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Field Supervisor
Attention: 5-Year Review
U.S. Fish and Wildlife Service
1340 Financial Blvd., Suite 234
Reno, NV 89502

RE: U.S. Fish and Wildlife Service, *Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Reviews of 58 Species in California and Nevada; Availability of Completed 5-Year Reviews in California, Nevada and Southern Oregon*, 73 Fed.Reg. 11, 945 (March 5, 2008). **GLOBAL WARMING IMPACTS**

Dear Field Supervisor:

The Attorney General of California submits these comments in response to the Fish and Wildlife Service's ("the Service") Initiation of 5-Year reviews of certain species in California listed as threatened or endangered.¹ *Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Reviews of 58 Species in California and Nevada; Availability of Completed 5-Year Reviews in California, Nevada and Southern Oregon*, 73 Fed. Reg. 11,945 (March 5, 2008). The Attorney General recommends that, in accordance with the statute, regulations, and guidance manual, the Service take this opportunity to fully explore and evaluate the impact of global warming on each of the species being reviewed. 16 U.S.C. § 1533(c), 50 CFR 424.21, and U.S. Fish and Wildlife Service and National Marine Fisheries Service, *5-Year Review Guidance: Procedures for Conducting 5 Year Reviews under the Endangered Species Act* (2007) (hereinafter 5-Year Review Guidance).²

This letter discusses those species identified in the March 5 announcement that are under the stewardship or jurisdiction of the Service's Sacramento office. For convenience, following general discussion of global warming its ecological impacts, and of the Endangered Species Act's legal requirements, we have grouped our comments according to the species' habitats or other common features.

¹ The Attorney General provides these comments pursuant to his independent power and duty to protect the natural resources of the State from pollution, impairment, or destruction in furtherance of the public interest. See Cal. Const., art. V, § 13; Cal. Govt. Code, §§ 12511, 12600-12; *D'Amico v. Board of Medical Examiners*, 11 Cal.3d 1, 14-15 (1974). These comments are made on behalf of the Attorney General and not on behalf of any other California agency or office.

² Commendably, the Service has addressed global warming and climate change in other 5-year reviews. See, e.g., National Marine Fisheries Service & U.S. Fish and Wildlife Service, *Loggerhead Sea Turtle (Caretta Caretta) 5-year Review: Summary and Evaluation*, 37-38 (2007). The Attorney General encourages the Service to expand and systemize the practice of addressing climate change.

Global Warming Background

There is overwhelming scientific evidence that the planet is warming and that this is due to human activities. In 2007, the International Panel on Climate Change (IPCC) concluded that “most of the observed increase in global average temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations.” IPCC, *Summary for Policymakers. In Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* 10 (2007). Eleven of the twelve years between 1995 and 2006 rank among the twelve warmest years since 1850 (when global temperature measurement began). *Id.* at 5. The warming trend over the last fifty years is nearly twice that for the last 100. *Ibid.* Looking forward, under a high emissions scenario, the IPCC estimates that global temperatures will rise another four degrees centigrade by the end of this century: even under a low emissions growth scenario, the IPCC estimates that the global temperature will go up another 1.8 degrees. *Id.* at 13.

The increase in global average temperatures affects certain areas more than others. The Western United States, in general, is experiencing more warming than the rest of the nation, with the 11 western states averaging 1.7 degrees Fahrenheit warmer temperatures than this region’s average over the 20th century. *See* Saunders, et al, *Hotter and Drier: the West’s Changed Climate* 2-3(2008) (available at <http://rockymountainclimate.org>). This increase in Western temperatures has occurred more at high altitudes than low ones, and has had real impacts. It has, for example, contributed to reduced snowpack; the reduced of snowpack is expected to worsen. *Id.* at pp.5, 8-10.

California, in particular, will suffer very serious consequences from global warming. *See, generally, Climate Action Team Report to Governor Schwarzenegger and the California Legislature* (2006) and California Climate Change Center, *Our Changing Climate, Assessing the Risks to California* (2006) (both available at www.climatechange.ca.gov). In California, reduced snowpack will cause more winter flooding and summer drought; as well as higher water temperatures in lakes and coastal areas. In the San Joaquin River Delta area “[a]s sea levels rise due to global climate change, the mean high-tide mark will move farther up land in and around the Delta,” resulting in potential flooding, breach of levees, inundation of cropland, saline water intrusion on aquifers used for drinking water, and other very serious consequences. Isenberg et al, *Our Vision for the California Delta* 25 (2007) (available at www.deltavision.ca.gov). The incidence of wildfires in California will also increase and the amount of increase is highly dependent on the extent of global warming. The California Climate Change Center finds that the risk of large wildfires could increase by 55 percent under a medium warming scenario, which is twice the increase expected if temperatures stay in the lower warming range. California Climate Change Center, *supra*, at 10.

Climate Change and Biota

No less certain than the fact of global warming itself is the fact that global warming, unchecked, will harm biodiversity generally and cause the extinction of vast numbers of species. In its 2007 report, the IPCC concluded that as global mean temperatures exceed a warming of

two to three degrees centigrade above pre-industrial levels, twenty to thirty percent of plant and animal species will face an increasingly high risk of extinction. Fischlin, A. et al. *Ecosystems, Their Properties, Goods and Services. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, 213 (2007). The IPCC described such changes at the global level as “significant [and] irreversible.” *Ibid.* Computer models reviewed by IPCC showed that climate change will likely be “a major driver of biodiversity loss in [multiple climate zones, including] Mediterranean-climate systems [such as California].” *Id.* at p. 241.

The intermediate biological changes that will ultimately lead to extinction – such as in habitat, in phenology, in predator and prey relationships – are also well documented. In 2004, the Pew Center on Global Climate Change found more than twenty studies “provide strong evidence of a direct link” between “climate change [and] observed ecological impacts.” Parmesan and Galbraith, *Observed Impact Of Global Climate Change In the U.S.* iii (2004) (available at <http://www.pewclimate.org>). A meta-study co-authored by Professor Parmesan looked at studies of more than 1,600 species across the globe and found “that about half of the species studied exhibited significant changes in their phenologies and/or distributions [Changes that were] systematically in the direction expected from regional changes in the climate.” *Id.*, at 15. “Very few instances of biotic change run completely counter to climate change predictions This consistency across scales of study and encompassing diverse taxa supports a conclusion that it is now ‘well-established’ that 20th century climate change has already affected wild plants and animals in North America.” *Id.* At 44.

The mechanisms by which global warming may push already endangered species closer to extinction are multiple. Global warming increases the frequency of extreme weather events, such as heat waves, droughts, and storms. *See, e.g.,* Field, C.B. et al., *North America. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* 627 (2007). Extreme events, in turn, “can cause mass mortality of individuals and contribute significantly to determining which species occur in ecosystems.” Fischlin et al., *supra*, at 216. As the climate warms, terrestrial habitats are moving northward and upward, but “in the future, range contractions are more likely than simple northward or upslope shifts.” Parmesan and Galbraith, *supra*, vi and 14. Climate change has likewise affected aquatic vertebrate animals off the California Coast: a “body of work in the California Current and associated intertidal areas has demonstrated clear effects of warming sea temperatures on vertebrate and invertebrate communities.” *Id.*, at 41. Warming can cause increased susceptibility to pathogens and possibly mass extinctions, as appears to be the case with certain amphibians.” Fischlin et al., *supra*, at 233.

In many instances, climate changes exacerbate current, precarious conditions, further stressing wild species and their associated ecosystems. “There is a growing consensus within the scientific community that climate change will compound existing threats and lead to an acceleration of the rate at which biodiversity is lost[.]” Parmesan and Galbraith, *supra*, at 45. A warmer climate, for example, will disturb ecosystems and habitats, but “[p]resent and future land-use change and associated landscape fragmentation are very likely to impede species’ migration and thus impair natural adaptation via geographical range shifts.” Fischlin et al.,

supra, at 213. As ranges shift due to climate change, habitats and ecosystems may be unable to relocate. For example, higher altitude species may not have any higher ground available. And housing tracts, highways, and other developments may prevent species' movement to other areas of potential habitat. Significant global warming will thus undermine the Service's carefully developed systems of habitat conservation areas.

These effects, unchecked, will have devastating impact on ecosystems and biodiversity. Global warming "will alter the structure, reduce biodiversity and perturb functioning of most ecosystems, and compromise the services they currently provide." Fischlin et al., *supra*, at 213. "The resilience of many ecosystems is likely to be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g., flooding, drought, wildfire, insects, ocean acidification), and other global change drivers (e.g., land use change, pollution, over-exploitation of resources)" *Ibid*.

The ESA and the Service's 5-year Review

The fundamental purpose of the Endangered Species Act (ESA), 16 U.S.C. § 1531 *et seq.*, is to conserve endangered and threatened species *and* the ecosystems upon which they depend for survival. 16 U.S.C. § 1531(b). The ESA defines "conserve" broadly as "to use, and the use of, all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided [by the ESA] are no longer necessary," i.e. to the point of full recovery. *Id.*, § 1532(3). In enacting the ESA, "the plain intent of Congress . . . was to halt and reverse the trend toward species extinction, *whatever the cost.*" *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 184 (1973) (emphasis added). Congress also directed the Service to use the best available science in evaluating the status of, and the threats faced by, threatened and endangered species. 16 U.S.C. § 1533(b)(1)(A). This focus on using and building upon the best available science is reflected in the Federal Register listing announcements, which typically recount the discovery of the species and its taxonomic history along with the pertinent biology. The Service's plant and wildlife biologists, the federal scientists entrusted with a precious and irreplaceable element of our nation's patrimony, may simultaneously further the fundamental purposes of the ESA and lead the federal government, by applying the latest available science to recognize, describe and forestall the impacts of global climate warming on endangered species and the living environment generally.

Five-year reviews are an appropriate time for the Service to evaluate the impact of global warming on listed species. In its March 5 announcement, the Service asked for information regarding "[h]abitat conditions including, but not limited to, amount, distribution, and suitability" and "[t]hreat status and trends" for the species being reviewed. Global warming is surely the single most significant "trend" affecting endangered species overall. This letter, and similar letters the Attorney General is sending to others of the Service's California offices, identifies only some of impacts of global warming on species being reviewed. The Service should look for all such effects. Surely "the novelty and complexity of the science to be reviewed [and] the importance of the information to decision making," justifies the fullest review of global warming impacts; accordingly the Service's manual directs the Service to utilize outside experts and external peer review as necessary. *5-Year Review Guidance, supra*, at 2-8.

The Attorney General recommends that each 5-year review address the impact of global warming at multiple levels. First, the review should fully evaluate those global warming impacts on the species that already have been observed or are easily deduced. Second, the review should include a searching analysis for other mechanisms whereby global warming might impede recovery of the species – or, worse, hasten its extinction. Finally, each review should make a series of recommendations including 1) additional research into the consequences of global warming for biota generally and for the listed species in particular; 2) steps to mitigate those consequences for the listed species; and 3) that the Service and other federal agencies take steps to retard global warming.³

The Species Being Reviewed:

The Attorney General urges that the Service, in its 5-year review of these species, investigate the impact of drought, other global-warming changes in precipitation, as well any other global-warming induced changes on these species.

Carson Wandering Skipper

Scientists have documented a variety of impacts of global warming on butterfly populations. In lowland California, butterfly species have advanced the date of first spring flights by an average 24 days over 31 years. Field et al, *supra*, at 622. Global warming has created an increased risk of drought and, historically, droughts have caused crashes of butterfly and insect populations. Parmesan and Galbraith, *supra*, at 6. Likewise, it is well documented that global warming will change the pattern of wildfires in California and the Service itself has noted that too-intense levels of fire may have been one cause of the decline of the population of the Myrtle's Silverspot Butterfly. *Endangered and Threatened Wildlife and Plants; 90-Day Findings and Commencement of Status Reviews for Five Petitions to List Six Species as Threatened or Endangered*, 55 Fed Reg. 46080, 46082. Finally, more complex interactions can be devastating to a butterfly species; here the impact of global warming on the Quino Checkerspot Butterfly is emblematic. As a consequence of this butterfly's habitat shifting northward and to higher elevations, a mismatch is occurring between the butterfly's reproductive cycle and its food source: plants hosting recently hatched caterpillars are drying up, often before the caterpillars can develop, let alone morph into butterflies. Parmesan and Galbraith, *supra*, at 15.

There are now at most four populations of the Carson Wandering Skipper. U.S. Fish and Wildlife Service, *Recovery plan for the Carson Wandering Skipper (Pseudocopaeodes eunus obscurus)* 1-2 (2006). Declining water supplies, as from drought or diversions, pose a particular threat to this butterfly because of its particular dependence on a salt grass that requires moisture or a high water table. *Id.* at 14-16.

Desert Tortoise (Mohave Population)

³ The Service's manual "strongly encourages" that the Service include recommendations for future action in each 5-year review. *5-Year Review Guidance, supra*, at 2-7.

In listing the Mojave Population of the Desert Tortoise, the Service noted that drought impairs the tortoise's ability to adapt to other stressors. "Of particular concern with the [Desert Tortoise (Mojave Population)] is the *continued drought* that has affected most of its Mojave range over the past several years. The resulting physiological stress caused by poor nutrition can be accentuated by other perturbations in the environment, such as the increased presence of predators, fire, off-highway vehicles, and competition for existing forage. The synergistic effects of these disturbances could result in the complete inability of both individual animals and isolated groups to return to and maintain population levels that are viable on a long-term basis." *Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Mojave Population of the Desert Tortoise*, 55 Fed Reg. 12178, 12188 (April 2, 1990) (emphasis added).

Conclusion

The Service's biologists are well aware of the threat global warming poses to already threatened or endangered species and to ecosystems and biota generally. The California Attorney General applauds the Service for addressing global warming in other 5-year reviews. This letter identifies some particular threats that global warming poses to the plant and animals whose review the Service is initiating. But global warming will impact the listed species and increase the risk of extinction of those species, in ways far beyond those identified in this letter. The Attorney General urges the Service to take an expansive and comprehensive view of the threats posed by global warming and, as part of each 5-year review conducted under the ESA, broadly consider all potential effects of global warming on the listed species.

Thank you for your consideration of these comments. If you wish to discuss any of the matters raised in this letter, please contact either Mr. Jim Potter at (213) 897-2637 or Mr. Ed Ochoa at (619) 645-2041.

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