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June 21, 2013

Field Supervisor
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

Re: 08ESMF00-2013-TA-0320-5 (Peer Review of Two Proposed Rules)

Dear Sir or Madam:

I have read the two rules sent to me for peer review: (1) to list *Rana sierrae* as endangered, to list the Northern Distinct Population segment of *Rana muscosa* as endangered, and to list *Anaxyrus canorus* as threatened, and (2) to designate critical habitat for the same three species. I have considered the questions listed in the letter requesting my peer review. I commend the Service for doing a thorough job in making excellent use of available literature and information and conducting well-reasoned syntheses and analyses. I have a few specific comments:

Proposed Rule Concerning Listing

Question 1 in the letter requesting my review. A component question was "Have we accurately described the biological or ecological requirements of the species and ongoing conservation measures for the species and their habitat?" I do not recall anything in the two Proposed Rules that describe the ongoing efforts to restore habitat by fish eradication or frog translocation, nor the ongoing efforts to treat frogs to facilitate their resistance to Bd.

P. 24473, col. 1, para 1. For simplicity, it would make sense to combine the two DPS's in the final listing. The environmental and threat factors differ somewhat between the two DPS's (e.g., southern DPS is primarily a stream dweller whereas the northern DPS is primarily a lake dweller), but I should think these differences can be acknowledged and treated differently within a single listing.

P. 24474, col. 3, para. 2. The descriptions of the ranges of the two *Rana* species are not consistent with the descriptions of the ranges of these species on p. 24475. The latter is more accurate.

P. 24475, col. 3, para 2, line 2. It seems "frog" here should be "frogs" because the descriptions provided apply to both frog species.

P. 24479, col. 1, para. 1, lines 8-12. This comparison is confusing. You mean, of the sites with breeding frogs in the 1990-2002 surveys, only 48% of them contained breeding frogs in 2006-2009 surveys?

P. 24481, col. 2, para 4, sentence 1. I suggest adding Bradford et al. (1998; p. 2482 and p. 2489) to the list of references about negative effects of fish on *Rana muscosa*. It represents yet another data set establishing the negative relationship.

P. 24486, col. 3, last para. Based on examination of numerous preserved specimens, the evidence is very strong that Bd's occurrence in the Sierra Nevada is a recent phenomenon. Padgett-Flohr and Hopkins (2009) describes the spread of Bd across California beginning in the 1960s, and the oldest record for Bd in the southern Sierra Nevada is 1975 (Wake and Vredenburg 2008).

P. 24489, col. 2, last para., next to last line: Add "sediment" to list of media.

P. 24489, col. 3, para. 1. The list of references is incomplete, ending in 2004. There have been several more recent studies, which are collectively much more comprehensive than the earlier studies. I suggest adding the following references, or a subset of them: Bradford et al. (2010a, 2010b, 2011, 2013), Hageman et al. (2006), Landers et al. (2008), and/or Mast (2012) to this list. Hageman et al. (2006) and Bradford et al. (2010a) test the hypothesis that the San Joaquin Valley is the primary source of airborne pesticides, and all but these two studies report contaminants in more than one medium.

P. 24489, col. 3, para. 4. Mercury from airborne sources has not been implicated in amphibian population declines in the Sierra Nevada, so I am not recommending that it be added. However, atmospherically transported mercury is a concern for fish, and mercury has been measured in in tadpoles of the Sierra chorus frog (*Pseudacris sierra*; formerly *P. regilla* here) in the southern Sierra (Bradford et al. 2012). Concentrations were low, and consequently these authors argued that mercury is not a concern for at least this amphibian or its predators.

p. 24489, col. 3, last para. that continues to following page. This paragraph needs to be rewritten to include Bradford et al. (2011). This study measured concentrations of numerous pesticides in multiple media in numerous sites in the southern Sierra and compared the distribution of contaminants with population declines of *Rana muscosa/sierra*. No association was found. Because these findings are based on measured concentrations rather than a metric for upwind pesticide use, they provide a far more realistic analysis of association between pesticide exposure and population declines than the analysis of Davidson and Knapp (2007). Moreover, the number of sites represented in Bradford et al. (2011) far exceed those represented in Fellers et al. (2004) and Sparling et al. (2001).

P. 24490, col. 2, para. 1, line 9. I suggest inserting "from geological sources" after "naturally acidic conditions" because "naturally acidic conditions" could mean anything less than pH 7 and this is very common.

P. 24490, col. 2, para. 4, Sentence 2. Given the findings of Bradford et al. (2011), I suggest revising this sentence as "Frogs are sensitive to contaminants, but measured contaminant concentrations in multiple media indicate very low exposures to contaminants from upwind sources."

P. 24495, col. 1, para 2, sentence 1, and P. 24496, col.1, last para., sentence 1. This statement is not consistent with the material and analyses presented. How can you say fish are "the cause" when there are published investigations demonstrating that Bd has caused declines and extirpations, and a reasonable inference from this is that Bd has caused many of the declines range-wide? Indeed, it was previously stated (P. 24487, col. 1, para. 3) that "amphibian pathogens (most specifically, the chytrid fungus) and predation by introduced fishes" are "two primary driving forces leading to population declines in the mountain yellow-legged frog complex." I think you can claim introduced fish as "the primary cause" because there is ample documentation that it has been a major cause, but I don't see how best available science indicates it is "the cause."

Proposed Rule for Critical Habitat

P. 24522, col. 1, para. 1 (a). These depth limits seem appropriate for high elevation lakes, but I don't think there are data to support them for streams, at least at lower elevation. I suggest indicating that the cutoff depths listed are for high elevation lakes.

P. 24522, col. 1, para. 7 (ii). Text should be revised to apply to all water bodies, not just lakes.

P. 24522, col. 1, last para. (b). I suggest inserting "or other structures" after "rocks." Some streams inhabited by *Rana* do not have rocks.

P. 24522, col. 3, para. 15 (b), line 2. Fix "allow maintain."

P. 24524, col. 3, para. 2, line 10. Fix "are may."

P. 24525, col. 2, paragraphs 2 and 3. I raise the question of whether the variable, "lake density," biases the model in favor of lake habitat over stream habitat. Previous studies of Dr. Knapp et al. have shown that within areas dominated by lake habitat for *Rana sierra* and *R. muscosa*, lake density is positively related to frog occupancy at a lake. Given that data for frog occurrences used in the Maxent model would be dominated by records from areas dominated by lake habitat, is it possible that the model under-represents the extent of suitable stream habitat, such as in the northern part of the range of *R. sierra* and the southern part of the range of the *R. muscosa* DPS? The text indicates the model "fit the data well," but this could be true for the joint range of the two taxa while underrepresenting records in areas dominated by stream habitat. I am not asserting that this is the case. I would just like to make sure the fit was good in the stream dominated portions of the range, and that the extent of critical habitat selected that includes predominantly stream habitat is representative of the extent such habitat.

P. 24527, col. 3, para. 1. The percentage of range selected as critical habitat (14%) is useful to know, but it would also be useful to provide the percentage of suitable habitat based on the Maxent model that was selected as critical habitat.

P. 24527, col. 2, text between the tables. Same comment as previous, except for *R. muscosa*.

P. 24528, col. 1, para. 1. Why is the % of range that is critical habitat not provided for Yosemite toad like it was for the two frog species?

P. 24529, Table 4. The codes for threats (1 thru 5) should be placed under footnote 2 instead of under footnote 3.

P. 24529, Table 4, and P. 24534, Table 5. I suggest adding a note somewhere that non-manageable threats (disease, predation, and climate change) are not included in this table. This is listed as footnote 3 in Table 6. Without this information, it took me a while to figure out why Bd was not listed as a threat in Tables 4 and 5.

P. 24535, col. 1 (Subunit 4D: Kaweah River) and col. 2 (Subunit 5A; Blossom Lakes). I'm puzzled that recreational activities are listed here, but not fish. I would think fish in this subunit would be a bigger concern than recreational activities.

P. 24545 and following (Section 17.95 Critical Habitat). Obviously, if any edits are made to elements in previous sections of the document, the edits would need to be repeated here.

Pp. 24546 to 24556. The order of the maps is opposite the order they are discussed in the text; that is, *R sierra* units are discussed first in the text whereas the maps for , appear first. Also, for each of the three species, it would be useful if the range of the species was shown on the locational index for each of the three index maps so it would be evident how the units are spread throughout the range.

<u>New References (except Bradford et al. 2010b)</u>

Bradford, D. F., E. M. Heithmar, N. G. Tallent-Halsell, G. M. Momplaisir, C. G. Rosal, K. E. Varner, M. S. Nash, and L. A. Riddick. 2010a. Temporal patterns and sources of atmospherically deposited pesticides in alpine lakes of the Sierra Nevada, California, USA. Environmental Science & Technology 44:4609-4614.

Bradford, D. F., K. Stanley, L. L. McConnell, N. G. Tallent-Halsell, M. S. Nash, and S. M. Simonich. 2010b. Spatial patterns of atmospherically deposited organic contaminants at high-elevation in the southern Sierra Nevada mountains, California. Environmental Toxicology and Chemistry 29:1056-1066.

Bradford, D. F., R. A. Knapp, D. W. Sparling, M. S. Nash, K. A. Stanley, N. G. Tallent-Halsell, L. L. McConnell, and S. M. Simonich. 2011. Pesticide distributions and population declines of California, USA, alpine frogs, *Rana muscosa* and *Rana sierrae*. Environmental Toxicology and Chemistry 30:682-691.

Bradford, D.F., J. L. Kramer, S.L. Gerstenberger, N.G. Tallent-Halsell, and M.S. Nash. 2012. Mercury in tadpoles collected from remote alpine sites in the southern Sierra Nevada Mountains, California, USA. Archives of Environmental Contamination and Toxicology 62: 135-140. DOI 10.1007/s00244-011-9674-y.\

Bradford, D.F., K.A. Stanley, N.G. Tallent,D.W. Sparling, M.S. Nash,R.A. Knapp, L.L. McConnell, and S. L. Massey Simonich. 2013. Temporal and spatial variation of atmospherically deposited organic contaminants at high elevation in Yosemite National Park, California, USA. Environmental Toxicology and Chemistry 32: 517-525. DOI 10.1002/etc.2094.

Hageman, K. J., S. L. Simonich, D. H. Campbell, G. R. Wilson, and D. H. Landers. 2006. Atmospheric deposition of current-use and historic-use pesticides in snow at national parks in the western United States. Environmental Science & Technology 40:3174-3180.

Landers, D. H., S. L. Simonich, D. A. Jaffe, L. H. Geiser, D. H. Campbell, A. R. Schwindt, C. B. Schreck, M. L. Kent, W. D. Hafner, H. E. Taylor, K. J. Hageman, S. Usenko, L. K. Ackerman, J. E. Schrlau, N. L. Rose, T. F. Blett, and M. M. Erway. 2008. The fate, transport, and ecological impacts of airborne contaminants in western national parks (USA). EPA/600/R-07/138, U.S. Environmental Protection Agency, Corvallis, Oregon, USA.

Mast, M.A., D.A. Alvarez, and S.D. Zaugg. 2012. Deposition and accumulation of airborne organic contaminants in Yosemite National Park, California. Environmental Toxicology and Chemistry 31: 524-533.

Padgett-Flohr, G.E., and R.L.I. Hopkins. 2009. *Batrachochytrium dendrobatidis*, a novel pathogen approaching endemism in central California. Diseases of Aquatic Organisms 83: 1-9.

Wake, D.B., and V.T. Vredenburg. 2008. Are we in the midst of a sixth mass extinction? A view from the world of amphibians. Proceedings of the National Academy of Sciences USA 105: 11466-11473.

Please contact me if I can be of further assistance.

Sincerely,

David F. Bradford, Ph.D.
Governing Board and Amphibian Section Editor
Herpetological Conservation and Biology

Chair
California-Nevada Amphibian Populations Task Force