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U.S. Bureau of Land Management
Coal Programmatic EIS Scoping
Bureau of Land Management
20 M Street, SE
Room 2134LM
Washington, DC 20003

Via electronic mail to: BLM_WO_Coal_Program_PEIS_Comments@blm.gov; Exhibits via Federal Express

RE: Notice of Intent to Prepare a Programmatic Environmental Impact Statement to Review the Federal Coal Program, 81 Fed. Reg. 17,720 (Mar. 30, 2016)

Dear Secretary Jewell, Director Kornze, and Chief Leverette:

On behalf of the Center for Biological Diversity and Utah Physicians for a Healthy Environment, we submit these comments on the Bureau of Land Management's Notice of Intent to Prepare a Programmatic Environmental Impact Statement to Review the Federal Coal Program.[1]

**The Center for Biological Diversity** ("the Center") is a nonprofit environmental organization dedicated to the protection of imperiled species and their habitats through science, education, policy, and environmental law. The Center has over 1.1 million members, supporters and activists dedicated to the conservation of endangered species and wild places, protection of human health and welfare, and combating climate change.

**Utah Physicians for a Healthy Environment** (UPHE) is a public interest nonprofit organization formed in 2007 whose members include 400 medical professionals within Utah, and another 4,000 supporting members of the public. UPHE is dedicated to protecting the health and well-being of the citizens of Utah by promoting science-based health education and interventions that result in progressive and measurable improvements to the environment.

We commend the Bureau of Land Management on its decision to take a long-overdue comprehensive look at the environmental consequences of the federal coal leasing program. In the over three decades since the last review of this program, two significant developments have occurred that require a thorough reevaluation of the BLM's role as a major coal supplier in the

[1] 81 Fed. Reg. 17,720 (Mar. 30, 2016).

United States and abroad. First, the emergence, through the industry's control of the lease-by-application program, of the Powder River Basin as the nation's largest source of cheap, subbituminous coal has made the BLM into a near-monopoly supplier of thermal coal, and perhaps inadvertently, the country's major facilitator of coal-fired electricity generation. Second, an overwhelming scientific and international consensus has emerged that anthropogenic climate change is real, is happening now, and requires concerted action if its most catastrophic consequences are to be mitigated. After years of denial, the BLM has begun, in some individual rulemaking and leasing reviews, to acknowledge the climate consequences of its coal leasing actions. The Programmatic Environmental Impact Statement process, however, provides the first nationwide opportunity to examine the emissions consequences of federal coal leasing programs and policies, and to begin to take action to bring BLM coal leasing into accord with the nation's stated climate goals and international commitments.

In the Notice of Intent, BLM states:

> Many stakeholders highlighted the tension between producing very large quantities of Federal coal while pursuing policies to reduce U.S. GHG emissions substantially, including from coal combustion. They also stated that the current leasing system does not provide a way to systematically consider the climate impacts and costs to the public of Federal coal development, either as a whole, or in the context of particular projects. In addition, they raise concerns that exporting Federal coal, and the associated GHG emissions, undermines our nation's efforts to encourage all countries to contribute to climate change mitigation efforts.[2]

These scoping comments are intended to assist BLM in meeting its stated goal of identifying and analyzing the climate impacts of the federal program, and the consistency of that program with climate policy. In short, reliable and readily-available tools and methods exist for quantifying GHG emissions limits necessary to meet climate targets, and for identifying the potential greenhouse gas emissions of federal coal deposits potentially available for lease and the comparative emissions consequences of various alternatives. Based on this information, BLM can and must, in order to meet climate targets, consider and adopt an alternative that extends indefinitely the present moratorium on new federal coal leases, and expands the moratorium to <u>all</u> unleased federal coal.

Federal coal already under lease is already exceeds both the quantity that can be burned while maintaining even a 50% change of limiting warming to 2°C, and the anticipated demand for Powder River Basin coal under such a scenario. Facing the realities of physics and international climate commitments requires the BLM to recognize that new federal coal leasing is inconsistent with even the least ambitious climate mitigation targets. The sooner the agency acknowledges this reality, the sooner BLM, other agencies, and coal-producing communities can engage with the necessity of an orderly end to the federal coal program, and a just and sustainable transition for the miners and communities whose labor fueled the twentieth century.

[2] 81 Fed. Reg. at 17,724-25.

In evaluating the federal coal leasing program as a whole, however, BLM must consider not only energy supply and economic return and the physical and policy limits on greenhouse gas emissions, but also several other significant indirect consequences of the coal leasing program. Federal coal leasing has significant adverse effects on both human health and welfare and on species at risk of extinction (both from the direct impacts of coal mining, transport, combustion, and disposal, and from the federal coal programs' significant contribution to global greenhouse gas emissions).

## I. Background

The U.S. Bureau of Land Management (BLM), operating under the authority various federal statutes (including the Mineral Leasing Act, Federal Land Policy and Management Act, the Surface Mining Control and Reclamation Act, the National Environmental Policy Act, and the Endangered Species Act), has the authority to lease publicly-owned coal deposits on approximately 570 million acres of public land to private companies for mining. Under the Mineral Leasing Act, BLM leases federal coal for 20-year periods (with 10-year extensions for producing deposits). Although the process theoretically allows for planned development and competitive bidding, for the past several decades federal coal lease sales has taken place at the behest of the coal industry, with most sales having only a single bidder.

Federal coal leases are primarily, although not exclusively, located in the four western states of Wyoming, Montana, Colorado, and Utah. Approximately 90% of federal coal production comes from the Powder River Basin of Wyoming and Montana, a cheap (easily accessed by surface mining techniques) source of relatively low-sulfur subbituminous coal. As of 2015, 43.5% of U.S. coal produced is from federal leases, and 88% of that coal is from the Powder River Basin. Most federal coal is used in electricity generation. As of 2012, federal coal production was 422 Mt, responsible for an estimated 769 Mt $CO_2$e in emissions – more than 13 percent of all U.S. fossil fuel GHG emissions, and more than 10 percent of all U.S. GHG emissions. A 2015 review of published government and scientific data estimates the total emissions potential of U.S. federal coal at 20 Gt $CO_2$e from coal already under lease, and a 212 Gt $CO_2$e unleased but potentially available for lease. The best available information suggests that coal currently under lease will meet demand for another 25 years (through 2041), under a scenario where the Clean Power Plan (but no other significant climate policies) are implemented. Although some coal companies hope to substitute coal export for declining domestic demand, the necessary infrastructure for expanded coal export does not currently exist. Although response to changes in coal production is contingent on numerous and not fully predictable market, regulatory, and political factors, the best available studies suggest that ending new federal coal leasing would reduce global emissions by 71 Mt $CO_2$e through 2030 if the Clean Power Plan is implemented, or 238 Mt $CO_2$e if the CPP is not implemented.

There has been no comprehensive national (or even regional) environmental review of the federal coal leasing program since 1984. Earlier this year, Secretary Jewell announced a partial moratorium on new coal leases and a "programmatic" environmental review of the entire leasing program. The stated purpose of this review is threefold: (1) to determine whether the current leasing program obtains a "fair return" to the taxpayer; (2) to assess the relationship between the coal leasing program and current market conditions; and (3) to address concerns about climate

change. The Secretary's order notes that "[m]any stakeholders highlighted the tension between producing very large quantities of Federal coal while pursuing policies to reduce U.S. GHG emissions substantially, including from coal combustion. Critics also noted that the current leasing system does not provide a way to systematically consider the climate impacts and costs to taxpayers of Federal coal development." Under the National Environmental Policy Act, a programmatic environmental impact statement requires a federal agency to consider (1) alternatives to its proposed course of action, including taking no action, and (2) the consequences of its proposed action and alternatives on the human environment. Despite court rulings making clear that this analysis includes consideration of the climate effects of resulting greenhouse gas emissions, federal agencies have been inconsistent in their treatment of GHG emissions resulting from leasing and infrastructure decisions, frequently dismissing emissions as globally insignificant or assuming perfect substitution of other fossil fuels.

II. NEPA Requirements for a Programmatic Environmental Impact Statement

The National Environmental Policy Act (NEPA) requires that federal agencies take a hard look at the environmental consequences of a major federal action before taking that action. Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 97 (1983). To that end, NEPA requires every federal agency to:

> include in every recommendation … on … major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on (i) the environmental impact of the proposed action, (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented, (iii) alternatives to the proposed action, (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. 42 U.S.C. § 4332(2)(C).

NEPA requires federal agencies to prepare an EIS for any major federal action significantly affecting the quality of the human environment. 42 U.S.C. § 4332(2)(C)(i); Sierra Club, 777 F. Supp. 2d at 47. This requirement furthers NEPA's twin aims of ensuring that an agency consider every significant aspect of the environmental impact of a proposed action, and inform the public that it has indeed considered environmental concerns in its decision making process. WildEarth Guardians v. Jewell, 738 F.3d 298, 302 (D.C. Cir. 2013)(quoting Baltimore Gas, 462 U.S. at 97).

To determine whether the impacts of an action are significant, Council on Environmental Quality (CEQ) regulations identify two factors: context and intensity. 40 C.F.R. § 1508.27(a)-(b). Context refers to an action's significance in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality, considering short- and long-term effects. Id. § 1508.27(a). Intensity refers to the severity of impact, based on a number of possible factors, including effects on public health or safety, cumulatively significant environmental impacts that are reasonable to anticipate, and the degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. Id. § 1508.27(b)(2), (6), (7).

As discussed herein, coal's life-cycle impacts are significant based on the intensity of effects on public health and safety, and the cumulative nature of the effects, particularly on coal mining, transport and export communities. Other agencies have recognized that the impacts of coal mining and coal transport are sufficiently significant to require preparation of an EIS. See e.g., WildEarth Guardians, 738 F.3d at 311 (Department of Interior prepared EIS for coal mining leases, where impacts included local air pollution, including ozone and nitrous oxides); Natural Res. Def. Council, Inc. v. Jamison, 815 F. Supp. 454, 457 (D.D.C. 1992) (Department of Interior prepares EIS to assess impact of leasing proposed sites for coal mining); US Army Corps of Engineers, Notice of Amendment to the Intent To Prepare an Environmental Impact Statement (EIS) for the Millennium Bulk Terminals—Longview Shipping Facility Project, 78 Fed. Reg. 54873 (Sept. 6, 2013) (EIS to be prepared due to potentially significant impacts related to proposed construction and operation of a facility to ship coal, which included air and water quality, noise, traffic, and recreation).

In addition to the significance of impact based on health and safety effects, the cumulative impact of coal's life-cycle processes is significant. See 40 C.F.R. §1508.27(b)(7). CEQ regulations define cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Id. at 1508.7. When an agency's action involves an increase in existing impacts, the relevant environmental impact is the cumulative impact, not merely the incremental difference between the new and existing level of activity. See Grand Canyon Trust v. FAA, 290 F.3d 339, 342 (D.C. Cir. 2002) (EA should have considered cumulative impact of new airport, and not merely incremental difference between noise associated with new airport and noise associated with existing airport.). The cumulative impacts of coal's life-cycle effects on human health and the environment are significant and therefore, BLM is obligated to consider the effects of those impacts, "incorporating the effects of other projects into the background data base of the project at issue." Grand Canyon Trust, 290 F.3d at 342 (citation omitted). Finally, recognizing the potentially significant public health impacts of the life-cycle of coal would set a precedent that would require BLM to apply NEPA to all future impacts and activities associated with federal coal, both upstream and downstream. Clearly, the health impacts of coal from cradle to grave are significant, as discussed at length in the following sections. Therefore, BLM has a responsibility within the scope of their NEPA authority to examine these impacts thoroughly and provide for ample public review.

Meaningful consideration of greenhouse gas emissions is clearly within the scope of required NEPA review.[3] As the Ninth Circuit has held, in the context of fuel economy standard rules:

> The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct. Any given rule setting a CAFE standard might have an "individually minor" effect on the environment, but these rules are "collectively significant actions taking place over a period of time" (quoting 40 C.F.R. § 1508.7)[4]

[3] Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1217 (9th Cir. 2008);
[4] Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1216 (9th Cir. 2008).

Whether or not any given lease sale is "individually minor" (a questionable assertion, given that single sales such as the Wright Area sales can implicate 2 billion tons of coal), it is beyond dispute that the federal coal program as a whole implicates a significant chunk of national and global greenhouse gas emissions – at current rates approximately 14% of U.S. fossil fuel emissions,[5] 10% of U.S. total GHG emissions,[6] and 1.6% of total global GHG emissions.[7] The courts have ruled that agency consideration indirect GHG emissions resulting from agency policy, regulatory, and leasing decisions cannot ignore the impact of decisions regarding coal supply.[8]

## III. Preventing Catastrophic Climate Change Requires Ending Federal Coal Leasing

Over 65 eminent climate scientists agree: the vast majority of known coal in the United States must stay in the ground if the federal coal program is to be consistent with national climate objectives and be protective of public health, welfare, and biodiversity.[9] As set forth below, the science is clear that (a) climate change is a serious and imminent threat to health, welfare, and biodiversity, (b) mitigating the worst effects of climate change requires rapid implementation of limits not just on rates of greenhouse gas emission, but on total greenhouse gas loads to the atmosphere, and (c) continued federal coal leasing is inconsistent with any reasonable path to mitigating greenhouse gas emissions to the degree necessary to protect health, welfare, and biodiversity.

### A. Climate Change Poses a Well-Documented Threat to the United States and the World

On December 12, 2015, nearly 200 governments, including the United States, agreed to the commitments enumerated in the Paris Agreement to "strengthen the global response to the threat of climate change"[10] The Paris Agreement codified the international consensus that the climate crisis is an urgent threat to human societies and the planet, with the parties recognizing that:

> Climate change represents an *urgent and potentially irreversible threat to human societies and the planet* and thus requires the widest possible cooperation by all

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[5] Climate Accountability Institute. 2015. Memorandum from Richard Heede to Friends of The Earth and Center for Biological Diversity, at http://webiva-downton.s3.amazonaws.com/877/3a/7/5721/Exhibit_1-1_ONRR_ProdEmissions_Heede_7May15.pdf.

[6] Stratus Consulting, Cutting Greenhouse Gas From Fossil-Fuel Extraction on Federal Lands and Waters 5 (2015), citing U.S. Environmental Protection Agency, "National Greenhouse Gas Emissions Data", available at hhtp://www.epa.gov/climatechange/ghghemissions/usinventoryreport.html;

[7] Boden, T.A., Marland, G., and Andres, R.J. (2015). National CO2 Emissions from Fossil-Fuel Burning, Cement Manufacture, and Gas Flaring: 1751-2011, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, doi 10.3334/CDIAC/00001_V2015.

[8] *See* Mid States Coal. For Progress v. Surface Transp. Bd., 345 F.3d 520, 532, 550 (8th Cir. 2003); High Country Conservation Advocates v. U.S. Forest Serv., 52 F.Supp. 3d 1174, 1197-98 (D.Colo. 2014)

[9] Ken Caldeira et al., Scientists support ending leasing on public lands to protect the climate, public health, and biodiversity (July 27, 2016), http://www.biologicaldiversity.org/programs/public_lands/energy/dirty_energy_development/coal/pdfs/16_7_26_Scientist_sign-on_letter_Coal_PEIS.pdf

[10] Paris Agreement, Art. 2(1).

> countries, and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions (emphasis added).[11]

Numerous authoritative scientific assessments have established that climate change is causing grave harms to human society and natural systems, and these threats are becoming increasingly dangerous. The Intergovernmental Panel on Climate Change, in its 2014 Fifth Assessment Report, stated that: "[w]arming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" and that "[r]ecent climate changes have had widespread impacts on human and natural systems."[12]

The United States' 2014 Third National Climate Assessment, prepared by a panel of non-governmental experts and reviewed by the National Academy of Sciences and multiple federal agencies similarly stated that "[t]hat the planet has warmed is 'unequivocal,' and is corroborated though multiple lines of evidence, as is the conclusion that the causes are very likely human in origin"[13] and "[i]impacts related to climate change are already evident in many regions and are expected to become increasingly disruptive across the nation throughout this century and beyond."[14] The United States National Research Council similarly concluded that: "[c]limate change is occurring, is caused largely by human activities, and poses significant risks for—and in many cases is already affecting—a broad range of human and natural systems."[15]

The IPCC and National Climate Assessment further decisively recognize the dominant role of fossil fuels in driving climate change:

> While scientists continue to refine projections of the future, observations unequivocally show that climate is changing and that the warming of the past 50 years is primarily due to human-induced emissions of heat-trapping gases. These emissions come mainly from burning coal, oil, and gas, with additional contributions from forest clearing and some agricultural practices.[16]
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[11] Paris Agreement, Decision, Recitals.
[12] IPCC AR5 Synthesis Report at 2.
[13] Melillo, Jerry M., Climate Change Impacts in the United States: The Third National Climate Assessment, Terese (T.C.) Richmond, and Gary W. Yohe, Eds., U.S. Global Change Research Program, doi:10.7930/J0Z31WJ2 (2014) (Third National Climate Assessment) at 61 (quoting IPCC, 2007:. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and H. L. Miller, Eds., Cambridge University Press, 1-18.).
[14] Third National Climate Assessment at 10.
[15] National Research Council, Advancing the Science of Climate Change (2010), available at www.nap.edu. ("Advancing the Science of Climate Change") at 2.
[16] Third National Climate Assessment at 2.

> $CO_2$ emissions from fossil fuel combustion and industrial processes contributed about 78% to the total GHG emission increase between 1970 and 2010, with a contribution of similar percentage over the 2000–2010 period (*high confidence*).[17]

These impacts emanating from the extraction and combustion of fossil fuels are harming the United States in myriad ways, with the impacts certain to worsen over the coming decades absent deep reductions in domestic and global GHG emissions. EPA recognized these threats in its 2009 Final Endangerment Finding under Clean Air Act Section 202(a), concluding that greenhouse gases from fossil fuel combustion endanger public health and welfare: "the body of scientific evidence compellingly supports [the] finding" that "greenhouse gases in the atmosphere may reasonably be anticipated both to endanger public health and to endanger public welfare."[18] In finding that climate change endangers public health and welfare, EPA has acknowledged the overwhelming evidence of the documented and projected effects of climate change upon the nation:

*Effects on air quality:* "The evidence concerning adverse air quality impacts provides strong and clear support for an endangerment finding. Increases in ambient ozone are expected to occur over broad areas of the country, and they are expected to increase serious adverse health effects in large population areas that are and may continue to be in nonattainment. The evaluation of the potential risks associated with increases in ozone in attainment areas also supports such a finding."[19]

*Effects on health from increased temperatures:* "The impact on mortality and morbidity associated with increases in average temperatures, which increase the likelihood of heat waves, also provides support for a public health endangerment finding."[20]

*Increased chance of extreme weather events*: "The evidence concerning how human induced climate change may alter extreme weather events also clearly supports a finding of endangerment, given the serious adverse impacts that can result from such events and the increase in risk, even if small, of the occurrence and intensity of events such as hurricanes and floods. Additionally, public health is expected to be adversely affected by an increase in the severity of coastal storm events due to rising sea levels."[21]

*Impacts to water resources:* "Water resources across large areas of the country are at serious risk from climate change, with effects on water supplies, water quality, and adverse effects from extreme events such as floods and droughts. Even areas of the country where an increase in water flow is projected could face water resource problems from the supply and water quality problems associated with temperature increases and precipitation variability, as well as

[17] IPCC AR5 Synthesis Report at 46.
[18] Final Endangerment Finding, 74 Fed. Reg. at 66,497.
[19] Final Endangerment Finding, 74 Fed. Reg. at 66,497
[20] Final Endangerment Finding, 74 Fed. Reg. at 66,497
[21] Final Endangerment Finding at 66,497-98.

the increased risk of serious adverse effects from extreme events, such as floods and drought. The severity of risks and impacts is likely to increase over time with accumulating greenhouse gas concentrations and associated temperature increases."[22]

*Impacts from sea level rise:* "The most serious potential adverse effects are the increased risk of storm surge and flooding in coastal areas from sea level rise and more intense storms. Observed sea level rise is already increasing the risk of storm surge and flooding in some coastal areas. The conclusion in the assessment literature that there is the potential for hurricanes to become more intense (and even some evidence that Atlantic hurricanes have already become more intense) reinforces the judgment that coastal communities are now endangered by human-induced climate change, and may face substantially greater risk in the future. Even if there is a low probability of raising the destructive power of hurricanes, this threat is enough to support a finding that coastal communities are endangered by greenhouse gas air pollution. In addition, coastal areas face other adverse impacts from sea level rise such as land loss due to inundation, erosion, wetland submergence, and habitat loss. The increased risk associated with these adverse impacts also endangers public welfare, with an increasing risk of greater adverse impacts in the future."[23]

*Impacts to energy, infrastructure, and settlements:* "Changes in extreme weather events threaten energy, transportation, and water resource infrastructure. Vulnerabilities of industry, infrastructure, and settlements to climate change are generally greater in high-risk locations, particularly coastal and riverine areas, and areas whose economies are closely linked with climate-sensitive resources. Climate change will likely interact with and possibly exacerbate ongoing environmental change and environmental pressures in settlements, particularly in Alaska where indigenous communities are facing major environmental and cultural impacts on their historic lifestyles."[24]

*Impacts to wildlife:* "Over the 21$^{st}$ century, changes in climate will cause some species to shift north and to higher elevations and fundamentally rearrange U.S. ecosystems. Differential capacities for range shifts and constraints from development, habitat fragmentation, invasive species, and broken ecological connections will likely alter ecosystem structure, function, and services, leading to predominantly negative consequences for biodiversity and the provision of ecosystem goods and services."[25]

In addition to these acknowledged impacts on public health and welfare generally, climate change is causing and will continue to cause serious impacts on natural resources that the

[22] Final Endangerment Finding at 66,498.
[23] Final Endangerment Finding at 66,498
[24] Final Endangerment Finding at 66,498
[25] Final Endangerment Finding at 66,498*see also* Third National Climate Assessment at 195-219.

Department of Interior is specifically charged with safeguarding.[26]

*Impacts to Public Lands:* Climate change is causing and will continue to cause specific impacts to public lands and resources. Although public lands provide a variety of public benefits, one recent Forest Service attempt at quantification estimates the public land ecosystem services at risk from climate change at between $14.5 and $36.1 billion annually.[27] In addition to the general loss of public land resources, irreplaceable species and aesthetic and recreational treasures are at risk of permanent destruction. High temperatures are causing loss of glaciers in Glacier National Park; the Park's glaciers are expected to disappear entirely by 2030, with ensuing warming of stream temperatures and adverse effects to aquatic ecosystems.[28] With effects of warming more pronounced at higher latitudes, tundra ecosystems on Alaska public lands face serious declines, with potentially serious additional climate feedbacks from melting permafrost.[29] In Florida, the Everglades face severe ecosystem disruption from already-occurring saltwater incursion.[30] Sea level rise will further damage freshwater ecosystems and the endangered species that rely on them.

*Impacts to Biodiversity and Ecosystems*: Across the United States ecosystems and biodiversity, including those on public lands, are directly under siege from climate change—leading to the loss of iconic species and landscapes, negative effects on food chains, disrupted migrations, and the degradation of whole ecosystems.[31] Specifically, scientific evidence shows that climate change is already causing changes in distribution, phenology, physiology, genetics, species interactions, ecosystem services, demographic rates, and population viability: many animals and plants are moving poleward and upward in elevation, shifting their timing of breeding and migration, and experiencing population declines and extirpations.[32] Because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to result in catastrophic species losses during this century. For example, the IPCC concluded that 20% to 30% of plant and animal species will face an increased risk of extinction if global average temperature rise exceeds 1.5°C to 2.5°C relative to 1980-1999, with an increased risk of extinction for up to 70% of species worldwide if global average temperature

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[26] *See* Federal Land Policy and Management Act of 1976, 43 U.S.C. §§ 1701(a)(8), 1712(c)(1); Multiple-Use Sustained Yield Act of 1960, 16 U.S.C. § 528; National Environmental Policy Act of 1969, 42 U.S.C. §§ 4331-4332.

[27] Esposito, Valerie *et al.*, Climate Change and Ecosystem Services: The Contribution and Impacts on Federal Public Lands in the United States, USDA Forest Service Proceedings RMRS-P-64 at 155-164 (2011).

[28] U.S. Environmental Protection Agency, Climate Change and Public Lands: National Parks at Risk (1999).

[29] *See* National Climate Assessment at 48; MacDougall, A. H., *et al.*, Significant contribution to climate warming from the permafrost carbon feedback, 5 Nature Geoscience 719-721 (2012), doi:10.1038/ngeo1573.

[30] *See* National Climate Assessment at 592; Foti, R., M*et al.*, Signs of critical transition in the Everglades wetlands in response to climate and anthropogenic changes, 110 Proceedings of the National Academy of Sciences 6296-6300, (2013), doi:10.1073/pnas.1302558110.

[31] National Climate Assessment at 13.

[32] *See* Parmesan, C. and G. Yohe, A globally coherent fingerprint of climate change impacts across natural systems, 421 Nature 37 (2003); Root, T. *et al.*, Fingerprints of global warming on wild animals and plants, 421 Nature 57 (2003); Chen, I. *et al.*, Rapid range shifts of species associated with high levels of climate warming, 333 Science 1024 (2011).

exceeds 3.5°C relative to 1980-1999.[33]

As greenhouse gas emissions and the resulting harms from climate change grow, the Fish and Wildlife Service and National Marine Fisheries Service are increasingly recognizing climate change as a significant threat to listed species. The Services determined that climate change is a threat (and a listing factor) in the listing rules for the vast majority of species listed as threatened and endangered in recent years. Our analysis of listing rules found that climate change was determined to be a threat for 96% and 91% of all species listed in 2012 and 2013, respectively.

In recent years, several species have been listed primarily because of climate change threats resulting from continued greenhouse gas emissions, including the polar bear in 2008, the bearded seal and ringed seal in 2012, and 20 coral species in 2014. The best-available science has concluded that the survival and recovery of these climate-vulnerable species depends on a return to lower atmospheric CO2 concentrations than the present level of 400 ppm. As such, the massive greenhouse gas emissions stemming from the federal coal program are clearly not consistent with the survival and recovery of these species.

*Corals:* For example, NMFS' 2015 Final Recovery Plan for Elkhorn and Staghorn Coral includes a recovery criterion with specific targets for ocean temperature and ocean acidification conditions that must be achieved for these corals to survive and recover. As noted in the Final Recovery Plan, meeting this criterion is consistent with a return to an atmospheric CO2 concentration of less than 350 ppm, as concluded by numerous scientific studies that have examined coral species viability in response to ocean warming and ocean acidification. Recognizing the responsibility of all federal agencies to promote listed species' conservation, the Final Recovery Plan further includes a recovery criterion calling for the adoption of "adequate domestic and international regulations and agreements" to abate threats from increasing atmospheric CO2 concentrations. The plan also includes a recovery action to "develop and implement U.S. and international measures to reduce atmospheric CO2 concentrations to a level appropriate for coral recovery."

*Polar Bears:* Similarly, the 2015 Draft Polar Bear Conservation Plan acknowledges that the polar bear cannot be recovered without decisive action to mitigate the primary threat to the species—greenhouse gas ("GHG") emissions driving sea-ice loss:

[33] IPCC, Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change 48 [Core Writing Team, Pachauri, R.K and Reisinger, A.(eds.)] (2007). Other studies have predicted similarly severe losses: 15%-37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario, s*ee* Thomas *et al.*, Extinction risk from climate change, 427 Nature 145 (2004)); the potential extinction of 10% to 14% of species by 2100 if climate change continues unabated, *see* Maclean, I. M. D. and R. J. Wilson, Recent ecological responses to climate change support predictions of high extinction risk, 108 Proc. Natl. Acad. Sci. 12337-12342 (2011); and the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species, *see* Warren, R. J. *et al.*, Increasing Impacts of Climate Change Upon Ecosystems with Increasing Global Mean Temperature Rise, 106 Climatic Change 141 (2011).

> The single most important step for polar bear conservation is decisive action to address global warming (Amstrup et al. 2010, Atwood et al. 2015), which is driven primarily by increasing atmospheric concentrations of greenhouse gases. Short of actions that effectively addresses the primary cause of diminishing sea ice, it is unlikely that polar bears will be recovered.

*Loggerhead sea turtles:* Other marine species are also at risk from numerous consequences of GHG emissions and ensuing ocean temperature increase, sea level rise, disruption of ocean currents, and extreme weather events. The 2011 listing rule for the loggerhead sea turtle found climate change and sea level rise to be a significant threat to multiple distinct population segments of the loggerhead sea turtle, including the North and South Pacific populations.[34] The Services found that "Similar to other areas of the world, climate change and sea level rise have the potential to impact loggerheads in the North Pacific Ocean."[35] This includes beach erosion and loss from rising sea levels, skewed hatchling sex ratios from rising beach incubation temperatures, and abrupt disruption of ocean currents used for natural dispersal during the complex life cycle (Hawkes *et al.,* 2009;Poloczanska *et al.,* 2009). Scientific reviews of the impacts of climate change on sea turtles confirm that climate change poses significant threats to the loggerhead (Fuentes et al. 2009, Hawkes et al. 2009, Witt et al. 2010). Hawkes et al. (2009) concluded that "[o]verall, climate change could supersede current documented threats posed to marine turtle populations" including bycatch, habitat destruction, and pollution (p.146). Fuentes et al. (2010) highlighted that sea turtles will be affected simultaneously by changes in multiple climatic processes which will create amplifying effects, especially in combination with other threats. Furthermore, many researchers have cautioned that sea turtles are especially vulnerable to climate change because they are slow to recover from disturbances due to their life history characteristics. The best available science on the impacts of observed and projected climate change on loggerhead sea turtles, reviewed below, clearly indicates that climate change--including sea level rise, increasing sand temperatures, increasing storm activity, rising ocean temperatures and changes in circulation pattern, and ocean acidification—is a significant threat to the survival of the species.

*Monarch Butterfly:* The Monarch butterfly, due to its narrow thermal requirements and specific microhabitat requirements, is also at exceptional risk due to climate change:[36]

> The monarch is threatened by several other factors including global climate change, severe weather events, pesticides, and the spread of invasive species. Unfavorable weather conditions have been identified as a primary factor contributing to the recent drastic declines in monarch populations. Weather that is

[34] Fish and Wildlife Service, Determination of Nine Distinct Population Segments of Loggerhead Sea Turtles and Endangered or Threatened, 76 Fed. Reg. 58,868, 58,909 (Sept. 22, 2011).
[35] Id.
[36] Center for Biological Diversity, PETITION TO PROTECT THE MONARCH BUTTERFLY (*DANAUS PLEXIPPUS LEXIPPUS*)
UNDER THE ENDANGERED SPECIES ACT.

> too hot or too cold at critical times in monarch development can cause massive mortality of caterpillars and adults. A single winter storm event in Mexican overwintering habitat in 2002 killed an estimated 450-500 million monarchs. This high death toll from a single storm event is particularly staggering given that the entire monarch population now numbers only about 35 million butterflies. Because of their narrow thermal tolerance and specific microhabitat requirements, climate change threatens monarchs in their summer and winter ranges. The threat from climate change in the monarch's overwintering habitat in Mexico is so dire that monarchs may no longer occur in the Monarch Butterfly Biosphere Reserve by the end of the century due to climatic changes. The monarch's summer breeding habitat in the United States is also predicted to become too hot in many areas for monarch's to be able to successfully reproduce.[37]

*Colorado River listed fishes* (Colorado pikeminnow, bonytail chub, humpback chub, and razorback sucker): Anthropogenic climate change is profoundly impacting the Colorado River in ways that are altering temperature, streamflow, and the hydrologic cycle. As detailed below, changes observed to date include rising temperatures, earlier snowmelt and streamflow, decreasing snowpack, and declining runoff and streamflow. Modeling studies project that these changes will only worsen, including continued declines in streamflow and intensification of drought. Climate change is likely to have significant effects on the endangered fish and the Colorado River ecosystem.[38]

*Impacts from Algal Blooms:* Toxic algal blooms are a public health menace and they have an obvious and distinct relationship with global warming.[39] Many types of algae release toxic compounds, or harbor other deadly bacteria, that can have a wide range of health consequences, especially neurotoxicity, and can even be fatal if swallowed.[40] The public health threat is enhanced because the toxicity of the blooms is not always proportional to their visibility.[41] In fact, the blooms can be dilute and inconspicuous and still highly toxic to wildlife and human health.[42]

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[37] *Id.* at 10-11.
[38] Impacts of Climate Change on the Colorado River Basin, Shaye Wolf, Ph.D., Climate Science Director, Center for Biological Diversity (March 10, 2016).
[39] U.S. Environmental Protection Agency, *Impacts of Climate Change on the Occurrence of Harmful Algal Blooms*, EPA Office of Water 820-S-13-001 (May 2013), found at https://www.epa.gov/sites/production/files/documents/climatehabs.pdf.
[40] Anderson, M. Donald et al., Estimated Annual Economic Impacts from Harmful Algal Blooms (HABs) in the United States, Woods Hole Oceanographic Institution (September 2000) pg. 5-6, found at https://www.whoi.edu/fileserver.do?id=24159&pt=10&p=19132.
[41] *Id*.
[42] *Id*.

Algae feed on nutrients like nitrogen and phosphorus whose presence in water may be the result of reckless agricultural practices, inadequate regulations, and leaky sewage systems.[43] But warmer temperatures ignite the process.[44] In fact, climate change promotes the growth and dominance of harmful algal blooms through a cascade of multiple mechanisms, including: warmer water temperatures, changes in rainfall patterns, increases in the acidity of ocean waters, and sea level rise.[45]

Algae need carbon dioxide to survive. Higher levels of carbon dioxide in the air and water accelerate algae growth, especially toxic blue-green algae which can float to the water's surface, depriving other marine life of oxygen and sunlight.[46] When global warming unleashes heavy rainfall and flooding more nitrogen/phosphorus pollution from farms and sewage seeps into waterways, serving up the nutrient banquet for the algae to thrive on.[47] Where global warming leads to drought, the salinity of fresh water bodies is increased.[48] This can cause marine algae to invade freshwater ecosystems. In the southwestern and south central United States, toxic marine algae have been killing fish in freshwater lakes since 2000.[49]

Warmer temperatures inhibit mixing of water layers, allowing stagnation of warmer layers near the surface, promoting thicker and faster algae growth.[50] Algal blooms actually increase water surface temperatures by absorbing more sunlight, creating a feed back spiral of more blooms, absorbing more sunlight, warming the water further, and promoting more blooms.[51]

Warmer temperatures reduce the viscosity of water, increasing the speed at which small aquatic organisms can vertically migrate.[52] This makes it easier for the small, toxic, cyanobacteria to float to the surface to form the dangerous blooms.[53]

While algal blooms are not new, there has been a worldwide increase in their frequency, severity and geographic distribution, in concert with the rise in global temperatures.[54] Significant outbreaks have occurred in the last few years in Ohio, Florida, New York, and Utah. Last year, a mass of record breaking warm water triggered a bloom that extended from southern California

[43] U.S. Environmental Protection Agency, *Nutrient Pollution Sources and Solutions*, EPA Office of Water (January 2016), found at https://www.epa.gov/nutrientpollution/sources-and-solutions.
[44] *See generally* EPA, *Impacts of Climate Change*.
[45] *See Id*.
[46] *See Id.*
[47] *See Id*.
[48] *See Id*.
[49] *See* Anderson, *Estimated Annual Economic Impacts*, at 24.
[50] *See generally* EPA, *Impacts of Climate Change*.
[51] *See Id*.
[52] *See Id*.
[53] *See Id.*
[54] *See Id.*

to Alaska, damaging the entire marine food web throughout the West Coast, especially the crab industry.[55] The bloom was 40 miles wide and 650 ft deep in some places.[56] Marine scientists said last year's toxic algal bloom was "unprecedented" and "diagnostic of what we can expect more of in the future."[57] The EPA notes that these blooms are now a serious environmental problem plaguing all 50 states, not just those on the coasts.[58]

The blooms also have a significant economic impact. In 2000, the Woods Hole Oceanographic Institution estimated that the annual economic cost to the US economy at that time was about $450 million dollars.[59] That figure would be markedly increased today.

*Impacts to oceans:* Oceans have absorbed the vast bulk of warming to date, and will continue to suffer increasingly severe impacts on temperature, acidity, circulation, and marine ecosystems from climate change.[60] A recent survey of science regarding climate change impacts to the world's oceans finds that:

> Marine ecosystems are centrally important to the biology of the planet, yet a comprehensive understanding of how anthropogenic climate change is affecting them has been poorly developed. Recent studies indicate that rapidly rising greenhouse gas concentrations are driving ocean systems toward conditions not seen for millions of years, with an associated risk of fundamental and irreversible ecological transformation. The impacts of anthropogenic climate change so far include decreased ocean productivity, altered food web dynamics, reduced abundance of habitat-forming species, shifting species distributions, and a greater incidence of disease. Although there is considerable uncertainty about the spatial and temporal details, climate change is clearly and fundamentally altering ocean ecosystems. Further change will continue to create enormous challenges and costs for societies worldwide, particularly those in developing countries.[61]

The IPCC's Fifth Assessment Report on Climate Change Impacts, Adaptation, and Vulnerability similarly summarizes the state of scientific research on foreseeable impacts to marine systems and reaches the following conclusions:

> **Due to projected climate change by the mid 21st century and beyond, global marine-species redistribution and marine-biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and**

[55] Mapes, Lynda V., *Toxic Algae Creating Deep Trouble on West Coast*, The Seattle Times, November 15th, 2015, http://www.seattletimes.com/seattle-news/environment/toxic-algae-creating-deep-trouble-on-west-coast/ (last visited July 28th, 2016).
[56] *See Id.*
[57] *See Id.*
[58] *See generally* U.S. EPA, *Nutrient Pollution Sources and Solutions*.
[59] *See* Anderson, *Estimated Annual Economic Impacts*at 4.
[60] *See* National Climate Assessment at 558-59.
[61] Ove Hoegh-Guldberg et al., The Impact of Climate Change on the World's Marine Ecosystems, Science 328, 1523 (2010), DOI: 10.1126/science.1189930

> **other ecosystem services (*high confidence*).** Spatial shifts of marine species due to projected warming will cause high-latitude invasions and high local-extinction rates in the tropics and semi-enclosed seas (*medium confidence*). Species richness and fisheries catch potential are projected to increase, on average, at mid and high latitudes (*high confidence*) and decrease at tropical latitudes (*medium confidence*). . . . The progressive expansion of oxygen minimum zones and anoxic "dead zones" is projected to further constrain fish habitat. Open-ocean net primary production is projected to redistribute and, by 2100, fall globally under all RCP scenarios. Climate change adds to the threats of over-fishing and other non-climatic stressors, thus complicating marine management regimes (*high confidence*).
>
> **For medium- to high-emission scenarios (RCP 4.5, 6.0, and 8.5), ocean acidification poses substantial risks to marine ecosystems, especially polar ecosystems and coral reefs, associated with impacts on the physiology, behavior, and population dynamics of individual species from phytoplankton to animals (*medium to high confidence*).** Highly calcified mollusks, echinoderms, and reef-building corals are more sensitive than crustaceans (*high confidence*) and fishes (*low confidence*), with potentially detrimental consequences for fisheries and livelihoods. . . . Ocean acidification acts together with other global changes (e.g. warming, decreasing oxygen levels) and with local changes (e.g. pollution, eutrophication) (*high confidence*). Simultaneous drivers, such as warming and ocean acidification, can lead to interactive, complex, and amplified impacts for species and ecosystems.[62]

The Third National Climate Assessment likewise has identified five significant ways in which climate change will adversely affect U.S. oceans and marine resources:

> 1. The rise in ocean temperature over the last century will persist into the future, with continued large impacts on climate, ocean circulation, chemistry, and ecosystems.
>
> 2. The ocean currently absorbs about a quarter of human-caused carbon dioxide emissions to the atmosphere, leading to ocean acidification that will alter marine ecosystems in dramatic yet uncertain ways.
>
> 3. Significant habitat loss will continue to occur due to climate change for

[62] IPCC, 2014: Summary for Policymakers 17, in: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

many species and areas, including Arctic and coral reef ecosystems, while habitat in other areas and for other species will expand. These changes will consequently alter the distribution, abundance, and productivity of many marine species.

4. Rising sea surface temperatures have been linked with increasing levels and ranges of diseases in humans and marine life, including corals, abalones, oysters, fishes, and marine mammals.

5. Climate changes that result in conditions substantially different from recent history may significantly increase costs to businesses as well as disrupt public access and enjoyment of ocean areas.[63]

*Impacts from Ocean Acidification:* The ocean's absorption of anthropogenic $CO_2$ has already resulted in more than a 30% increase in the acidity of ocean surface waters, at a rate likely faster than anything experienced in the past 300 million years, and ocean acidity could increase by 150% to 200% by the end of the century if $CO_2$ emissions continue unabated.[64] Ocean acidification negatively affects a wide range of marine species by hindering the ability of calcifying marine creatures to build protective shells and skeletons and by disrupting metabolism and critical biological function.[65] The adverse effects of ocean acidification are already being observed in wild populations, including reduced coral calcification rates,[66] reduced shell weights of foraminifera in the Southern Ocean,[67] and mass die-offs of larval Pacific oysters in the Pacific Northwest.[68]

Coral reef ecosystems, which are estimated to harbor one-third of marine species and which support the livelihoods of a half billion people, are particularly threatened by ocean acidification. Some corals are already experiencing reduced calcification.[69] Due to the

[63] National Climate Assessment at 558.

[64] Orr, J. C., V. J. Fabry, O. Aumont, L. Bopp, S. C. Doney, R. a Feely, A. Gnanadesikan, N. Gruber, A. Ishida, F. Joos, R. M. Key, K. Lindsay, E. Maier-Reimer, R. Matear, P. Monfray, A. Mouchet, R. G. Najjar, G.-K. Plattner, K. B. Rodgers, C. L. Sabine, J. L. Sarmiento, R. Schlitzer, R. D. Slater, I. J. Totterdell, M.-F. Weirig, Y. Yamanaka, and A. Yool. 2005. Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms. Nature 437:681–6; . Feely, R., S. Doney, and S. Cooley. 2009. Ocean acidification: Present conditions and future changes in a high CO2 world. Oceanography 22:36–47; Hönisch, B., A. Ridgwell, D. N. Schmidt, E. Thomas, S. J. Gibbs, A. Sluijs, R. Zeebe, L. Kump, R. C. Martindale, S. E. Greene, W. Kiessling, J. Ries, J. C. Zachos, D. L. Royer, S. Barker, T. M. Marchitto, R. Moyer, C. Pelejero, P. Ziveri, G. L. Foster, and B. Williams. 2012. The geological record of ocean acidification. Science 335:1058–63.

[65] Fabry, V., B. Seibel, R. Feely, and J. Orr. 2008. Impacts of ocean acidification on marine fauna and ecosystem processes. ICES Journal of Marine Science 65:414–432; Feely et al 2009; Kroeker, K.J, R.L. Kordas, R. Crim, I.E. Hendriks, L. Ramajo, G.S. Singh, C.M. Duarte, and J-P Gattuso. 2013. Impacts of ocean acidification on marine organisms: quantifying sensitivities and interactions with warming. Global Change Biology 19: 1884-1896.

[66] De'ath, G., J. M. Lough, and K. E. Fabricius. 2009. Declining coral calcification on the Great Barrier Reef. Science 323:116–119.

[67] Moy, A. D., W. R. Howard, S. G. Bray, and T. W. Trull. 2009. Reduced calcification in modern Southern Ocean planktonic foraminifera. Nature Geoscience 2: 276-280

[68] Barton, A., B. Hales, G. G. Waldbusser, C. Langdon, and R. A. Feely. 2012. The Pacific oyster, *Crassostrea gigas*, shows negative correlation to naturally elevated carbon dioxide levels: Implications for near-term ocean acidification effects. Limnology and Oceanography 57:698–710.

[69] Cooper, T. F., G. De'Ath, K. E. Fabricius, and J. M. Lough. 2008. Declining coral calcification in massive Porites in two nearshore regions of the northern Great Barrier Reef. Global Change Biology 14:529–538; Gledhill, D. K., R.

synergistic impacts of ocean acidification, mass bleaching, and other stresses, reefs are projected to experience "rapid and terminal" declines worldwide at atmospheric $CO_2$ concentrations of 450 ppm.[70] Prominent coral scientists have called for reducing atmospheric $CO_2$ to less than 350 ppm to protect coral reefs from collapse.[71]

Numerous U.S. and international scientific and policy bodies have identified ocean acidification as an urgent threat to ocean ecosystems, food security, and society.[72] The United Nations Environment Programme concluded that ocean acidification's impact on marine organisms poses a threat to food security and the billions of people that rely on a marine-based diet.[73] Moreover, a recent study estimated that the damage our oceans will face from emissions-related problems will amount to $428 billion a year by 2050 and nearly $2 trillion per year by the century's end.[74]

In sum, climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems and economy of the United States. These impacts are felt across the nation, including upon the public lands the Secretary of the Interior is charged with safeguarding. A rapid and deep reduction of emissions generated from fossil fuels, coal above all, is essential if such threats are to be minimized and their impacts mitigated.

a. Climate Policy

The United States has committed to the climate goal of holding the increase in the global average temperature to "well below 2°C above pre-industrial levels" and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels under the Paris Agreement.[75] Human-caused climate change is already causing widespread damage from intensifying global food and water insecurity, the increasing frequency of heat waves and other extreme weather

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Wanninkhof, F. J. Millero, and M. Eakin. 2008. Ocean acidification of the greater Caribbean region 1996–2006. Journal of Geophysical Research 113:C10031; De'ath et al. 2009; Bates, N., A. Amat, and A. Andersson. 2010. Feedbacks and responses of coral calcification on the Bermuda reef system to seasonal changes in biological processes and ocean acidification. Biogeosciences 7:2509–2530.

[70] Veron, J. E. N., O. Hoegh-Guldberg, T. M. Lenton, J. M. Lough, D. O. Obura, P. Pearce-Kelly, C. R. C. Sheppard, M. Spalding, M. G. Stafford-Smith, and A. D. Rogers. 2009. The coral reef crisis: the critical importance of<350 ppm $CO_2$. Marine Pollution Bulletin 58:1428–36.

[71] Veron et al. 2009; Frieler, K., M. Meinshausen, A. Golly, M. Mengel, K. Lebek, S.D. Donner, and O. Hoegh-Guldberg. Limiting global warming to 2ºC is unlikely to save most coral reefs. Nature Climate Change. Published Online. doi: 10.1038/NCLIMATE1674.

[72] NRC. 2010. Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean. National Academies Press; UNEP. 2010. UNEP Emerging Issues: Environmental Consequences of Ocean Acidification: A Threat to Food Security; Rogers, A. D., and D. d'A. Laffoley. 2011. International Earth system expert workshop on ocean stresses and impacts Summary Report. IPSO Oxford.

[73] UNEP 2010.

[74] Noone, K., R. Sumaila, and R. Diaz. 2012. Valuing the Ocean : Executive Summary, Stockholm Environment Institute. Stockholm Environment Initiative

[75] The Paris Agreement, which was adopted at the 2015 United Nations Framework Convention on Climate Change Conference of the Parties and signed by the United States in April 2016, commits all signatories to "[h]olding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change." See Paris Agreement at Article 2, Section 1(a), https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

events, inundation of coastal regions by sea level rise and increasing storm surge, the rapid loss of Arctic sea ice, increasing species extinction risk, and the worldwide degradation of coral reefs. Limiting further temperature rise is needed to prevent increasingly dangerous and potentially irreversible impacts.[76] However, current climate policy and emissions reduction pledges in the United States and globally are not sufficient to achieve a 1.5°C or 2°C limit, and stronger action to reduce greenhouse gas emissions is urgently needed.[77]

International consensus and commitments acknowledge the global climate emergency and demand decisive action to limit fossil fuel extraction. On December 12, 2015, 197 nation-state and supra-national organization parties meeting in Paris at the 2015 United Nations Framework Convention on Climate Change Conference of the Parties consented to an agreement (Paris Agreement) committing its parties to take action to avoid dangerous climate change.[78] As the Paris Agreement opens for signature in April 2016[79] and the United States is expected to sign the treaty as a legally binding instrument through executive agreement,[80] the Paris Agreement commits the United States to critical goals—both binding and aspirational—that mandate bold action on the United States' domestic policy to rapidly reduce greenhouse gas emissions.

The United States and other parties to the Paris Agreement recognized "the need for an effective and progressive response to the urgent threat of climate change on the basis of the best available scientific knowledge."[81] The Paris Agreement articulates the practical steps necessary to obtain its goals: parties including the United States have to "reach global peaking of greenhouse gas emissions *as soon as possible* . . . and to *undertake rapid reductions* thereafter in

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[76] IPCC. 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, at 65, Box 2.4, Figure 2.5, https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full.pdf; U.N. Framework Convention on Climate Change. 2015. Subsidiary Body for Scientific and Technical Advice. Report on the Structured Expert Dialogue on the 2013-15 Review, No. FCCC/SB/2015/INF.1, at 15-16, 30-32, http://unfccc.int/resource/docs/2015/sb/eng/inf01.pdf; Schleussner, C-F. et al. 2016. Differential climate impacts for policy-relevant limits to global warming: the case of 1.5°C and 2°C. Earth System Dynamics 7: 327-351.

[77] Climate Action Tracker ranks the United States INDC (intended nationally determined contribution) submitted to the UNFCCC as "not yet consistent with limiting warming to below 2°C unless other countries make much deeper reductions and comparably greater effort than the USA." Climate Action Tracker finds that current US climate policy is insufficient to meet the US INDC. See http://climateactiontracker.org/countries/usa.html Analyses of the aggregate effect of national climate pledges (INDCs or intended nationally determined contributions) submitted to the UNFCCC under the Paris Agreement estimate a 2.7 to 3.7°C temperature rise above pre-industrial levels. See Rogelj, J. et al. 2016. Paris Agreement climate proposals need a boost to keep warming well below 2°C. Nature 534: 631-639; UNEP. 2015. The Emissions Gap Report 2015. United Nations Environment Programme (UNEP), Nairobi, http://uneplive.unep.org/media/docs/theme/13/EGR_2015_301115_lores.pdf; Climate Action Tracker. 2015. 2.7°C is not enough – we can get lower, http://climateactiontracker.org/news/253/Climate-pledges-will-bring-2.7C-of-warming-potential-for-more-action.html; Climate Interactive. 2015. Climate Scoreboard: UN Climate Pledge Analysis, https://www.climateinteractive.org/programs/scoreboard/.

[78] Paris Agreement, Art. 2.

[79] Paris Agreement, Art. 20(1).

[80] *See* U.S. Department of State, Background Briefing on the Paris Climate Agreement, (Dec. 12, 2015), http://www.state.gov/ r/pa/prs/ps/2015/12/250592.htm.

[81] *Id.*, Recitals.

accordance *with best available science*,"[82] imperatively commanding that developed countries specifically "should continue taking the lead by undertaking economy-wide absolute emission reduction targets"[83] and that such actions reflect the "highest possible ambition."[84]

The Paris Agreement codifies the international consensus that climate change is an "urgent threat" of global concern,[85] and commits all signatories to achieving a set of global goals. Importantly, the Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature "to *well below 2°C* above pre-industrial levels and to *pursue efforts to limit the temperature increase to 1.5°C* above pre-industrial levels"[86] (emphasis added).

In light of the severe threats posed by even limited global warming, the Paris Agreement established the international goal of limiting global warming to 1.5°C above pre-industrial levels in order to "prevent dangerous anthropogenic interference with the climate system," as set forth in the UNFCCC, a treaty which the United States has ratified and to which it is bound.[87] The Paris consensus on a 1.5°C warming goal reflects the findings of the IPCC and numerous scientific studies that indicate that 2°C warming would exceed thresholds for severe, extremely dangerous, and potentially irreversible impacts.[88] Those impacts include increased global food and water insecurity, the inundation of coastal regions and small island nations by sea level rise and increasing storm surge, complete loss of Arctic summer sea ice, irreversible melting of the Greenland ice sheet, increased extinction risk for at least 20-30% of species on Earth, dieback of the Amazon rainforest, and "rapid and terminal" declines of coral reefs worldwide.[89] As scientists noted, the impacts associated with 2°C temperature rise have been "revised upwards, sufficiently so that 2°C now more appropriately represents the threshold between 'dangerous'

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[82] *Id.*, Art. 4(1).
[83] *Id.*, Art. 4(4).
[84] Id, Art. 4(3).
[85] *Id.*, Recitals.
[86] *Id.*, Art. 2.
[87] *See* U.N. Framework Convention on Climate Change, Cancun Agreement. Available at http://cancun.unfccc.int/ (last visited Jan 7, 2015); United Nations Framework Convention on Climate Change, Copenhagen Accord. Available at http://unfccc.int/meetings/copenhagen_dec_2009/items/5262.php (last accessed Jan 7, 2015). The United States Senate ratified the UNFCC on October 7, 1992. *See* https://www.congress.gov/treaty-document/102nd-congress/38.
[88] *See* Paris Agreement, Art. 2(1)(a); U); U.N. Framework Convention on Climate Change, Subsidiary Body for Scientific and Technical Advice, Report on the structured expert dialogue on the 2013-15 review, No. FCCC/SB/2015/INF.1 at 15-16 (June 2015);IPCC AR5 Synthesis Report at 65 & Box 2.4.
[89] *See* Jones, C. et al, Committed Terrestrial Ecosystem Changes due to Climate Change, 2 Nature Geoscience 484, 484–487 (2009);Smith, J. B. *et al.*, Assessing Dangerous Climate Change Through an Update of the Intergovernmental Panel on Climate Change (IPCC) 'Reasons for Concern', 106 Proceedings of the National Academy of Sciences of the United States of America 4133, 4133–37 (2009); ; Veron, J. E. N. *et al.*, The Coral Reef Crisis: The Critical Importance of <350 ppm CO2, 58 Marine Pollution Bulletin 1428, 1428–36, (2009); ; Warren, R. J. *et al.*, Increasing Impacts of Climate Change Upon Ecosystems with Increasing Global Mean Temperature Rise, 106 Climatic Change 141–77 (2011); Hare, W. W. *et al.*, Climate Hotspots: Key Vulnerable Regions, Climate Change and Limits to Warming, 11 Regional Environmental Change 1, 1–13 (2011); ; Frieler, K. M. *et al.*, Limiting Global Warming to 2ºC is Unlikely to Save Most Coral Reefs, Nature Climate Change, Published Online (2013) doi: 10.1038/NCLIMATE1674; ; M. Schaeffer *et al.*, Adequacy and Feasibility of the 1.5°C Long-Term Global Limit, Climate Analytics (2013).

and 'extremely dangerous' climate change." [90] Consequently, a target of 1.5ºC or less temperature rise is now seen a essential to avoid dangerous climate change and has largely supplanted the 2°C target that had been the focus of most climate literature until recently. As demonstrated below, under *any* formulation, the majority of United States fossil fuels, particularly federal coal, must stay in the ground.

b. Carbon Budgets Preclude New Coal Leasing

Immediate and aggressive greenhouse gas emissions reductions are necessary to keep warming below a 1.5º or 2°C rise above pre-industrial levels. Put simply, there is only a finite amount of $CO_2$ that can be released into the atmosphere without rendering the goal of meeting the 1.5°C target virtually impossible. A slightly larger amount could be burned before meeting a 2°C limit became an impossibility. Globally, fossil fuel reserves, if all were extracted and burned, would release enough $CO_2$ to exceed this limit several times over.[91]

The question of what amount of fossil fuels can be extracted and burned without negating a realistic chance of meeting a 1.5 or 2°C target is relatively easy to answer, even if the answer is framed in probabilities and ranges. The IPCC Fifth Assessment Report and other expert assessments have established global carbon budgets, or the total amount of remaining carbon that can be burned while maintain some probability of staying below a given temperature target. According to the IPCC, total cumulative anthropogenic emissions of $CO_2$ must remain below about 1,000 gigatonnes ($GtCO_2$) from 2011 onward for a 66% probability of limiting warming to 2°C above pre-industrial levels.[92] Given more than 100 $GtCO_2$ have been emitted since 2011,[93] the remaining portion of the budget under this scenario is well below 900 $GtCO_2$. To have an 80% probability of staying below the 2°C target, the budget from 2000 is 890 $GtCO_2$, with less than 430 $GtCO_2$ remaining.[94]

To have even a 50% probability of achieving the Paris Agreement goal of limiting warming to 1.5°C above pre-industrial levels equates to a carbon budget of 550-600 $GtCO_2$ from 2011 onward, [95] of which more than 100 $GtCO_2$ has already been emitted. To achieve a 66% probability of limiting warming to 1.5°C requires adherence to a more stringent carbon budget of only 400 $GtCO_2$ from 2011 onward, [96] of which less than 300 $GtCO_2$ remained at the start of 2015. An 80% probability budget for 1.5°C would have far less that 300 $GtCO_2$ remaining. Given that global $CO_2$ emissions in 2014 alone totaled 36 $GtCO_2$,[97] humanity is rapidly

[90] Anderson, K. and A. Bows, Beyond 'Dangerous' Climate Change: Emission Scenarios for a New World, 369 Philosophical Transactions, Series A, Mathematical, Physical, and Engineering Sciences 20, 20–44 (2011).
[91] Cimons at 6, 33 n.2.
[92] IPCC AR5 Physical Science Basis at 27; IPCC AR5 Synthesis Report at 63-64 & Table 2.2.
[93] From 2012-2014, 107 $GtCO_2$ was emitted (*see* Annual Global Carbon Emissions at http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html).
[94] Carbon Tracker Initiative at 6; Meinshausen *et al.* 2009 at 1159
[95] IPCC AR5 Synthesis Report at 64 & Table 2.2.
[96] *Id*.
[97] *See* Global Carbon Emissions, http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html

consuming the remaining burnable carbon budget needed to have even a 50/50 chance of meeting the 1.5°C temperature goal.[98]

The science is clear that the vast majority of the world's fossil fuels must remain in the ground in order to maintain any reasonable hope of limiting global warming to 1.5º or even 2°C above pre-industrial levels. Global fossil fuel reserves and resources far exceed the carbon budgets needed to stay below a 1.5º or 2°C temperature target.[99]

Two recent studies estimated that global oil, gas, and coal resources considered currently economically recoverable contain potential greenhouse gas emissions estimated at 2,900 $GtCO_2$[100] and 4196 $GtCO_2$[101] respectively. Other sources estimate even greater global fossil fuel reserves at 3,677 to 7,120 $GtCO_2$.[102] When considering all fossil fuel resources (defined as those recoverable over all time with both current and future technology irrespective of current economic conditions), potential combustion emissions have been estimated at nearly 11,000 $GtCO_2$[103] upwards to 31,353 and 50,092 $GtCO_2$.[104]

Even the lowest of these estimates (2,900 $GtCO_2$) is more than three times greater than the most generous carbon budget nominally consistent with a 2°C temperature limit (~900 $GtCO_2$), while the largest (50,092 $GtCO_2$) is over 160 times greater than the remaining budget for a 66% probability of not exceeding a 1.5°C limit (<300 $GtCO_2$).

As stated by one study, "the disparity between what resources and reserves exist and what can be emitted while avoiding a temperature rise greater than the agreed 2C limit is

[98] In addition to limits on the *amount* of fossil fuels that can be utilized, emissions pathways compatible with a 1.5 or 2°C target also have a significant temporal element. Leading studies make clear that to reach a reasonable likelihood of stopping warming at 1.5° or even 2°C, global $CO_2$ emissions must be phased out by mid-century and likely as early as 2040-2045. *See, e.g.* Joeri Rogelj *et al.*, Energy system transformations for limiting end-of-century warming to below 1.5°C, 5 Nature Climate Change 519, 522 (2015). United States focused studies indicate that we must phase out fossil fuel $CO_2$ emissions even earlier—between 2025 and 2040—for a reasonable chance of staying below 2ºC. *See, e.g.* Climate Action Tracker, http://climateactiontracker.org/countries/usa. Issuing new legal entitlements to explore for and extract federal fossil fuels for decades to come is wholly incompatible with such a transition.

[99] Analyses by the Carbon Tracker Initiative estimated that 80% of proven fossil fuel reserves must be kept in the ground to have a reasonable probability (75-80%) of staying below even 2°C. This estimate includes only the fossil fuel reserves that are considered currently economically recoverable with a high probability of being extracted. *See* Carbon Tracker Initiative at 2, 6.

[100] McGlade and Ekins at 187-192.

[101] Raupach, M. *et al.*, Sharing a quota on cumulative carbon emissions. 4 Nature Climate Change 873-879 (2014) at Figure 2.

[102] IPCC, 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change at Table 7.2 [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.("IPCC AR5 Mitigation of Climate Change")

[103] McGlade and Ekins at 188.

[104] IPCC AR5 Mitigation of Climate Change at Table 7.2.

therefore stark."[105] Another recent report on global carbon reserves found that:

> The reserves of coal, oil and natural gas outlined in this report contain enough carbon to rocket the planet far beyond the°C limit. Warming from fossil fuels puts other carbon sinks at risk. As permafrost melts and peat bogs dry, they emit enormous quantities of carbon dioxide, furthering a chain reaction where the release of carbon results in a warmer world, which in turn releases more carbon.[106]

The unleased federal coal resource alone is estimated at 212 GtCO2e, or almost two-thirds of the remaining global carbon budget for a reasonable probability of limiting warming to 1.5ºC.[107]

In the United States, coal is the largest and most carbon dioxide-intensive conventional fossil fuel resource.[108] The Department of Interior's fossil fuel leasing program contributes about one-quarter of all US fossil fuel emissions, with 14% of US emissions coming from the federal coal program,[109] which comprises approximately 41% of total US coal production.[110] Coal mining, particularly underground mining, also contributes substantial additional methane emissions, with vastly higher radiative forcing potential than carbon dioxide.[111]

Mitigation pathways for holding temperature rise well below 2°C mandate a rapid phase-out of coal emissions.[112] For example, a recent study estimates that 95% of US coal reserves,

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[105] McGlade and Ekins at 188.
[106] Cimons at 6.
[107] Mulvaney et al. at 5. The remaining carbon budget for a 66% probability of limiting warming to 1.5°C and 2°C above pre-industrial is 240 GtCO2 and 850 GtCO2 , respectively, from 2015 onward, equivalent to ~334 GtCO2e and ~1180 GtCO2e (gigatonnes CO2 equivalent) based on the ratio of 1.39 CO2e/CO2 from Meinshausen et al. (2009). [See Meinshausen, M. et al. 2009. Greenhouse gas emission targets for limiting global warming to 2 degrees Celsius. Nature 458: 1158–1162.] 212 GtCO2e comprises 63% of a 334 GtCO2e budget and 18% of an 1180 GtCO2e budget.
[108] *See* Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014 (April 2016) at 3-5.
[109] See Climate Accountability Institute. 2015. Memorandum from Richard Heede to Friends of The Earth and Center for Biological Diversity, at http://webiva-downton.s3.amazonaws.com/877/3a/7/5721/Exhibit_1-1_ONRR_ProdEmissions_Heede_7May15.pdf; Stratus Consulting. 2014. Greenhouse Gas Emissions from Fossil Energy Extracted from Federal Lands and Waters: An Update, at 13, http://wilderness.org/sites/default/files/Stratus-Report.pdf
[110] U.S. Energy Information Administration. 2014. Sales of Fossil Fuels Produced from Federal and Indian Lands, FY 2003 through FY 2013, at Table 1, http://www.eia.gov/analysis/requests/federallands/pdf/eia-federallandsales.pdf.
[111] EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks at ES-6; IPCC AR5 Physical Science Basis Chapter 8 at 714, Table 8.7 & note b (20-year radiative forcing potential of fossil fuel methane is 87 times that of carbon dioxide).
[112] McGlade, C. and P. Ekins. 2015. The geographic distribution of fossil fuels unused when limiting global warming to 2°C. Nature 517: 187-192; Rogelj, J. et al. 2015. Energy system transformations for limiting end-of-century warming to below 1.5°C. Nature Climate Change 5: 519-528; Raupach, M. et al. 2014. Sharing a quota on cumulative carbon emissions. Nature Climate Change 4: 873-879; Stockholm Environment Institute. 2016. How would phasing out U.S. federal leases for fossil fuel extraction affect CO2 emissions and 2°C goals? Peter Erickson and Michael Lazarus, Working Paper No. 2016-02, https://www.sei-international.org/mediamanager/documents/Publications/Climate/SEI-WP-2016-02-US-fossilfuel-leases.pdf

including both federal and non-federal coal, must remain unburned to preserve a reasonable probability of remaining below 2°C.[113] Coal mining, transport, combustion, disposal, and cleanup also have significant external costs on public health and the environment that must be taken into consideration in the PEIS.[114]

A near-term phase-out of federal coal is also critical because new leasing locks in investment and high-carbon infrastructure for mining, transport, and coal combustion, all of which is inconsistent with the pressing need to end fossil fuel emissions.[115] A rapid end to federal coal extraction would send an important signal internationally and domestically to markets, utilities, investors and other nations that the United States is committed to upholding its climate obligation to limit temperature rise to well below 2°C.

c. Role of Federal Coal

The Department of Interior's fossil fuel leasing program contributes about one-quarter of all US fossil fuel emissions, with approximately 14% of US emissions coming from the federal coal program. See Climate Accountability Institute. 2015.[116] Based on EIA, USGS, and BLM data, the best available estimate of the entire unleased federal coal resource is 212 $GtCO_2e$, or almost two-thirds of the entire remaining global carbon budget for maintaining a reasonable probability of limiting warming to 1.5°C.[117] The PEIS must not only quantify the contribution of the federal coal leasing program to greenhouse gas emissions and global carbon budgets, but also the foreseeable results of the various alternatives on near- and medium-term national and global emissions. The fact that emissions rates are influenced by multiple factors (including market, policy, and regulatory factors) does not obscure the fact that a variety of models exist and can be used to evaluate the emissions consequences of leasing policy under a variety of scenarios (including business as usual, implementation of the Clean Power Plan, and predicted coal demand in a scenario that achieves 450 ppm $CO_2$ climate targets).

As an initial matter, it is important to note that the role of the federal coal program in coal supply, infrastructure, consumption, is larger than its (considerable) share of U.S. coal production. As the Institute for Energy Economics and Financial Analysis has noted,

[113] McGlade and Elkins (2015) use a global least-cost model for allocating unburnable fossil fuel reserves that does not incorporate global equity considerations; including equity considerations suggests that more US fossil fuel reserves should remain unburned.
[114] *See* Epstein, P.R. et al. 2011. Full cost accounting for the life cycle of coal. Annals of the New York Academy of Sciences 1219: 73-98.
[115] Climate Action Tracker. 2015. The Coal Gap: planned coal-fired power plants inconsistent with 2C and threaten achievement of INDCs, http://climateactiontracker.org/assets/publications/briefing_papers/CAT_Coal_Gap_Briefing_COP21.pdf
[116] Memorandum from Richard Heede to Friends of The Earth and Center for Biological Diversity, at http://webiva-downton.s3.amazonaws.com/877/3a/7/5721/Exhibit_1-1_ONRR_ProdEmissions_Heede_7May15.pdf; Stratus Consulting. 2014. Greenhouse Gas Emissions from Fossil Energy Extracted from Federal Lands and Waters: An Update, at 13, http://wilderness.org/sites/default/files/Stratus-Report.pdf
[117] Mulvaney et al. 2015 at 4; *see* IPCC AR5 Synthesis Report at 63-64 & Table 2.2; Rogelj 2016 at Table 2.

> The availability of cheap coal from the PRB has not only provided the industry with a price advantage that has allowed much deeper market penetration throughout the years—from 5 percent in 1982 to nearly 48 percent today—but it has also had significant implications for the nation's energy policy. For the past 30 years, the U.S. government has effectively selected coal as its primary energy source to power the nation's electric grid. In addition to its market penetration, analysts have concluded that coal's dominance has effectively prevented the development of public-private partnership policies and programs to improve energy diversity in the United States.[118]

In other words, the expectation of a continued policy below-market federal coal leasing, particularly from the Powder River Basin, encourages investment in coal mining, coal export schemes, and, in particular, continued infrastructure investment and lock-in coal transportation, export, and electricity generation, based on the assumption that the BLM's leasing policies will continue to provide a plentiful supply of cheap, reliable, relatively low-sulfur sub-bituminous coal from the Powder River Basin. As the IEEFA noted, "Given that the United States owns almost all the coal in the [Powder River Basin] region, the U.S. government holds an effective monopoly of western coal. As a result, government policies—or more precisely those of the DOI—are extremely influential and shape annual coal production levels and the market price of coal."

Evaluating the market and resulting emissions consequences of the coal leasing programs is both required by NEPA and well within BLM's capabilities.[119] In recent months, at least four sophisticated efforts have been made to evaluate the market and emissions consequences of alternative federal coal leasing policies, and concluded that a policy of ending new federal coal lease issuance or modification would have significant effects on mitigating greenhouse gas emissions, while still exceeding both anticipated coal demand for the coming decades, and the time horizon for exceeding 1.5° and 2°C carbon budgets. BLM can and should acknowledge and make use of the sources and methods in these studies to formulate quantitative assessments of the emissions and carbon budget consequences of leasing alternatives (including cessation of leasing, a declining production schedule based on meeting climate targets, and incorporation of a meaingful carbon charge on leased coal production into new or modified lease terms).

In January 2016, Vulcan Philanthropy., employing analytic models supplied by ICF International, "commissioned a forward-looking analysis using ICF International's

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[118] Institute for energy Economics and Financial Analysis, "The Great Giveaway: An analysis of the costly failures of federal coal leasing in the Powder River Basin" (June 2012).

[119] *See* Ctr. for Biological Diversity v. National Highway Traffic Safety Admin., 538 F.3d 1172 (9th Cir. 2008); Mid States Coalition for Progress v. STB, 345 F.3d 520 (8th Cir. 2003); High Country Conservation Advocates v. United States Forest Serv., 52 F. Supp. 3d 1174, 1196 (D. Colo. 2014); for examples of quantifying end-use emissions of coal leasing, see U.S. FOREST SERV., RULEMAKING FOR COLORADO ROADLESS AREAS, SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT (Nov. 2015) .

(ICF) Integrated Planning Model (IPM®), relying on assumptions and scenarios as specified by Vulcan."[120] The Vulcan study applied the ICF model of coal prices and consumption to various scenarios including no Clean Power Plan, a Clean Power Plan with mass-based caps on emissions, and a Clean Power Plan with emissions trading under a rate-based rule. The study then assessed the affects of various policy choices, including royalty increases based on the Social Cost of Carbon and (in their policy case 6), a 100% ramp-down of federal coal leasing. The Vulcan application of the ICF model found that a "production limit policy case," i.e. a cessation of new federal leasing, would have significant impacts on coal production, coal markets and exports, generation capacity and mix, and ultimately $CO_2$ emissions.[121] Ultimately, Vulcan found that ending new leasing would sharply reduce PRB coal production from 2037 on, with only a partial shift to production in other regions.[122] This would also end Montana coal exports starting in 2040.[123] The net result of Vulcan's finding is that, for a no new leasing policy, U.S. coal production would decline 348 Mt through 2040 without the Clean Power Plan, and 85 Mt under a mass-based Clean Power Plan.[124] This in turn would result in a shift to more efficient gas-fired generation and, to a lesser extent, renewable energy deployment and efficiency improvement.[125] Vulcan concludes the net effect on $CO_2$ emissions in 2040 would be nearly 500 Mt/year without the CPP, and a lesser reduction under the CPP.[126]

In May 2016, the Stockholm Environment Institute, building on the Vulcan/ICF modeling, undertook a more nuanced analysis of the emissions consequences of federal leasing cessation, taking into account additional factors including (a) a supply and demand model for coal exports; (b) exclusion of metallurgical coal; (c) accounting for non-federal coal that may be constrained due to the highly-intermingled ownership of federal and nonfederal coal in the PRB.[127] Applying this more nuanced model to Vulcan's ICF results, SEI ultimately found:

> In our reference case, assuming Clean Power Plan implementation, we find that leasing restrictions would reduce $CO_2$ emissions in 2030 from coal by about 107 Mt $CO_2$, but increased use of gas would increase emissions by about 36 Mt $CO_2$, resulting in a net reduction of 71 Mt $CO_2$.[128]

SEI notes that this 2030 reduction of 2030 million tons $CO_2$ would be rivaled, as an emissions reduction policy, only by the EPA CAFÉ standards for light-duty vehicles

[120] Vulcan Philanthropy, Federal Coal Leasing Reform Options: Effects on $CO_2$ Emissions and Energy Markets (Jan. 2016).
[121] *See id.* at 49-57.
[122] *Id.* at 46-47.
[123] *Id.* at 50.
[124] *Id.* at 47.
[125] *Id.* at 51-52.
[126] *Id.* at 56-57, Exhibits 89-90.
[127] Peter Erickson and Michael Lazarus, How would phasing out U.S. federal leases for fossil fuel extraction affect $CO_2$ emissions and 2°C goals? at 18-22 (May 2016), SEI Working Paper 2016-02.
[128] *Id.* at 22.

(approximately 200 Mt) and the Clean Power Plan (up to 610 Mt).[129] Should the Clean Power Plan not be implemented, a coal leasing cessation would reduce emissions by 270 Mt in 2030 – nearly half the savings of the CPP.[130] Ultimately, SEI concludes that ending new leasing (and lease modifications expanding reserves), would

> Send national coal production on a declining pathway, potentially to levels more consistent with a 2°C pathway for U.S. coal extraction. Such an action could leave 4 billion short tons of federal coal in the ground that otherwise would be combusted between now and 2040, equivalent to about 7 Gt of CO2 emissions.[131]

In July 2016, Eco-Shift consulting projected the "production horizons"- the number of years' worth of remaining production - from currently leased federal fossil fuels using the U.S. Energy Information Administration's (EIA) 2016 "reference case" for fossil fuel production.[132] EcoShift found that, under the EIA reference case (including Clean Power Plan implementation), "Coal under federal lease would last 25 years, through 2041."[133] This production horizon greatly exceeds the dates at which carbon budgets for 1.5°C and 2°C would be exceeded by continued emissions at 2014 rates – 2021 and 2036 respectively.[134] The discrepancy between the production horizon for already-leased coal and carbon budget exceedance dates makes clear that, barring either extraordinarily rapid global emissions declines or rapid, widespread and successful deployment of carbon capture and sequestration technology, there is no scenario where new federal coal leasing at any significant level is consistent with the nation's stated climate aims.

Significantly, both Vulcan and SEI examined the effect of leasing policies in a context where the Clean Power Plan was the only meaningful downstream constraint on U.S. coal consumption. More recently, Energy Transition Advisors, Earth Track, and Carbon Tracker Initiative undertook to examine the role of federal Powder River Basin coal in a (modestly ambitious) climate scenario – the International Energy Agency's "450 scenario" aimed at modeling the energy demands consistent with an atmospheric $CO_2$ concentration of 450 ppm, and an ensuing 50% probability of keeping warming within 2°C of preindustrial levels.[135] Although the IEA "450 scenario" is less ambitious than Paris goals or the demands of protecting health and biodiversity, it provides an existing model for assessing the role of federal leasing, PRB production, and coal markets in a modestly climate-constrained scenario.[136] The ETA first examined U.S. EIA "reference case" coal production projections under the CPP to conclude that demand for PRB coal tracks reasonably well with US-wide demand for power-sector control under a modestly $CO_2$-constrained scenario.[137] It then applies coal trajectories under the IEA

[129] *Id.* at 28 & Figure 7.
[130] *Id.*
[131] *Id.* at 31.
[132] Dustin Mulvaney et al., Over-Leased: How Production Horizons of Already Leased Federal Fossil Fuels Outlast Global Carbon Budgets 1 (July 2016).
[133] *Id.*
[134] *Id.* at Figure 1.
[135] Mark Fulton et al., Enough Already: Meeting 2°C PRB Coal Demand Without Lifting the Federal Moratorium (July 2016).
[136] The IEA 450 Scenario also makes aggressive assumptions regarding the deployment of CCS technology; Fulton et al. provides alternative scenarios involving later CCS development. *See id.* at 6 n.10.
[137] *Id.* at 7.

"450 Scenario" to the Powder River Basin, to find, under various CCS scenarios, a rapid decline in demand for PRB coal from 2016 through 2030, leveling off somewhat around 2030.[138] Fulton et al. then compared these anticipated demand scenarios with the best available information regarding coal deposits already under lease in the PRB.[139] Their conclusion was that, "[u]nder the 450 Scenario with no CCS, potential production from existing leases is sufficient to meet projected demand in every year through 2040."[140] Moreover, they found that "even without additional efforts to pursue a 2°C scenario beyond those already announced, significant production from new leases is not expected to be needed until 2031."[141]

The implications of the ETA study are worth noting at length, because they cut to the core of the inquiry presently before BLM as to how to align the federal coal program with climate goals:

> Our analysis suggests that pursuit of a 2°C or less climate commitment obviates the need to award new leases for PRB coal mining through at least 2040. Under the power system that the US must transition to if it is to fulfill its Paris Agreement commitments, the 745 Mt of potential production from new PRB mines is unneeded to meet projected demand through 2040.
>
> In contrast, awarding leases for such mines invites up to $2.9 billion of investment that is at odds with America's stated climate ambitions and should prove unnecessary as the world moves towards a 2°C outcome. As PRB mines account for the majority of coal produced on federal lands, this suggests that a continued moratorium on all new leases is warranted under a 2°C scenario. Indeed, taking steps to slow production from the PRB would send a strong signal to other parties to the Paris Agreement that the United States is beginning to put its own house in order.
>
> Note that because the US's current energy trajectory (as exemplified by the AEO Reference Case) does not fully align with a 2°C trajectory, a federal coal moratorium has the potential to yield incremental climate benefits even if current federal policies such as the Clean Power Plan are fully implemented. Inasmuch as implementation of such demand---side policies is delayed or weakened due to political opposition, then the role for supply---side restrictions such as a federal coal moratorium become all the more salient as drivers of US alignment with a 2°C scenario.[142]

The Vulcan, Ecoshift, SEI, and ETA studies make use of well-established government and industry data sources and models to provide reasonable forecasts of the consequences of alternative coal leasing policies on coal production, prices, and resulting consumption and emissions. BLM clearly has the tools available to create detailed

[138] *Id.* at 9 & Figure 1.
[139] *Id.* at 11 & Figure 3.
[140] *Id.* at 12.
[141] *Id.*.
[142] *Id.* at 17.

quantitative models of the coal program's consequences, and must do so in order to meet both its NEPA obligations and stated goals for this process. In particular, the ETA study provides a clear path for methods to analyze the role of federal coal leasing in under a scenario which at least begins to approach meeting U.S. climate targets. In order to truly assess the consistency of the coal program with COP21 commitments, BLM should also develop and analyze models for coal demand under GHG concentration scenarios that achieve a higher likelihood of remaining under 2°C and "substantially below," or 1.5°C.

d. BLM Must Consider the Climate, Environmental, and Economic Consequences of Its Policies on Coal Export

As coal consumption for power generation declines domestically, facilitating schemes for coal export threatens to undermine climate policy by discouraging efficiency and renewable energy development abroad. As domestic coal consumption has declined, exports of Montana federal coal have increased greatly in 2013 and 2014.[143] One study found that "[p]roposed coal export facilities in the Northwest will result in more coal consumption in Asia and undermine China's progress towards more efficient power generation and usage. Decisions the Northwest makes now will impact Chinese energy habits for the next half-century; the lower coal prices afforded by Northwest coal exports encourage burning coal and discourage the investments in energy efficiency that China has already undertaken."[144]

The Government Accountability Office has faulted BLM for its persistent turning a blind eye to the export schemes of Powder River Basin coal producers. In December, the GAO found that, despite the industry's public claims of hopes for coal export:

> BLM considers coal exports to a limited extent when developing an estimate of fair market value and generally does not explicitly consider estimates of the total amount of coal in the United States that can be mined economically, known as domestic reserve estimates. In the few state offices that did consider exports, we generally found the same generic statements in appraisal and economic reports that stated in general terms the possibility of future growth in coal exports, and there was limited tracking of exports from specific mines. As a result, BLM may not be factoring specific export information into appraisals or keeping up-to-date with emerging trends.[145]

The PEIS process provides BLM both an obligation and an opportunity to make an informed and conscious decision as to whether it is consistent with its statutory obligations to subsidize increased coal consumption in China by committing to the long-

[143] Williams-Derry, Clark, Unfair Market Value II: Coal Exports and the Value of Federal Coal, Sightline Institute (2016).
[144] Thomas M. Power, "The Greenhouse Gas Impact of Exporting Coal from the West Coast: An Economic Analysis" (July 2011).
[145] Government Accountability Office, Coal Leasing: BLM Could Enhance Appraisal Process, More Explicitly Consider Coal Exports, and Provide More Public Information 36 (Dec. 2013), GAO-14-140.

term availability of relatively inexpensive Powder River Basin coal for export purposes. The most detailed study to date of the market, consumption, and resulting greenhouse gas consequences of Powder River Basin coal export to China assessed the interaction of coal prices, Chinese demand and capacity, combustion and transportation impacts, and concluded that PRB coal exports to China would (a) lower coal costs for southeastern China coastal markets, increasing the incentive for long-term investment in coal-fired generation, and (b) discourage Chinese investment in efficiency and low-carbon energy sources.[146] The Power export study also noted that, because clean energy technologies are a growing market, and coal mining and shipping mature industries with relatively low employment potential, a policy of subsidizing raw coal export undermines U.S. investment and economic advantage in less carbon-intensive and more employment-intensive clean energy technologies.[147]

## IV. Public Health Impacts of the Federal Coal Leasing Program

From cradle to grave, coal's impact on human health is undeniable. At every stage of coal's life-cycle, health impacts are clearly documented including during mining, transport, preparation at the power plant, combustion, disposal of post-combustion wastes, and export abroad. Coal combustion in particular has been well-studied, with compelling evidence of widespread health effects on neighboring communities. Burning coal to generate electricity harms human health and compounds many of the major public health problems facing the world today. The pollution from coal affects all major organ systems in the human body, and contributes to diseases affecting large portions of the U.S. population, including asthma, lung cancer, heart disease and stroke.[148] It interferes with lung development, increases the risk of heart attacks, and compromises brain capacity and mental health. In addition, the discharge of carbon dioxide into the atmosphere associated with burning coal is responsible for more than 30% of total U.S. carbon dioxide pollution, contributing significantly to global warming and its associated health impacts.[149]

However, each of these steps in the coal life-cycle, in addition to coal combustion, generates pollution. Before coal can be used in power plants, it first must be mined, washed, and transported. After being burned in power plants, the remaining ash must be stored or disposed of. Because demand for coal-fired power has declined in recent years domestically, coal exports are on the rise in the United States. Coal export facilities are notorious for impacts on neighboring communities, including health impacts associated with coal dust and shipping pollution. This section will provide an overview of the public health impacts derived from each of the four

[146] Thomas M. power & Donovan S. Power, "The Impact of Powder River Basin Coal Exports on Global Greenhouse Gas Emissions" 60 (May 2013).
[147] *Id.* at 64-70.
[148] *See generally* E. Burt, et al., *Scientific Evidence of Health Effects from Coal Use in Energy Generation*, Healthcare Research Collaborative, University of Illinois at Chicago School of Public Health (April 2013); A. Lockwood, et al., *Coal's Assault on Human Health*, Physicians for Social Responsibility (Nov. 2009).
[149] *See* Id.

major stages of the coal life-cycle: mining and transport, combustion, disposal and export.

### A. Coal mining's public health impacts.

The occupational health impacts of mining coal are well known and must be considered when reviewing the effects of electricity generation with coal. Most of the research on the health effects of coal mining have been performed among miners in large scale mines in Europe and North America.[150]

Traumatic injury remains a significant problem and ranges from trivial to the fatal. Coal mining leads U.S. industries in fatal injuries.[151] Common causes of fatal injury include rock fall, fires, explosions, mobile equipment accidents, falls from height, entrapment and electrocution.[152] Less common but recognized causes of fatal injury include flooding of underground workings, wet-fill release from collapsed bulkheads and air blast from block caving failure.[153] Noise is almost ubiquitous in mining; it is generated by drilling, blasting, cutting, materials handling, ventilation, crushing, conveying and ore processing. Controlling noise has proven difficult in mining and noise-induced hearing loss remains common**.**[154]

Coal mining is also associated with chronic health problems among miners, such as Coal Workers' Pneumoconiosis, also known as CWP or "black lung disease," which causes permanent scarring of the lung tissue.[155] A 2002 review of 250 studies on coal mining calculated that up to 12% of coal miners develop the potentially fatal lung condition due to the inhalation of dust during mining operations. Data indicates a direct relationship between the mass of respirable coal mine dust inhaled and the incidence and severity of CWP.[156] The following chain of events has been proposed for the initiation and progression of CWP: (1) inhaled coal dust concentrates at the bifurcations of the respiratory bronchioles; (2) local inflammation results in the accumulation of phagocytic cells that scavenge coal dust particles, forming lung lesions known as coal macules; (3) with further exposure, coal macules enlarge to form coal nodules; (4) as the lesions condense, surrounding tissue is torn forming scar emphysema; and lastly (5) connective tissue becomes associated with these lesions leading to progressive massive fibrosis (PMF).[157]

Not only are miners at a higher risk for CWP, but they are also at higher risk for chronic bronchitis and accelerated loss of lung function. As a result, the Federal Coal Mine Health and Safety Act of 1969 legislatively has defined ''black lung disease'' to include not only CWP but

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[150] C. Stephens, M. Ahern, *Worker and Community Health Impacts Related to Mining Operations Internationally. A Rapid Review of the Literature*, London, Mining and Minerals for Sustainable Development Project (2001)
[151] *See* Coal's Assault on Human Health at vi.
[152] A.M. Donoghue, *Occupational Health Hazards in Mining: An Overview*, Occupational Medicine 283 (2004)
[153] *Id*.
[154] *Id*.
[155] *See generally* R.K. Pachauri & A. Reisinger (eds), *Climate Change 2007--Synthesis Report: Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the IPCC* (2007); C. Stephens, et al.,; E. Burt, et al., *Health Effects from Coal Use*; Coal's Assault on Human Health.
[156] W.M. Walton et al., *The Effect of Quartz and Other Non-Coal Dusts in Coal Workers' Pneumoconiosis: Part I*, Walton, W.H. (ed) Inhaled Particles IV 669-700 (1977)
[157] R. Finkelman et al., *Health Impacts of Coal and Coal Use: Possible Solutions*, International Journal of Coal Geology 50, at 438 (2002).

also obstructive lung diseases, such as chronic bronchitis and emphysema, as well as silicosis associated with an employment history in coal mines.[158] Inhalation of coal mine dust is associated with the development of pulmonary disease in miners, and coal miners have also been reported to have a higher than normal incidence of stomach cancer.[159]

Threats to the public health persist even after removal of coal from a mine. Surface mining destroys forests and groundcover, leading to flood-related injury and mortality, as well as soil erosion and the contamination of water supplies. When mines are abandoned, rainwater reacts with exposed rock to cause the oxidation of metal sulfide minerals. This reaction releases iron, aluminum, cadmium, and copper into the surrounding water system and can also contaminate drinking water.

Before coal can be transported to power plants, it must be washed to remove soil and rock impurities. Coal washing uses polymer chemicals and large quantities of water and creates a liquid waste called slurry. Slurry ponds can leak or fail, leading to injury and death, and slurry injected underground into old mine shafts can release arsenic, barium, lead, and manganese into nearby wells, contaminating local water supplies.[160]

Once coal is mined and washed, it must be transported to power plants via truck, ship, barge or train. Railroad engines and trucks together release over 600,000 tons of nitrogen oxide and 50,000 tons of particulate matter into the air every year in the process of hauling coal, largely through diesel exhaust.[161] Coal trains and trucks also release coal dust into the air, exposing nearby communities to dust inhalation. There are essentially six potential local environmental effects of concern related to coal transportation: (1) emission of particulate matter in the form of coal dust; (2) emission of particulate matter in the form of diesel locomotive exhaust; (3) production of noise and vibration by train movement; (4) congestion and collisions along roadways and rail lines; (5) train derailments; and (6) fires due to spontaneous combustion of coal.[162]

In addition to the miners themselves, communities near coal mines may be adversely affected by mining operations due to the effects of blasting, the collapse of abandoned mines, and the dispersal of dust from coal trucks. These impacts are discussed at length in the subsequent sections.

### B. Coal combustion emissions' impact on public health.

The combustion phase of coal's life-cycle exacts the greatest toll on human health. Most of coal's health burden results from its combustion in power plants, with the rest of the health burden consisting of the effects caused from the other steps of the coal's life-cycle. Pollutants

[158] *Id*.
[159] *Id.* at 440.
[160] *See* A. Lockwood, et al., Coal's Assault on Human Health at 4; E. Burt, et al., *Health Effects from Coal Use* at 3.
[161] D.A. Lashof, D. Delano, J. Devine, et al., *Coal in A Changing Climate*, Natural Resources Defense Council (2007), *available at*: http://www.nrdc.org/globalwarming/coal/coalclimate.pdf
[162] Multnomah County Health Department, *The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon: A Health Analysis and Recommendations for Further Action*, Health Assessment and Evaluation (2013).

generated by coal combustion can have profound effects on the health of local communities, especially vulnerable individuals including children, the elderly, pregnant women, and those suffering from asthma and lung disease. On a global scale, coal emissions can travel long distances, even affecting populations living remote from power plants.

The "external costs" of electricity generation from coal are the burdens to society that are not included in the electricity's monetary price. Estimates of the external costs of electricity generation from coal suggest that 95% of the external cost consists of the adverse health effects on the population.[163] When coal is burned, it produces air-borne pollutants of sulfur dioxide, particulate matter (PM), nitrogen oxides, mercury, arsenic, chromium, nickel, and other heavy metals, acid gases, hydrocarbons, and dozens of other substances known to be hazardous to human health.[164] It also contributes to smog through the release of oxides of nitrogen, which react with volatile organic compounds (VOCs) in the presence of sunlight to produce ground-level ozone, the primary ingredient in smog. In 2011, the World Health Organization compiled air quality data from 1,100 cities in 91 countries and found that residents living in many urban areas are exposed to persistently elevated levels of fine particle pollution, partly due to coal-fired power plants, as well as the burning of coal for cooking and heating.[165]

A 2007 article published in the medical journal, *The Lancet*, summarizes the burden of the health effects of generating electricity from coal and lignite (a type of coal). It estimated that for every TWh (Terrawatt-hour) of electricity produced from coal in Europe, there are 24.5 deaths, 225 serious illnesses including hospital admissions, congestive heart failure and chronic bronchitis, and 13,288 minor illnesses.[166] When lignite, the most polluting form of coal, is used, each TWh of electricity produced results in 32.6 deaths, 298 serious illnesses, and 17,676 minor illnesses.[167] To give these data perspective, consider the fact that nearly half of the 4,160 TWh of electricity generated in the United States in 2007 came from coal-fired power plants.[168] If these estimates are applied to the U.S., as many as 50,000 deaths per year may be attributable to burning coal.[169]

The major health effects linked to coal combustion emissions damage the respiratory, cardiovascular, and nervous systems and contribute to four of the top five leading causes of death in the United States: heart disease, cancer, stroke, and chronic lower respiratory diseases.[170] Although it is difficult to ascertain the proportion of this disease burden that is attributable to coal pollutants, even very modest contributions to these major causes of death are likely to have large effects at the population level, given high incidence rates.

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[163] E. Burt, et al., *Health Effects from Coal Use* at 4.
[164] *See* id. at 3.
[165] *Tackling the Global Clean Air Challenge*, News Release, World Health Organization (Sept. 2011).
[166] A. Markandya & P. Wilkinson, *Energy and Health 2: Electricity Generation and Health*, The Lancet 979-990 (2007)
[167] *Id*.
[168] *Id.*
[169] A. Lockwood, et al., Coal's Assault on Health at 2.
[170] *See generally* E. Burt, et al., *Health Effects from Coal Use*; A. Lockwood, et al., *Coal's Assault on Human Health* 1.

### 1. Respiratory Effects

Specific pollutants from burning coal that cause a negative health effect on the respiratory system include particulate matter (PM), sulfur dioxide (SO2), and oxides of nitrogen, such as NO2.

*Particulate Matter* -- Particulate matter is generated from the combustion of coal and is characterized by size -- small particles less than 2.5 micrometers (PM2.5) and larger particles up to 10 micrometers (PM10). PM2.5 travels deeper into the airways than PM10 and is therefore generally believed to cause a greater threat to human health.[171] In a report evaluating over 40 studies on the health effects of exposure to small particulate matter (PM2.5), the U.S. Environmental Protection Agency concluded that PM2.5 likely causes respiratory symptoms, the development of asthma, and decrements in lung function in children.[172] Findings from the review conclude that a 10 μg/m3 increase in PM2.5 is associated with a 1% to 3.4% decrease in FEV1, a measure of lung function, in asthmatic children.[173] It also concluded that exposure to PM2.5 increases emergency department visits and hospital admissions for respiratory related symptoms such as infections and chronic obstructive pulmonary disease.[174] Epidemiological evidence from Australia and New Zealand, Mexico, Canada, and Europe confirm that these health effects on the respiratory system are seen around the globe among communities exposed to PM2.5.[175] In addition to respiratory illnesses, long-term exposure to PM2.5 is causally linked to the development of lung-cancer. [Implementing the final emission guidelines of the Clean Power Plan may lead to reductions in ambient PM2.5 concentrations below the NAAQS for PM and ozone in some areas and assist other areas with attaining these NAAQS.][176]

*Sulfur Dioxide* -- Exposure to sulfur dioxide (SO2) emitted by coal burning power plants increases the severity and incidence of respiratory symptoms of those living nearby, particularly children with asthma.[177] For adults and children who are susceptible, inhalation of SO2 causes inflammation and hyper-responsiveness of the airways, aggravates bronchitis, and decreases lung function. There is a significant association between community-level SO2 concentration and hospitalizations for asthma and other respiratory conditions, and asthma emergency department visits particularly among children and adults over 65.[178] The EPA identified three short-term morbidity endpoints

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[171] *See* E. Burt, et al., *Health Effects from Coal Use* at 5.
[172] U.S. Environmental Protection Agency, *Integrated Science Assessment for Particulate Matter* (Dec. 2009).
[173] *Id.*
[174] *Id.*
[175] A.G. Barnett, et al., *Air Pollution and Child Respiratory Health: A Case-Crossover Study in Australia and New Zealand*, Am. J. of Resp. Crit. Care Med. (2005); A. Barraza-Villarreal, et al., *Air Pollution, Airway Inflammation, and Lung Function in a Cohort Study of Mexico City Schoolchildren*, Environ. Health Persp. (2008); Y. Chen, et al., *Influence of Relatively Low Level of Particulate Air Pollution on Hospitalization for COPD in Elderly People*, Inhal Toxicol. (2004); J. De Hartog, et al., *Effects of Fine and Ultrafine Particles on Cardiorespiratory Symptoms in Elderly Subjects with Coronary Heart Disease: The ULTRA Study*, Am. J. Epidemiol. (2003).
[176] *Regulatory Impact Analysis for the Clean Power Plan Final Rule*, U.S. Environmental Protection Agency (Aug. 2015) *available at*: https://www.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf
[177] *See* E. Burt, et al., *Health Effects from Coal Use* at 6.
[178] *Integrated Science Assessment for Sulfur Oxides – Health Criteria*, U.S. Environmental Protection Agency (2008).

that the SO2 ISA identified as "causal relationship": asthma exacerbation, respiratory-related emergency department visits, and respiratory-related hospitalizations.[179]

*Oxides of Nitrogen* -- Oxides of nitrogen (NOX) are by-products of fossil fuel combustion from automobiles and coal-fired power plants, among many other sources. Oxides of nitrogen react with chemicals in the atmosphere to create pollution products such as ozone (smog), nitrous oxide (N2O), and nitrogen dioxide (NO2). NO2 and ozone are pollutants of particular concern. When asthmatic children are exposed to NO2 they can experience increases in wheezing and cough.[180] Exposure to NO2 also increases susceptibility to viral and bacterial infections, and at high concentrations (1-2 ppm), it can cause airway inflammation.[181] At low concentrations (0.2 - 0.5 ppm) NO2 causes decrements in lung function in asthmatics.[182] Increases in ambient NO2 levels (3-50 ppb) cause increases in hospital admissions and emergency department visits for respiratory causes, particularly asthma. Depending on localized concentrations of volatile organic compounds, reducing NOx emissions would also reduce human exposure to ozone and the incidence of ozone-related health effects.[183]

Reducing emissions of SO2 and NOx would also reduce human exposure to ambient PM2.5 and the incidence of PM2.5-related health effects.[184] In 2008, the National Academies of Sciences issued a series of recommendations to the EPA regarding the quantification and valuation of ozone-related short-term mortality. Chief among these was that "...short-term exposure to ambient ozone is likely to contribute to premature deaths" and the committee recommended that "ozone-related mortality be included in future estimates of the health benefits of reducing ozone exposures..."[185]

### 2. Cardiovascular Effects

Coal-fired power plants contribute to the global burden of cardiovascular disease primarily through the emission of particulate matter. PM2.5 has been causally linked to cardiovascular disease and death.[186] The World Health Organization (WHO) estimates that worldwide, 5% of cardiopulmonary deaths are due to particulate matter pollution.[187] Long term exposure to PM2.5 has been shown to accelerate the development of atherosclerosis and increase emergency department visits and hospital admissions for ischemic heart disease and congestive heart failure.[188] The U.S. EPA reports that a majority of the studies it reviewed found a 0.5-2.4% increase in emergency department

[179] *See* Regulatory Impact Analysis at 4-53.
[180] *Integrated Science Assessment for Oxides of Nitrogen-Health Criteria*, U.S. Environmental Protection Agency (July 2008).
[181] *See* id.
[182] *See* id.
[183] *Id*.
[184] *See* Regulatory Impact Analysis at 4-11.
[185] *Id.* at 4-17, 4-18.
[186] *See Integrated Science Assessment for Particulate Matter*,.
[187] *Global Health Observatory (GHO): Outdoor Air Pollution*, World Health Organization (2003) *available at:* http://www.who.int/gho/phe/outdoor_ air_pollution/en/index.html.
[188] *See* E. Burt, et al., *Health Effects from Coal Use*, at 7.

visits and hospital admissions for cardiovascular diseases per each 10 μg/m3 increase in PM2.5 concentrations,[189] and a 2007 scientific review of the health effects of combustion emissions reported an 8-18% increase in cardiovascular deaths per 10 μg/m3 increase in PM2.5 concentration in the United States.[190]

### 3. Neurological Effects

Coal contains many naturally-occurring heavy metals, including mercury. When coal is burned, mercury is emitted into the atmosphere in gaseous form. The United Nations estimates that 26% of global mercury emissions (339-657 metric tons/ year) come from the combustion of coal in power plants.[191] The mercury emitted into the atmosphere is deposited into waterways, converted to methylmercury, and passed up the aquatic food chain. Consumption of methylmercury-contaminated fish, from mercury emissions locally, regionally, and internationally, by pregnant women can cause developmental effects in their offspring such as lower intelligence levels, delayed neurodevelopment, and subtle changes in vision, memory, and language.[192]

### 4. Reproductive Health Effects

The National Academy of Sciences concluded that "the population with the highest risk is the children of women who consumed large amounts of fish and seafood during pregnancy. The committee concludes that the risk to that population is likely to be sufficient to result in an increase in the number of children who have to struggle to keep up in school."[193] The evidence of air pollution's effects on pregnancy is sufficient to conclude that exposure to air pollution during pregnancy can cause low birthweight.[194] Researchers have studied the association between electricity generation from coal-fired power plants and infant mortality, and infant mortality was shown to increase with increased coal consumption in countries that had mid to low infant mortality rate at baseline (1965).[195]

### 5. Climate change health effects

[189] *See Integrated Science Assessment for Particulate Matter*.
[190] J. Lewtas, *Air Pollution Combustion Emissions: Characterization of Causative Agents and Mechanisms Associated with Cancer, Reproductive, and Cardiovascular Effects*, Mut. Res. 636:95 (2007)
[191] J. Pacyna, et al., *Study on Mercury Sources and Emissions and Analysis of Cost and Effectiveness of Control Measures: "UNEP Paragraph 29 Study"*, UNEP (Nov. 2010).
[192] World Health Organization, *Exposure to Mercury: A Major Public Health Concern*, Pub. Health & Env. (2007)
[193] National Research Council (NRC), *Toxicological Effects of Methylmercury* (2000).
[194] *See* E. Burt, et al., *Health Effects from Coal Use* at 7.
[195] J. Gohlke, et al., *Estimating the Global Public Health Implications of Electricity and Coal Consumption*, Env. Health Perspect. 119(6) (June 2011)

Pollution from the life-cycle of coal is one of the leading causes of climate change.[196] Climate change itself is a significant threat to human health and well-being.[197] The health impacts of climate change include harms from increasing heat stress and other extreme weather events, increases in air pollution, the spread of vector-borne diseases, food insecurity and under-nutrition, changing exposure to toxic chemicals, displacement, and stress to mental health and well-being.[198] Although everyone is vulnerable to health impacts from climate change, certain groups are particularly vulnerable to climate change-related health harms such as children, the elderly, low-income communities, some communities of color, immigrant groups, and persons with disabilities and pre-existing medical conditions.[199] The 2015 Lancet Commission on Health and Climate Change highlighted that climate change is causing a global medical emergency, concluding that "the implications of climate change for a global population of 9 billion people threatens to undermine the last half century of gains in development and global health."[200]

Climate change-driven health impacts are already occurring in the United States, particularly due to morbidity and mortality from extreme weather events which are increasing in frequency and intensity.[201] Heat is already the leading cause of weather-related deaths in the United States, and extreme heat is projected to lead to increases in future mortality on the order of thousands to tens of thousands of additional premature deaths per year across the United States by the end of this century.[202] Extreme precipitation events have become more common in the United States, contributing to increases in severe flooding events in some regions.[203] Floods are the second deadliest of all weather-related hazards in the United States and can lead to drowning, contaminated drinking water leading to disease outbreaks, and mold-related illnesses.[204]

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[196] Intergovernmental Panel on Climate Change Fifth Assessment Report Chapter 7, *Energy Systems*. pg 554.
[197] Luber, G. et al. 2014: Ch. 9*: Human Health. Climate Change Impacts in the United States: The Third National Climate Assessment*. J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 220-256. doi:10.7930/J0PN93H5. *See* also Watt, N. et al. 2015. *Health and climate change: policy responses to protect public health*. The Lancet 386: 1861-1914.
[198] Sheffield, P. and Landrigan, P.J. 2011. *Global Climate Change and Children's Health: Threats and Strategies for Prevention*. Environmental Health Perspectives 119: 291-298..
[199] *See Id*. *See* also USGCRP [US Global Change Research Program]. 2016. *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska, Eds. U.S. Global Change Research Program, Washington, DC, 312 pp. http://dx.doi.org/10.7930/J0R49NQX.
[200] Watt, N. et al. 2015. *Health and climate change: policy responses to protect public health*. The Lancet 386: 1861-1914.
[201] *See Id*. *See* also Luber, G. et al. 2014: Ch. 9*: Human Health. Climate Change Impacts in the United States: The Third National Climate Assessment*. J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 220-256. doi:10.7930/J0PN93H5; USGCRP [US Global Change Research Program]. 2016. *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska, Eds. U.S. Global Change Research Program, Washington, DC, 312 pp. http://dx.doi.org/10.7930/J0R49NQX.
[202] *See* USGCRP, 2016. *The Impacts of Climate Change on Human Health in the United States*.
[203] *See* Luber, G. et al. 2014: Ch. 9*: Human Health. Climate Change Impacts in the United States*.
[204] *See Id*.

Air pollution components, specifically ozone, air particulates, and allergens, are expected to increase with climate change. 74 Fed. Reg. 66496 §IV.B.1(b). Climate-driven increases in ozone will cause more premature deaths, hospital visits, lost school days, and acute respiratory symptoms.[205] Projected climate-related increases in ground-level ozone concentrations in 2020 could lead to an average of 2.8 million more occurrences of acute respiratory symptoms, 944,000 more missed school days, and over 5,000 more hospitalizations for respiratory-related problems.[206] In 2020, the continental U.S. could pay an average of $5.4 billion (2008$) in health impact costs associated with the climate penalty on ozone, with California experiencing the greatest estimated impacts averaged at $729 million.[207]

Risks from infectious diseases are also increasing as climate change alters the geographic and seasonal distribution of vector-borne diseases.[208] Climate change favors the spread of some pathogen-carrying vectors. Lyme disease is the most common vector-borne disease in the United States, with 25,000–30,000 cases reported to the CDC per year, with the highest incidence among children between ages 5 and 9.[209] The risk of human exposure to Lyme disease is expected to increase as ticks carrying Lyme disease and other pathogens become active earlier in the season and expand northward in response to warming temperatures.[210] Rising temperatures and changes in rainfall have already contributed to the maintenance of West Nile virus in parts of the United States, and climate change is expected to increase suitable conditions for the mosquitoes that transmit West Nile virus, increasing human exposure risk to the disease.[211]

As highlighted by the Third National Climate Assessment, fighting climate change by reducing greenhouse gas pollution provides critical "opportunities to improve human health and well-being across many sectors," including a wide array of important health co-benefits.[212]

The impacts of coal combustion can also be described in economic terms, and several papers have attempted to estimate the cost of using coal by assigning value to the environmental and public health damage caused during each stage of coal's extraction, transportation, combustion, and disposal. One such study estimated that the external costs of coal-fired electricity in the U.S. add an extra 17.8 cents to each kWh of electricity produced; an amount

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[205] *See* USGCRP, 2016. *The Impacts of Climate Change on Human Health in the United States*.
[206] UCS [Union of Concerned Scientists]. 2011. *Rising Temperatures and Your Health: Rising Temperatures, Worsening Ozone Pollution*. Available at http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/climate-change-and-ozone-pollution.pdf.
[207] *See Id*.
[208] *See* USGCRP, 2016. *The Impacts of Climate Change on Human Health in the United States*
[209] Bernstein, A.S. and S.S. Myers. 2011. *Climate change and children's health*. Current Opinion in Pediatrics 23: 221–6.
[210] *See* USGCRP, 2016. *The Impacts of Climate Change on Human Health in the United States*.
[211] Harrigan, R.J., H.A. Thomassen, W. Buermann, and T.B. Smith. 2014. *A continental risk assessment of West Nile virus under climate change*. Global Change Biology 20: 2417-2425; Paz, S. 2015. *Climate change impacts on West Nile virus transmission in a global context*. Philosophical Transactions of the Royal Society B 370: 20130561.
[212] *See* Luber, G. et al. 2014: Ch. 9*: Human Health. Climate Change Impacts in the United States*.

that would triple its cost to consumers.[213] Another U.S. report by Machol et al. estimates 45 cents per kWh as the cost of the health burden and environmental damages from coal combustion.[214] In 2011, the US EPA estimated the benefits and costs of the Clean Air Act, a law which regulates emissions of sulfur dioxide, oxides of nitrogen, carbon monoxide, and particulate matter in the United States. The EPA calculated that the ratio of health care cost savings to compliance costs was 25:1 in 2010.[215] This means that for every dollar spent complying with the Clean Air Act, twenty-five dollars were saved in health care costs due to lower disease burden, including a reduction in premature deaths, and cases of bronchitis, asthma, and myocardial infarction.[216]

### C. Coal waste disposal impacts on public health.

The storage of post-combustion wastes from coal plants also threatens human health. After combustion, some coal ash is recycled into cement and other engineering products, but most of it is disposed of in dry or wet landfills.[217] There are 584 coal ash dump sites in the U.S., and toxic residues have migrated into water supplies and threatened human health at dozens of these sites.[218] Landfills that leak flyash waste can contaminate ground and surface water with arsenic, cadmium, barium, thallium, selenium, and lead.[219]

The occurrence of uncontrolled coal fires increased following the beginning of coal mining because of the increased amount of coal being exposed to oxygen and because of fires associated with the mining activity as well as accidental and intentional fires started on coal waste piles. Unofficial estimates from the U.S. Office of Surface Mining indicate that, despite many years of concerted efforts to extinguish these fires, there are still approximately 150 uncontrolled surface and underground coal fires in the U.S.[220]

### D. Coal exports' impact on public health.

The United States produced just under a billion short tons of coal in 2015, but as domestic coal use declines, producers are increasingly looking to export U.S. coal—and the pollution associated with burning this coal—overseas.[221] Even though the coal will ultimately be

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[213] P.R. Epstein, et al., *Full Cost Accounting for the Life Cycle of Coal*, Ann. NY Acad. Sci. (2011)
[214] B. Machol & S. Rizk, *Economic Value of U.S. Fossil Fuel Electricity Health Impacts*, 52 Env. Intl. 75-80 (2013)
[215] *The Benefits and Costs of the Clean Air Act: 1990-2020*, U.S. Environmental Protection Agency, Office of Air and Radiation (2010).
[216] *Id*.
[217] *See See* E. Burt, et al., *Health Effects from Coal Use* at 3.
[218] *See Methane as a Greenhouse Gas*, U.S. Climate Change Science Program (2006) *available at*: http://www.climatescience. gov/infosheets/highlight1/CCSP-H1-methane18jan2006.pdf; *Coalbed methane—An Untapped Energy Resource and an Environmental Concern—USGS Fact Sheet*, U.S. Geological Survey, FS-019-97 (1997) *available at*: http://energy.usgs.gov/ factsheets/Coalbed/coalmeth.html.
[219] *See* E. Burt, et al., *Health Effects from Coal Use* at 3.
[220] R. Finkelman, *Potential Health Impacts of Burning Coal Beds and Waste Banks*, 59 Intl. J. of Coal Geo. 19, 20 (2004).
[221] U.S. Energy Information Administration's Coal Use Projections and forecasts found at https://www.eia.gov/forecasts/steo/report/coal.cfm; Government Accountability Office, Coal Leasing: BLM Could Enhance Appraisal Process, More Explicitly Consider Coal Exports, and Provide More Public Information 36 (Dec. 2013), GAO-14-140.

burned elsewhere, the mining and transportation of coal for export nonetheless have significant adverse effects on human health and the environment in the United States. Transporting the coal to ports releases coal dust from open rail cars, as well as diesel exhaust from train engines, along the rail lines.[222] Coal dust particles themselves contribute to lung disease, asthma, and cardiopulmonary diseases, and can contain toxic heavy metals like arsenic and lead, which pose additional health risks, such as skin, bladder, liver, and lung cancers and damage to the nervous system.[223] At the ports, unloading the coal, storage in piles, and reloading it onto ships all emit large quantities of coal dust.[224] Trains and ships used to transport coal also emit diesel exhaust and other harmful air pollutants, which worsen respiratory and pulmonary conditions and can cause premature death.

According to a 1993 Norfolk Southern Rail Emission study, each open car carrying metallurgical coal from mines in Appalachia to the port terminals in Hampton Roads and Baltimore releases roughly 300 pounds coal dust into the air, water, and soil in the communities through which it travels.[225] According to a 2011 Burlington Northern Santa Fe (BNSF) study, each rail car carrying Powder River Basin [thermal] coal loses between 250 and 700 pounds of coal and coal dust on each trip, or over 30 tons of coal for a typical 120-car coal train.[226] BNSF estimates that around 3,600 lbs. per car can be lost in the form of dust.[227]

Ports are also a significant source of coal dust. When a train arrives at a coal export terminal, it may dump its coal into an open air storage pile or holding silo. Alternatively, a train arriving at a port terminal may wait for days in a train yard at the port before its coal is unloaded. These waiting train cars and open-air coal piles are significant sources of coal dust particulate matter at export terminals because typical wind speeds and wind gusts prevalent in near-coastal areas cause coal particles from the storage piles and from the uncovered tops of waiting coal cars to be released into the air.[228] Unloading the coal from rail cars into storage piles at the port facility and storing the coal in these piles emits coal dust into the air, soil, and water nearby. In addition, coal dust is carried off the storage piles as runoff when the piles are exposed to rain.[229] This runoff can impact both surface water and underlying groundwater. When a ship is ready for loading, conveyor belts transport the coal from the train car, silo, or coal pile, and dump the coal onto the ship, releasing additional coal dust into the air and water.

Coal dust, once emitted, can have multiple impacts on humans and the environment. Fugitive coal dust that is 10 micrometers or less in diameter is classified as PM10, and fugitive

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[222] BNSF Railway. "Coal Cars." Found at http://www.bnsf.com/customers/equipment/coal-cars/.
[223] Center for Disease Control and Prevention. "Coal dust." *NIOSH Pocket Guide to Chemical Hazards.* Nov 18, 2010. Found at http://www.cdc.gov/niosh/npg/npgd0144.html.
[224] Burlington Northern Santa Fe Railway, "Coal Dust FAQ," Mar 2011, found at http://www.coaltrainfacts.org/docs/BNSF-Coal-Dust-FAQs1.pdf.
[225] Simpson Weather Associates , *Norfolks Southern Rail Emission Study: Consulting Report Prepared for Norfolk Southern Corporation*. Charlottesville, VA (30 December 1993) found at http://leg2.state.va.us/dls/h&sdocs.nsf/By+Year/SD581994/$file/SD58_1994.pdf. (appendix E).
[226] *See* BNSF Coal Dust FAQ.
[227] *See Id*.
[228] Bounds, WJ and Johannesson, KH. "Arsenic addition to soils from airborne coal dust originating at a major coal shipping terminal." *Water, Air, and Soil Pollution* 185 (2007): 195-207.
[229] *See Id*. at 198.

coal dust that is 2.5 micrometers or less in diameter is classified as PM2.5. PM10 can travel up to 30 miles, and PM2.5 can travel 500 miles.[230] Both PM10 and PM2.5 are extremely harmful to human health. The particles can travel deep into the lungs and into the bloodstream, causing premature death in people with heart or lung disease, heart attacks, decreased lung function, and increased respiratory effects, including irritation of the airways, aggravated asthma, coughing, and breathing difficulties.[231] Groups that are most at risk due to PM10 and PM2.5 exposure include children, older adults, low-income communities, and individuals with asthma or preexisting heart and lung disease. Inorganic arsenic found in coal dust deposited in soil near coal export terminals is a human carcinogen.[232] Human exposure to inorganic arsenic by inhalation has been strongly associated with lung cancer, and ingestion has been linked to skin, bladder, liver, and lung cancers.[233] Chronic inhalation has been associated with irritation of the skin and mucous membranes, as well as effects in the brain and nervous system. Gastrointestinal effects, anemia, peripheral neuropathy, skin lesions, hyperpigmentation, and liver or kidney damage have resulted from chronic oral exposure to elevated levels of inorganic arsenic.[234]

In addition to coal dust, the trains and ships used to transport coal emit diesel exhaust. Diesel exhaust contains significant sources of harmful air pollutants including particulate matter (PM/PM2.5), volatile organic compounds (VOCs), toxic compounds known as air toxics, carbon monoxide (CO), nitrogen oxides (NOx) and, in the case of ships, sulfur oxides (SOx), and contributes to elevated ozone levels.[235] This pollution causes poor air quality, reduced visibility, water and soil contamination, and ecosystem damage. Health effects associated with exposure to this pollution include premature mortality, increased hospital admissions, heart and lung diseases, asthma, reduced lung function, and increased cancer risk.[236]

U.S. coal emissions from combustion overseas, namely in Asia, returns to the U.S. in the form of particulate matter, ozone and mercury deposition. Multiple studies have shown that, depending on the season and meteorological conditions, a significant portion of particulate pollution in California originates in Asia, as well the precursors for ozone, the ozone itself, and gaseous mercury.[237] Indeed, a University of California at Berkley study found that 29% of particulate matter pollution in the San Francisco Bay area originated from fossil fuel use in China.[238] Another study found that the majority of particulate pollution in Lake Tahoe originated in Asia.[239] Coal's pollution footprint is extremely large, spanning thousands of miles across oceans and continents. The health impacts stemming from this pollution are significant and should be addressed in any environmental review of the federal coal program.

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[230] *See Id*. at 200.
[231] *See* Environmental Protection Agency, *Integrated Science Assessment on PM* at 25.
[232] *See Bounds, WJ and Johannesson.KH* at 196.
[233] World Health Organization Fact Sheet on Inorganic Arsenic found at http://www.who.int/mediacentre/factsheets/fs372/en/.
[234] *See Id.*
[235] California EPA's Fact Sheet on Health Impacts of Diesel Exhaust emissions found at: http://oehha.ca.gov/media/downloads/calenviroscreen/indicators/diesel4-02.pdf,
[236] *See Id*.
[237] Lin, Jintai, et al. *China's international trade and air pollution in the United States,* Proceedings of the National Academy of Sciences of the United States of American, vol. 111 no. 5, pgs. 1736-1741, January 21, 2014.
[238] Ewing, A. Stephanie, et al., *Pb Isotopes as an Indicator of the Asian Contribution to Particulate Air Pollution in Urban California***,** *Environ. Sci. Technol. Journal, 44* (23), pp 8911–8916**.** October 29, 2010.
[239] *See Id*.

V. The Impacts of Coal Mining on Species and Habitats

There are myriad environmental impacts from mining coal, transporting it by rail, burning it, and disposing of the resulting waste, all which must be fully analyzed in the EIS. Exploiting coal resources causes a broad array of environmental harms through contamination of air, surface and groundwater, and publicly owned lands.[240] The EIS must include an analysis of impacts to biological, marine, and aquatic resources on both public and private lands and waters affected by coal mining, transportation and combustion – that is, in the areas where mining of the coal takes place, through rail or other corridors, through the loading and shipping of the coal, to its final destination, burning, and disposal. Such resources include marine and terrestrial mammals, game and non-game resident and migratory bird species, raptors, songbirds, amphibians, reptiles, fisheries, aquatic invertebrates, wetlands, and vegetative communities – including species listed pursuant to the Endangered Species Act (ESA). For species protected under the ESA, BLM must consult with the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) under § 7 of the Act to determine whether BLM regulated coal mining activities will adversely affect these species or their designated critical habitat.[241] Because this programmatic decision implicates a significant share of not only domestic but global greenhouse gas emissions whose effects occur globally, the relevant "action area" for purposes of consultation is global.

The BLM must ensure that up-to-date information on all potentially impacted flora and fauna is made available in the Draft PEIS, so that adequate impact analyses can be completed and to ensure robust public participation. Habitat degradation, fragmentation, and loss must all be assessed, along with any resulting impacts to wildlife and marine species. Cumulative impacts, such as increased wildlife mortality from mining related activities (including, but not limited to, increased human conflicts, habitat loss, and increased hunting pressure), transport of coal, pollution from coal combustion, and coal combustion waste disposal, must be fully analyzed. Impacts to wildlife migration corridors must also be evaluated.

The PEIS must also consider all potential water quality impacts (*e.g.*, increased sediment loads, possible spills, coal dust impacts, mercury deposition, changes to alluvial groundwater quality, degradation of drinking well water) and water quantity impacts (*e.g.*, drawdown of aquifers, diversions or diminutions of surface flow, hydrologic changes affecting seeps and springs, drinking water impacts), as well as impacts to water resources that would be expected from burning the coal and disposing of coal combustion waste, whether domestically or overseas, and the impacts that potential alterations in water quality and quantity will have on listed species.

Transportation of coal over long distances also has significant environmental impacts, including the fossil fuel consumption of moving large volumes of material over long distances. Data shows that open coal trains lose huge volumes of coal dust during transportation. Such discharges add to air quality problems along the rail route, and cause contamination of

[240] *See generally* Paul R. Epstein et al, Full cost accounting for the life cycle of coal in "Ecological Economics Reviews," Ann. N.Y. Acad. Sci. 1219: 73-98 (2011); Jayni Foley Hein and Peter Howard, Illuminating the Hidden Costs of Coal (Dec. 2015); A Hidden Cost of Coal, Northern Plains Resource Council; Exporting Powder River Basin Coal: Risks and Costs, Western Organization of Resource Councils (Sept. 2011).
[241] 16 U.S.C. § 1536(a)(2).

waterbodies and other habitat areas. According to BNSF studies, 500 to 2,000 lbs of coal can be lost in the form of dust for each rail car, and coal trains are typically composed of at least 120 cars per train. In other studies, again according to BNSF, as much as three percent of the coal in each car (around 3,600 lbs per car) can be lost in the form of dust.[242] This is a huge volume of coal that will escape into the air and water, potentially affecting many listed species and essential habitat areas, which must be fully analyzed in the EIS. Moreover, as with the greenhouse gas impacts, this analysis must be viewed in the context of all existing and reasonably foreseeable similar impacts.

The PEIS's analysis of coal dust should also include a discussion of the efficacy of surfactants to control coal dust, potential impacts of the use of surfactants to control dust emissions, as well as consequences from not using surfactants. Although use of surfactants in some contexts is common, their efficacy and safety for use on coal-carrying trains is unproven. Further, surfactants contain myriad undisclosed chemicals, many of whose biological and ecological effects have not yet been adequately studied. Surfactants could cause a number of potential harms, including: danger to human health during and after application; surface, groundwater and soil contamination; air pollution; changes in hydrologic characteristics of the soils; and impacts on native flora and fauna populations. *See* Environmental Protection Agency, Potential Environmental Impacts of Dust Suppressants: Avoiding another Times Beach § 3 (May 30-31, 2002).

The net results of the impacts of coal mining have been significant water pollution, loss of natural areas, and great reductions in biological diversity in mined places. We thank BLM for recognizing that the current implementation of the Federal coal program has failed to protect our waterways, wildlife, and natural ecosystems from coal mining and related pollution. We provide the following information to support the need for more protective regulations to ensure that mining operations are conducted so as to minimize disturbances and adverse impacts on fish, wildlife, and related environmental values.

A. Site-Specific Impacts of Mining

In the Notice of Intent to Prepare a Programmatic Environmental Impact Statement, one of the issues that BLM seeks comment on is "how, when and where to lease." Specifically, the Notice states that the PEIS "will consider whether the BLM's unsuitability screening criteria adequately address the questions of where and/or where not to lease for coal production, as well as other potential factors that could be applied during the planning process to provide guidance on the most appropriate locations for coal leasing." The incredible harm that coal mining has caused to local habitats and communities, and the number of species that have been pushed to the brink of extinction from coal mining activities (discussed below), indicates that the unsuitability screening criteria are not adequately addressing the impacts of coal mining, and more specific and enforceable limitations must be applied to prevent further harm.

As set forth above, it is our position that no further coal mining can be allowed if we are to meet our climate goals, and our remaining coal reserves must be kept in the ground to prevent harm to waterways and habitats; however, in the event that the regulations will continue to allow

[242] Hearing Transcript, July 29, 2010, *Arkansas Electric Cooperative Association – Petition for Declaratory Order*, Surface Transportation Board, Docket No. FD 35305, at 42:5-13.

for the exploitation of this dirty, dangerous fossil fuel resource, below we have provided our concerns over the unsuitability screening criteria, and suggest criteria for determining areas where coal mining should not be allowed.

However, it is not only that the criteria themselves that are inadequate to prevent coal mining from unduly harming our communities and habitats – the implementation of the screening criteria is likewise inadequate. For example, several exemptions allow the criteria to be bypassed. Pursuant to 43 C.F.R § 3461.2-1(a)(1), "each of the unsuitability criteria shall be applied to all coal lands with development potential identified in the comprehensive land use plan or land use analysis;" however, that section adds that "for areas where 1 or more unsuitability conditions are found and for which the authorized officer of the surface management agency could otherwise regard coal mining as a likely use, the exceptions and exemptions for each criterion may be applied." This broad grant of authority to disregard the applicability of the unsuitability criteria in cases where coal mining is somehow still considered a "likely use" is dangerous, especially without any indication of the factors that would be used to determine its applicability. Allowing lands to be mined even when the unsuitability criteria suggest it should not be, simply because some "authorized officer" thinks that coal mining is a "likely use," provides nothing other than a means for mining companies to exert influence on the agency in an attempt to disregard the criteria intended to protect sensitive areas from harm. This provision must be changed such that no mining is allowed on lands that have been shown to be unsuitable.

Furthermore, 43 C.F.R § 3461.2-1(b)(1) allows the "authorized officer" to make that assessment "on the best available data that can be obtained given the time and resources available to prepare the plan." This standard falls well short of what is normally used to ensure that environmental resources are not unduly adversely impacted. Under both the ESA and NEPA, the standard is to use the "best available science."[243] The limitation provided in 43 C.F.R § 3461.2-1(b)(1) regarding time and resources, however, is a slippery slope that would allow decisions to be made based on incomplete and unreliable information - especially given the fact that resources at both the state and federal level for gathering data to support studies regarding the impacts of coal mining on the environment are entirely lacking. The regulations also do not require that all relevant information be used in BLM's analysis. 43 C.F.R § 3461.2-1 states that "land use analysis shall include an indication of the adequacy and reliability of the data involved;" however, the regulation does not prohibit BLM from making a determination if the information is incomplete, but rather allows BLM to determine that a criterion "cannot be applied" due to "inadequate or unreliable data," and then merely requires that the "analysis [] discuss the reasons therefor and disclose when the data needed to make an assessment with reasonable certainty would be generated." This provision allows decisions to be made without sufficient information or regard for environmental impacts, and is therefore precarious when we must be precautionary.

A provision that states emphatically that decisions must be based on the best available science, and that no mining may be allowed absent sufficient information on the potential impacts on human health and the environment, is necessary to prevent the devastating harm that coal mining has already caused and will continue to cause if more enforceable restrictions are not

[243] *See* 16 U.S.C. § 1536(a)(2).

employed. NEPA, for example, requires agencies to gather information where there is incomplete information essential to making a determination of impacts.[244] If that information cannot be obtained, then BLM should not merely have to disclose the reasons why the data is unavailable and when it could be obtained, but should have to assess the relevance of that information, as required under NEPA,[245] and no determination must be made until such information is available.

Furthermore, 43 C.F.R. § 3461.4 allows for exploration on lands that have been deemed unsuitable under the current criteria. This is illogical and dangerous.[246] Not only does this allow exploration activities that have the potential to cause harm to the environment and local habitats on lands already deemed unsuitable (potentially because of the presence of features or species that make the area sensitive to such activities), but this provision can only be meant to allow mining companies the opportunity to find economic reserves in order to exert pressure on BLM to release lands already deemed unacceptable by finding some exemption. Encouraging the development of lands that have already been deemed unsuitable for mining is inconsistent with the best interests of the public and can only lead to unnecessary environmental harm.

1. The Unsuitability Screening Criteria

i. Criterion 1

Criterion 1 prevents coal mining on "all Federal lands" including not only obvious areas such as National Parks and wilderness areas, but on all National Forests. This is a reasonable limitation, especially given the fact that sufficient private land exists for coal exploitation, and public lands must be managed under public trust principles, which are inconsistent with the harms to both the local and global environment caused by coal mining. The only way to protect public lands and the species that rely on them from undue harm from coal mining is to prevent these activities on our public lands.

However, there is an exception that swallows this rule. It states that a lease may be issued for mining on National Forest lands if there are "no significant recreational, timber, economic or other values which may be incompatible with the lease, and [] surface operations and impacts are incident to an underground coal mine." First, that surface impacts are incident to underground mining is meaningless, and does not prevent undue harm to our National Forests. The fact that there is no language about minimizing these incidental impacts to the surface resources is totally unreasonable, given that minimization of impacts is essential to protecting resources. While the regulations provide for BLM to place "particular emphasis" on protecting

[244] 43 C.F.R. § 1502.22(a) ("If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.").
[245] *Id*. at § 1536(b).
[246] For example, the regulations state that all areas within 300 feet of any public building, school, church, community or institutional building or public park or within 300 feet of an occupied dwelling are unsuitable, yet this provision would allow exploration in these sensitive areas regardless.

certain environmental resources,[247] a more specific requirement that harm be minimized should be included at the very least.

Second, this exception provides too much leeway for the decision to allow mining on National Forest lands. Whether there are "values" that are inconsistent or incompatible with the lease is a very broad, undefined inquiry. As discussed above, the "value" attributable to preventing further climate harm should outweigh all economic basis for allowing further coal mining; however, apparently this provision has not been properly employed, since coal mining continues to occur, regardless of the impacts. Further, this provision ignores impacts to habitats and species, focusing instead on the economic values associated with National Forests, such as timber and recreation. This provision should be broadened to include habitat, such that mining on National Forest lands may not be allowed if such activities are incompatible with the habitat needs of species that rely on those areas – particularly species protected under state and/or federal law, or that have been otherwise identified as imperiled.

ii. Criterion 3

Criterion 3 provides that lands within 100 feet of the outside line of the right-of-way of a public road or within 100 feet of a cemetery, or within 300 feet of any public building, school, church, community or institutional building or public park or within 300 feet of an occupied dwelling are unsuitable. While providing strict buffers for these sensitive areas is warranted (and the same must be done for environmental resources as well, such as streams), the distances provided here are insufficient to protect our communities. This provision allows coal mining within 300 feet (just one football field) of a school or home. Based on what we now know about the harmful effects of mining on local communities, including both water impacts from the release of pollutants and air impacts from toxic coal dust, a much larger buffer (i.e. 500 feet or more) should be employed.[248]

iii. Criterion 4

Criterion 4 states that "Federal lands designated as wilderness study areas shall be considered unsuitable while under review by the Administration and the Congress for possible wilderness designation. For any Federal land which is to be leased or mined prior to completion of the wilderness inventory by the surface management agency, the environmental assessment or

[247] *See* 43 CFR 3420.1-4(e)(3) ("In making these multiple use decisions, the Bureau of Land Management or the surface management agency conducting the land use planning shall place particular emphasis on protecting the following: Air and water quality; wetlands, riparian areas and sole-source aquifers; the Federal lands which, if leased, would adversely impact units of the National Park System, the National Wildlife Refuge System, the National System of Trails, and the National Wild and Scenic Rivers System.").

[248] The public health issues raised by coal extraction, transportation and use include increased air pollution from coal dust (mercury, arsenic, lead, uranium), soil contamination by coal dust, and increased noise. The EIS should include a specific focus on children, the elderly, and other vulnerable members of the community. Air quality impacts and pollution from nitrogen dioxide (NO2), particulate matter, and coal dust must be analyzed. NO2 exposure can have a wide range of health impacts depending on the length of exposure and various other factors. Epidemiologic research establishes a plausible relationship between NO2 exposures and adverse health effects ranging from the onset of respiratory symptoms to hospital admission. Particulate matter (PM) refers to a broad class of diverse substances that exist as discrete particles of varying size. Environmental Protection Agency, Integrated Science Assessment for Particulate Matter, 4-2. EPA/600/R-08/139F, December 2009, 76 Fed. Reg. 57105 at 57302; Exh. 147, Health Effects and Economic Impacts of Fine Particle Pollution in Washington, Washington Dep't of Ecology (Dec. 15, 2009).

impact statement on the lease sale or mine plan shall consider whether the land possesses the characteristics of a wilderness study area. If the finding is affirmative, the land shall be considered unsuitable...."

This provision, while protecting areas that have been designated for potential inclusion into wilderness areas, leaves too many sensitive areas open to coal mining activities. The provision should apply not only to wilderness study areas and those areas with wilderness characteristics, it should also include all inventoried roadless areas, as well as other large habitat blocks that are vital to species that rely on intact habitat.

Habitat fragmentation is one of the biggest threats to biodiversity.[249] Maintaining large habitat blocks is not only essential for the species that rely on them, but for all species to adapt and adjust to climate change. Given that coal is rapidly becoming an obsolete source of energy – mostly because we now know that exploiting coal resources is horrible for the environment – there is absolutely no reason to continue to allow mining activities in areas that would cause greater habitat fragmentation or otherwise adversely affect large habitat blocks. The revamped program should therefore provide that intact habitat blocks (i.e. greater than __ acres) must be protected, and any lands where mining activities would contribute to fragmentation are unsuitable.

iv. Criterion 6

Pursuant to criterion 6, "Federal lands under permit by the surface management agency, and being used for scientific studies involving food or fiber production, natural resources, or technology demonstrations and experiments shall be considered unsuitable for the duration of the study, demonstration or experiment...." It is not clear whether "natural resources" is intended to cover studies regarding habitat or species, but it should be made clear that such studies – especially those involving habitat needs and the impacts of mining on species or waterways – would also render lands unsuitable.

v. Criterion 9

Criterion 9 states that designated or proposed critical habitat for listed species, and habitat for such species which is determined to be of essential value and where the presence of threatened or endangered species has been scientifically documented, shall be considered unsuitable. While this should be the end of it, and no coal mining activities should ever be allowed to take listed species or adversely modify essential or critical habitat, there is an exception in Criterion 9 that not only swallows the rule, it chews it up and spits it out.

[249] *See e.g.* U.S. DEPARTMENT OF THE INTERIOR, DRAFT STREAM PROTECTION RULE ENVIRONMENTAL IMPACT STATEMENT 4-95 (2015) (stating that the removal of trees and habitat fragmentation associated with coal mining "may cause species to become threatened or endangered, and can contribute to species extinction"); *Id.* at 4-113 ("The negative effects of mining on specific features of habitats (soils, topography, water quality, and vegetation) may make it more difficult for wildlife species to reestablish after a mining disturbance and may increase the proliferation of non-native species on reclaimed landscapes."); *Nat'l Parks Conservation Ass'n v. Jewell*, 62 F. Supp. 3d 7, 16 (D.D.C. 2014) (noting that "[d]irect effects of surface coal mining and reclamation operations on threatened, endangered, or proposed species or critical habitat consists [sic] primarily of habitat alteration by land clearing and earthmoving operations…. If a species of concern lacks individual mobility, land clearing and excavation activities may result in a direct take").

The exception states that a "lease may be issued and mining operations approved if, after consultation with the Fish and Wildlife Service, the Service determines that the proposed activity is not likely to jeopardize the continued existence of the listed species and/or its critical habitat."

There are several problems with this exception. The first is that while site-specific consultation may result in measures to reduce or avoid harm to species, that process fails to provide a holistic analysis of the cumulative impacts caused by coal mining activities.

The second is that consultation often does not take place on specific mining projects regulated under SMCRA, due to a 1996 Biological Opinion, which covers all take of all listed species, for all time (including future listed species) from impacts associated with coal mining.[250] The Service relies on this BiOp to find that individual mines will not jeopardize listed species absent site-specific analysis, yet mining activities continue to drive species to the brink of extinction. This is due, in part, to the reliance on Protection and Enhancement Plans (PEPs), which are intended to implement measures to mitigate take, such that mining activities will not jeopardize species in violation of Section 7 of the ESA. However, FWS has only provided PEP Guidance for some listed species, such as the Indiana bat and blackside dace, but not for all species that may be directly and indirectly impacted by surface and/or underground coal mining of federal coal. Endangered or threatened species directly affected by existing or proposed mines on federal coal leases include but not limited to:[251]

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| Ute ladies'-tresses | blowout penstemon |
| Gunnison sage-grouse | Mexican spotted owl |
| Southwestern willow flycatcher | Yellow-billed cuckoo |
| Greenback cutthroat trout | Pawnee montane skipper |
| Canada lynx | Preble's meadow jumping mouse |
| DeBeque phacelia | Penland alpine fen mustard |
| Colorado hookless cactus | bonytail chub |
| humpback chub | razorback sucker |
| Colorado pikeminnow | Utah prairie dog |
| gray bat | Virginia Big-eared bat |
| dusktail darter | palezone shiner |
| Cumberland darter | Cumberland elktoe |
| Fanshell | Cumberlandian combshell |
| oyster mussel | tan rifflefshell |
| snuffbox | pink mucket |
| little-wing pearlymussel | Cumberland bean pearlymussel |
| Cumberland sandwort | Cumberland Rosemary |

[250] 1996 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations under SMCRA (hereafter "1996 Biological Opinion").

[251] See BLM, Final Environmental Impact Statement for the Wright Area Coal Lease Applications 3-188 (July 2010); USDA Forest Service, Rulemaking for Colorado Roadless Areas, Supplemental Draft Environmental Impact Statement 21 (Sept. 2015); BLM, Draft Environmental Impact Statement, Alton Coal Tract Lease By Application at 3-83 (Nov. 2011); BLM and USFS, Environmental Assessment, Bledsoe Coal Lease, KYES-53865 (Oct. 2012), available at http://www.blm.gov/style/medialib/blm/es/minerals/coal/coal_lease_sales_nepa.Par.46357.File.dat/BledsoeCoalLease.EA.12Oct2012.LowResolu.pdf.

| | |
|---|---|
| American chaffseed | white-haired goldenrod |
| Virginia spiraea | running Buffalo clover |

Absent site-specific consultation and PEPs that actually implement protections for species, it is impossible for mine operators to "minimize disturbances and adverse impacts on fish and wildlife and related environmental values, including compliance with the Endangered Species Act…."[252] Further, even where the agencies do not rely on the 1996 BiOp and do conduct consultations, history has shown that this has not worked to protect imperiled species. Data published since 1996 document increasingly significant declines in numerous imperiled and federally protected taxa, and degradation of their habitats, as the result of surface coal mining.[253]

Recent scientific and policy documents further show that surface mining is increasingly imperiling numerous species of many taxa, contrary to the conclusions of the 1996 Biological Opinion, and perhaps specifically because OSM and FWS have failed to properly implement and oversee the implementation of the requirements of the 1996 Biological Opinion.[254] It is therefore clear that this criterion is failing to ensure the protection of listed species.

As discussed above, there is no reason to allow coal mining generally, and even less to allow these activities in areas that support listed or proposed species. This dying industry should not be allowed to drag down with it the imperiled species that rely on lands that coal companies want to exploit for profit. Rather, the standard should be that any land with suitable habitat for listed or proposed species is unsuitable for coal mining, and if an exception must be provided (and there really is no good reason to do so), then the exception should be allowed only if after surveys and studies it has been shown that no habitat for listed or proposed species would be negatively impacted, and a concurrence letter from FWS stating that no take is expected to occur.

vi. Criterion 10

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[252] 30 C.F.R. § 780.16(b).

[253] Melvin Warren & Wendell Haag, *Spatio-temporal patterns of the decline of freshwater mussels in the Little South Fork Cumberland River, USA*, Biodiversity and Conservation 14: 1383–1400 (2005); James Wickham et al., *The effect of Appalachian mountaintop mining on interior forest*, Landscape Ecology 22: 179-187 (2007); Douglas Becker, D.A. et al., *Impacts of mountaintop mining on terrestrial ecosystem integrity: identifying landscape thresholds for avian species in the central Appalachians, United States*, Landscape Ecology 30: 339- 356 (2015); Emily Bernhardt & Margaret Palmer, *The environmental costs of mountaintop mining valley fill operations for aquatic ecosystems of the Central Appalachians*, Annals of the New York Academy of Sciences 1223: 39–57 (2011); Emily Bernhardt et al., *How many mountains can we mine? Assessing the regional degradation of Central Appalachian rivers by surface coal mining*, Environmental Science and Technology 46: 8115−8122 (2012).

[254] STEVEN AHLSTEDT ET AL., LONG-TERM TREND INFORMATION FOR FRESHWATER MUSSEL POPULATIONS AT TWELVE FIXED-STATION MONITORING SITES IN THE CLINCH AND POWELL RIVERS OF EASTERN TENNESSEE AND SOUTHWESTERN VIRGINIA 1979-2004(2005); Nathaniel Hitt & Douglas Chambers, *Temporal changes in taxonomic and functional diversity of fish assemblages downstream from mountaintop mining*, Freshwater Science 33(3): 915-926 (2014); Brenee Muncy et al., *Mountaintop removal mining reduces stream salamander occupancy and richness in southeastern Kentucky (USA)*, Biological Conservation 180: 115-121 (2014); U.S. ENVIRONMENTAL PROTECTION AGENCY, THE EFFECTS OF MOUNTAINTOP MINES AND VALLEY FILLS ON AQUATIC ECOSYSTEMS OF THE CENTRAL APPALACHIAN COALFIELDS, EPA/600/R-09/138F (2011); Gregory Pond, *Patterns of Ephemeroptera taxa loss in Appalachian headwater streams (Kentucky, USA)*, Hydrobiologia 641:185–201 (2010); Todd Petty et al., *Landscape indicators and thresholds of stream ecological impairment in an intensively mined Appalachian watershed*, Journal of the North American Benthological Society 29(4):1292-1309 (2010); Endangered status for the Cumberland Darter, Rush Darter, Yellowcheek Darter, Chucky Madtom, and Laurel Dace, Final Rule, 76 Fed. Reg. 48,722 (Aug. 9, 2011); Endangered species status for the Big Sandy Crayfish and the Guyandotte River Crayfish, Proposed Rule, 80 Fed. Reg. 18,710 (Apr. 7, 2015).

Criterion 10 states that Federal lands containing critical habitat for state listed plant or animal species shall be considered unsuitable. While in theory this is protective of species, it suffers from some of the same issues as discussed above regarding federally-listed species. In short, this is not being enforced correctly, and the results speak for themselves. Too many species have suffered from coal mining over the past few decades – with many driven to the brink of extinction or extirpated entirely – for anyone to argue that this criterion (or Criterion 9) is doing what it intended. A new rule that does not allow any adverse modification of habitat for any listed species, state or federal, is warranted to ensure that species do not continue to be harmed by a process that allows for wanton destruction of habitat.

It is, in fact, readily apparent that state programs are not being properly enforced. In *West Virginia Highlands Conservancy*, for example, the court detailed the damage done by OSM's refusal to properly oversee the inadequate West Virginia program. It noted many direct impacts and wide ranging indirect impacts, finding:

> a climate of lawlessness, which creates a pervasive impression that continued disregard for federal law and statutory requirements goes unpunished, or possibly unnoticed. Agency warnings have no more effect than a wink and a nod, a deadline is just an arbitrary date on the calendar and, once passed, not to be mentioned again. Financial benefits accrue to the owners and operators who were not required to incur the statutory burden and costs attendant to surface mining; political benefits accrue to the state executive and legislators who escape accountability while the mining industry gets a free pass. Why should the state actors do otherwise when the federal regulatory enforcers' findings, requirements, and warnings remain toothless and without effect?[255]

The Federal coal program is therefore not being properly implemented, which has resulted in undue adverse impacts to habitats and the species that rely on them.

vii. Criteria 12, 14 and 15

Criterion 12 protects bald and golden eagle roost and concentration area used during migration and wintering, and Criterion 14 protects high priority habitat for migratory bird species. While these protective measures are vitally important to these species, it is not clear that they are being properly implemented. As set forth herein, recent history has shown that coal mining has had severe adverse impacts on habitats. It is not clear whether the process that has been put in place to determine those areas that are vital to eagles and other migratory birds is being properly followed.

In order to be sufficiently protective, all concentration areas for eagles and migratory birds used for migration and wintering should be considered unsuitable. Moreover, there should be no exceptions to this rule. As discussed above, sacrificing any of these essential habitat areas in order to exploit coal resources is illogical and unconscionable. We must move beyond coal now, and cannot allow this dying industry to continue to cause undue adverse harm.

[255] *West Virginia Highlands Conservancy v. Norton*, 161 F. Supp. 2d 676, 684 (S.D. W.V. 2001).

However, we do note that these criteria contain important protections that should apply likewise to other species. Areas where species congregate or that contain high biodiversity and unique habitats must be protected, for current and future generations. Furthermore, the notion that we must protect roost and concentration areas for migration and wintering should be applied to ESA species as well. Criterion 9 protects critical habitat; however, not all listed species have designated critical habitat. Therefore, we urge that these protections be extended, such that all lands that are relied on by listed species, as well as those that contain important habitat areas for other species, are not despoiled by mining activities. This should include not just those areas that species currently rely on, but also those areas that are important for habitat connectivity, which is essential for climate resilience (i.e. species must be able to adapt to climate change, which in many cases requires north/south movement to maintain habitat niches as areas are altered by climate change).

Furthermore, the focus must be not only on the immediate area, but on the entire area impacted by coal mining activities. This is especially important for impacts to sensitive river systems and the species that rely on them, such as freshwater mussel, many of which are critically imperiled. Studies and analysis indicate that threatened and endangered species that rely on the waterways impacted by surface coal mining, such as fish and freshwater mussels, are most susceptible when they are within ten river miles of mining projects.[256] The sediments and

[256] Anderson, R. M., Layzer, J. B., & Gordon, M. E. (1991). Recent catastrophic decline of mussels (Bivalvia, Unionidae) in the Little South Fork Cumberland River, Kentucky. Brimleyana, (17), 1-8.; Layzer, J. B., & Anderson, R. M. (1992). Impacts of the coal industry on rare and endangered aquatic organisms of the upper Cumberland River Basin. Kentucky Department of Fish and Wildlife Resources; Warren Jr, M. L., & Haag, W. R. (2005). Spatio-temporal patterns of the decline of freshwater mussels in the Little South Fork Cumberland River, USA. Biodiversity & Conservation, 14(6), 1383-1400; Houp, R. E. (1993). Observations of long-term effects of sedimentation on freshwater mussels (Mollusca: Unionidae) in the North Fork of Red River, Kentucky. Transactions of the Kentucky Academy of Science, 54(3-4), 93-97; U.S. Environmental Protection Agency. (2002). Clinch and Powell Valley Watershed Ecological Risk Assessment. EPA/600/R-01/050; Newton, T. J., & Bartsch, M. R. (2007). Lethal and sublethal effects of ammonia to juvenile Lampsilis mussels (unionidae) in sediment and water-only exposures. Environmental Toxicology and Chemistry, 26(10), 2057-2065; Vannote, R. L., & Minshall, G. W. (1982). Fluvial processes and local lithology controlling abundance, structure, and composition of mussel beds. Proceedings of the National Academy of Sciences, 79(13), 4103-4107; Pond, G. J., Passmore, M. E., Borsuk, F. A., Reynolds, L., & Rose, C. J. (2008). Downstream effects of mountaintop coal mining: comparing biological conditions using family-and genus-level macroinvertebrate bioassessment tools. Journal of the North American Benthological Society, 27(3), 717-737; Jenkinson, J. J. (2005). Specific gravity and freshwater mussels. Ellipsaria, 7, 12-13; McCann, M.T. & Neves, R.J.( 1992). Toxicity of coal-related contaminants to early life stages of freshwater mussels in the Powell River, Virginia. Virginia Cooperative Fish and Wildlife Research Unit, Dept. of Fisheries and Wildlife Sciences. Research Work Order No. 23 for U.S. Fish and Wildlife Service, Asheville Field Office. August 1992; Kitchel, H. E., Widlak, J. C., & Neves, R. J. (1981). The impact of coal-mining waste on endangered mussel populations in the Powell River, Lee County, Virginia. Report to the Virginia State Water Control Board, Richmond; Ahlstedt, S. A., & Tuberville, J. D. (1997). Quantitative reassessment of the freshwater mussel fauna in the Clinch and Powell Rivers, Tennessee and Virginia. Conservation and management of freshwater mussels II. Upper Mississippi River Conservation Committee, Rock Island, Illinois, 72-97; Burkhead, N. M., & Jelks, H. L. (2001). Effects of suspended sediment on the reproductive success of the tricolor shiner, a crevice-spawning minnow. Transactions of the American Fisheries Society, 130(5), 959-968; Sutherland, A. B., & Meyer, J. L. (2007). Effects of increased suspended sediment on growth rate and gill condition of two southern Appalachian minnows. Environmental Biology of Fishes, 80(4), 389-403; Jones, E. B., Helfman, G. S., Harper, J. O., & Bolstad, P. V. (1999). Effects of riparian forest removal on fish assemblages in southern Appalachian streams. Conservation biology, 13(6), 1454-1465; Sutherland, A. B., Maki, J., & Vaughan, V. (2008). Effects of suspended sediment on whole-body cortisol stress response of two southern Appalachian minnows, Erimonax monachus and Cyprinella galactura. Copeia, 2008(1), 234-244; Zamor, R. M., & Grossman, G. D. (2007). Turbidity affects foraging success

pollutants that harm these species are most prevalent within this ten mile area; therefore, we urge BLM to protect our rivers and streams, and to fulfill its ESA obligations, by ensuring that mining activities do not result in the introduction of sediment or other pollutants, such that no harm will occur to species within at least ten river miles of a mining project. We also emphasize that only considering pollution impacts ten river miles downstream may not adequately address comprehensive downstream water quality impacts such as cumulative sedimentation or biomagnification of contaminants. For this reason, we ask BLM to consult with the Services on this issue (see below).

We do note that Criterion 15 has the potential to provide a means for the protection of these essential habitat areas, and therefore it would seem that BLM understands – at least in theory – the prudence of habitat protection; however, the issue seems to be one of enforcement and accountability, and it is readily apparent that many such areas are not being protected from coal mining. As discussed above, even with these unsuitability criteria in place, data published since 1996 document increasingly significant declines in numerous imperiled and federally protected taxa, and degradation of their habitats, as the result of surface coal mining. Recent scientific and policy documents further show that surface mining is increasingly imperiling numerous species of many taxa.[257] Clearly, more must be done to protect essential habitats and the species that rely on them from coal mining.

2. Impacts from mining and combusting coal are not being adequately mitigated

The Notice of Intent To Prepare a Programmatic Environmental Impact Statement seeks comment on "BLM's general approach to mitigation for these impacts from coal production, and specifically, whether impacts from mining and combusting Federal coal are adequately mitigated across the Federal coal program." It is readily apparent that mitigation for the impacts of coal mining has been woefully inadequate. As discussed herein, the existing regulatory program has proven to be insufficient, resulting in the wanton destruction of habitat areas across the country. For example, the Powder River Basin in Montana and Wyoming is well known as a sacrifice zone that pumps out coal for domestic and foreign use. Once home to wide ranging elk herds, pronghorn, mule deer, prairie falcons, bobcats, mountains lions, and greater sage-grouse – as well as providing habitat for hundreds of migratory birds – today the region is largely dotted with coal mines, roads, and other coal-related facilities. While wildlife still hang on the brink of extirpation in a few areas in this region, the basin evidences how environmental laws have failed to strike a balance of protecting environmental values while authorizing coal production, and that harm is not being mitigated.

Although the majority of federal coal leasing occurs in the interior west (and primarily the Powder River Basin of Wyoming and Montana), federal coal leasing also occurs in Appalachia, where biodiversity and human health are being devastated for coal production.[258]

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of drift-feeding rosyside dace. Transactions of the American Fisheries Society, 136(1), 167-176; Newcombe, C. P., & Jensen, J. O. (1996). Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management, 16(4), 693-727; Newcombe, C. P., & MacDonald, D. D. (1991). Effects of suspended sediments on aquatic ecosystems. North American Journal of Fisheries Management, 11(1), 72-82.

[257] See Notes 13 and 14.

[258] See, e.g., BLM and USFS, Environmental Assessment, Bledsoe Coal Lease, KYES-53865 (Oct. 2012), available at http://www.blm.gov/style/medialib/blm/es/minerals/coal/coal_lease_sales_nepa.Par.46357.File.dat/BledsoeCoalLea

Home to the greatest freshwater biological diversity in the U.S., Appalachia is a true species hot spot. Yet, coal mining is contributing to the alarming loss of biological diversity in the Appalachian Mountains. This has been evidenced by the vast upswing in aquatic dependent species requiring ESA protection in the southeast region. The USFWS's findings in protecting such species illustrate that coal mining is a significant threat leading to species listings. Further, already listed species in the region are also experiencing ongoing declines due to downstream impacts from surface mining, such as sedimentation, and existing regulations are utterly failing to protect species from these impacts.

For example, in listing the Cumberland darter as endangered, the USFWS found that sediment/ siltation is "the most common stressor of aquatic communities in the upper Cumberland River basin" and the "primary source of sediment" is "resource extraction" – i.e., coal mining and logging.[259] The USFWS identified "water quality degradation" and the addition of "high concentrations of dissolved metals and other solids that lower stream pH or lead to elevated levels of stream conductivity" as another "significant threat" to the Cumberland darter.[260] Likewise, in listing the blackside dace, the USFWS recognized "that impacts associated with the development of [coal and timber] resources in the past has caused the loss of many blackside dace populations."[261]

Coal mining was also identified as a threat to, and among the reasons for listing, rayed bean and snuffbox mussels. The USFWS found that "low pH commonly associated with coal mine runoff can reduce glochidial encystment rates, thus impacting mussel recruitment" and that

> adverse impacts from heavy-metal-rich drainage from coal mining and associated sedimentation have been documented in portions of historical rayed bean and snuffbox habitat in the upper Ohio River system in western Pennsylvania, West Virginia, and southeastern Ohio. Likewise, coal mining has impacted rayed bean habitat in the upper Tennessee River system, Virginia, and snuffbox habitat in eastern Kentucky (lower Ohio and Mississippi River systems in southeastern Illinois and western Kentucky; upper Cumberland River system in southeastern Kentucky and northeastern Tennessee; and upper Tennessee River system in southwestern Virginia).[262]

Similar conclusions were reached in listing the sheepnose and spectaclecase mussels.[263] Water quality degradation from surface coal mining also contributed to the need to list the

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se.EA.12Oct2012.LowResolu.pdf; see generally BLM, BLM Eastern States Coal Sales, http://www.blm.gov/es/st/en/prog/minerals/coal.html.

[259] Endangered status for the Cumberland Darter, Rush Darter, Yellowcheek Darter, Chucky Madtom, and Laurel Dace, Final Rule. 76 Fed. Reg. 48,722, 48,732 (2011). Although federal coal holdings are not as pervasive as in the Powder River Basin, federal coal leases affect Cumberland Basin waters and species. *See* BLM and USFS, Environmental Assessment, Bledsoe Coal Lease.

[260] 76 Fed. Reg. at 48,732.

[261] Determination of threatened species status for the blackside dace, Final Rule. 52 Fed. Reg. 22,580 (1987).

[262] Determination of endangered status for the rayed bean and snuffbox mussels throughout their ranges. 77 Fed. Reg. 08632 (2012) (internal citations omitted).

[263] Determination of endangered status for the Sheepnose and Spectaclecase mussels throughout their range, final rule. 77 Fed. Reg. 14914 (2012). In addition, the FWS designated 27 miles of the main stem of the Big South Fork and 9 miles of the New River in Tennessee as critical habitat for three endangered mussels: Cumberland elktoe, oyster mussel, and Cumberlandian combshell. 60 Fed. Reg. at 53,148.

diamond darter in West Virginia,[264] the addition of the Kentucky arrow darter to the candidate list,[265] and the proposed listing for the Big Sandy and Guyandotte River crayfishes.[266]

The biological impacts of coal mining are not limited to the Powder River Basin. These impacts are felt in coal mining areas throughout our country. For example, recent coal leasing proposals in Utah also highlight the on-going failure to address impacts to species, including greater sage-grouse and Utah prairie dog, that are vulnerable to habitat loss.[267] Thus, coal mining activities are impacting species that have been recognized as vulnerable to such activities across the country, and efforts to mitigate these impacts have not been successful.

This is due to the basic fact that effectively mitigating the impacts of coal mining is fundamentallynot possible. Surface coal mining is accomplished by logging or clearing the mine site, then removing overburden from the coal seam and then blasting and removing the coal. This includes strip mining and open pit mining practices, as well as mountain top removal mining, wherein excess mining waste is dumped into fills in nearby hollows or valleys, smothering streams and habitat. Surface coal mining requires large areas of land to be disturbed,

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[264] U.S. Fish and Wildlife Service (FWS). (2013). Endangered species status for diamond darter, final rule. 78 FR 45079 ("While the overall percentage of the entire Elk River watershed subjected to mining activities may be small, watersheds of some Elk River tributaries, such as Leatherwood Creek, are highly dominated by mining activity and include mining permits encompassing 81 to 100 percent of the subwatersheds (WVDEP 2011b, p. 37). Mining is likely a significant factor affecting the water quality of streams, such as Leatherwood Creek, that are principle tributaries to the Elk River. The effects of these mining activities conducted both within the Elk River mainstem and in Elk River tributaries, coupled with the effects from other activities described in Factor A, are continuing threats to the diamond darter.").

[265] U.S. Fish and Wildlife Service FWS. (2010). Candidate Notice of Review. 75 Fed. Reg. 69,224 ("The subspecies' habitat and range have been severely degraded and limited by water pollution from surface coal mining and gas-exploration activities; removal of riparian vegetation; stream channelization; increased siltation associated with poor mining, logging, and agricultural practices; and deforestation of watersheds. The threats are high in magnitude because they are widespread across the subspecies' range. In addition, the magnitude (severity or intensity) of these threats, especially impacts from mining and gas- exploration activities, is high because these activities have the potential to alter stream water quality permanently throughout the range by contributing sediment, dissolved metals, and other solids to streams supporting Kentucky arrow darters, resulting in direct mortality or reduced reproductive capacity. The threats are imminent because the effects are manifested immediately and will continue for the foreseeable future.").

[266] U.S. Fish and Wildlife Service. (2015). Endangered species status for the Big Sandy and Guyandotte River Crayfishes, proposed rule. 80 Fed. Reg. 18,726 ("Coal mining—The past and ongoing effects of coal mining in the Appalachian Basin are well documented, and both underground and surface mines are reported to degrade water quality and stream habitats. Notable water quality changes associated with coal mining in this region include increased concentrations of sulfate, calcium, and other ions (measured collectively by a water's electrical conductivity); increased concentrations of iron, magnesium, manganese, and other metals; and increased alkalinity and pH, depending on the local geology. The common physical changes to local waterways associated with coal mining include increased erosion and sedimentation, changes in flow, and in many cases the complete burial of headwater streams. These mining-related effects are commonly noted in the streams and rivers within the ranges of the Big Sandy and the Guyandotte River crayfishes. The response of aquatic species to coal mining-induced degradation are also well documented, commonly observed as a shift in a stream's macroinvertebrate (e.g., insect larva or nymphs, aquatic worms, snails, clams, crayfish) or fish community structure and resultant loss of sensitive taxa and an increase in tolerant taxa. As mentioned above, coal mining can cause a variety of changes to water chemistry and physical habitat; therefore, it is often difficult to attribute the observed effects to a single factor. It is likely that the observed shifts in community structure (including the extirpation of some species) are, in many cases, a result of a combination of factors." (internal references omitted)).

[267] BLM, Alton Coal Lease Tract Lease By Application, Supplemental Draft Environmental Impact Statement, DOI-BLM-UT-C040-2015-011-EIS (June 2015).

destroying mountains and forest habitat, and results in deposition of sediment and heavy metals into waterbodies, which results in adverse impacts on streams and local biodiversity. [268] It is the height of human arrogance to suggest that these impacts can be sufficiently mitigated. Rather, it is clear that the lost functions and values of the areas decimated by coal mining are near impossible to recover.

To date, restoration and mitigation efforts have largely failed when it comes to protecting water quality and species. For this reason, we ask BLM to focus on protection of essential habitat areas and waterways first, and to rely on mitigation only in certain limited situations – i.e., when ESA-listed or proposed species or designated critical habitats are not present downstream or in the mine site area, and it can be shown with sufficient evidence that the functions and values of the impacted streams and native ecosystems can be fully restored.

Numerous studies document the failure of restoration to protect water quality, species, and local communities from the impacts of coal mining. These studies are too numerous for us to list in total so we provide relevant excerpts of scientific conclusions:

- "Overall, the data show that mitigation efforts being implemented in southern Appalachia for coal mining are not meeting the objectives of the Clean Water Act to replace lost or degraded streams ecosystems and their functions"[269]

- "Mitigation actions being undertaken are primarily geomorphic projects to enhance perennial streams yet the majority of streams impacted are intermittent and fewer linear feet of stream have been restored than impacted. Compliance is primarily based on visual habitat assessments performed by the mining company or their consultants which typically report marginal or suboptimal habitat status post restoration. Projects were not required to meet specified biological or water quality standards yet for the projects that reported such data, most were impaired."[270]

- "The disturbance caused by MTR/VF is drastically changing the central Appalachian landscape, compromising the natural ecological and functional state of both terrestrial and aquatic environments. The reclamation process, emphasizing soil compaction and the establishment of non-native herbaceous species, has hindered the establishment of native tree species on MTR sites (Zipper et al., 2011). These terrestrial impacts in combination with changes in water chemistry and stream geomorphology lead to long-lasting changes

[268] *See e.g.* U.S. DEPARTMENT OF THE INTERIOR, DRAFT STREAM PROTECTION RULE ENVIRONMENTAL IMPACT STATEMENT 4-95 (2015) (stating that the removal of trees and habitat fragmentation associated with coal mining "may cause species to become threatened or endangered, and can contribute to species extinction"); *Id.* at 4-113 ("The negative effects of mining on specific features of habitats (soils, topography, water quality, and vegetation) may make it more difficult for wildlife species to reestablish after a mining disturbance and may increase the proliferation of non-native species on reclaimed landscapes."); *Nat'l Parks Conservation Ass'n v. Jewell*, 62 F. Supp. 3d 7, 16 (D.D.C. 2014) (noting that "[d]irect effects of surface coal mining and reclamation operations on threatened, endangered, or proposed species or critical habitat consists [sic] primarily of habitat alteration by land clearing and earthmoving operations…. If a species of concern lacks individual mobility, land clearing and excavation activities may result in a direct take").

[269] Palmer, M. A., & Hondula, K. L. (2014). Restoration as mitigation: analysis of stream mitigation for coal mining impacts in southern Appalachia. Environmental science & technology, 48(18), 10552-10560.

[270] *Id*.

to terrestrial and aquatic ecosystem function (Simmons et al., 2008). Full recovery of species diversity in streams impacted by MTR/VF has not been documented"[271]

- "Indeed, the MTR/VF streams had, on average, 75% less forest cover than control streams"[272]

- "Reclaimed mine sites have soils containing unweathered rock that is heavily compacted to reduce erosion, resulting in altered water tables and disturbed flow paths (Bonta et al., 1992; Bernhardt and Palmer, 2011). In particular, compacted soils lead to high rates of storm water runoff. Negley and Eshleman (2006) and Ferrari et al. (2009) found that MTR/VF streams had tripled storm runoff and doubled flow rates compared to reference catchments."

- "The extent to which these constructed channels provide important ecosystem services lost by burial of natural headwater streams as a result of mining is not well known. Fritz et al. (2010) reported significantly lower rates of litter breakdown and higher levels of iron, manganese, sulfate, and conductivity in constructed channels draining VF watersheds than in natural channels draining forested watersheds. Petty et al. (2013) observed lower organic matter (OM) decomposition rates and higher levels of conductivity, dissolved solids, and dissolved organic carbon (DOC) in West Virginia MTR/ VF constructed channels than in nearby reference channels. Based on their database containing descriptions of 38,000 stream and river restoration projects, Bernhardt and Palmer (2011) stated that they did not know of a single case where a constructed channel recreated the hydrology or ecological functions of natural streams."[273]

As these examples illustrate, mitigation of coal mining activities has failed to reclaim the functions and values of impacted waterways. In particular, it has failed in Appalachia to restore water quality and fish, wildlife, and other species. Moreover, as discussed above coal mining has been one of several threats that has led to the need to protect species under the ESA, indicating that mitigation efforts have not been successful in protecting species, and should not be relied on by BLM to protect the environment.

Therefore, in light of the record before it, it is critical that BLM ensure that waterways affected by proposed mines with ramifications for species listed or proposed for listing under the ESA and their critical habitat are protected, rather than rely on mitigation plans to justify destruction of these important habitat areas, since restoration plans may not adequately address impacts to imperiled species and their habitat.[274]

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[271] Brenee'L, M., Price, S. J., Bonner, S. J., & Barton, C. D. (2014). Mountaintop removal mining reduces stream salamander occupancy and richness in southeastern Kentucky (USA). Biological Conservation, 180, 115-121.

[272] *Id*.

[273] Burke, R. A., Fritz, K. M., Barton, C. D., Johnson, B. R., Fulton, S., Hardy, D., ... & Jack, J. D. (2014). Impacts of mountaintop removal and valley fill coal mining on C and N processing in terrestrial soils and headwater streams. Water, Air, & Soil Pollution, 225(8), 1-17.

[274] According to the DOI Energy and Climate Change Task Force, avoidance should be the first goal: "If a project can reasonably be sited so as to have no negative impacts to resources of concern then that is generally the most defensible approach. By avoiding adverse impacts in the first place, there is no need to take further action to

If BLM will continue to rely on mitigation for the coal program, a new mitigation protocol must be developed. The Department of the Interior has been revising its mitigation policies in recent years, and has in fact declared that it is "necessary to successfully shift from project-by-project management to consistent, landscape-scale, science-based management of the lands and resources for which the Department is responsible."[275] DOI has further stated that "[i]n the mitigation context, the landscape approach dictates that it is not sufficient to look narrowly at impacts at the scale of the project; it is necessary to account for impacts to resource values throughout the relevant range of the resource that is being impacted."[276]

It does not appear that the current mitigation regime for BLMs coal program is meeting the goals set forth by DOI. Mitigation is done piecemeal, without the comprehensive, industry-wide analysis that is necessary for landscape-scale mitigation, resulting in the environmental harm discussed herein. As DOI even admits, "mitigation experts have noted, '[T]he way mitigation is currently applied does not capture cumulative impacts associated with development; it does not provide a structured decision-making framework to determine when projects can proceed or should be avoided; and it does not harness the full potential of offsets (conservation actions applied away from the development site).'"[277]

To rectify this, DOI has provided guiding principles for landscape-scale mitigation. These include that an agency, "[a]t the outset of the project planning process, [should] incorporate mitigation and landscape objectives into the design and development of projects that are likely to impact natural or cultural resources." DOI further urges bureaus to "[i]dentify and promote mitigation efforts that improve the resilience of our nation's resources in a rapidly changing climate," and to "[p]romote transparency and consistency in the development of mitigation measures." Therefore, we urge BLM to undertake, concurrent with this programmatic EIS, an analysis of the various alternatives to mitigation for coal mining, and to thereby develop protocols to establish a mitigation program on a landscape-scale.[278] This should be done in consultation with FWS and NMFS for mitigation that has the potential to affect listed species.[279]

## B. BLM Must Undertake ESA Consultation on the Coal Program

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minimize or offset such impact." *See* A Strategy for Improving the Mitigation Policies and Practices of The Department of the Interior at 2 (April, 2014).

[275] The Energy and Climate Change Task Force, A Strategy for Improving the Mitigation Policies and Practices of The Department of the Interior at I (April, 2014).

[276] *Id.* at II.

[277] *Id.* at 8 (citing Kiesecker, Joseph M., Holly E. Copeland, Bruce A. McKenney, Amy Pocewicz, and Kevin E. Doherty. 2011. Energy by Design: Making Mitigation Work for Conservation and Development. Chapter 9 in: David E. Naugle (Ed.), Energy Development and Wildlife Conservation in Western North America. pp. 159-181).

[278] *Id.* at 13. DOI has provided a process to follow for this analysis, which includes four steps:
1) identifying key landscape-scale attributes, and the conditions, trends, and baselines that characterize these attributes; 2) developing landscape-scale goals and strategies; 3) developing efficient and effective compensatory mitigation programs for impacts that cannot be avoided or minimized; and 4) monitoring and evaluating progress and making adjustments, as necessary, to ensure that mitigation is effective despite changing conditions.

[279] *See id.* at 12 (directing bureaus to "Coordinate with other federal and state agencies, tribes, and stakeholders in conducting assessments of existing and projected resource conditions, forming mitigation strategies, and developing compensatory mitigation programs.").

Congress enacted the ESA in 1973 to provide for the conservation of endangered and threatened fish, wildlife, plants and their natural habitats.[280] The ESA imposes substantive and procedural obligations on all federal agencies with regard to listed and proposed species and their critical habitats.[281]

Under section 7 of the ESA, federal agencies must "insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined ... to be critical."[282]

The definition of agency "action" is broad and includes "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies," including programmatic actions, such as the BLM action at issue here.[283]

The duties in ESA section 7 are only fulfilled by an agency's satisfaction of the consultation requirements that are set forth in the implementing regulations for section 7 of the ESA, and only after the agency lawfully complies with these requirements may an action that "may affect" a protected species go forward.[284] Here, BLM is considering broad changes to the Federal coal program, which "includes land use planning, processing applications (*e.g.,* for exploration licenses and lease sales), estimating the value of proposed leases, holding lease sales, and post-leasing actions...."[285] According to BLM's Notice, "[t]he Federal coal program has other potential impacts on public health and the environment, beyond climate impacts, that will also be assessed in the Programmatic EIS. These include the effects of coal production on. . . wildlife, including endangered species. . . ."[286] Based on this admission, it is clear that BLM must undertake programmatic consultation in order to fulfill its duties pursuant to Section 7 of the ESA.

However, while formal programmatic consultation is required on BLM's coal program, it would be improper and unlawful for any incidental take statement to be issued as part of the biological opinion.[287] Numerous different ESA-protected species and their designated critical habitats are likely to be adversely affected. It remains unclear whether sufficient protections will be implemented to ensure that listed species are not jeopardized by cumulative impacts

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[280] *Id*. §§ 1531, 1532.
[281] *See id*. §§ 1536(a)(1), (a)(2) and (a)(4) and § 1538(a); 50 C.F.R. § 402.
[282] 16 U.S.C. § 1536(a)(2).
[283] 50 C.F.R. § 402.02. Likewise, the "action area" includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." *Id.*
[284] *Pac. Rivers Council v. Thomas*, 30 F.3d 1050, 1055-57 (9th Cir. 1994).
[285] 81 Fed. Reg. at 17722.
[286] *Id*. at 17726.
[287] It is well-settled that programmatic biological opinions do not require an incidental take statement where those opinions explicitly mandate future site-specific consultations for take authorizations. *See Gifford Pinchot Task Force v.USFWS*, 378 F.3d 1059, 1067–68 (9th Cir.) *am. by* 387 F.3d 968 (9th Cir. 2004); *Forest Serv. Employees for Envtl. Ethics*, 726 F. Supp. 2d at 1224–1225; *W. Watersheds Project v. BLM*, 552 F. Supp. 2d 1113, 1139 (D. Nev. 2008); *Swan View Coal., Inc. v. Turner*, 824 F. Supp. 923, 934–35 (D. Mont. 1992). Here, should the Services issue a no-jeopardy opinion on OSMRE's regulations, it should not be accompanied by an incidental take statement because all incidental take (including any resulting from OSMRE-issued SMCRA permits) should only be authorized, if at all, via a Section 10 permit or Section 7 consultation.

Moreover, there is no feasible way that the Services can predict, let alone quantify, the amount of incidental take of currently-listed species that will result from coal mining throughout the country under BLM's program in the years to come. Further, the biological opinion cannot possibly analyze or quantify incidental take for future-listed species that will be adversely affected by coal mining. Rather, incidental take can only occur, and can only be analyzed an appropriately permitted, at the site-specific and species-specific level. Therefore, consistent with the Services' revised regulations defining "framework programmatic action," the programmatic consultation on BLM's revised coal program should acknowledge that it is a framework programmatic consultation under which any incidental take will be subsequently authorized under a permit-specific Section 7 or Section 10 process.[288]

1. BLM must consult at the Programmatic EIS stage

It is well-established that programmatic decisions are subject to the ESA's consultation requirement.[289] A programmatic decision to continue or modify the federal coal leasing program is an "agency action" for purposes of the ESA. The ESA defines agency action as "any action authorized, funded, or carried out" by a federal agency. 16 U.S.C. § 1536(a)(2). The phrase is further defined in ESA regulations as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies." 50 C.F.R. § 402.02. These include: "(b) the promulgation of regulations" and "(d) actions directly or indirectly causing modifications to the land, water or air." *Id.*

Moreover, any to defer analysis of the potential impacts to listed species to a later decision would violate BLM's regulations regarding special status species as set forth in BLM Manual 6840 - Special Status Species Management. Pursuant to Manual 6840, it is the responsibility of State Directors to not only inventory BLM lands to determine the occurrence of BLM special status species, but also to determine "the condition of the populations and their habitats, and how discretionary BLM actions affect those species and their habitats."[290] The leasing of federal lands for coal extraction is a discretionary BLM action that has the potential to adversely affect listed species. Deferring an analysis of the potential effects of selling coal leases to the __ stage is entirely inconsistent with the requirements of Manual 6840. If a lease is sold, the lessee acquires certain contractual rights constraining BLM authority. For example, according to 43 C.F.R. § 3101.1-2, once a lease is issued to its owner, that owner has the "right to use as much of the lease lands as is necessary to explore for, drill for, mine, extract, remove and dispose of the leased resource in the leasehold" subject to specific nondiscretionary statutes and lease stipulations. Therefore, once the lease is sold, it will be too late for BLM to ensure that sufficient protections will be in place to protect this species from the cumulative impacts of extraction-related activities.

[288] *See* 80 Fed. Reg. 26,832 (May 11, 2015) (adding definition of "framework programmatic action" to 50 C.F.R. § 402.02 and adding 50 C.F.R. § 402.14(i)(1)(6) on incidental take statements not being required at the programmatic level where subsequent actions resulting in incidental take will be separately consulted on).
[289] *See, e.g.*, *New Mexico v. Bureau of Land Management*, 565 F.3d 683, 689, n.1 (10th Cir. 2009) Conner v. Burford, 848 F.2d 1441 (9th Cir. 1988); *Lane County Audubon Society v. Jamison*, 958 F.2d 290 (9th Cir. 1988); *Pacific Rivers Council v. Thomas*, 30 F.3d 1050 (9th Cir. 1994); *Silver v. Babbitt*, 924 F.Supp. 976 (D. Ariz. 1995)
[290] *Id.* at § .04.

The development of species-specific and ecosystem-based conservation strategies implicitly necessitates a more holistic review of the cumulative impacts of the proposed lease sale, which cannot be accomplished through site-specific analysis alone. And, piecemeal analyses of individual lease sales do not provide the appropriate perspective for examining the cumulative effects of hydraulic fracturing and climate change impacts at the regional and landscape scale and for making land management decisions.

Where activities have the potential to adversely impact listed species, those impacts must be addressed "at the earliest possible time," in order to avoid delay, ensure that impacts are avoided and opportunities for mitigation are not overlooked.[291] Furthermore, under the ESA an analysis of the effects of an action must consider actions that are interrelated or interdependent.[292] This suggests that BLM should consider the effects of coal mining, transport, combustion and disposal activities at the lease sale stage, since those actions are inherent in leasing land for such purposes. It is therefore evident that in order to effectuate the policy of protecting Bureau sensitive species set forth in Manual 6840,[293] and consistent with the established practice of early, comprehensive review of potential impacts to sensitive species, BLM must consider impacts to listed species at the lease sale, rather than waiting until the APD stage for project specific review.

2. BLM Must Consult Regarding the Mercury Impacts of the Coal Program's Foreseeable Coal Combustion

The indirect effects of coal leasing and mining include atmospheric emissions of mercury from coal combustion. Mercury is a potent and widely distributed neurotoxin with serious adverse health effects on human health and development as well as the behavior, reproduction, and survival of threatened and endangered species. The United Nations estimates that 26% of global mercury emissions (339-657 metric tons/ year) come from the combustion of coal in power plants.[294] A recent decision held that agencies must consider the indirect effects of even microscopic levels of mercury from coal leasing, mining and combustion decisions:

> the record reveals that even microscopic changes in the amount of mercury deposition can have significant impacts on threatened and endangered species in the area impacted by the Four Corners Power Plant. See AR 1-2-14-1990 (concluding that a .1% increase in mercury deposition in the basin is likely to jeopardize the continued existence of the Colorado pikeminnow). Given the potentially significant impacts of mercury pollution, OSM's failure to discuss or analyze the deleterious impacts of combustion-related mercury deposition in the area of the Four Corners Power Plant is troubling.[295]

[291] *See i.e.* 50 C.F.R. §§ 402.14(a), (g)(8).
[292] 50 C.F.R. §§ 402.14 and 402.02.
[293] *See* BLM Manual 6840 at .06 ("Bureau sensitive species will be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA.").
[294] J. Pacyna, et al., *Study on Mercury Sources and Emissions and Analysis of Cost and Effectiveness of Control Measures: "UNEP Paragraph 29 Study"*, UNEP (Nov. 2010).
[295] Dine Citizens Against Ruining Our Environment v. U.S. Office of Surface Mining Reclamation and Enforcement, 82 F.Supp. 3d 1201, 1215 (D. Colo. 2015).

The deposition of mercury and selenium within the Colorado River Basin continues to threaten both human health and endangered species, including the four Colorado River endangered fish. Current scientific information indicates continuing mercury and selenium contamination in the Colorado River Basin, which has the potential to detrimentally affect these species.

Consumption through the food chain is the primary mechanism of bioaccumulation of mercury in the endangered fish, and particularly affects the Colorado pikeminnow's diet as the largest of the endangered Colorado River fish (Herrmann et al. 2016 at 204). Sources of mercury include high levels of atmospheric mercury deposition called "cold condensation" from coal-fired power plant emissions (*Id.* at 205). This atmospheric deposition and watershed runoff is the most prevalent source of mercury in the Colorado River, but mercury pollution from old gold smelters in the Basin have also infiltrated this river system through decades of runoff from smaller tributaries (*Id.* at 215). In Grand Canyon, there is a high concentration of mercury in the atmosphere due to emissions from the coal burning Navajo Generating Station in Page, Arizona, resulting in direct negative effects on the endangered fishes' habitat in the lower Colorado River Basin (Walters 2015 at 2385).

Mercury contamination is especially concerning because all four species depend on aquatic invertebrates as a food source. Other piscivorous animals and non-native fish that prey on these juvenile fish, in turn, accumulate mercury, which continues up the food chain, bioaccumulating in adult fish. Concentrations of mercury exceeding 8 micrograms (µg/g) in fish organs or eggs may result in reproductive dysfunction and abnormalities (Herrmann et al. 2016 at 204). Walters et al. (2015) found that mean mercury concentrations for three native species and three non-native species from a Colorado River sample site exceeded the risk threshold for piscivorous mammal consumption (*Id*. at 2390).

Because of the scale of the federal coal leasing program (over 40% of U.S. coal production), BLM must quantify, consider, and consult on, the indirect mercury emissions from combustion of coal, its contribution to global mercury atmospheric concentrations and deposition rates, and its ensuing effects on sensitive, threatened, and endangered species, including the four Colorado River listed fish.

### 3. BLM Must Consult Regarding the Climate Impacts of the Coal Program's Foreseeable GHG Emissions

In reviewing the federal coal leasing program, the Bureau of Land Management must consider the impacts, including climate impacts, on threatened and endangered species. Specifically, the Bureau must consult with the Fish and Wildlife Service and National Marine Fisheries Service as required by section 7 of the Endangered Species Act.

The ESA was enacted, in part, to provide a "means whereby the ecosystems upon which endangered species and threatened species depend may be conserved...[and] a program for the conservation of such endangered species and threatened species."[296] Section 2(c) of the ESA establishes that it is "the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."[297] The ESA defines "conservation" to mean "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 pursuant to this Act are no longer necessary."[298] Similarly, Section 7(a)(1) of the ESA directs that the Bureau and other federal agencies shall use their programs and authorities to conserve endangered and threatened species.[299]

To fulfill the purposes of the ESA, federal agencies are required to "insure that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the adverse modification of habitat of such species... determined...to be critical."[300] When an agency action "may affect listed species or critical habitat" the agency must consult with expert wildlife agencies, Fish and Wildlife Service and National Marine Fisheries Service, using the "best scientific and commercial data available."[301] ESA consultation serves as an essential function to guide federal actions and identify mitigation to avoid harming listed species. Through consultation, the Services may specify reasonable and prudent alternatives that will avoid jeopardizing listed species and "suggest modifications" to the action to "avoid the likelihood of adverse effects" to the listed species.[302]

Here, the Bureau must consult on the federal coal leasing program to ensure that coal leasing does not further imperil endangered species. Agencies are required to consult on programs that manage federal lands and leasing, including this coal leasing program.[303] The ESA expressly and broadly requires an agency to comply with Section 7 for "*any* action" it authorizes or funds.[304] "Action" is broadly defined to include ""all activities or *programs* of any kind authorized, funded, or carried out, in whole or in part" by federal agencies and includes actions that may directly or indirectly cause modifications to the land, water, or air."[305]

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[296] 16 U.S.C. § 1531(b).
[297] 16 U.S.C. § 1531(c)(1).
[298] 16 U.S.C. § 1532(3).
[299] 16 U.S.C. § 1536(a)(1).
[300] 16 U.S.C. § 1536(a)(2) (Section 7 consultation).
[301] 50 C.F.R. § 402.14(a).
[302] 16 U.S.C. § 1536(b); 50 C.F.R. § 402.13.
[303] *See e.g., Cal. ex rel. Lockyer v. United States Dep't of Agric*., 459 F. Supp. 2d 874, 912 (N.D. Cal. 2006) (finding that the Forest Service violated the ESA by failing to consult on the effects of the State Petitions Rule (which replaced the Roadless Rule) and noting that "[t]he fact that consultation would only address impacts at the programmatic level does not excuse the need to do so); *aff'd sub nom Cal. ex rel. Lockyer v. USDA*, 575 F.3d 999 (9th Cir. 2009); see also *Conner v. Bufford*, 848 F.2d 1441,1453-54 (9th Cir. 2012).
[304] 16 U.S.C. § 1536(a)(2) (emphasis added); *Pac. Rivers Council v. Thomas*, 30 F.3d 1050, 1054 (9th Cir. 1994) ("there is little doubt that Congress intended to enact a broad definition of agency action in the ESA").
[305] 50 C.F.R. § 402.02 (emphasis added).

T he coal leasing program may affect numerous threatened and endangered species, and it is essential that such consultation evaluate the effects of the coal leasing program's significant contribution to greenhouse gas emissions and the resulting harm to listed species and their habitats from climate change.

As greenhouse gas emissions and the resulting harms from climate change grow, the Fish and Wildlife Service and National Marine Fisheries Service are increasingly recognizing climate change as a significant threat to listed species. The Services determined that climate change is a threat (and a listing factor) in the listing rules for the vast majority of species listed as threatened and endangered in recent years. Our analysis of listing rules found that climate change was determined to be a threat for 96% and 91% of all species listed in 2012 and 2013, respectively. The table below includes examples of species listed during 2006-2013 for which climate change was a listing factor. Climate change is also a growing threat to many threatened and endangered species that were first listed for other reasons.

| **Common name** | **Scientific name** | **Year listed** |
|---|---|---|
| Elkhorn coral | *Acropora palmata* | 2006 |
| Staghorn coral | *Acropora cervicornis* | 2006 |
| Steelhead trout (Puget Sound DPS) | *Oncorhynchus mykiss* pop. 37 | 2007 |
| Polar bear | *Ursus maritimus* | 2008 |
| Black abalone | *Haliotis cracherodii* | 2009 |
| Pacific eulachon (Southern DPS) | *Thaleichthys pacificus* | 2010 |
| DeBeque phacelia | *Phacelia scopulina var. submutica* | 2011 |
| Casey's june beetle | *Dinacoma caseyi* | 2011 |
| Miami blue butterfly | *Cyclargus thomasi bethunebakeri* | 2012 |
| Franciscan Manzanita | *Arctostaphylos franciscana* | 2012 |
| 24 Hawaiian species | | 2012 |
| Llanero coqui | *Eleutherodactylus juanariveroi* | 2012 |
| Choctaw bean | *Villosa choctawensis* | 2012 |
| Round ebonyshell | *Fusconaia rotulata* | 2012 |
| Southern kidneyshell | *Ptychobranchus jonesi* | 2012 |
| Alabama pearlshell | *Margaritifera marrianae* | 2012 |
| Fuzzy pigtoe | *Pleurobema strodeanum* | 2012 |
| Narrow pigtoe | *Fusconaia escambia* | 2012 |
| Tapered pigtoe | *Fusconaia burkei* | 2012 |
| Southern sandshell | *Hamiota australis* | 2012 |
| Hawaiian Islands false killer whale | *Pseudorca crassidens* | 2012 |
| Bearded seal (Beringia DPS) | *Erignathus barbatus* | 2012 |
| Ringed seal (Arctic DPS) | *Pusa hispida* | 2012 |
| 38 Hawaiian species | | 2013 |
| Diminutive amphipod | *Gammarus hyalleloides* | 2013 |
| Pecos amphipod | *Gammarus pecos* | 2013 |

| | | |
|---|---|---|
| Diamond tryonia | *Pseudotryonia adamantina* | 2013 |
| Phantom tryonia | *Tryonia cheatumi* | 2013 |
| Gonzales tryonia | *Tryonia circumstriata (=stocktonensis)* | 2013 |
| Phantom springsnail | *Pyrgulopsis texana* | 2013 |
| Diamond darter | *Crystallaria cincotta* | 2013 |
| Gierisch mallow | *Sphaeralcea gierischii* | 2013 |
| Jollyville Plateau salamander | *Eurycea tonkawae* | 2013 |
| Austin blind salamander | *Eurycea waterlooensis* | 2013 |
| Jemez Mountains salamander | *Plethodon neomexicanus* | 2013 |
| Neosho mucket | *Lampsilis rafinesqueana* | 2013 |
| Rabbitsfoot | *Quadrula cylindrica cylindrica* | 2013 |
| Mount Charleston blue butterfly | *Plebejus shasta charlestonensis* | 2013 |
| Slabside pearlymussel | *Pleuronaia dolabelloides* | 2013 |
| Fluted kidneyshell | *Ptychobranchus subtentum* | 2013 |
| Acuna cactus | *Echinomastus erectocentrus var. acunensis* | 2013 |
| Fickeisen plains cactus | *Pediocactus peeblesianus fickeiseniae* | 2013 |
| Florida bonneted bat | *Eumops floridanus* | 2013 |
| Cape Sable thoroughwort | *Chromolaena frustrata* | 2013 |
| Florida semaphore cactus | *Consolea corallicola* | 2013 |
| Aboriginal prickly-apple | *Harrisia (=Cereus) aboriginum (=gracilis)* | 2013 |
| Blue-billed curassow | *Crax alberti* | 2013 |
| Brown-banded antpitta | *Grallaria milleri* | 2013 |
| 15 Hawaiian species | *Vetericaris chaceorum* | 2013 |
| Spring pygmy sunfish | *Elassoma alabamae* | 2013 |

In recent years, several species have been listed primarily because of climate change threats resulting from continued greenhouse gas emissions, including the polar bear in 2008, the bearded seal and ringed seal in 2012, and 20 coral species in 2014. The best-available science has concluded that the survival and recovery of these climate-vulnerable species depends on a return to lower atmospheric $CO_2$ concentrations than the present level of 400 ppm. As such, the massive greenhouse gas emissions stemming from the federal coal program are clearly not consistent with the survival and recovery of these species.

For example, NMFS' 2015 *Final Recovery Plan for Elkhorn and Staghorn Coral* includes a recovery criterion with specific targets for ocean temperature and ocean acidification conditions that must be achieved for these corals to survive and recover.[306] As noted in the Final Recovery Plan, meeting this criterion is consistent with a return to an atmospheric $CO_2$ concentration of less than 350 ppm, as concluded by numerous scientific studies that have

[306] NMFS. 2015. Recovery Plan for Elkhorn (*Acropora palmata*) and Staghorn (*A. cervicornis*) Corals. Prepared by the Acropora Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. *See* Recovery Criterion 5: "Sea surface temperatures across the geographic range have been reduced to Degree Heating Weeks less than 4; and Mean monthly sea surface temperatures remain below 30°C during spawning periods; and Open ocean aragonite saturation has been restored to a state of greater than 4.0, a level considered optimal for reef growth."

examined coral species viability in response to ocean warming and ocean acidification.[307] Recognizing the responsibility of all federal agencies to promote listed species' conservation, the Final Recovery Plan further includes a recovery criterion calling for the adoption of "adequate domestic and international regulations and agreements" to abate threats from increasing atmospheric $CO_2$ concentrations.[308] The plan also includes a recovery action to "develop and implement U.S. and international measures to reduce atmospheric $CO_2$ concentrations to a level appropriate for coral recovery."[309]

Similarly, the 2015 Draft Polar Bear Conservation Plan acknowledges that the polar bear cannot be recovered without decisive action to mitigate the primary threat to the species—greenhouse gas ("GHG") emissions driving sea-ice loss:

> The single most important step for polar bear conservation is decisive action to address global warming (Amstrup et al. 2010, Atwood et al. 2015), which is driven primarily by increasing atmospheric concentrations of greenhouse gases. Short of actions that effectively addresses the primary cause of diminishing sea ice, it is unlikely that polar bears will be recovered.[310]

The best-available science on polar bear viability and sea-ice loss under climate change indicates that returning the atmospheric $CO_2$ concentration to ~350 ppm is needed for polar bear survival and recovery. Amstrup et al. (2010), published in the journal *Nature*, provides the best-available science on the greenhouse gas emissions pathways and atmospheric concentrations needed for polar bear recovery. This study found that polar bear probability of persistence increases when greenhouse gases are reduced significantly in the near future, and that the best-possible on-the-ground management to reduce other threats plays an important, although secondary, role in increasing persistence probabilities.[311] Importantly, Amstrup et al. (2010) showed that the commitment scenario—in which $CO_2$ stays at a constant level of 368 ppm and radiative forcing remains at ~2.2 watts/$m^2$—is consistent with polar bear recovery in all ecoregions. These findings are compatible with studies that have found that returning the

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[307] These studies include: (1) Veron et al. (2009) which recommends an atmospheric $CO_2$ concentration of less than 350 ppm to protect coral reef health, and suggests a target of 320 ppm which is the level that pre-dates the onset of mass bleaching events; (2) Donner (2009) which suggests an atmospheric $CO_2$ concentration target below 370 ppm to avoid degradation of coral reef ecosystems; (3) Simpson et al. (2009) which correlates a Caribbean open-ocean aragonite saturation state of 4.0, which is recommended by the plan, with an atmospheric $CO_2$ level at 340 to 360 ppm; and (4) Frieler et al. (2012) which shows that limiting warming to ~1ºC above pre-industrial levels is needed to protect Caribbean coral reefs from degradation. A 1ºC target is consistent with an emissions trajectory that peaks in the next few years at 400 ppm, declines sharply thereafter (~6% decline per year), and returns atmospheric $CO_2$ to below 350 ppm in the early 2100s (Hansen et al. 2013).

[308] *See* Recovery Criterion 8.

[309] *See* Recovery Action 9.

[310] U.S. Fish and Wildlife. 2015. Polar Bear (*Ursus maritimus*) Conservation Management Plan, Draft. U.S. Fish and Wildlife, Region 7, Anchorage, Alaska. 59 pp, at 6.

[311] Amstrup, S.C. et al. 2010. Greenhouse gas mitigation can reduce sea-ice loss and increase polar bear persistence. Nature 468: 955-960. Because sea-ice habitat decreases relatively linearly with increases in mean global temperature rise in their models, the study concluded that the loss of sea-ice habitat and corresponding "declines in polar bear distribution and numbers are not unavoidable" if immediate and rapid GHG reductions were to be implemented, thus emphasizing the need for rapid, decisive action on emissions reductions.

atmospheric $CO_2$ concentration to between 350 and 400 ppm by 2100, and subsequently below 350 ppm, is needed to recover Arctic sea ice.[312]

Because each significant new addition of greenhouse gases increases the extinction risk for many listed species, the massive greenhouse gas emissions stemming from the federal coal program, which contributes 13% of all US fossil fuel $CO_2$ emissions, clearly affect many listed species. The continuation of the federal coal program jeopardizes climate-change-vulnerable species, while an end to coal leasing on public lands would be consistent with their continued survival and recovery. As such, the Bureau must consult with the Fish and Wildlife Service and National Marine Fisheries Service on the impacts to listed species of the significant greenhouse gas emissions from the federal coal program.

## VI. BLM Must Consider and Prioritize a Just Transition for Coal Mining Communities

In planning for the necessary phase-out of the coal leasing program, we call on the BLM to work to the maximum extend of its authority to minimize the adverse consequences on coal-dependent communities, and to help provide for a just and sustainable transition for those communities, who have contributed so greatly to powering the United States in the twentieth century and beyond. A key component of such a just transition is being honest with those communities in recognizing that the externalized costs of coal mining and combustion are too great for the nation and the world to bear. Yet the economic burden of the transition must not fall solely on the coal-reliant communities of the Powder River Basin and elsewhere, who have already borne disproportionate costs from automation, coal company bankruptcies, underfunded pensions, underfunded reclamation liabilities, and the public health effects of coal mining and combustion.

Therefore, we call on BLM to adopt commitment to prioritize providing support and assistance to help communities that are currently heavily reliant upon the federal coal program transition to more sustainable and prosperous economies. The Department of the Interior can play a key role in helping communities secure POWER Initiative grants (or any funding that may be authorized through the President's POWER+ Plan), direct resources to support conservation and research projects in or near communities, and encourage appropriate renewable energy development

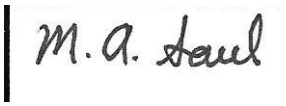
## VII. Conclusion

We commend the Secretary and the BLM on their decision to undertake this long-overdue examination of the federal coal leasing program, including its climate and other environmental consequences, and to adopt a moratorium, at least in part, on new leasing pending that review. We hereby submit these scoping comments in an effort to assist the agency in preparing a thorough and robust review of the environmental consequences of the program, including initiating formal consultation with the Fish and Wildlife Service and National Marine Fisheries Service under the Endangered Species Act. We urge the BLM to give serious consideration to, and ultimately adopt, an alternative that would expand the moratorium to all unleased federal coal, and extend it indefinitely, or, at a minimum, until such time as BLM can conclusively

[312] Hansen, J. et al. 2008. Target atmospheric $CO_2$: Where should humanity aim? Open Atmospheric Science Journal 2:217-231; Hansen, J. et al. 2013. Assessing "dangerous climate change": required reduction of carbon emissions to protect young people, future generations and nature. PLoS ONE 8: e81648.

demonstrate that additional federal coal leasing could be conducted in such a manner as not to impair the possibility of meeting national and global GHG mitigation goals.

Sincerely,



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