerable Southeastern ecosystems, the United States Geological Survey noted that the population of the Nashville metropolitan area “is projected to nearly double by 2030.”¹⁹ The upper reaches of the Mill Creek watershed, which used to be primarily

¹² Delisting Proposal, 65,103.

¹³ *Id.* See also **Att. 8**, J. F. Coles *et al.*, *Effects of urban development on stream ecosystems in nine metropolitan study areas across the United States*, U.S. Geological Survey Circular 1373 (2012), <https://pubs.usgs.gov/circ/1373/pdf/Circular1373.pdf>.

¹⁴ *Id.*

¹⁵ U.S. Fish and Wildlife Service, *Nashville crayfish (Orconectes shoupi) 5 –Year Review: Summary and Evaluation* (2017), 21.

¹⁶ Delisting Proposal, 65,099. The Service uses the Species Status Assessment document as a framework “to deliver foundational science for informing all [Endangered Species Act] decisions,” and it is meant to assess species viability, progress towards recovery, and degree of vulnerability from human or natural threats. **Att. 9**, U.S. Fish and Wildlife Service, *Species Status Assessment Framework: An Integrated Framework for Conservation* (2016), https://www.fws.gov/endangered/improving_esa/pdf/SSA_Fact_Sheet-August_2016.pdf.

¹⁷ U.S. Fish and Wildlife Service, *Species Status Assessment Report for the Nashville Crayfish (Orconectes shoupi)* (July 2018), 46-47 (Assessment).

¹⁸ *Id.* at 43.

¹⁹ **Att. 10**, Jennifer Costanza *et al.*, *Assessing climate-sensitive ecosystems in the Southeastern United States*, U.S. Geological Survey Open-File Report 2016–1073 (2016), 136, <http://dx.doi.org/10.3133/ofr20161073>.

rural and agricultural, are being developed for residential purposes.²⁰ In its Climate Adaptation Plan, the Nashville Area Metropolitan Planning Organization reports that population forecasts for the Nashville Metro region “estimate an additional one million more people to reside in this area by 2040, which equates to an increase of over 75%.”²¹ Williamson and Rutherford Counties, in particular, are expected to see an extreme rate of growth and sprawl in the next several decades.²²

Urban and suburban sprawl increases impervious surface coverage, as well as decreasing the overall tree canopy; in turn, this “alters hydrologic cycles by increasing the speed, temperature, and pollution of waters entering streams, which can lead to flooding and landslides.”²³ The Tennessee Wildlife Resource Agency’s (TWRA) 2015 Tennessee State Wildlife Action Plan indicates that potential urban growth poses a high to very high risk to Mill Creek and its tributaries, particularly the headwaters.²⁴ Urbanization is also associated with decreased direct groundwater recharge, which can lower stream baseflow.²⁵

The Service appears to take the position that the Nashville crayfish is so resilient that, even in the face of rapidly increasing development (with the accompanying spread of impervious surfaces, increased erosion, siltation, sedimentation, and other decreases in water quality), its population will continue to be stable through the foreseeable future. The justification for this position is that, “despite the increased development, the species has been found in several locations and in large numbers.”²⁶ Despite numerous threats to the crayfish’s habitat, such as “potentially toxic chemicals and lubricants” released from bore holes, “improper use or overuse of lawn pesticides and fertilizers,” “consistent stormwater and sediment inputs to the Mill Creek watershed,” and “frequent spills/releases of raw sewage and hazardous substances,” the crayfish “persists in high numbers.”²⁷ Therefore, the Service concludes, “[t]he species exhibits a high degree of resistance to disturbance, indicating the species has a low susceptibility to threats and a high degree of stability.”²⁸

This position has several major flaws.

Most fundamentally, even if the crayfish is highly resilient, that does not mean its ability to withstand water pollution in its extremely restricted range is unlimited. All species have limits. The Service would not contest that, were the entire Mill Creek watershed channelized, with no slab rock at all, the crayfish would not be able to survive. The question the Service must answer

²⁰ Assessment, 43.

²¹ **Att. 11**, Nashville Area Metropolitan Planning Organization, *Building Resilience: A Climate Adaptation Plan (Draft)*, 46, http://www.nashvillempo.org/docs/BuildingResilience_DRAFT.pdf.

²² *Id.* at 49.

²³ *Id.* at 72.

²⁴ **Att. 12**, Tennessee State Wildlife Action Plan Team, *Tennessee State Wildlife Action Plan 2015*, Tennessee Wildlife Resources Agency (2015), 77, <http://www.tnswap.com/pdf/2015swap.pdf>.

²⁵ **Att. 13**, Michael O’Driscoll *et al.*, *Urbanization Effects on Watershed Hydrology and In-Stream Processes in the Southern United States*, *Water* 2010, 2 (2010), 615, <https://www.mdpi.com/2073-4441/2/3/605/html>.

²⁶ Delisting Proposal, 65,103.

²⁷ *Id.* at 65,104.

²⁸ *Id.*

is not whether the crayfish is, indeed, a “hardy beast,”²⁹ but whether the continued threat of habitat destruction due to development is one that could lead to the crayfish’s extinction were the protections of the Endangered Species Act removed. The Service has not even asked that question, and certainly has not answered it.

At the risk of stating the obvious, the species has survived the past 34 years of increasingly intensive development throughout its range while enjoying the Endangered Species Act’s protections. The Endangered Species Act requires federal agencies to consult with the Service to ensure actions they take are not likely to jeopardize the crayfish. 16 U.S.C.A. § 1536. It also prohibits take, even by private parties, which prevents developers from recklessly destroying crayfish habitat. 16 U.S.C.A. § 1538. Thus, the examples the Service now provides about the species’ “hardiness” have all occurred within the context of the protections of the Endangered Species Act, which have, until now, prevented the most apocalyptic habitat destruction from occurring.

The Clean Water Act and Tennessee Water Quality Control Act, in contrast, do not provide specific protection for species habitat, which the Service acknowledges.³⁰ Although both laws serve a vital role in protecting Tennessee’s waters, they are limited; the agencies implementing them are often understaffed in comparison to the number of operations they are expected to oversee, notices of violation are generally only issued after pollution has already occurred, and the penalties associated with those violations are often not severe enough to deter future violations.³¹ The Clean Water Act has also been substantially weakened by new regulations that limit the protection available to small streams without continuous flow—a common feature of headwaters and small tributaries.³²

Second, despite the Service’s statement that the only area that the species was known to have been “negatively impacted” was near a toxic release spill from the airport, its own evidence does not bear this out. Although the Service has not seen fit to undertake comprehensive long-term population studies of the Nashville crayfish prior to the Delisting Proposal, one of the studies it does rely on shows that the crayfish population is lower in the lower portions of Mill Creek—in other words, the more heavily polluted, urbanized areas.³³ The study’s author concludes that, “[w]hile we cannot be certain that land use in the watershed explains the higher densities of Nashville Crayfish that were found at upstream sites, the data supports this

²⁹ **Att. 14**, NatureServe, *NatureServe Explorer: An online encyclopedia of life [web application]*, Version 7.1, NatureServe, Arlington, Virginia (2019), accessed January 27, 2020, <http://explorer.natureserve.org/servlet/NatureServe?searchName=Orconectes+shoupi>.

³⁰ Delisting Proposal, 65,105.

³¹ *Id.*

³² **Att. 6**, U. S. Environmental Protection Agency, *Final Rule: The Navigable Waters Protection Rule*, <https://www.epa.gov/nwpr/final-rule-navigable-waters-protection-rule> (awaiting publication in the Federal Register); **Att. 7**, K. M. Fritz, B. R. Johnson, and D. M. Walters, *Field Operations Manual for Assessing the Hydrologic Permanence and Ecological Condition of Headwater Streams*, EPA/600/R-06/126, U.S. Environmental Protection Agency, Office of Research and Development, Washington DC (2006), 13.

³³ **Att. 15**, Dale McGinnity, *2016 Project Overview Report for: Long Term Population Monitoring for the Endangered Nashville Crayfish (Orconectes shoupi)*, Cooperative Agreement with U.S. Fish and Wildlife (Sept. 30, 2016), 9 (Nashville Zoo Study) (table showing progressively smaller average crayfish numbers moving downstream).

hypothesis.”³⁴ This five-year study, conducted between 2012 and 2016, represents the most recent rigorous population data referenced in the Assessment, and it seems to contradict the conclusion reached by the Service about one of the most fundamental aspects of the Delisting Proposal: whether increased development negatively affects the Nashville crayfish population.

Even in the absence of data directly showing Nashville crayfish decline as a consequence of development, the Service may not infer that development has no negative impact on the crayfish. *See Tucson Herpetological Soc’y v. Salazar*, 566 F.3d 870, 879 (9th Cir.2009) (“If the science on population size and trends is undeveloped and unclear, the Secretary cannot reasonably infer that the absence of evidence of population decline equates to evidence of persistence.”). Habitat alteration as result of development, including sedimentation and siltation, has a known negative impact on aquatic biological communities generally,³⁵ and what evidence does exist—the Nashville Zoo study—seems to suggest that this includes the Nashville crayfish as well. *See Motor Vehicle Mfrs. Ass’n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 57 (1983) (rejecting agency rationale when “every indication in the record points the other way” (internal quotation marks omitted)). The Service has presented no evidence that the Nashville crayfish, unlike other freshwater organisms, suffers no ill effects from water quality degradation as a result of development, and “[t]he lack of any data showing a population decline due to [a specific threat]” is not sufficient to demonstrate “population stability in the face of [that threat].” *Greater Yellowstone Coal., Inc. v. Servheen*, 665 F.3d 1015, 1020-30 (9th Cir. 2011).³⁶

B. Climate change

The Service devotes two paragraphs of the Delisting Proposal to exploring how climate change threatens the Nashville crayfish, and notes that expected effects of climate change in the southeastern United States include more frequent droughts, flooding, more extreme heat, and more intense storms.³⁷ The Service states that “[s]pecific effects of climate change to crayfish habitat could include changes in stream temperature regimes; the timing and levels of precipitation, causing more frequent and severe floods and droughts; and alien species introductions.”³⁸ Additionally, the Service recognizes the possibility of synergistic effects of climate change and rapid development.³⁹

Despite all these impacts, the Service has apparently decided to ignore the threat of climate change. The Service claims that, beyond the 20-25 year projection timeframe it has

³⁴ *Id.* at 10. *See infra*, section IV B.

³⁵ **Att. 8**, J. F. Coles *et al.*, *Effects of urban development on stream ecosystems in nine metropolitan study areas across the United States*, U.S. Geological Survey Circular 1373 (2012), 4, <https://pubs.usgs.gov/circ/1373/pdf/Circular1373.pdf>.

³⁶ *See also Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv.*, 342 F. Supp. 3d 968, 974 (N.D. Cal. 2018), *amended in part*, No. C 16-06040 WHA, 2018 WL 6067546 (N.D. Cal. Nov. 20, 2018), *appeal dismissed sub nom. Ctr. for Biological Diversity v. United States Fish & Wildlife Serv.*, No. 19-15102, 2019 WL 1762190 (9th Cir. Apr. 10, 2019) (holding that the Service’s failure “to come to grips” with study showing an increase in fisher toxicant exposure, and instead concluding, “ipse dixit style” that the best evidence did not support concluding that the impacts rose to the level of a threat, was arbitrary and capricious).

³⁷ Delisting Proposal, 65,106.

³⁸ *Id.*

³⁹ *Id.*

decided to use, “much uncertainty remains in both the degree of climate change and the species’ response to changes in precipitation and temperature.”⁴⁰ Since the Service claims that it lacks information on how future droughts or temperature changes will affect specific species in specific streams it concludes that, though “future impacts due to the effects of climate change may reduce the resiliency of the species,” “the long-term effects remain unknown.”⁴¹

The impacts of climate change, particularly on longer time frames, are admittedly difficult to predict with certainty. However, this does not absolve the Service from taking climate change’s impacts into account when assessing the Nashville crayfish’s future viability. There is a large amount of evidence to suggest that Tennessee will suffer from increased flooding, droughts, and temperature. TWRA’s 2015 State Wildlife Action Plan lists three main climate change drivers that lead to vulnerability for Tennessee’s wildlife: changes in precipitation timing and duration, increasing temperatures, and altered disturbances (e.g., fire, wind damage, ice storms).⁴² Nashville crayfish are most in danger from the first, which can cause both increased droughts and increased floods; this, in turn, can “lead to habitat destabilization,” as well as potentially exacerbating “the input of excess nutrients and toxicity loading” due to increases in stormwater runoff.⁴³

A United States Geological Survey study of climate change impacts on the Nashville Basin ecosystem region notes that, though there is a “high degree of uncertainty among climate models” regarding projected changes in temperature and precipitation, the model projections, “as a whole... predict an increase in variability for precipitation in the future.”⁴⁴ The Environmental Protection Agency also predicts increased flooding and droughts in Tennessee, and notes that “periods of extreme rainfall can increase the impacts of pollution on streams.”⁴⁵

A 2009 TWRA report on climate change’s impacts on wildlife states that “[d]roughts reduce invertebrate production,” and that “populations that are already stressed (such as many [threatened and endangered] species) may not be able to withstand a severe drought.”⁴⁶ Increased precipitation “will increase non-point run off issues that already plague aquatic habitats,” such as sedimentation, pesticides, and fertilizers; additionally, “[i]ncreased flooding will increase the likelihood that aquatic invasive species will spread to new rivers, streams, and lakes.”⁴⁷ A 2015 update to this report notes that both precipitation variability year to year and the frequency of extreme precipitation events have risen in the past decades.⁴⁸ Increased frequency of droughts is

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² **Att. 12**, Tennessee State Wildlife Action Plan Team, *Tennessee State Wildlife Action Plan 2015*, Tennessee Wildlife Resources Agency (2015), 154, <http://www.tnswap.com/pdf/2015swap.pdf>.

⁴³ *Id.*

⁴⁴ **Att. 10**, Jennifer Costanza *et al.*, *Assessing climate-sensitive ecosystems in the Southeastern United States*, U.S. Geological Survey Open-File Report 2016–1073 (2016), 133, <http://dx.doi.org/10.3133/ofr20161073>.

⁴⁵ **Att. 16**, U.S. Environmental Protection Agency, *What Climate Change Means for Tennessee* (August 2016), <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-tn.pdf>.

⁴⁶ **Att. 17**, Tennessee Wildlife Resources Agency, *Climate Change and Potential Impacts to Wildlife in Tennessee: An Update to Tennessee’s State Wildlife Action Plan* (2009), 89, <http://www.tnswap.com/files/tnclimatechange.pdf>.

⁴⁷ *Id.* at 90.

⁴⁸ **Att. 18**, P. Glick *et al.*, *Climate Change Vulnerability Assessment for Tennessee Wildlife and Habitats*, Report prepared by the National Wildlife Federation and The Nature Conservancy – Tennessee for the Tennessee Wildlife Resources Agency (2015), 6, http://tnswap.com/files/TNSWAP_2015VulnerAssmt.pdf.

“likely to contribute to more-frequent stream drying events, even in those systems that are considered perennial,” which may in turn “increase the frequency of local species extirpations.”⁴⁹ Increased human demand for water in drought conditions may also influence streamflows negatively.⁵⁰

Climate change has caused, and will continue to cause, major changes to global temperature and weather patterns, and Middle Tennessee is no exception. Although the Service is correct that the impact of climate change in the near term, particularly in highly specific areas, can’t be predicted with certainty, that does not mean that *there are no impacts*. The Service’s reliance on uncertainty to justify its refusal to fully consider foreseeable climate change impacts is unreasonable. The Service may not “simply invoke ‘scientific uncertainty’ to justify its action.” *Greater Yellowstone Coal., Inc. v. Servheen*, 665 F.3d 1015, 1028 (9th Cir. 2011). The Service must explain why this uncertainty “counsels in favor of delisting now, rather than, for example, more study.” *Id.*⁵¹ By using uncertainty to avoid taking climate change’s impacts into account, despite a wealth of studies agreeing in their predictions about increased precipitation and extreme weather events in Tennessee, the Service is failing its statutory mandate to use the “best scientific and commercial data available.” 16 U.S.C.A. § 1533(b)(1)(A).

IV. The Service lacks the data necessary to draw positive conclusions about species viability.

A. The Element Occurrence data is not sufficient to indicate persistence, range, or resilience.

In the Delisting Proposal, the Service states that the Assessment “measured resiliency at the population segment level, but also reported resiliency in total stream miles.”⁵² This reliance on “population segments” was because there was “insufficient information on dispersal and genetics to accurately delineate demographic populations for Nashville crayfish.”⁵³ These segments were delineated using “habitat quality” and “species occurrence data from natural heritage data of the Tennessee Department of Environment and Conservation (TDEC) and opinions of species experts.”⁵⁴ The “species occurrence data” refers to “Element Occurrence (EO)” data taken from TDEC’s Natural Heritage Data shapefiles.⁵⁵ EO data “represent survey detections for Nashville crayfish conducted since 1985, and each EO has an associated EO viability score.”⁵⁶ The Service states that the EO viability scores “provide a succinct assessment of the estimated viability of the species” at the time the viability score was recorded.⁵⁷ This resulted in, ultimately, 10 population segments.

⁴⁹ *Id.* at 47.

⁵⁰ *Id.*

⁵¹ See also *Motor Vehicle Mfrs. Ass’n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 52 (1983) (although “policymaking in a complex society must account for uncertainty, [that] does not imply that it is sufficient for an agency to merely recite the terms ‘substantial uncertainty’ as a justification for its actions.”).

⁵² Delisting Proposal, 65,100-01.

⁵³ *Id.* at 65,101.

⁵⁴ *Id.* The Service does not appear to have provided public access to any of these expert opinions.

⁵⁵ *Id.*

⁵⁶ *Id.* at 65,101-02.

⁵⁷ *Id.* at 65,102.

The Service states that there “has been no change in the distribution of the species within its historical range,” citing its own unpublished data, with no other corroboration or ability to scrutinize that statement.⁵⁸ Based on the Assessment, much of this claim appears to rest on EO data. However, the Service’s use of *all* the data from 1985 to the present to show species persistence obscures how temporally skewed the Natural Heritage Data actually is. The Southern Environmental Law Center requested all the EO data about the Nashville crayfish from TDEC, and received data showing 113 EO data collection sites.⁵⁹ What the Service never makes clear in the Assessment, or the Delisting Proposal, is that only *seven* of these sites recorded any EO data for the crayfish after 2010. Despite this obvious data gap, which is particularly egregious given the rapid pace of development in Nashville in the past decade,⁶⁰ the Service appears to use this data as a primary source for its conclusion that “the Nashville crayfish has remained stable throughout the Mill Creek watershed.”⁶¹

The Service uses this 1985-present data to show *current range* in several figures throughout the Assessment (Figures 2, 8, and 9), with a red dot showing known crayfish sightings, despite the fact that only approximately 6% of those sightings occurred in the last decade.⁶² This decision is particularly deceptive in Figure 9, which overlays post-1985 detections with impaired and healthy waterways based on the Environmental Protection Agency’s 2014 303(d) listed streams to show that “Nashville crayfish persist despite these water quality impairments.”⁶³ Only *three* of the EO sightings in Figure 9 are from 2014 or later; it is perfectly possible that crayfish are less abundant than they used to be in impaired waters versus healthy waters, but it would be impossible to tell either way from this map.⁶⁴ The Service had the data and ability to color-code the dates to show change over time, but chose not to do so, even though it seriously reduces the explanatory power of this figure. Water quality degradation is known to have a negative impact on aquatic life in general,⁶⁵ and the Service has no justification in its decision to assume, without evidence, that crayfish continue to persist in every location they’ve been spotted in the past three decades despite intervening water quality deterioration.

⁵⁸ Assessment, 5

⁵⁹ The EO data on the Nashville crayfish was provided to us by the Tennessee Natural Heritage Program, a division of TDEC.

⁶⁰ **Att. 3**, Samuel Stebbins, *Viva Las Vegas, here's the fastest growing cities in each state and Sin City is among them*, USA TODAY (Apr. 22, 2019), <https://www.usatoday.com/story/money/2019/04/22/the-fastest-growing-city-in-each-state/39362311/> (Nashville-Davidson-Murfreesboro-Franklin metro area had 15.2% population growth between 2010 and 2018, compared with 6.5% statewide).

⁶¹ Delisting Proposal, 65,099. The other “surveys” mentioned, the Nashville Zoo study and the Sevenmile Creek study, both represent only portions of the watershed (the main stem of Mill Creek and Sevenmile Creek) for limited time periods (five years and two years); the Sevenmile Creek study is also almost two decades old (1999-2001). *Id.*

⁶² Assessment, 6; 23; 26. If they’re using additional sources apart from the EO set, they haven’t specified what those are, or where to find them.

⁶³ *Id.* at 31.

⁶⁴ *Id.* at 26.

⁶⁵ **Att. 8**, J. F. Coles *et al.*, *Effects of urban development on stream ecosystems in nine metropolitan study areas across the United States*, U.S. Geological Survey Circular 1373 (2012), 2, <https://pubs.usgs.gov/circ/1373/pdf/Circular1373.pdf>.

B. The other population data used is too limited to draw any definite conclusions about population trends over time, and the Service's conclusions seem to contradict the conclusions of the researchers.

The Service's reliance on incomplete EO data is even more troubling because there is little other population data available. The Service states that population estimates for the crayfish are "limited to the mainstem of Mill Creek and Sevenmile Creek."⁶⁶ Those population estimates are themselves limited, with the most recent data coming from the Nashville Zoo's Mill Creek surveys ending in 2016 (Nashville Zoo study).⁶⁷ The Nashville Zoo study, which took crayfish population samples once per year for five years at three sites in Mill Creek, and once per year for three years at two other locations in Mill Creek, is the most comprehensive population study on Nashville crayfish that is cited in the Delisting Proposal or the Assessment.

Two of the initial sites selected for the study in Mill Creek tributaries had to be abandoned, because "[t]he sampling protocols as written were not sensitive enough to detect the low numbers of Nashville Crayfish at these sites."⁶⁸ The Service's summary of this study in the Delisting Proposal omits mentioning these two abandoned sites. The Service states that the study, "conducted between 2011 and 2015 [sic]," documented "a total of 1,763 crayfish per 100 linear meters at five main stem Mill Creek sampling sites," and that the study indicated that Nashville crayfish were the "predominant species, comprising more than 90 percent of all crayfish documented at all five sites surveyed."⁶⁹ This seems to imply, falsely, that all five mainstem sites were surveyed for five years, when in fact *only three* mainstem sites were studied for five years, and the other two mainstem sites (added after the failure of the methodology at the two tributary sites for two years) were only monitored for three years.⁷⁰

The Service goes on to state that "[a]ccording to these surveys", including the Nashville Zoo study, "the Nashville crayfish has remained stable throughout the Mill Creek watershed."⁷¹ But the Nashville Zoo study states explicitly that the Nashville crayfish population was so low at the initially selected tributary sites that the researchers could not continue collecting data at those sites. The Sevenmile Creek survey only collected data in Mill Creek and one tributary, between 1999 and 2001.⁷² The Assessment states that "[r]esults of surveys conducted between 1988 and 2003 indicate that the Nashville crayfish occurs primarily in the middle-to-upper reaches of the Mill Creek system."⁷³ The collection sites of those surveys appear to have all been on the Mill

⁶⁶ Delisting Proposal, 65,099.

⁶⁷ *Id.*

⁶⁸ **Att. 15**, Nashville Zoo Study, 3.

⁶⁹ Delisting Proposal, 65,099. The 1,763 figure cited does not seem accurate. The Nashville Zoo study states that "[a] total of 1,763 crayfish have been documented while conducting the long term population monitoring protocols," and then later gives the following estimates of crayfish population per 100 meter sampling site: Mile 5.5 (658.5), Mile 13.6 (699.0), and Mile 20.8 (1916). **Att. 15**, Nashville Zoo Study, 1, 9. over the last 5 years,"

⁷⁰ *Id.* at 2.

⁷¹ Delisting Proposal, 65,099.

⁷² *Id.*

⁷³ Assessment, 29-30.

Creek mainstem.⁷⁴ The Service therefore has almost no current (within the last decade) information on the population levels of Nashville crayfish in Mill Creek's tributaries.

Additionally, although the Nashville Zoo study did show stable populations in the three mainstem Mill Creek sites over the five year period, it also showed that the crayfish population is lower in the more urbanized and polluted lower reaches of Mill Creek.⁷⁵ Although this is not conclusive evidence that the crayfish is negatively impacted by pollution caused by land use, the study's author notes that "the data supports this hypothesis."⁷⁶ The author also notes that "[t]he upper portion of the watershed may serve as a reservoir population of Nashville crayfish that may repopulate lower parts of the watershed after major floods potentially compromise populations there."⁷⁷ Any damage to crayfish populations in the upper portion of the watershed may therefore be of particular importance, as "flooding will likely be worse in the future," and that "toxic pollutants will also be more likely in stormwater runoff after flooding events which may negatively impact crayfish populations."⁷⁸ When considered in light of the consensus view of researchers that middle Tennessee is likely to experience increased flooding in coming years due to climate change, this threat becomes even more concerning.⁷⁹

Although the Service's mandate is to use "the best available data," and not the "best possible data," the Service cannot "affirmatively rely on limited and inconclusive studies (which the Service itself recognizes as 'imperfect') as evidence of persistence, and in turn use this 'evidence' of persistence as proof that the stressors pose no threat to the [species]." *Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv.*, 342 F. Supp. 3d 968, 978–79 (N.D. Cal. 2018), *amended in part*, No. C 16-06040 WHA, 2018 WL 6067546 (N.D. Cal. Nov. 20, 2018), *appeal dismissed sub nom. Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv.*, No. 19-15102, 2019 WL 1762190 (9th Cir. Apr. 10, 2019).

When there is limited data, it is often the case that no conclusion may be reached; the Service must make an affirmative case that the limited and imperfect population data it has available is sufficient to *rationaly conclude* that the Nashville crayfish population is stable and viable throughout most of its range. *See Tucson Herpetological Soc. v. Salazar*, 566 F.3d 870, 879 (9th Cir. 2009) ("If the science on population size and trends is underdeveloped and unclear, the Secretary cannot reasonably infer that the absence of evidence of population decline equates to evidence of persistence."). Here, the limited data available to the Service has been interpreted by at least one expert in the field to support the opposite conclusion than the one reached by the

⁷⁴ *Id.* at 30.

⁷⁵ **Att. 15**, Nashville Zoo Study, 9.

⁷⁶ *Id.* at 10. An alternate theory for this phenomenon noted by the author is that the 2010 flood negatively impacted downstream populations more than upstream populations, and so downstream populations took longer to recover, resulting in the discrepancy. Although this also seems plausible, the continued lack of parity between upstream and downstream populations six years after the flood indicates that, if this theory is true, downstream populations are very vulnerable to flooding, and take a long time to recover, which is itself a reason to be concerned about development (as it increases flood risk).

⁷⁷ *Id.*

⁷⁸ *Id.*

⁷⁹ **Att. 16**, U.S. Environmental Protection Agency, *What Climate Change Means for Tennessee* (August 2016), <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-tn.pdf>.

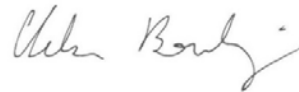
Service. Given its faulty reliance on EO data and the lack of longitudinal population data, the Service has offered no reasonable explanation for its own conclusion.

V. Conclusion

The Nashville crayfish continues to face the threats that caused it to be listed as endangered over three decades ago, including habitat destruction and the inherent vulnerability of its restricted range in proximity to a large and growing urban center. The Service acknowledges these continuing, and increasing, threats, but has proposed—without evidentiary support—that the Nashville crayfish will be fine anyway, even without the Endangered Species Act protections it has so far sheltered under. The Delisting Proposal is unreasonable and unscientific, and should be withdrawn.

Thank you for your consideration of these comments.

Sincerely,



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Attachment List

- Att. 1,** Email from Amanda Garcia (SELC) to Lee Andrews (FWS) (Jan. 24, 2020)
- Att. 2,** Comment letter submitted to FWS by SELC *et al.* requesting comment period extension for delisting of Nashville crayfish (Jan. 9, 2020)
- Att. 3,** Samuel Stebbins, *Viva Las Vegas, here's the fastest growing cities in each state and Sin City is among them*, USA TODAY (Apr. 22, 2019), <https://www.usatoday.com/story/money/2019/04/22/the-fastest-growing-city-in-each-state/39362311/> (Nashville as fastest-growing city in Tennessee in 2019)
- Att. 4,** Dale D. Goble, *The Endangered Species Act: What We Talk About When We Talk About Recovery*, 49 NAT. RESOURCES J. 1 (2009)
- Att. 5,** *Endangered and Threatened Wildlife and Plants; Determination of Endangered Species Status for the Nashville Crayfish (Orconectes shoupi)*, 51 Fed. Reg. 34,410-11
- Att. 6,** U. S. Environmental Protection Agency, *Final Rule: The Navigable Waters Protection Rule*, <https://www.epa.gov/nwpr/final-rule-navigable-waters-protection-rule> (awaiting publication in the Federal Register)
- Att. 7,** K. M. Fritz, B. R. Johnson, and D. M. Walters, *Field Operations Manual for Assessing the Hydrologic Permanence and Ecological Condition of Headwater Streams*, EPA/600/ R-06/126, U.S. Environmental Protection Agency, Office of Research and Development, Washington DC (2006)
- Att. 8,** J. F. Coles *et al.*, *Effects of urban development on stream ecosystems in nine metropolitan study areas across the United States*, U.S. Geological Survey Circular 1373 (2012), <https://pubs.usgs.gov/circ/1373/pdf/Circular1373.pdf>
- Att. 9,** U.S. Fish and Wildlife Service, *Species Status Assessment Framework: An Integrated Framework for Conservation* (2016), https://www.fws.gov/endangered/improving_esa/pdf/SSA_Fact_Sheet-August_2016.pdf
- Att. 10,** Jennifer Costanza *et al.*, *Assessing climate-sensitive ecosystems in the Southeastern United States*, U.S. Geological Survey Open-File Report 2016–1073 (2016), <http://dx.doi.org/10.3133/ofr20161073>
- Att. 11,** Nashville Area Metropolitan Planning Organization, *Building Resilience: A Climate Adaptation Plan (Draft)*, http://www.nashvillempo.org/docs/BuildingResilience_DRAFT.pdf
- Att. 12,** Tennessee State Wildlife Action Plan Team, *Tennessee State Wildlife Action Plan 2015*, Tennessee Wildlife Resources Agency (2015), <http://www.tnswap.com/pdf/2015swap.pdf>

Att. 13, Michael O’Driscoll *et al.*, *Urbanization Effects on Watershed Hydrology and In-Stream Processes in the Southern United States*, Water 2010, 2 (2010), <https://www.mdpi.com/2073-4441/2/3/605/htm>

Att. 14, NatureServe, *NatureServe Explorer: An online encyclopedia of life [web application]*, Version 7.1, NatureServe, Arlington, Virginia (2019), accessed January 27, 2020, <http://explorer.natureserve.org/servlet/NatureServe?searchName=Orconectes+shoupi>

Att. 15, Dale McGinnity, *2016 Project Overview Report for: Long Term Population Monitoring for the Endangered Nashville Crayfish (Orconectes shoupi)*, Cooperative Agreement with U.S. Fish and Wildlife (Sept. 30, 2016) (Nashville Zoo Study)

Att. 16, U.S. Environmental Protection Agency, *What Climate Change Means for Tennessee* (August 2016), <https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-tn.pdf>

Att. 17, Tennessee Wildlife Resources Agency, *Climate Change and Potential Impacts to Wildlife in Tennessee: An Update to Tennessee’s State Wildlife Action Plan* (2009), <http://www.tnswap.com/files/tnclimatechange.pdf>

Att. 18, P. Glick *et al.*, *Climate Change Vulnerability Assessment for Tennessee Wildlife and Habitats*, Report prepared by the National Wildlife Federation and The Nature Conservancy – Tennessee for the Tennessee Wildlife Resources Agency (2015), http://tnswap.com/files/TNSWAP_2015VulnerAssmt.pdf