

Master Response 13 Climate Change

Table MR13-1. Comments Addressed in Master Response 13

Comment	Commenter
I502-9	Forster, Peggy
I502-14	Forster, Peggy
04-266	Center for Biological Diversity (Keats, Adam)
04-267	Center for Biological Diversity (Keats, Adam)
04-268	Center for Biological Diversity (Keats, Adam)
04-269	Center for Biological Diversity (Keats, Adam)
04-270	Center for Biological Diversity (Keats, Adam)
04-271	Center for Biological Diversity (Keats, Adam)
04-272	Center for Biological Diversity (Keats, Adam)
04-273	Center for Biological Diversity (Keats, Adam)
04-274	Center for Biological Diversity (Keats, Adam)
04-275	Center for Biological Diversity (Keats, Adam)
04-276	Center for Biological Diversity (Keats, Adam)
04-277	Center for Biological Diversity (Keats, Adam)
04-278	Center for Biological Diversity (Keats, Adam)
04-279	Center for Biological Diversity (Keats, Adam)
04-280	Center for Biological Diversity (Keats, Adam)
04-281	Center for Biological Diversity (Keats, Adam)
04-282	Center for Biological Diversity (Keats, Adam)
04-283	Center for Biological Diversity (Keats, Adam)
04-284	Center for Biological Diversity (Keats, Adam)
04-285	Center for Biological Diversity (Keats, Adam)
04-286	Center for Biological Diversity (Keats, Adam)
04-287	Center for Biological Diversity (Keats, Adam)
04-288	Center for Biological Diversity (Keats, Adam)
04-289	Center for Biological Diversity (Keats, Adam)
04-290	Center for Biological Diversity (Keats, Adam)
04-291	Center for Biological Diversity (Keats, Adam)
04-292	Center for Biological Diversity (Keats, Adam)
04-292A	Center for Biological Diversity (Keats, Adam)
04-293	Center for Biological Diversity (Keats, Adam)
08-6	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-7	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-7A	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-09	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-10	Santa Clarita Organization for Planning and the Environment (Lutness, David)

Comment	Commenter
08-10a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-11	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-11a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-11b	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-12	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-12a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-13	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-13a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-13b	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-14	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-15	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-15a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-16	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-16a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-16b	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-17	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-19	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-21	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-22	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-22a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-23	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-24	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-25	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-26	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-26a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-27	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-27a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-27b	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-28	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-29	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-29a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-29b	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-30	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-31	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-31a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-31b	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-31c	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-32	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-33	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-33a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-34	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-35	Santa Clarita Organization for Planning and the Environment (Lutness, David)

Comment	Commenter
08-35a	Santa Clarita Organization for Planning and the Environment (Lutness, David)
08-35b	Santa Clarita Organization for Planning and the Environment (Lutness, David)
012-4	TriCounty Watchdogs (de Leeuw, Jan)
012-5	TriCounty Watchdogs (de Leeuw, Jan)
012-6	TriCounty Watchdogs (de Leeuw, Jan)
012-7	TriCounty Watchdogs (de Leeuw, Jan)
012-8	TriCounty Watchdogs (de Leeuw, Jan)
012-9	TriCounty Watchdogs (de Leeuw, Jan)
012-10	TriCounty Watchdogs (de Leeuw, Jan)
012-11	TriCounty Watchdogs (de Leeuw, Jan)
012-12	TriCounty Watchdogs (de Leeuw, Jan)
012-20	TriCounty Watchdogs (de Leeuw, Jan)
012-21	TriCounty Watchdogs (de Leeuw, Jan)
012-22	TriCounty Watchdogs (de Leeuw, Jan)
012-23	TriCounty Watchdogs (de Leeuw, Jan)
012-24	TriCounty Watchdogs (de Leeuw, Jan)
012-25	TriCounty Watchdogs (de Leeuw, Jan)
012-26	TriCounty Watchdogs (de Leeuw, Jan)
012-26a	TriCounty Watchdogs (de Leeuw, Jan)
012-27a	TriCounty Watchdogs (de Leeuw, Jan)
012-27b	TriCounty Watchdogs (de Leeuw, Jan)
012-27c	TriCounty Watchdogs (de Leeuw, Jan)

13.1 Summary of Substantive Comments

The following summarizes the substantive comments received on the Draft EIS and Draft TU MSHCP specific to climate change analysis. Table MR13-1 provides a list of the commenters and a reference to the individual comment, as summarized in the following list. The parenthetical reference after each summary bullet indicates where a response to that comment is provided.

- The affected environment and environmental baseline should reflect the effects of climate change on the environment. (Response provided in Section 13.2.1, Environmental Setting.)
- The analysis of greenhouse gas (GHG) emissions is inadequate; it should include indirect effects of climate change from the proposed action, it should include Plan-Wide Activities, and it was cursory and inconsistent with the analysis in the Tejon Mountain Village Environmental Impact Report (TMV EIR). (Response provided in Section 13.2.2, Adequacy of Analysis of Indirect Climate Change Effects.)
- The Draft EIS failed to reach a significance conclusion. (Response provided in Section 13.2.3, Significance of Climate Change Effects.)
- Black carbon emissions should be analyzed and mitigation measures should be imposed. (Response provided in Section 13.2.4, Black Carbon.)
- Embodied emissions from manufacturing of concrete should be analyzed. (Response provided in Section 13.2.5, Embodied Emissions.)

- Additional, specific mitigation commitments should be made. (Response provided in Section 13.2.6, Adequacy of Mitigation Measures).
- The proposed action would be inconsistent with Assembly Bill (AB) 32 and Executive Order S-3-05. (Response provided in Section 13.2.7, Consistency of Proposed Action with Implementation of AB 32 and Executive Order S-3-05.)
- The effect of climate change on biological resources, including ecosystem processes, biodiversity, specific biota, such as amphibians, butterflies, alpine species, and plants, diseases and vectors, and wildlife habitat connectivity, should be reflected in the analysis. (Response provided in Section 13.2.8, Analysis of Climate Change Effects on Biological Resources.)
- The effect of climate change on air quality should be reflected in the analysis. (Response provided in Section 13.2.9, Climate Change Effects on Air Quality.)
- The effect of climate change on water resources should be reflected in the analysis. (Response provided in Section 13.2.10, Climate Change Effects on Water Resources.)
- Analysis of compliance with Federal Endangered Species Act (ESA) requirements regarding conservation and recovery should account for climate change. (Response provided in Section 13.2.11, Climate Change Analysis Required by Endangered Species Act.)

13.2 Responses to Substantive Comments

13.2.1 Environmental Setting

Various commenters raised questions regarding the adequacy of the Draft EIS's discussion of the environmental setting with respect to climate change. Commenters questioned the discussion of the "affected environment," as well as the Draft EIS's treatment of the baseline with respect to climate change effects, and suggested that the Draft EIS failed to account for background climate change conditions. The following describes the consideration of climate change in the description of the affected environment and baseline conditions in the Supplemental Draft EIS.

13.2.1.1 Affected Environment

The discussion of the affected environment with respect to climate change has been updated and is presented in Section 3.9, Climate Change and Greenhouse Gases, in Volume I of the Supplemental Draft EIS based on comments and new information available since issuance of the Draft EIS. Specifically, the regulatory setting has been updated and discussions have been updated regarding the primary sources of GHGs, California's role in emissions of GHGs, alternative global warming scenarios, and the potential effects of climate change, including the cumulative nature of GHGs. More information has been provided in Section 4.9, Climate Change and Greenhouse Gases, in the Supplemental Draft EIS on the potential effects of climate change on various environmental resources, including air quality, water resources, and species.

With respect to specific regulatory documents mentioned by commenters, since the Draft EIS was issued, the Council on Environmental Quality (CEQ) issued its *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* (Draft NEPA Guidance) (Council on Environmental Quality 2010). The public comment period on the Draft NEPA Guidance closed on May 19, 2010. Although the Draft NEPA Guidance is not yet effective or applicable, the Draft EIS has been revised to comply with its recommendations (Section 4.9.1.1, Regulatory Setting, in Volume I of this Supplemental Draft EIS). The EIS's approach to discussing the affected environment is also consistent with the Draft NEPA Guidance recommendation of describing reasonably foreseeable

effects on the environment from climate change in order to frame the analysis of how a proposed action would or would not interact with these effects (Council on Environmental Quality 2010, p.7). Additionally, Department of the Interior (DOI) Order No. 3289, which replaces Order No. 3226 cited by one commenter, provides internal DOI direction to consider risks associated with climate change, and makes DOI organizational changes, including the establishment of a Climate Change Response Council to develop an integrated climate change strategy for resources managed by the DOI. Although this directive is not specifically related to private lands, the TU MSHCP provides a preservation and adaptive management strategy that accounts for climate change, and the Draft EIS has been revised to consider the effects of climate change consistent with the overall intent of this order, as further discussed below.

Some commenters requested that the discussion of the affected environment include numerical estimates of projected climate change impacts on California. In particular, one commenter cited specific predictions of the consequences of climate change from the California Climate Change Center report *Our Changing Climate, Assessing the Risks to California* (2006), including temperature, sea level rise, heat wave days and heat-related deaths, critical dry years, ozone formation, electricity demand, wildfire risk, and forest yields. The same commenter requests that the EIS supplement its description of global warming impacts with data from the recently released report by the Committee on Environment and Natural Resources called *The Scientific Assessment of the Effects of Global Change on the United States* (National Science and Technology Council 2008) (referred to here as *The Scientific Assessment*).

The commenter is correct that California faces certain challenges associated with climate change that are not universally present, including sea level rise and increased vulnerability to wildfires, and more information has been added in this Supplemental Draft EIS to describe the range of projections under different warming scenarios, consistent with the information presented by the commenter (Section 3.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS). As recognized by the sources cited by the commenter, a single set of numerical estimates has not been established, and the precise nature of the effects from climate change are not fully known and depend on whether the warming scenario is high, medium, or low (California Climate Change Center 2006, p. 15). This Supplemental Draft EIS recognizes these scenarios.

One commenter suggested that the EIS should be supplemented with data from *The Scientific Assessment*. The commenter does not identify any specific information that should be included from this report. The Service is aware of this report, and it is included in the administrative record.

One commenter notes that scientists model effects based on different emission scenarios, and describes predictions under some of these modeled scenarios. This commenter cites California Climate Change Center (2008) and Kelley and Goulden (2008) as raising concerns about how climate change is affecting California and how this affects plants, animals, and species. The commenter cites Hayhoe et al. (2004) for support of a prediction that, under a low-emissions scenario, heat waves and extreme heat in Los Angeles will quadruple in frequency and heat-related mortality will increase two to three times, alpine and subalpine forests will be reduced by 50 to 75%, and Sierra Nevada snowpack will be reduced by 30 to 70%. The commenter also cites Hayhoe et al. (2004) regarding predictions under a high-emissions scenario, such as heat waves of six to eight times greater frequency, with heat-related mortality increasing five to seven times, alpine and subalpine forest reduction of 75 to 90%, and Sierra Nevada snowpack reduction of 74 to 90%, and effects on runoff and streamflow that, in combination with projected declines in winter precipitation, could disrupt California's water rights system.

The commenter is correct that studies indicate that climate change is affecting California, although neither California Climate Change Center (2008) nor Kelley and Goulden (2008), as cited by the commenter, describe these changes as "severe" or "irreversible" as suggested by the commenter. Kelley and Goulden (2008) recognize that several other factors—including regional heat island

effects or long-term climate functions—may play a role in changing plant distribution. The discussion in Kelley and Goulden (2008) is limited to a study in the Santa Rosa Mountains on the southwest boundary of the Coachella Valley, which is geographically distinct from the Covered Lands.

The commenter is also correct that scientists predict the potential effects of climate change based on different emissions scenarios, including the scenarios described by Hayhoe et al. (2004), cited by the commenter. It should also be noted that many researchers, including Cayan et al. (2006), cited by the commenter, predict the more extreme effects depicted by Hayhoe et al. (2004) can be avoided by requiring emissions reductions that will set us on a lower emissions pathway. California has begun an emissions reduction path through AB 32, for example, which requires that GHG emissions be reduced to year 1990 levels.

As mentioned above, this Supplemental Draft EIS has been revised to include a discussion of various potential warming scenarios and includes many of the statistics cited in these comments. In addition, the EIS has been revised to include a discussion of the potential effects of climate change in California and how they may affect biological resources, water resources, and air quality.

13.2.1.2 Baseline

Some commenters questioned the environmental baseline in the Draft EIS, against which climate change effects from the proposed action are measured.

Revisions to this Supplemental Draft EIS have been made to clarify that the baseline against which the alternatives are compared is the No Action Alternative. The No Action Alternative is compared to existing conditions. Revisions have also been made to clarify that emissions generated under existing conditions occur as a result of Existing Ranch Uses currently occurring on the Covered Lands, which are assumed to occur and result in similar level of emissions under the No Action Alternative. While Existing Ranch Uses do generate some level of GHG emissions, the types of activities currently occurring on the Covered Lands involve only a very small amount of GHG emissions, which are considered to be negligible. Therefore, consistent with NEPA and as discussed above, the analysis measures the potential GHG emissions of all alternatives against a baseline that assumes essentially only very minor existing emissions, thereby providing a worst-case analysis of potential GHG effects.

One commenter suggested that the appropriate baseline against which to compare the proposed action's potential GHG effects was a future scenario that reflects the effects that climate change would have on species and other resources. As discussed above, this Supplemental Draft EIS discusses the projected effects climate change could have on various environmental resources, including air quality, water resources, and species. Section 4.9, Climate Change and Greenhouse Gases, in Volume I of the Supplemental Draft EIS includes discussions of the effect climate changes has on these resources, and the interplay of these relationships with respect to the alternatives. In addition, this Supplemental Draft EIS contains a discussion regarding the potential interplay between climate change and the biological resources affected by the alternatives (Appendix C, Climate Change Effects and the TU MSHCP, of this Supplemental Draft EIS).

13.2.2 Adequacy of Analysis of Indirect Climate Change Effects

Several commenters questioned the adequacy of the Draft EIS's analysis of indirect GHG emissions that may result from the proposed action, including whether indirect GHG emissions were quantified at all. One commenter also questioned the propriety of not quantifying GHG emissions that could result from Plan-Wide Activities. Another commenter questioned whether the emissions calculations are accurate because they differ from those in the TMV EIR (Kern County 2009).

Although the Draft NEPA Guidance is not final, consistent with its proposed recommendations, this Supplemental Draft EIS has been revised to quantify indirect GHG emissions that could result from the proposed action and other action alternatives (Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS). This analysis considers the potential emissions of GHGs that would result from construction and operation of the Commercial and Residential Development Activities that could occur under each alternative. Specifically, the emissions inventory includes construction emissions associated with on- and off-road construction vehicle and equipment use; and operational emissions associated with electricity generation, on-road vehicle use, natural gas and hearth combustion, and water supply. This Supplemental Draft EIS has been updated to reflect the most up-to-date information available relating to emissions calculations.

This analysis is consistent with the Draft NEPA Guidance. The Draft NEPA Guidance recommends that a NEPA document discuss the potential effects of a proposed action by:

- quantifying cumulative emissions over the life of the project,
- discussing measures to reduce GHG emissions, including consideration of reasonable alternatives, and
- qualitatively discussing the link between such GHG emissions and climate change.

With respect to Plan-Wide Activities, this Supplemental Draft EIS has been revised to clarify that Plan-Wide Activities do not represent a substantial change from current conditions or the No Action Alternative under any of the action alternatives. For these reasons, GHG emissions were not modeled for these activities.

With respect to the different GHG emissions calculations between the Draft EIS and TMV EIR, as noted by a commenter, these differences were due to the fact that the Draft EIS and TMV EIR used different model assumptions to calculate GHG emissions (e.g., whereas the TMV EIR, which was released after publication of the Draft EIS, used project-specific inputs, the Draft EIS used general construction assumptions regarding phasing, equipment types and quantities, and mix of energy sources, which was appropriate given the program level of the Draft EIS document). However, this Supplemental Draft EIS has been revised to use assumptions consistent with the TMV Project and the most updated emissions model.

13.2.3 Significance of Climate Change Effects

One commenter stated the Draft EIS “fails to recognize the significance of GHG emissions under NEPA” and cites *Ctr. For Biological Diversity v. Nat’l Highway Traffic Safety Admin.*, 508 F.3d 550 (9th Cir. 2007) as requiring the evaluation of the cumulative significance of GHG emissions on climate change under NEPA.

In *CBD v. NHTSA*, cited by commenters, the court concluded that the environmental assessment prepared by the National Highway Traffic Safety Administration (NHTSA) was inadequate because of NHTSA’s failure to justify its cursory conclusion that a proposed fuel efficiency standard would not have any significant climate change effects and, therefore, an EIS was not required. The court was considering “significance” in the context of the need to prepare an EIS, not in terms of drawing significance conclusions. No Federal thresholds of significance have been developed with respect to climate change impacts, and the Service has not developed any guidance on this topic.

Nevertheless, this Supplemental Draft EIS has been revised to clarify that GHG emissions from the proposed action have the potential to emit GHG emissions that would contribute cumulatively to climate change. Given this contribution, and due in part to the uncertainties and changing legal requirements associated with GHG emissions, the analysis determines that the cumulative effect of

the proposed action and alternatives on GHG emissions could be substantial (Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS).

As mentioned above, this Supplemental Draft EIS has been revised to include quantification of the potential GHG emissions from Commercial and Residential Development Activities for each alternative, and a discussion of each alternative's contribution to cumulative climate change effects. Thus, consistent with NEPA requirements, a full disclosure of the magnitude of the effects is provided and an accurate comparison among alternatives is made.

13.2.4 Black Carbon

Some commenters believe the EIS should include an analysis of black carbon emissions. Black carbon, which is a component of particulate matter (PM), can be emitted through natural processes (wildfires) or can be anthropogenic in origin (fossil fuel combustion, biomass burning). Commenters pointed out that black carbon is a short-lived pollutant that contributes to climate change. Commenters noted the regional nature of black carbon and stated that it is associated with a number of negative health impacts. According to commenters, black carbon provides an important opportunity for mitigation of climate change effects. These comments cited a number of articles and reports on black carbon, which are discussed below.

Currently, no state or Federal laws regulate black carbon. In particular, neither AB 32 nor the AB 32 Scoping Plan discuss black carbon or call for its reduction. The effect black carbon has on climate change is complex; scientific consensus on the effect black carbon emissions have on global temperature has not been reached. Unlike GHGs, which are pollutants that are emitted in gaseous form, black carbon is emitted in condensed (particulate) form. The effect black carbon emissions have on climate change is typically expressed in units of radiative forcing. The comments accurately describe black carbon's atmospheric effects, all of which can lead to positive radiative forcing. However, it should be noted that the study cited by commenters also notes that black carbon can lead to negative radiative forcing (Ramanathan and Carmichael 2008, p. 222). As with the primary identified GHGs, black carbon potentially contributes to global climate change. However, the commenter's statement that black carbon is the second greatest contributor to climate change after carbon dioxide (CO₂) is not put into context with the rest of the cited reference. As explained in the reference, developing nations in the tropics and East Asia are the major source regions of black carbon emissions (Ramanathan and Carmichael 2008, p. 221). According to the Intergovernmental Panel on Climate Change (IPCC), global black carbon emissions are likely to have only 3 to 21% of the climate change effect of CO₂ emissions¹ (2007, pp. 131–132). In addition, the commenter's statement that the global warming potential of black carbon is 760 times greater than that of CO₂ is not consistent with the cited reference (Reddy and Boucher 2007, p. 1), which states the global warming potential of black carbon for different regions ranges from 374 to 677 with a global mean of 480.

The United States is not a major contributor of black carbon. Several studies, including those cited by commenters, note that developing nations in the tropics and East Asia are the major source regions for black carbon emissions (Ramanathan and Carmichael 2008, pp. 221–227). For example, while East and South Asia are responsible for 53% of global black carbon emissions, North America contributes only about 10% to the global black carbon burden (with the U.S. responsible for only 6.1% of fossil-fuel soot) (Reddy and Boucher 2007, p. 4–5; Jacobson 2007, p. 4; Hadley et al. 2007, p. 1, indicating more than 75% of black carbon found in the spring over the west coast of the U.S. originates in Asia). Most black carbon emissions are the result of open biomass burning and residential biofuel and coal combustion; additional sources include transportation, industrial, and

¹ The radiative forcing associated with CO₂ is approximately 1.6 W/m², while the radiative forcing of BC is +0.20 ± 0.15 W m⁻² (+0.05 to 0.35 W/m²).

power generation activities (Bond 2007, pp. 30–31). Black carbon emissions in the U.S. have decreased since 1925, despite an increase in coal use, as a result of improved combustion technologies and PM controls (Bond 2007, p. 30). Moreover, it should be noted that with respect to the Covered Lands, the California Air Resources Board conducted the California Regional Particulate Air Quality Study to characterize PM in the San Joaquin Valley and determined that black carbon constituted only about 5% of the PM in the region during the period studied (Held et al. 2004, p. 3,698). Thus, black carbon represents a small component of the region's PM.

Two sources are cited to support statements that black carbon has a number of negative health effects that are additional to the health effects associated with PM: Mortality Risk Associated with Short-Term Exposure to Traffic Particles and Sulfates (Maynard et al. 2007) and Testimony for the Hearing on Black Carbon and Climate Change (U.S. House of Representatives Committee on Oversight and Reform, 2007). However, these references do not support this assertion. Maynard et al. (2007) uses black carbon as a surrogate for traffic particles emitted primarily by combustion engines and by brake and road wear. The article attributes an observed increase in mortality rate to exposure to traffic particulates as a whole, including black carbon—not solely to black carbon (Maynard et al. 2007, p. 751). Similarly, the testimony on black carbon attributes increases in chronic bronchitis, blood pressure, and infant mortality due to pneumonia to exposure to emissions—both gases and particulates—resulting from combusting coal or biomass for cooking; these health effects are not attributed exclusively to black carbon (U.S. House of Representatives House Committee on Oversight and Reform 2007, p. 9).

Some commenters suggested that reducing black emissions offers important climate change mitigation opportunities. In the atmosphere, black carbon is part of the complex mixture of condensed phase material referred to as *particulate matter*. Control technology that is designed to reduce PM concentrations will also reduce black carbon. Section 4.3, Air Quality, in Volume I of this Supplemental Draft EIS clarifies that a variety of measures to reduce PM emissions would be required by the local jurisdiction at the time an individual development project is approved. This Supplemental Draft EIS has been revised to clarify that Kern County's approval of the TMV Project supports this conclusion. For example, the local approval process required implementation of several mitigation measures to reduce PM emissions, such as requiring construction equipment exhaust controls, and prohibiting wood-burning fireplaces and an overall commitment to fully offsetting PM₁₀ emissions in the San Joaquin Valley Air Basin, (Appendix J, TMV Specific and Community Plan Mitigation Monitoring and Reporting Program, of this Supplemental Draft EIS).

The study cited by commenters, Global and Regional Climate Changes Due to Black Carbon (Ramanathan and Carmichael 2008), concludes that certain black carbon control measures can reduce short-term climate change trends, but focuses on potential black carbon control opportunities in Asia that could reduce black carbon associated with biofuel cooking (Ramanathan and Carmichael 2008, p. 226). Such measures are not relevant in the U.S., where biofuel cooking is not widespread. Moreover, another study not cited by commenters, Can Reducing Black Carbon Emissions Counteract Global Warming? (Bond and Sun 2005, p. 5,924) calls into question the efficacy of black carbon mitigation. According to this study, reducing CO₂, rather than black carbon, is often the most cost-effective method of reducing climate change effects, because anthropogenic CO₂ is mostly emitted by industrialized nations and causes most long-term climate change impacts (Bond and Sun 2005, p. 5,925). This report also concludes that black carbon mitigation may not affect climate change (Bond and Sun 2005, p. 5,925). Finally, with respect to black carbon controls available in the United States, according to the Worldwatch Institute's State of the World: Into a Warming World 2009 report, diesel particulate filters can eliminate over 90% of black carbon particulate emissions from diesel vehicles, while other flow-through or partial particulate filter technologies can eliminate 40 to 90% of black carbon emissions from diesel vehicles (Worldwatch 2009, p. 57). These controls are very common on diesel vehicles in the U.S., and, in fact, are required

for many types of equipment that would be used in the TMV Project, as shown in the TMV EIR (Kern County 2009, p. 7-7).

Revisions to Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS, also clarify that a variety of measures to reduce CO₂ emissions would also be required at the time an individual development project is approved. As indicated in this section, Kern County's approval of the TMV Project supports this conclusion. For example, the local approval process included several mitigation measures to reduce CO₂ emissions, such as energy efficiency commitments and encouragement of alternative vehicle use and an overall commitment to reduce GHG emissions by at least 29% relative to business as usual (Appendix J, TMV Specific and Community Plan Mitigation Monitoring and Reporting Program, of this Supplemental Draft EIS).

13.2.5 Embodied Emissions

Some commenters expressed concern that the Draft EIS does not consider the effects associated with the manufacture of concrete, and suggested that there are methods for analyzing the lifecycle or embodied emissions of concrete manufacture, as discussed in Reducing California's Greenhouse Gases through Product Life Cycle Optimization (Environmental Energy Technologies Division 2005).

Embodied emissions result from a product's production, use, and end of life (product lifecycle). The commenter is correct that the EIS does not estimate embodied emissions associated with concrete production. Estimating embodied emissions requires methodology that is far more uncertain and speculative than for other classes of emissions. Multiple protocols and guidance documents counsel against including embodied emissions in environmental documents. In particular, looking to California for guidance, in the context of the 2010 amendments to the California Environmental Quality Act (CEQA) Guidelines, both the California Natural Resources Agency (CNRA) and the Governor's Office of Planning and Research (OPR) specifically declined to recommend including lifecycle emissions estimates in the GHG analysis in CEQA documents. According to CNRA, no regulatory definition of *lifecycle* exists, and analyzing lifecycle emissions may go beyond the meaning of "indirect effects" and be inconsistent with CEQA (California Natural Resources Agency 2009, pp. 71-72.) CNRA specifically points to emissions associated with the manufacturing of building materials to illustrate an analysis that would be beyond the intended reach of CEQA. Similarly, in its Transmittal of the Governor's Office of Planning and Research's Proposed Senate Bill (SB) 97 CEQA Guidelines Amendments, OPR explained it was suggesting updates to the CEQA Guidelines to avoid an implication that lifecycle analysis is required under CEQA (Governor's Office of Planning and Research 2009, p. 5; see also San Joaquin Valley Air Pollution Control District 2009, p. 175 [for the purposes of CEQA, emissions from raw materials acquisition and manufacturing processes should not be included in the emissions inventory for the project]; California Air Pollution Control Officers Association 2008, p.65 ["The full life-cycle of GHG emissions from construction activities is not accounted for in the modeling tools available, and the information needed to characterize GHG emissions from manufacture, transport, and end-of-life of construction materials would be speculative at the CEQA analysis level"]).

Thus, the EIS does not analyze lifecycle emissions generally and embodied emissions associated with manufacture of concrete specifically.

13.2.6 Adequacy of Mitigation Measures

Commenters asserted that the Draft EIS failed to provide feasible mitigation measures and alternatives for GHG emissions, and requested the inclusion of a variety of mitigation measures to reduce GHG emissions associated with the proposed action, including the use of renewable energy for electricity generation and preferential contracting with clean truck companies.

This Supplemental Draft EIS has been revised to clarify that potential GHG emissions from individual proposed development projects are regulated at the local level by local air pollution control districts. The discussion in Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS clarifies that the implementation of mitigation measures would be required by the appropriate district and local jurisdiction during individual project approval. For example, Kern County's approval of the TMV Project included several mitigation measures to reduce GHG emissions. This Supplemental Draft EIS has been revised to include compliance with GHG-reducing requirements (Section 4.9.3.3, Mitigation Measures, in Volume I of this Supplemental Draft EIS). Examples of the types of measures that would be required during project-level approvals are provided in Appendix J, TMV Specific and Community Plan Mitigation Monitoring and Reporting Program, of this Supplemental Draft EIS. These measures would apply to Commercial and Residential Development Activities for all the alternatives at the time an individual project is proposed, and would include use of alternative fuels for construction equipment, as suggested by commenters, as well as measures that would reduce GHGs associated with operations, such as energy efficiency and green building commitments, compliance with any relevant GHG reduction plans adopted by the local jurisdiction, and measures to encourage use of alternative modes of transportation and incorporation of renewable energy systems.

Thus, this Supplemental Draft EIS has been revised to include a mitigation measure to comply with applicable Federal, state, and local air quality requirements, including any applicable GHG requirements (Section 4.9.3.3, Mitigation Measures, in Volume I of this Supplemental Draft EIS) and recognizes that detailed mitigation would be developed during the entitlement process for Commercial and Residential Development Activities under Kern County's jurisdiction. For example, Kern County would be responsible for implementing any applicable CEQA guidance or local grading or building permits, and would be the appropriate entity to incorporate avoidance and minimization measures with respect to GHG emissions into local approvals (Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS). Further, the EIS explains that the planned development nature of all the action alternatives (except the Kern County General Plan Buildout Alternative), including the Proposed TU MSHCP Alternative would create opportunities for innovative approaches to sustainability and notes that the Service anticipates the applicant would incorporate measures such as energy- and water-reduction features, requirements for minimizing construction materials and solid waste, and air quality emission reductions that would result in GHG reduction co-benefits (Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS).

As discussed in Master Response 10, TMV Project and EIR, and Development-Related Effects Analysis, the TMV EIR provides support for the efficacy of this EIS mitigation measure, and includes mitigation commitments requested by commenters, including renewable power provisions (Kern County 2009, pp. 4.3-128 to 4.3-135) and construction equipment and bid specification requirements (Kern County 2009, p. 4.3-117).

Additionally, with respect to addressing the effects of climate change, the Supplemental Draft EIS clarifies that species-specific conservation measures would be implemented that would reduce effects from climate change under the Proposed TU MSHCP, Condor Only HCP, and CCH Avoidance MSHCP Alternatives. For example, measures to address changed circumstances from climate change, resulting from drought and fire, would be implemented through an adaptive management program. It is also anticipated that the Kern County General Plan Buildout Alternative would likely include similar conservation measures; however, compliance with applicable regulations, including the ESA would occur on a project-by-project basis.

13.2.7 Consistency of Proposed Action with Implementation of AB 32 and Executive Order S-3-05

Some commenters state concern that the TU MSHCP threatens the successful implementation of the California Global Warming Solutions Act (AB 32, 2006) and Executive Order S-3-05, which require reductions of current levels of emissions in California. According to these comments, a revised EIS must be prepared that adequately analyzes the proposed action's cumulative contribution to climate change.

As indicated above, this Supplemental Draft EIS has been revised to include an analysis of the potential GHG emissions for Commercial and Residential Development Activities under each alternative. Executive Order S-3-05 and AB 32 are discussed in Section 4.9.1.1, Regulatory Setting, and in Appendix C, Climate Change Effects and the TU MSHCP, of this Supplemental Draft EIS.

Executive Order S-3-05, which preceded enactment of AB 32, sets forth a series of emissions reduction targets for California: achieving year 2000 GHG levels by 2010, year 1990 levels by 2020, and an 80% reduction below year 1990 levels by 2050. The executive order is not a legal mandate (*Lockyer v. City and County of San Francisco*, 33 Cal. 4th 1055, 1068 (Cal. 2004) ("the legislative power is the power to enact statutes, the executive power is the power to execute or enforce statutes").

AB 32, enacted in 2006, requires California's GHG emissions to return to 1990 levels by 2020. Under AB 32, the California Air Resources Board (CARB) is the lead agency for implementing its emission-reduction mandates. Pursuant to AB 32, CARB approved the Climate Change Scoping Plan: A Framework for Change (Scoping Plan), which establishes an overall framework for achieving AB 32 requirements. The Scoping Plan applies to nearly all sectors of the California economy, and includes measures that will affect commercial and residential development within the state.

CARB is in the process of implementing the Scoping Plan. As indicated in Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS, all the alternatives would be required to comply with applicable regulations, including AB 32 and the Scoping Plan. All Commercial and Residential Development Activities under any of these alternatives would be subject to these requirements and would need to comply with any relevant requirements of the Scoping Plan or AB 32. The alternatives would not be inconsistent with the Scoping Plan or interfere with implementation of any other element of AB 32.

As mentioned previously, Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS indicate that development projects facilitated by the proposed action, would be required to comply with applicable Federal, state, and local laws and policies to address potential effects associated with GHG emissions. For example, Kern County's approval of the TMV Project, which represents the majority of development under most of the alternatives, was approved by the Kern County Board of Supervisors in 2009. The TMV EIR (Kern County 2009), includes an assessment of the project's potential climate change impacts, and a commitment to reduce GHG emissions from the project consistent with AB 32's mandates (Appendix J, TMV Specific and Community Plan Mitigation Monitoring and Reporting Program, of this Supplemental Draft EIS).

13.2.8 Analysis of Climate Change Effects on Biological Resources

A commenter suggested that the Draft EIS should adequately consider the effects of climate change on the Covered Species and how these effects might interact with effects from the proposed action.

The commenter is correct that climate change can have effects on biological resources, such as alteration of precipitation and temperature patterns that in turn cause species to seek different habitat types or try to adapt to climatic or habitat changes. The commenter is also correct that these alterations can negatively affect species that are unable to adapt to new conditions. In response to comments, these potential effects—including potential effects on the Covered Species—are analyzed for each alternative in Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS. This discussion includes an analysis of the extent to which each alternative satisfies the management prescriptive for habitat maintenance in response to climate change identified by Halpin (1997). In addition, Appendix C, Climate Change Effects and the TU MSHCP, of this Supplemental Draft EIS includes a detailed analysis of the relative vulnerability to climate change of the Covered Species, concluding that some Covered Species are likely to be more sensitive to climate change, others are expected to be less sensitive, and some are likely to be insensitive to it.

As discussed in this Supplemental Draft EIS, the exact contours of the relationship between climate change and biological resources is not well understood. Moreover, a direct link between emissions from a proposed action and specific species effects cannot be made. This has been recognized by the DOI: “The requisite causal connections cannot be made between the emissions of GHGs from a proposed agency action and specific localized climate change as it impacts listed species or critical habitat. Given the nature of the complex and independent processes active in the atmosphere and the ocean acting on GHGs, the causal link simply cannot currently be made between emissions from a proposed action and specific effects on a listed species or its critical habitat” (U.S. Department of the Interior 2008, p. 6).² The EIS recognizes the potential for global climate change to affect Covered Species. This Supplemental Draft EIS includes a detailed analysis of this relationship, to the extent that it is understood, and analyzes how the various alternatives would respond to the potential for climate change to affect Covered Species.

As discussed in this Supplemental Draft EIS, climate change effects on biological resources would occur with or without implementation of any of the alternatives. Although the No Action Alternative would preserve up to 106,317 acres of the Covered Lands, under this alternative, funding would not necessarily be made available to implement other adaptive management strategies; thus, Halpin's (1997) recommendations would not be met. Under the Proposed TU MSHCP and CCH Avoidance MSHCP Alternatives, more than 129,000 acres of the Covered Lands (and, due to the Ranchwide Agreement, 90% of Tejon Ranch) would be preserved, thereby protecting the vast majority of communities expected to be most affected by climate change; design features would be included that would provide for flexible buffers; landscape connectivity would be ensured; features would be included to reduce effects of stressors on the Covered Species and their habitat, thereby counteracting stresses from climate change; and provisions would be included to allow a flexible response to climate change effects such as drought and wildfires. Thus, these alternatives would satisfy Halpin's (1997) recommendations. The Condor Only HCP Alternatives would generally

² The recognition of gaps in the scientific understanding of the relationship between climate change and effects on species is consistent with the Ninth Circuit's holding in *Center for Biological Diversity v. Kempthorne*, 588 F.3d 701 (2009). The Ninth Circuit rejected the Center for Biological Diversity's (CBD's) claim that the Service violated the Marine Mammal Protection Act and NEPA by failing to account for the effects of oil and gas activities in the context of a warming climate. The court emphasized that CBD only offered evidence of general effects of climate change on polar bears, but did not synthesize how these effects would interact with the oil and gas activities permitted by the proposed regulations. (*Center for Biological Diversity v. Kempthorne*, 588 F.3d 701, 711–712).

respond to risks from climate change to the same degree; however, no provisions would be included to respond to climate change effects on species other than the condor. Finally, the Kern County General Plan Buildout Alternative may not provide redundant reserves, may not include effective buffers, would result in impaired habitat connectivity, and would not include a holistic adaptive management regime; this alternative would not satisfy Halpin's (1997) recommendations.

The Supplemental Draft EIS's discussion of climate change, and its approach to the potential effects of climate change on Covered Species, complies with all standards cited by the commenter, including *Massachusetts v. EPA*, DOI Order No. 3226, and *CBD v. NHTSA*. Specifically, although not addressing climate change in the context of NEPA and environmental review requirements, the commenter is correct that, in *Massachusetts v. EPA*, the U.S. Supreme Court recognized that the "harms associated with climate change are serious and well recognized" (*Mass. v. EPA*, 127 S. Ct. 1438, 1455 (2007)). Consistent with this opinion, this Supplemental Draft EIS recognizes the effects that climate change is having—including on the Covered Species, to the extent this relationship is understood—and analyzes the proposed action's potential cumulative contribution to it.

Similarly, the commenter cites DOI Order No. 3226, which was superseded by Order No. 3289, as noted above, for the premise that DOI agencies must consider climate change effects when undertaking long-range planning exercises. Although this order applies to DOI-managed lands and the quoted statement does not refer to private activities on private lands, the EIS thoroughly considers the climate change effects of all alternatives.

Finally, in *CBD v. NHTSA* (508, F.3d 508 (2007)), the court concluded that the environmental assessment prepared by NHTSA was inadequate because of NHTSA's failure to justify its cursory conclusion that a proposed fuel efficiency standard would not have any significant climate change effects and, therefore, an EIS was not required. Although *CBD v. NHTSA* does speak to the need for EISs to include an analysis of the climate change effects of a proposed Federal action, it does not need to include a discussion of the effects of climate change on the general environment. Consistent with *CBD v. NHTSA*, as discussed above, the EIS discusses the potential climate change effects of the proposed action and compares these potential effects against a baseline that assumes only negligible existing emissions, and to those of the No Action Alternative.

The following sub-sections address potential climate change effects on ecosystem processes; biodiversity; specific biota, including amphibians, butterflies, alpine species, and plants; diseases and vectors; and wildlife habitat connectivity.

13.2.8.1 Climate Change Effects on Ecosystem Processes

The commenter cited the United States Global Change Research Program (USGCRP)(2009) to support the statement that climate change has affected a range of ecosystem processes, leading to shifts in species ranges and timing of migration. According to the commenter, threats to species and their ecosystems include fire, insect pests, disease pathogens, and invasive weed species. The commenter also asserts that arid southwest desert and dryland areas—such as the Covered Lands—are likely to become hotter and drier, feeding a cycle of invasive species, drought, and wildfire.

Revisions to this Supplemental Draft EIS include additional information about the effects that climate change has already had and is predicted to have on biological resources, including its potential to increase risks such as drought/fire, insect pests, disease pathogens, and invasive species.

USGCRP (2009) synthesizes a variety of scientific assessments and recently published research on climate change, and projects future climate change based on these analyses. The commenter is correct that USGCRP (2009) finds that climate change has affected various ecosystems and is likely to continue to do so in the future. Although this Supplemental Draft EIS relies on other sources to

describe the potential effects of climate change on biological resources, these sources are generally consistent with USGCRP (2009). In addition, it should be noted that, USGCRP (2009, pp. 8, 10, 21, 25, 68) recognizes significant uncertainty with respect to future effects of climate change.

As discussed above, revisions presented in this Supplemental Draft EIS include an analysis of how each alternative would be affected by and address potential effects of climate change on the relevant biological resources.

13.2.8.2 Climate Change Threats to Biodiversity

Commenters suggested that climate change poses a major threat to biodiversity and cite various sources to support assertions regarding the role of climate change in the extinction of species and loss of biodiversity.

The commenters are correct that climate change poses a risk to species. As discussed in this Supplemental Draft EIS, and expanded upon in Appendix C, Climate Change Effects and the TU MSHCP, of this Supplemental Draft EIS, although some of the Covered Species demonstrate characteristics that increase their relative vulnerability to climate change, the precise way in which climate change will affect Covered Species is not well-understood and cannot be quantified, nor can the relationship of such potential effects to potential effects from the proposed action. The EIS recognizes that climate change is an important challenge with respect to biodiversity and analyzes how each alternative would respond to it in revisions presented in Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS. While all the alternatives would preserve, to varying degrees, the majority of the Covered Lands in open space, the Proposed TU MSHCP Alternative addresses 27 Covered Species and, incorporates additional protections for changed circumstances to address climate change effects, as well as adaptive management terms for multiple species. Thus, the Proposed TU MSHCP Alternative meets the management prescription identified by Halpin (1997) to address climate changes. Similar features are included in the Condor Only HCP Alternative, although this alternative would not include management of other Covered Species to respond to climate change. The CCH Avoidance MSHCP Alternative, like the Proposed TU MSHCP Alternative would meet all of the Halpin (1997) management prescriptions. In contrast, the Kern County General Plan Buildout Alternative may not provide redundant reserves, effective buffers, habitat connectivity, or a holistic adaptive management regime.

These commenters cite many sources to support the general idea that climate change poses substantial threats to species. As discussed above, this Supplemental Draft EIS recognizes this threat and includes additional information to address this topic. In addition, while most of these sources do discuss threats to biological resources posed by climate change, they do not relate specifically to California, the Covered Lands, or the Covered Species. In addition, many of these sources recognize the uncertainty of the relationship between climate change and biological resources. For example, the commenters cite the International Union for Conservation of Nature (IUCN) (2009) and Mayhew et al. (2007) for the proposition that climate change is a leading threat to California's and the world's biological diversity, including with respect to extinction. IUCN (2009), which is a comprehensive information source on the global conservation status of the world's plant and animal species, does suggest that climate change will play an important role in species extinction in the 21st century (International Union for Conservation of Nature (IUCN) 2009, p. 77). However, the report also notes that some species are more susceptible to the effects of climate change than others due to their life history and their ecological, behavioral, physiological, and genetic traits (IUCN 2009, p. 78). In addition, IUCN (2009) recognizes other threats to species that will likely contribute to extinction, such as habitat destruction, competition from invasive species, predation, and human use as food and medicine. With the exception of noting that California has a particular concentration of threatened conifer species, IUCN (2009) does not include any specific analyses regarding California, the Covered Lands, or Covered Species.

Mayhew et al. (2007) analyzed fossil records to determine whether a link exists between global biodiversity, defined as the richness of families and genera, and low-latitude sea surface temperatures. According to Mayhew et al. (2007), their results are the first clear evidence that global climate change may explain substantial variation in the fossil record, and that the climate record may help estimate future effects on biodiversity; their findings “may have implications for extinction and biodiversity change under future climate warming” (Mayhew et al. 2007, p. 47). However, Mayhew et al. (2007) also qualify their data and its applicability for estimating future effects of climate change on biodiversity, and indicate that a clear cause-and-effect relationship has not been established. In addition, the authors state that their data cannot be used to predict changes over short time scales (i.e., the next 90 years), and that even at the scale of geologic periods, the data become variable as the periods are analyzed individually, and statistically significant relationships are not discernible. The paper does not say that climate change will become one of the major drivers of extinction in the 21st century, nor does it relate specifically to California, the Covered Lands, or Covered Species.

The commenter cites Thomas et al. (2004) and IPCC (2007) for predictions of percentage of species that would go extinct under different climate change scenarios. The authors conclude that, under high-, medium- and low-emissions scenarios, 35%, 24%, and 18%, respectively, of the world’s species would be committed to extinction by 2050. However, the authors themselves highlight the uncertainties associated with their research: “Many unknowns remain in projecting extinctions, and the values provided here should not be taken as precise predictions. Analyses need to be repeated for larger samples of regions and taxa, and the selection of climate change scenarios need to be standardized” (Thomas et al. 2004, p. 147). Moreover, this analysis does not distinguish between extinctions arising from habitat destruction versus climatic unsuitability, and was limited to regions in Mexico, Queensland, South Africa, Europe, Australia, Amazonia, Brazil, and South Africa—none of which directly apply to the Covered Lands. The commenter accurately cites IPCC (2007) for the projection that 20 to 30% of plant and animal species have an increased risk of extinction due to climate change. However, these projections do not specifically relate to or provide species-specific information about any Covered Species. The commenter also states that the Service has recognized that climate change poses an ongoing threat to wildlife that can lead to extinction and cites three *Federal Register* (FR) notices regarding the listing of species under the ESA. Two of the listings—71 FR 26852 and 74 FR 1937—are for National Marine Fisheries Service’s (NMFS) final rules on species listing, the first for elkhorn and staghorn corals, and the second for black abalone. These listings do not relate to the Covered Lands or the Covered Species. The third listing, 73 FR 28212, constitutes a Service listing that draws a link between risk to species and climate change. However, this listing is for the polar bear. As with the coral and abalone listings discussed above, no connection exists between the polar bear and the Covered Lands or potential effects from the proposed action. In addition, in conjunction with issuing the polar bear listing, DOI also issued a rule under Section 4(d) of the ESA providing that incidental take of polar bears resulting from activities outside their current range—including climate change—is not prohibited; this rule was finalized on December 16, 2008 (73 FR 76249). The current Secretary of the Interior, Ken Salazar, declined to rescind this rule, stating: “It is currently not possible to directly link the emission of greenhouse gases from a specific power plant, etc., to effects on specific bears or bear populations. This direct “connect the dots” standard is required under the ESA and court rulings. Therefore, the Service’s policy guidance to its field staff is not to require such consultation. Pending further review and analysis, DOI does not believe that a project-by-project ESA review of proposed actions that have the potential to increase GHG emissions, regardless of where they occur or how much they contribute to global GHG emissions, is the appropriate tool for addressing climate change impacts. A comprehensive approach is needed in order to protect the polar bear and other species that are impacted by climate change” (U.S. Fish and Wildlife Service 2009).

The commenter cites Parmesan and Galbraith (2004) and Walther et al. (2005) to support their assertions that scientists predict three categories of impacts from climate change:

- earlier timing of spring events,
- extension of species range poleward/upward in elevation, and
- decline in species adapted to cold weather/increase in those adapted to warm weather.

This Supplemental Draft EIS recognizes the potential for climate change to have these effects, and cites to the finding of these authors. However, none of these studies suggest any connection between the species they analyze and those that may be present on the Covered Lands.

13.2.8.3 Climate Change Effects on Amphibians

According to one commenter, some of the species most susceptible to climate change include amphibians, such as the Tehachapi slender salamander, yellow-blotched salamander, and western spadefoot toad. These comments cite IUCN (2008) and IUCN (2009) to support this assertion, and note that a recent study linked extinction of amphibian species in tropical highland forests in Central and South America to climate change as a result of creating ideal conditions for growth of chytrid fungus, a disease that kills frogs. According to these comments, the golden toad, which is endemic to the same tropical mountain forests, was also driven to extinction from climate change. The comments assert that amphibian extinctions from Monteverde represent one of the largest vertebrate extinction events of the last 100 years and are a harbinger of the effects climate change will have on species around the world.

The commenter is correct that the Tehachapi slender salamander, and amphibians in general, have several characteristics of species likely to be sensitive to climate change. This Supplemental Draft EIS includes additional information regarding the effects of climate change on the Tehachapi slender salamander and other amphibian species (Section 4.9, Climate Change and Greenhouse Gases, and Section 5.2 of Appendix C, Climate Change Effects and the TU MSHCP, of this Supplemental Draft EIS).

With respect to the sources cited by the commenter, IUCN (2008, p. 4) is a short article that suggests up to 52% of amphibians are susceptible to climate change. However, the article states that the greatest climate change susceptibility occurs in Mesoamerica, northwestern South America, southern Brazil and its neighboring countries, and a large expanse from east to central to southern Africa (International Union for Conservation of Nature 2008, p. 8). All of these areas are geographically distinct from the Covered Lands. Similarly, though IUCN (2009, p. 80) suggests that up to 52% of amphibians may be susceptible to climate change, it identifies the same areas as IUCN (2008) as the most likely to see climate change effects occur with respect to amphibians. In addition, IUCN (2009, p. 23) states that habitat loss and degradation, and pollution—not climate change—are the most common threats to amphibians.

The commenter cites a study of harlequin frog—a species endemic to the American tropics — extinctions conducted in Central and South America (Costa Rica, in particular), and an article that discusses the results of this study, as well as some other research on amphibian extinctions (Pounds et al. 2006, Eilperin 2006). However, this research is limited to Central and South America, which present extremely different climates than is present on the Covered Lands.

The commenter suggests that these reports apply to amphibians that may be affected by the proposed action, such as the Tehachapi slender salamander, the yellow-blotched salamander, and the western spadefoot toad. However, neither of these reports discuss potential effects of climate change on these species, or any other amphibians that are Covered Species.³

³ It should be noted that, with respect to the Tehachapi slender salamander, the Service has recognized that models do not currently exist that permit prediction of how climate change will affect the Tehachapi slender salamander's range. In its Notice of 90-Day Petition Finding and Initiation of Status Review, the Service stated: "We believe that climate change models that are currently available are not yet capable of making meaningful predictions of climate

13.2.8.4 Climate Change Effects on Butterflies

A commenter addressed the potential effects of climate change on butterflies. The commenter stated that checkerspot butterflies, including the Edith checkerspot, Quino checkerspot, Bay checkerspot, and Taylor checkerspot, are clear examples of species severely affected by climate change. The commenter cited Parmesan and Galbraith (2004), for the proposition that as a result of climate change, the host plant for the Edith's checkerspot butterfly develops earlier in the spring, resulting in the hatching of caterpillars on plants that have completed their lifecycle and dried up. The commenter stated that more populations have been lost in the southern portion of their range than in the northern portion, resulting in a net shift of range northward and upward in elevation. The commenter noted that these same changes have affected the other checkerspot species. Finally, the commenter cited Krajick (2004) and suggested that climate change affects butterfly species in other ways as well, including as a result of the northward expansion of the tree line, which can impede dispersal, fragment habitat, and increase mortality as a result of butterfly collisions with the trees.

Although butterflies are not among the Covered Species, this Supplemental Draft EIS has been revised with additional information regarding the effects of climate change on insects, which includes butterflies (Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS). As discussed in that section, none of these butterflies are Covered Species, nor are the Covered Lands within their range or within an area covered by these studies.

13.2.8.5 Climate Change Effects on Alpine Species

Some comments raised particular questions regarding the ability of alpine species to adapt to climate change effects. In particular, these comments discussed climate change effects on the pika and on alpine plants. The comments cited Krajick (2004), and stated that alpine species like the pika are unable to shift their ranges as warming temperatures and advancing tree lines, competitors, and predators affect their mountain habitat; and alpine plants, which have little ability to shift their range, may be at the most risk from climate change. Comments also cited Beever et al. (2003) and Grayson (2005) for further discussion regarding the decline of the American pika. One commenter noted that American pika populations at 7 of 25 localities in the Great Basin have disappeared in recent years, and cited studies indicating that the average elevation of surviving populations of pika have increased.

Although pika is not a Covered Species, this Supplemental Draft EIS has been revised with additional information regarding the effects of climate change on mammals generally (Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS). As discussed in that section, the Covered Lands do not represent an alpine environment, nor is a pika a Covered Species. The studies cited by the commenter relate to vulnerability of alpine ecosystems in Spain, Greece, Australia, and New Zealand (Krajick 2004), and the Great Basin (Beever et al. 2003; Grayson 2005), which are geographically distinct from the Covered Lands.

13.2.8.6 Climate Change Effects on Plants

Several comments also related to climate change effects on plants. A commenter referenced a study discussed by Morse et al. (1995) of 15,148 North American vascular plants that found 7 to 11% of

change for specific, local areas such as the range of the Tehachapi slender salamander. We do not have models to predict how the climate in the range of the Tehachapi slender salamander will change, and we do not know how any change may alter the range of the species ... we do not have information on past and future weather patterns within the specific range of the species to conclude that the species may be threatened by climate change" (74 FR 18340).

species could be entirely out of their climate envelopes with a 3°C warming, the lower limit of the temperature increase predicted by the IPCC. According to the commenter, at the upper bound of predicted climate change, this percentage could be 25%–40%. The commenter stated that, in contrast, about 90 plant species are believed to have become extinct in North America in the last 200 years.

Although Morse et al. (1995) did not address any of the Covered Species, this Supplemental Draft EIS recognizes that climate change may affect various vegetation communities in a variety of ways, including as a result of changes in the length of the growing season, tolerances to temperature regimes, changes in precipitation, and more frequent and intense wildfires (Section 4.9, Climate Change and Greenhouse Gases, and Appendix C, Climate Change Effects and the TU MSHCP, of this Supplemental Draft EIS).

13.2.8.7 Climate Change Effects on Disease and Vectors

One commenter suggested that climate change can alter conditions for diseases and their vectors in a way that allows the incidence of species disease to increase and spread. The commenter cites Harvell et al. (2002) to support their statement that climate change will exacerbate plant disease by altering the biological processes of the pathogen, host, or disease-spreading organism. The commenter states that the most severe and least predictable disease outbreaks will likely occur when climate change alters host and pathogen geographic ranges. The commenter further cites Harvell et al. (2002) to support its assertion that climate change will influence wildlife disease by affecting free-living, intermediate, or vector stages of pathogens. According to the commenter, many vector-transmitted diseases are currently climate-limited; human diseases (e.g., malaria, Lyme disease, tick-borne encephalitis, yellow fever, plague, dengue fever) have expanded ranges into higher latitudes as temperatures warm.

In response to comments, additional information has been added to this Supplemental Draft EIS, Section 4.9, Climate Change and Greenhouse Gases, and Appendix C, Climate Change Effects and the TU MSHCP, of this Supplemental Draft EIS, regarding the effects of climate change on the spread of vectors. As discussed in the appendix, climate change could result in the increased introduction of invasive species, including diseases and parasites, which could in turn affect public health and/or species.

Although Harvell et al. (2002, p. 2,158) do predict that climate change will result in increased disease abundance and distribution, the paper also discusses other factors that can affect the range and abundance of plant disease. In addition, Harvell et al. (2002, pp. 2,161) state that some wildlife vectors perform better in cooler conditions, and discuss other factors that may affect the range and abundance of disease, including increases in drug-resistant strains, pollution, and changes in land use and vegetation. Nevertheless, the commenter is correct that climate change may increase the spread of diseases and their vectors, which is recognized in this Supplemental Draft EIS.

13.2.8.8 Importance of Wildlife Linkages

According to one commenter, climate change will elevate the importance of wildlife linkages to connect species populations or provide for migratory corridors for species affected by climate change. The commenter cites Servheen et al. (2007), Halpin (1997), and South Coast Wildlands (2006) for the premise that a key function of wildlife corridors is to buffer the negative effect of climate change on wildlife through facilitating migration and genetic flow. The commenter notes that Tejon Ranch is part of a landscape connection that is integral to the interconnectedness of California's biographic regions and their wildlife, and asserts that the importance of wildlife connection or linkage must be analyzed in the context of its elevated importance to provide for wildlife migration due to climate change.

The Service agrees that, if climate change places strains on species, the movement ability offered by wildlife linkages may become increasingly important. The commenter is correct that the Tehachapi Mountains represent an important habitat linkage, which is discussed in Section 3.1.5, Wildlife Habitat Linkages and Corridors, in Volume I of this Supplemental Draft EIS. In addition, Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS has been updated to include a specific analysis of each alternative and its ability to meet the Halpin (1997) recommendation for designing reserves that include linkages for species that address climate change effects.

13.2.9 Climate Change Effects on Air Quality

One commenter raised questions regarding the adequacy of the Draft EIS's discussion of climate change effects on air quality.

The commenter is correct that climate change may result in increased air quality problems. For example, climate change may result in warmer temperatures that could increase the potential for ozone formation. This in turn could increase the risk of respiratory problems associated with deteriorating air quality.

Additional information regarding the potential effects of climate change on air quality has been presented in Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS. As indicated in the revisions, higher temperatures resulting from climate change may facilitate air pollution formation—in particular ground-level ozone—and result in increased wildfires, or cause heat-related public health effects. However, although some studies indicate a relationship between air quality and climate change, the precise details of this relationship are unclear, and no tools exist to link a particular action's air quality effects to a rise in global temperature.

13.2.10 Climate Change Effects on Water Resources

A commenter raised questions about the potential for climate change to interact with effects from the proposed action on water resources.

The commenter is correct that climate change is expected to have an effect on water resources in California. In response to comments, and to supplement the discussion of the affected environment, Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS presents additional information regarding the potential effects of climate change on water resources. As this information demonstrates, the precise extent to which climate change effects on water resources would affect the Covered Lands cannot be predicted with certainty.

Approval of the TU MSHCP and implementation of the habitat conservation plan would not itself substantially affect water supply. Additionally, the TU MSHCP would include a number of provisions to ensure flexibility of its species-protection requirements in light of potential effects on water from climate change, including a required response and imposition of preventive measures to be taken should climate change create new risks to Covered Species, as a result of increased drought (Section 8, Changed Circumstances and Plan Implementation, in the TU MSHCP). These requirements would be incorporated into any incidental take permit (ITP) issued by the Service.

13.2.11 Climate Change Analysis Required by Endangered Species Act

One commenter asserted that the Draft EIS and Draft TU MSHCP failed to account for the ESA's required analysis of conservation and recovery of endangered species through the ESA Section 10 process, and cites *Nat'l Wildlife Fed'n v. NMFS*, 481 F.3d 1224 (9th Cir. 2007) for support. The commenter further cites *NRDC v. Kempthorne*, 506 F.Supp.2d 322 (E.D. Cal. 2007) and *Pac. Coast Fed'n of Fishermen's Ass'n v. Gutierrez*, 606 F.Supp.2d 1122 (E.D. Cal. 2008) as support for its assertion that courts have repeatedly ruled that an agency's failure to address the effects of climate change in analyzing effects to threatened and endangered species violates the ESA. According to the commenter, the risks that climate change poses to ecosystems covered by the TU MSHCP and the environment in general must be fully analyzed and accounted for in the EIS.

With respect to the *National Wildlife Federation* case and the ESA Section 7 standard related to survival and recovery, please see Master Response 8, Regulatory Considerations. With respect to the other two cases, *NRDC* and *Pac. Coast Fed'n of Fishermen's Ass'n*, these companion ESA Section 7 cases relate to aquatic species where the agency failed to consider how climate change could affect river hydrology and water supply (506 F.Supp.2d at 367-370; 606 F.Supp.2d at 1183-84). In both cases, the courts determined that the ESA Section 7 biological opinions completely failed to mention climate change, making it impossible to determine whether the agencies simply ignored the data presented, or considered it and then appropriately dismissed it because it was too speculative (506 F.Supp.2d at 369; 606 F.Supp.2d at 1,184). The *NRDC* court also emphasized that the Biological Opinion included no assurances that appropriate measures would be put in place if climate change created negative effects on water supply (506 F.Supp.2d at 370).

As discussed above, additional information related to climate change effects on the Covered Species is presented in Section 4.9, Climate Change and Greenhouse Gases, in Volume I of this Supplemental Draft EIS in responses to comments on the Draft EIS. Although the cases cited in the comment are specific to ESA Section 7 compliance and not to ESA Section 10 or NEPA compliance, the cases presented by commenters were considered in these revisions. The EIS and TU MSHCP account for these potential effects, and include provisions to protect Covered Species from potential adverse effects resulting from climate change on the Covered Lands. As mentioned above, the Proposed TU MSHCP Alternative, in particular, would require the preservation of the vast majority of the Covered Lands, includes changed circumstances provisions to address climate change effects, and incorporates an adaptive management regime for the 27 Covered Species.