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To Whom It May Concern:

The American Society of Mammalogists (ASM) is a non-profit, professional, scientific, and educational Society consisting of nearly 2,400 members from all 50 United States and 60 other countries worldwide. The ASM was founded in 1919, and is the world's oldest and largest organization devoted to the study of mammals. We strongly support the conservation and responsible use of wild mammals based on current, sound, and accurate scientific knowledge. The Society has a long history of reviewing issues related to mammalian conservation, and where appropriate, adopting positions on issues concerning the conservation and responsible management of mammals and their habitats.

I am writing on behalf of the ASM to comment on the proposed rule (50 CFR 424) by the US Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), which will establish a regulatory definition of "habitat" in the context of the designation of critical habitat for listed species, a provision of Section 4 of the US Endangered Species Act (ESA) as amended (16 U.S.C. 1531 et seq.). The proposed rule defines "habitat" as:

> "The physical places that individuals of a species depend upon to carry out one or more life processes. Habitat includes areas with existing attributes that have the capacity to support individuals of the species."

The proposed rule also provides a second definition of habitat as an alternative to the first:

> "The physical places that individuals of a species use to carry out one or more life processes. Habitat includes areas where individuals of the species do not presently exist but have the capacity to support such individuals, only where the necessary attributes to support the species presently exist."

Both definitions include wording that strongly suggests that a recovery plan (for which critical habitat is a vehicle) could not use ecosystem restoration or habitat management in *unoccupied* areas in order to make those areas suitable to sustain the species. In other words, "attributes" that are currently missing from those unoccupied sites but could be restored to them by tools of ecosystem restoration (e.g., dam

removal, stream-channel restoration, understory thinning, invasive species removal, prescribed burning, etc.) could not be considered when deciding whether those areas qualified as "habitat." There is a tacit assumption in key phrases in both definitions—"existing attributes" and "where the necessary attributes to support the species presently exist"—that habitat is static. This assumption is counter to all scientific understanding about landscape ecology and the fundamentals of wildlife habitat management. The exclusion of *potential* habitat from consideration as suitable habitat (and thus critical habitat) for listed species presents an artificial and unnecessary barrier in the potential recovery plans for many species.

On the other hand, wording in these definitions also appears to exclude known threats to habitat, such as desertification and global climate change, in consideration of threats to taxa. This also counters all scientific data to date. Global climate change is amplifying desertification while leading to major changes in thermal profiles of habitats across the globe. This is forcing some species to retreat in search of suitable habitat that may occur outside of their current range. Recent research has confirmed that all but one of the 459 species listed under as endangered under the ESA are negatively impacted by climate change (Delach et al. 2019). Failure to incorporate this reality into management plans for biological diversity would be legislatively irresponsible, morally questionable, and according to a recent survey by the PEW Research Center (2020), it counters the preferences of the American public.

We address two specific concerns with these proposed definitions. First, when considering whether an area is habitat for a vertebrate animal, including mammals, very often the physical attributes are present but the biotic attributes are not, generally reflecting degradation, succession, fire suppression, and other processes that occur without active management. At its simplest, this applies to any species that is a seral-stage specialist, whether it favors early (fire-dependent) or a late (old-growth dependent) seral-stages. In the former category, the state-threatened southeastern pocket gopher (*Geomys pinetus*) has been extirpated from >76% of its historic distribution in Georgia largely due to fire suppression and succession of its open understory habitat to an undesirable shrub and woodland stage (GDNR 2008). Suitable soils (the most important physical environmental variable for this species) exist in all of its former localities that have not been developed or cultivated, but the structure and composition of the plant community (especially succulent tubers of perennial grasses) precludes colonization or subsistence. Only modest and limited management efforts are needed to convert such locations to "good habitat" (open-understory pine savanna) for this species, but the proposed definitions would disallow such management.

As an example of the other extreme, the Sonoma tree vole (*Arborimus pomo*) and the red tree vole (*Arborimus longicaudus*) depend on a shrinking landscape of old-growth forest fragments in a limited range of coastal Oregon and northwestern California (Dunk and Hawley 2009, Forsman et al. 2016). The former is a Species of Special Concern in California (CNDDB 2020); the latter is similarly listed in Oregon (ODFW 2020, USFWS 2020). With ongoing loss of optimal habitats (old-growth stands of mesic forest), younger but maturing stands could readily be managed as future habitat in order to reverse the declining population trend; such efforts could effectively integrate biodiversity management with contemporary sustainable logging operations. Ironically, USFWS in late 2019 denied a petition to list the north Oregon coast Distinct Population Segment of the red tree vole as threatened or endangered because it reasoned that maturing stands of unoccupied forest would soon allow the species to expand its range into these areas (USFWS 2019). By the proposed definitions in this rule, these maturing stands would have neither "*existing* attributes" of suitable habitat for the red tree vole nor "necessary attributes to support the species [that] presently exist". If the USFWS adopts the proposed definition, would it then have to revisit its decision to deny listing the red tree vole, because the logic it used to deny that petition will directly contradict the new rule?

The goal of the critical habitat provision of Section 4, ESA, is recovery of the species, and this has long been understood to require managing a species *and its habitat* to the point where it is no longer threatened with extinction across a significant portion of its range. To achieve this goal, in nearly all

cases, the total abundance of the listed taxon must increase, and this generally mandates an expansion of its geographic distribution (hence, into unoccupied habitats). The proposed definitions of habitat preclude consideration of areas that possess all necessary attributes except for habitat structure and composition (i.e., plant community characteristics, which are "habitat" for terrestrial animals), but which could be restored by active measures, or simply by time (as USFWS, itself, recommended for the red tree vole). As one example, recovery of the critically endangered black-footed ferret (*Mustela nigripes*) is hindered by a lack of introduction sites in part due to the lack of sufficient areas possessing large and viable populations of their primary prey (prairie dogs, *Cynomys* spp.). Lack of prairie dogs at otherwise suitable sites should not preclude consideration of such an area as habitat for ferrets, because prairie dog colonies can be restored by reintroduction, and in some cases simply by reducing their mortality (Hoogland 2001) and with simple active measures to control fleas in prairie dog towns, which can prevent plague outbreaks (Hoogland et al. 2004, Wagner et al. 2006).

Our second key concern with the proposed definitions pertains to the inability to plan in the face of known impacts of global climate change, which is impacting habitats across the planet. In a pre-climate change world, habitat is a dynamic product of biotic and abiotic influences and interactions. When we layer climate change over this, however, we see rapid and frequently unprecedented changes to the distribution and even the nature of habitat, with consequences on many species (e.g., Urban 2015). Species will need to follow the new distribution of their habitats as these shift to higher elevations or higher latitudes. Well-documented examples include American pikas (*Ochotona princeps*; Beever et al. 2003, Erb et al. 2011, Steward et al. 2017), alpine chipmunks (*Tamias alpinus*; Moritz et al. 2008, Rubidget et al. 2011, Rowe et al. 2014), and wolverines (*Gulo gulo*, Mckelvey et al. 2011, Inman et al. 2012). Sea-level rise, associated with melting of Antarctic and Greenland ice sheets, is predicted to destroy habitat for low-elevation coastal species, including such federally endangered taxa as Florida panther (*Puma concolor coryi*; Whittle et al. 2008), key deer (*Odocoileus virginianus clavium*, Early et al. 2010), Florida salt marsh vole (*Microtus pennsylvanicus dukecampbelli*, USFWS 1991, FFWCC no date), salt marsh harvest mouse (*Reithrodontomys raviventris*, Smith et al. 2014, Thorne et al. 2018), and Alabama beach mouse (*Peromyscus polionotus ammobates*, USFWS 2009). The Florida panther is predicted to lose 29% of its current habitat with 1 m of sea level rise and fully 62% with a 3 m rise (Whittle et al. 2008); similar predictions apply to other coastal species. Recovering species such as these will require dispersal opportunities (and/or introduction, or "assisted migration"; McLachlan et al. 2007, Vitt et al. 2009) not into additional habitats but into *replacement* habitats, where there may be a spatial shifts but no net gain of area occupied. To this end, unoccupied areas may require habitat management to support populations of these climate-refugee species, because they may not all presently have "existing attributes". Unfortunately, redefining habitat as in the proposed rule would be likely to preclude adaptive strategies such as these, hastening the decline of such climate-refugee species.

In summary, the revised definitions of "habitat" in the USFWS proposed rule fail to recognize the best available science, in at least two fundamental areas. First, ecology has recognized for over a century that habitat is dynamic, not static, and different consumer species favor habitats at different stages of natural succession. Second, conservation biology recognizes and highlights the importance of anthropogenic restoration and assisted migration in providing viable habitat for climate refuge species whose current habitat is being lost to various anthropogenic causes, including deforestation, desertification, expansion of urban or agricultural footprints, and especially climate change. To define habitat in a manner that precludes application of the best available science will serve to diminish the value of the Endangered Species Act and to hasten the ultimate demise of many species in the near future. Given the emerging reality of the sixth mass extinction (Dirzo et al. 2014, Ceballos et al. 2020), we have an obligation to take the higher road on this.

The simplest means of resolving this issue would be to remove verbiage in the proposed definitions that restrict habitat to current, existing conditions, and to insert wording that clarifies that

management, natural succession, or other factors may alter local conditions, favoring some species while disfavoring others.

Two leading texts in mammalogy and wildlife biology provide such definitions. Feldhamer (2020, p. 597) defines habitat as "An area that contains the necessary resources, including food, water, and cover, and promotes residency through survival and reproduction by a species." Silvy & Catanach (2020, p. 286) "define habitat to include all abiotic and biotic features of the environment that allow an organism to occupy a given space (including survival and reproduction)."

Both of these definitions subsume the salient characteristics that ecologists widely recognize as defining habitat, and crucially, neither of these definitions is hindered by artificial temporal constraints on the availability of habitat features. Rather, they allow necessary flexibility to resource managers as they consider how best to develop recovery plans and apply requisite management efforts to serve the intent of the ESA, which is to recover species such that they may be down-listed from threatened or endangered status.

On behalf of the American Society of Mammalogists I urge you to revise the proposed definition to account for both natural and human-induced habitat changes. Failure to do so actively and intentionally excludes "the best available science" in the listing and recovery processes. The ASM stands ready to provide further input in this effort.

Sincerely,

Douglas A. Kelt

References Cited

Beever, E. A., P. F. Brussard, and J. Berger. 2003. Patterns of apparent extirpation among isolated populations of pikas (*Ochotona princeps*) in the Great Basin. Journal of Mammalogy 84**:**37-54.

Ceballos, G., P. R. Ehrlich, and P. H. Raven. 2020. Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction. Proceedings of the National Academy of Sciences 117**:**13596.

CNDDB (California Natural Diversity Database). July 2020. Special Animals List. California Department of Fish and Wildlife. Sacramento, CA. Available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline. Accessed 24 August 2020.

Delach, A., et al. 2019. Agency plans are inadequate to conserve US endangered species under climate change. Nature Climate Change 9**:**999-1004.

Dirzo, R., H. S. Young, M. Galetti, G. Ceballos, N. J. B. Isaac, and B. Collen. 2014. Defaunation in the Anthropocene. Science 345**:**401-406.

Dunk, J. R., and J. Hawley. 2009. Red tree vole habitat suitability modeling: implications for conservation management. Forest Ecology and Management 258: 626–634.

Early, L. M., R. G. Harvey, L. A. Brandt, J. H. I. Watling, and F. J. Mazzotti. 2010. Science support for climate change adaptation in south Florida. Available at https://edis.ifas.ufl.edu/uw331. Accessed 24 August 2020.

Erb, L. P., C. Ray, and R. Guralnick. 2011. On the generality of a climate-mediated shift in the distribution of the American pika (*Ochotona princeps*). Ecology 92**:**1730-1735.

Feldhamer, G. A., J. F. Merritt, C. Krajewski, J. L. Rachlow, and K. M. Steward. 2020. Mammalogy: adaptation, diversity, and ecology, 5th ed. Johns Hopkins University Press, Baltimore, Maryland.

Forsman, E. D., J. K. Swingle, R. J. Davis, B. L. Biswell, and L. S. Andrews. 2016. Tree voles: an evaluation of their distribution and habitat relationships based on recent and historical studies, habitat models, and vegetation change. General Technical Report PNW-GTR-948. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

FFWCC (Florida Fish and Wildlife Conservation Commission). No date. Florida salt marsh vole. Available at https://myfwc.com/wildlifehabitats/profiles/mammals/land/florida-salt-marsh-vole/. Accessed 24 August 2020.

GDNR (Georgia Department of Natural Resources). 2008. Survey of the current distribution of the southeastern pocket gopher (*Geomys pinetis*) in Georgia. Final Report to Georgia DNR. 42 pp. Available at https://www.nrc.gov/docs/ML1016/ML101690212.pdf. Accessed 15 August 2020.

Hoogland, J. L. 2001. Black-tailed, Gunnison's, and Utah prairie dogs reproduce slowly. Journal of Mammalogy 82: 917-927.

Hoogland, J. L., R. A. Davis, S. Benson-Amaram, D. Labruna, B. Goossens, and M. A. Hoogland. 2004. Pyraperm kills fleas and halts plague among Utah prairie dogs. Southwestern Naturalist 49: 376-383.

Inman, R. M., A. J. Magoun, J. Persson, and J. Mattisson. 2012. The wolverine's niche: linking reproductive chronology, caching, competition, and climate. Journal of Mammalogy 93**:**634-644.

McKelvey, K. S., et al. 2011. Climate change predicted to shift wolverine distributions, connectivity, and dispersal corridors. Ecological Applications 21**:**2882-2897.

McLachlan, J. S., J. J. Hellmann, and M. W. Schwartz. 2007. A framework for debate of assisted migration in an era of climate change. Conservation Biology 21:297-302.

ODFW (Oregon Department of Fish and Wildlife). 2019. Sensitive species list. Available at: https://www.dfw.state.or.us/wildlife/diversity/species/docs/Sensitive_Species_List.pdf. Accessed 24 August 2020.

Pew Research Center. 2020. How Americans see climate change and the environment in 7 charts. Available at https://www.pewresearch.org/fact-tank/2020/04/21/how-americans-see-climate-change-and-the-environment-in-7-charts/. Accessed 25 August 2020.

Rowe, K. C., et al. 2014. Spatially heterogeneous impact of climate change on small mammals of montane California. Proceedings of the Royal Society Biological Sciences Series B 282**:**20141857.

Rubidge, E. M., W. B. Monahan, J. L. Parra, S. E. Cameron, and J. S. Brashares. 2011. The role of climate, habitat, and species co-occurrence as drivers of change in small mammal distributions over the past century. Global Change Biology 17**:**696-708.

Silvy, N. J., and T. A. Catanach. 2020. Radiotelemetry, remote monitoring, and data analyses. Pp. 262-296 in The wildlife techniques manual. Vol. 1. Research, 8th ed. (N. J. Silvy, ed.). Johns Hopkins University Press, Baltimore, Maryland.

Smith, K. R., L. Barthman-Thompson, W. R. Gould, and K. E. Mabry. 2014. Effects of natural and anthropogenic change on habitat use and movement of endangered salt marsh harvest mice. PLoS One 9**:**e108739.

Stewart, J. A. E., D. H. Wright, and K. A. Heckman. 2017. Apparent climate-mediated loss and fragmentation of core habitat of the American pika in the northern Sierra Nevada, California, USA. PLoS One 12**:**e0181834.

Thorne, K., et al. 2018. U.S. Pacific coastal wetland resilience and vulnerability to sea-level rise. Science Advances 4(2)**:**eaao3270.

Urban, M. C. 2015. Accelerating extinction risk from climate change. Science 348**:**571-573.

USFWS (U.S. Fish and Wildlife Service). 1991. Endangered and Threatened Wildlife and Plants; Endangered Status for the Florida Salt Marsh Vole. *Federal Register* 56(9):1457-1459.

USFWS (U.S. Fish and Wildlife Service). 2009. Alabama beach mouse (*Peromyscus polionotus ammobates*, Bowen 1968) 5-year review: summary and evaluation. Alabama Ecological Services Field Office, Daphne, Alabama. Available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwim-8q517TrAhUxHzQIHVFkBuMQFjAEegQIARAB&url=https%3A%2F%2Fwww.cabi.org%2FISC%2FFullTextPDF%2F2011%2F20117202375.pdf&usg=AOvVaw1EW1fjIoGYb9FzGuYbBzPc. Accessed 24 August 2020.

USFWS (U.S. Fish and Wildlife Service). 2019. Endangered and Threatened wildlife and plants; Five species not warranted for listing as Endangered or Threatened Species. 50 CFR 17. Available at: https://www.federalregister.gov/documents/2019/12/19/2019-27334/endangered-and-threatened-wildlife-and-plants-five-species-not-warranted-for-listing-as-endangered. Accessed 15 August 2019.

USFWS (U.S. Fish and Wildlife Service). 2020. Red tree vole. Available at: https://www.fws.gov/oregonfwo/articles.cfm?id=149489455. Accessed 24 August 2020.

Vitt, P., K. Havens, and O. Hoegh-Guldberg. 2009. Assisted migration: part of an integrated conservation strategy. Trends in Ecology and Evolution 24:473-474.

Wagner, D. M., L. C. Drickamer, D. M. Krpata, C. J. Allender, W. E. Van Pelt, and P. Keim. 2006. Persistence of Gunnison's prairie dog colonies in Arizona, USA. Biological Conservation 130**:**331-339.

Whittle, A., D. S. Maehr, S. Fei, and J. Cox. 2008. Global climate change and its effects on large carnivore habitat in Florida. Poster abstract in: Florida's wildlife: on the Frontline of Climate Change. Available at http://www.ces.fau.edu/floc/posters.html. Accessed 24 August 2020.