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Selma Sierra
Bureau of Land Management
Utah State Office
PO Box 45155
Salt Lake City, Utah 84145

May 10, 2010

Re: Protest of the Bureau of Land Management's Notice of Competitive Oil and Gas Lease Sale of Parcels with High Conservation Value

Dear Director Sierra:

I. Protested Parcels

In accordance with 43 C.F.R. §§ 4.450-2; 3120.1-3, Center for Native Ecosystems ("CNE") protests the May 25, 2010 sale of the following parcels:

UT0510-034	UT0510-036	UT0510-039
UT0510-035	UT0510-037	

II. Affected Resources

Oil and gas exploration and development authorized through the proposed leasing of the protested parcels is likely to have significant negative impacts on greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species.

Please see Exhibit 1 for a list of special status species that will be negatively impacted as a result of the proposed leasing of the protested parcels. Exhibit 1 lists the species that are likely to occur within the protested parcels, according to GIS data from BLM, Utah Division of Wildlife Resources, Utah Natural Heritage program and other sources. In some cases the protested parcels contain key habitat for these species, and

there are one or more known occurrences of the species within the protested parcel. In other cases, the species no longer occurs within the protested parcel, but the parcel contains habitat which may be important to the recovery of the species. CNE can provide additional information on the records of occurrence of each species within each protested parcel (e.g. the date the species was last observed in the parcel etc.), and on the type and importance of habitat within the protested parcels upon request. In addition, oil and gas exploration and development authorized through the proposed leasing of the protested parcels is also likely to have significant impacts on lands of high conservation value and the rare and imperiled species and other unique resources they support. Lands of high conservation value that may be significantly impacted by the proposed leasing include the Upper San Rafael Canyon Area of Critical Environmental Concern and areas that CNE has nominated as white-tailed prairie dog Areas of Critical Environmental Concern. Parcels that are listed in Exhibit 1 as containing white-tailed prairie dog habitat in may be within areas that CNE nominated as white-tailed prairie dog Areas of Critical Environmental Concern as part of the RMP revision process.

The issues raised in the statement of reasons apply to these species and areas of high conservation value. We provide additional information on some of these species in the following paragraphs.

A. <u>Greater Sage-Grouse and Gunnison Sage-Grouse</u>

Oil and gas development authorized by the leasing of the protested parcels will have significant impacts on greater sage-grouse. Please see Exhibit 1 for details on the overlap between protested parcels and key greater sage-grouse habitat.

Oil and gas development authorized by the leasing of the protested parcels is likely to have significant direct, indirect, and cumulative impacts on greater sage-grouse breeding, nesting, brood rearing and winter habitat, and result in population declines and lek abandonment. The studies listed below contain information on:

- the status of the greater sage-grouse
- the impacts of oil and gas development on greater sage-grouse
- the efficacy of application of various protective measures (including protective measures applied to the protested parcels as lease stipulations and notices) in mitigating impacts of oil and gas development on greater sage-grouse
- expert recommendations on how best to minimize and mitigate impacts of oil and gas development on greater sage-grouse
- information essential to analysis of the direct and indirect impacts of the oil and gas development on the protested parcels on greater sage-grouse
- information essential to analysis of the cumulative impacts of oil and gas development on the protested parcels, and other past, present and reasonably foreseeable activities, including grazing, climate change, fire, grazing etc., on greater sage-grouse populations

This information is essential to adequate NEPA analysis of the likely direct, indirect, and cumulative impacts of oil and gas development on the protested parcels on greater sage-grouse. In addition, this information is crucial to any effort to develop a range of alternatives for oil and gas development, and to develop and analyze the likely effectiveness of lease notices and stipulations applied to the protested parcels to mitigate impacts of oil and gas development on greater sage-grouse to insignificance. The information in these documents constitutes the best available science on greater sage-grouse, and the impacts of oil and gas development on greater sage-grouse. The BLM has not considered the information contained within these documents as part of a National Environmental Policy Act (NEPA) analysis of the impacts of oil and gas development authorized by the leasing of the protested parcels on greater sage-grouse. We hereby incorporate the following documents by reference:

Western Watersheds Project v. U.S. Forest Service, 535 F. Supp. 2d 1173 (D. Idaho 2007).

Aldridge CL, Boyce MS. 2007. Linking occurrence and fitness to persistence: habitat-based approach for endangered greater sage-grouse. Ecological Applications 17: 508-526.

Baxter RJ, Flinders JT, Mitchell DL. 2008. Survival, movements, and reproduction of translocated greater sage-grouse in Strawberry Valley, Utah. Journal of Wildlife Management 72: 179-186.

Braun CE. 2006. A blueprint for sage-grouse conservation and recovery. Tucson, AZ: Grouse Inc.

Connelly JW, Schroeder MA, Sands AR, Braun CE. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin 28: 967-985.

Doherty KE. 2008. Sage-grouse and energy development: Integrating science with conservation planning to reduce impacts. Ph.D. Dissertation. University of Montana, Missoula.

Doherty KE, Naugle DE, Walker BL, Graham JM. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management 72: 187-195.

Holloran MJ, Anderson SH. 2005. Spatial distribution of greater sage-grouse nests in relatively contiguous sage-brush habitats. The Condor 107: 742-752.

Holloran MJ, Heath BJ, Lyon A, Slater SJ, Kuipers JL, Anderson SH. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. Journal of Wildlife Management 69: 638-649.

Moynahan BJ, Lindberg MS, Rotella JJ, Thomas JW. 2007. Factors affecting nest survival of greater sage-grouse in Northcentral Montana. Journal of Wildlife Management 71: 1773-1783.

Oyler-Mccance SJ, Taylor SE, Quinn W. 2005a. A multilocus population genetic survey of the greater sage-grouse across their range. Molecular Ecology 14: 1293-1310.

Oyler-Mccance SJ, St. John J, Taylor SE, Apa A, Quinn TW. 2005b. Population genetics of Gunnison sage-grouse: Implications for management. Journal of Wildlife Management 69: 630-637.

Schroeder MA, et al. 2004. Distribution of sage-grouse in North America. The Condor 106: 363-376.

Teddy Roosevelt Conservation Partnership, North American Grouse Partnership. 2008. Petition for rulemaking to protect greater sage-grouse on lands administered by the Bureau of Land Management. 44 pages.

Biologists from the Western Association of Wildlife Agencies ("WAFWA") recently authored a memorandum entitled: Using the best available science to coordinate conservation actions that benefit sage-grouse across states affected by oil and gas development in Management Zones I-II (Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming) (Memorandum from Terry Cleveland and John Emmerich to Tom Christiansen and Joe Bohne, Wyoming Game and Fish Department, January 29, 2008).

Walker BL, Naugle DE, Doherty KE. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71: 2644-2654.

U.S. Fish and Wildlife Service. 2008. Greater sage-grouse interim status update. 31 October 2008. Mountain Prairie Region Wyoming Ecological Services Office, 240 pp.

U.S. Geological Survey. 2009. Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and its Habitat (early release of 25 chapters of the monograph accepted for publication by the University of California Press as part of the Cooper Ornithological Society's *Studies in Avian Biology* series). http://sagemap.wr.usgs.gov/monograph.aspx

Wyoming Department of Game and Fish. 2009. Recommendations for development of oil and gas resources within important wildlife habitats. May 2009. Cheyenne, WY, 250 pp.

We ask that BLM consider the information contained within these documents in making a decision regarding whether to withdraw the protested parcels given the arguments outlined below.

The greater sage-grouse (Centrocercus urophasianus) is a unique species of grouse found only in sagebrush dominated habits of western North America. This species, first described by Meriwether Lewis near the confluence of the Marias and Missouri rivers in Montana in 1805 (Schroeder et al. 2004), is the largest grouse in North America, and the second largest grouse in the world. Greater sage-grouse were once widely distributed across western U.S. and Canada, numbering in the hundreds of thousands. Greater sage-grouse have long been the subject of fascination because of their elaborate courtship displays, in which large numbers of males gather on display grounds (known as leks) to perform a "strutting display" for watching females. Males lift and fan their pointed tail feathers, erect their head plumes, inflate air sacs on their chests, strut about, and produce a series of interesting sounds including "wing swishes", "air sac plops" and a whistle. Females observe these displays and select the most attractive males to mate with. Only a small number of males are selected by most of the females for breeding. The same lek may be used by grouse for decades. Observing the courtship ritual of the greater sage-grouse is one of the most captivating wildlife watching experiences in North America. The greater sage-grouse is also one of 19 upland game birds in the United States, which bring in significant hunting revenue and provide recreation for millions of licensed hunters. Finally, the greater sage-grouse has become the symbol for conserving sagebrush ecosystems, increasingly valued for their wide-open spaces, abundant wildlife, opportunities for recreation and hunting, and central place in defining the character of western landscapes and people. The greater sage-grouse is an icon of a vanishing western landscape.

The greater sage-grouse is native only the sagebrush habitats of western North America (Schroeder et al. 1999). The sagebrush habitats of western North America represent some of the largest ecosystems North America, historically covering millions of acres across 16 western states and three Canadian provinces (*see* Knick et al. 2003; and Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). At the time of European settlement, the seemingly endless expanse of sagebrush stretching across the Western landscape resembled a "Sagebrush Sea." Sagebrush is the dominant plant in these ecosystems, interspersed with a variety of shrubs, grasses and forbs. Greater sage-grouse depend on large, intact, interconnected expanses of sage-brush habitat for every part of their life-cycle (*see* Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). Historically, greater sage-grouse were widely distributed across much of the sagebrush dominated expanses of western North America. These sagebrush habitats are also home to more than 350 other species that depend on sagebrush for all or part of their existence (Knick et al. 2003; and Knick and Connelly 2009, Chapter 1 in Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). Among these are world class populations of mule deer, pronghorn and elk, abundant songbirds, colorful wildflowers and a host of

other wildlife and plants. As a result of the fact that greater sage-grouse is a landscape-scale sagebrush obligate, the health of sage-grouse populations may function as an indicator of the health of the sagebrush ecosystem and the diversity of other species that depend on it for survival, and conservation of greater sage-grouse habitat may benefit many other species that rely on sagebrush habitat.

Over the past century, human activities have caused heavy loss, fragmentation and degradation of sagebrush, such that sagebrush ecosystems are among the most threatened habitats in North America (*see* Knick et al. 2003; Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). Loss and degradation of native habitats has impacted much of the sagebrush ecosystem and its associated wildlife (*see* Knick et al. 2003; and Connelly et al. 2004). Greater sage-grouse have declined dramatically as a result of loss of suitable sagebrush habitat to meet seasonal requirements for food, cover and nesting (*see* Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx)

Greater sage-grouse have been extirpated from nearly half of their original range in Western North America (Schroeder et al. 2004). For decades, sage-grouse populations have been monitored each spring by counting the number of males present on leks. Changes in number of males on leks and number of active leks have been used to estimate population status and trends. Data gained from lek counts suggests that greater sage-grouse populations have declined by 45-80% across their range, and local populations have declined from 17-92% (*see* Connelly and Braun 1997, Braun 1998, Connelly et al. 2004, cited in Doherty, 2008, page 14). A newly released study estimates that greater sage-grouse populations (as indicated by the number of males counted on leks) have declined by 65% across their range between 1965 and 2007 (*see* Garton et al. 2009, Chapter 16 in: Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). This new research supports previous work indicating that greater sage-grouse have undergone significant long-term declines. In addition, this new science reveals that the number of sage-grouse that sagebrush habitat can support has declined between 2% and 6% per year from 1965-2007 in about half the populations studied (Garton et al. 2009, Chapter 16), suggesting that population declines are linked to a long-term decline in the quality and quantity of suitable habitat for sage-grouse.

The decline of the greater sage-grouse has prompted concern from scientists, conservationists, sportsmen, state wildlife agencies, bird enthusiasts, and federal land management agencies. In 2002 and 2003, concern about the continued decline of the greater sage-grouse prompted several individuals and organizations to petition the USFWS to list the greater sage-grouse as endangered across its entire range. The USFWS initially found that the petitions "presented substantial information indicating that the petitioned actions may be warranted." *See* 70 Fed. Reg. 2244 (January 12, 2005).

However, in early January 2005, the Service released its 12-month finding that listing the greater sage-grouse was not warranted. *See* 70 Fed. Reg. 2244 (January 12, 2005). In July 2006 petitioners filed suit seeking to overturn the Service's decision not to list the sage-grouse, and on December 4, 2007, the U.S. District Court for the District of Idaho set aside the agency's action, finding that political interference in the scientific review tainted the process to a degree that rendered the decision not to list the sage-grouse as threatened or endangered arbitrary and capricious under the law. Western Watersheds Project v. U.S. Fish and Wildlife Service, 535 F.Supp.2d 1173 (D. Idaho Dec. 4, 2007). The Court explained the perilous condition of the sage-grouse and its habitat, noting that "[n]owhere is sage-grouse habitat described as stable. By all accounts, it is deteriorating, and that deterioration is caused by factors that are on the increase." *Id.* at 1186. In response to the Court's ruling, the USFWS initiated a new status review to consider information regarding "threats, conservation measures, and population and status of the greater sage-grouse" that has become available since the legally flawed decision struck down by the Idaho court. *See* 73 Fed. Reg. 10218 (February 26, 2008). The USFWS expects to release a new determination on the petition to list in early 2010.

Recent model forecasts suggest that at least 13% of the remaining greater sage-grouse populations may be at short term risk for extinction within the next 30 years while 75% of the populations and 29% of the sage-grouse management zones may be at long-term risk of extinction within the next 100 years if current trends and conditions persist (*see* Garton et al. 2009, Chapter 16 in: Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx) (Authors assume that populations are at short term risk of extinction if the population declines below 50 breeding adults and at long-term risk of extinction if the population declines below 500 breeding adults). The Authors note that these are clearly underestimates of the risk of extinction, due to the fact that many smaller populations could not be analyzed and modeled because of lack of sufficient data, and smaller populations have suffered greater declines and tend to be at greater risk than larger populations (Garton et al. 2009, Chapter 16). In addition, these predictions assume that future conditions will continue the same trajectory or trend observed in the past. If there is an increase in the rate of loss of suitable sage-brush habitat in the future, then these models will underestimate risk of extinction. On the other hand, if a concerted effort succeeds in reducing the rate of loss of suitable sagebrush habitat, then future population trajectories could be improved (Garton et al. 2009, Chapter 16). It is also important to note that there is a growing consensus among conservation biologists that the number of individuals required to avoid a turning point to extinction may be closer to 5000 breeding adults (Traill 2009), rather than 50 or 500 breeding adults as assumed by Garton et al. (2009, Chapter 16). If this is the case, then the number of greater sage-grouse populations at risk of short and long-term extinction may be far greater than estimated by Garton et al. (2009, Chapter 16).

The underlying cause of greater sage-grouse population declines is the loss of suitable sagebrush habitat from a variety of causes (*see* Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at

http://sagemap.wr.usgs.gov/monograph.aspx). Human land use has altered landscapes used by greater sage-grouse in most parts of their range (Knick et al. 2003; Connelly et al. 2004; Connelly and Knick 2009, Chapter 1 in: Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). Loss and degradation of sagebrush habitat and concomitant declines in greater sage-grouse populations have been attributed primarily to agriculture, human development, altered fire regimes, and exotic plant invasions (*see id.*).

The area dominated by sagebrush land cover has been reduced by conversion to cropland and other land uses (*see id.*). Sage-grouse population declines have been correlated with increases in agriculture (*see id.*). At some point, the removal and fragmentation of sagebrush habitat due to agriculture may reach a threshold beyond which sage-grouse may be extirpated from a region (*see id.*). Agriculture currently covers 89,000 square miles of the sage-grouse range and causes declines in sage-grouse populations by removing or fragmenting habitat in the most productive areas (*see id.*).

Human development, including urban and residential development, energy development and infrastructure development also reduce the area dominated by sage-brush land cover, change the configuration of sagebrush within the landscape mosaic, and change the composition of sagebrush habitat, decreasing the suitability of the landscape for sage-grouse. Human populations have increased as much as 666% in some parts of the sage-grouse range, and more than 8 million people live within three miles of sage-grouse (*see* Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). As development and infrastructure expand, sagebrush habitat is lost and remaining habitat is fragmented into small isolated patches, ultimately making the landscape unsuitable for sage-grouse. Construction of structures such as oil and gas wells, power lines, fences etc. decrease the suitability of the landscape for sage-grouse and contribute to the extirpation of leks (*see* Chapters 1, 17, and 19 in: Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). Human development may also favor increases in predators that prey on sage-grouse (*id.* Chapter 1 and Chapter 8). The infrastructure network changes the configuration of sage-brush within the landscape, reducing sage-brush to few widely dispersed patches that are unsuitable for sage-grouse (*id.*, Chapter 1 and Chapter 14). Currently, ninety-five percent of the sagebrush within the range of the sage-grouse is within 1.5 miles of a road. Roads can facilitate the spread of invasive species, influence predator movements, increase wildfire potential from human activities, and exacerbate other factors that adversely affect sage-grouse (*id.* Chapter 1 and Chapter 14). Industrial and recreational use of the road network is increasing on public lands, as energy development and demand for off-highway vehicle recreation increases.

Oil and gas development is widespread and increasing across the eastern portion of the sage-grouse range, (including Wyoming, Utah and Colorado). Oil and gas development currently impacts 8% of sagebrush habitats (*see* Chapter 21 in Ecology and Conservation of Greater Sage-Grouse: A Landscape Species and Its Habitats, Monograph chapters for publication in *Studies in Avian Biology,* Cooper Orinthological Society, 2009, at http://sagemap.wr.usgs.gov/monograph.aspx). In addition, exploration and development of wind, solar and geothermal energy is increasing rapidly in many parts of the sage-grouse range. For example, new corridors proposed for energy transmission would affect another 2% of the current sagebrush distribution (Chapter 1).

Composition of sagebrush has changed and resulted in fire regimes that are altered from historic patterns. More than half of the sagebrush in some portions of the sag-grouse range could be converted to cheatgrass, a highly invasive exotic plant that increases the potential for fire by changing the dynamics of the plant community. As a result, fire has converted large sagebrush landscapes to exotic grasslands that are not used by sage-grouse. Number of fires and total area burned has increased in most parts of the sage-grouse range, and the probability that a lek was abandoned between 1965 and 2007 increased by 12% for each square mile burned. (*id.* Chapters 1, 11 and 12). In contrast, at high elevations, fire has decreased from historic patterns resulting in expansion of woodlands and displacement of sagebrush communities and sage-grouse. (*id.* Chapters 1, 11 and 12).

Poorly managed livestock grazing may damage soils and vegetation, facilitate the spread of weeds, change the vegetative composition of sagebrush communities, contribute to changes in the fire regime, require construction of roads and fences, and exacerbate other factors that adversely impact greater sage-grouse.

Greater sage-grouse may also be negatively impacted by predation, disease, and hunter harvests (*id.* Chapters 6, 8, 9 and 10). West Nile Virus has emerged as a new, important source of mortality in low and mid-elevation greater sage-grouse populations over the past decade (*see id.*, Chapter 10).

Climate change may result in an increase in average temperatures of more than 6 degrees Celsius, and, under the most extreme temperature increase, as much as 80% of the current sagebrush would be lost (*see id.* Chapter 11), with dire implications for greater sage-grouse and other sagebrush species.

It is very important to note that the combination of multiple land uses may influence sage-grouse more than any single use. Lek abandonment (and presumably population declines), increase with increases in the cumulative measure of human influence on the landscape, called the "human footprint" (*see id.* Chapter 14). While sage-grouse populations may not necessarily be lost as the result of a single anthropogenic feature (e.g. a road or an oil and gas well), multiple human features on the landscape may act in synergy to cause impacts that exceed a threshold, resulting in population loss (*see id.* Chapter 14). Growing evidence suggests that sage-grouse respond to anthropogenic features at large scales, and changes need to be made to existing management strategies

to account for sage-grouse movement and dispersal patterns, and the cumulative impacts of human uses at a landscape scale. Cumulative impacts have resulted in a decline in carrying capacity (the number of birds the habitat can support) at a rate of 2% to 12% per year in nearly half of the greater sage-grouse populations that have been monitored over time (Chapter 16). Management that does not consider the cumulative impacts of human activities at a landscape scale will not be capable of reversing ongoing declines in the carrying capacity of sage-grouse habitat.

The conservation challenges that face the greater sage-grouse, are shared by the more than 350 other species that require sagebrush habitats. The sagebrush dominated habitats of western North America contain a high proportion of imperiled species, including species like the Gunnison sage-grouse and pygmy rabbit that are currently being considered for protection under the Endangered Species Act. The sagebrush habitats of the intermountain region make up the third most threatened bird habitat in the U.S. (*Studies in Avian Biology* Chapter 1).

Nearly all of the threats to sagebrush habitat and greater sage-grouse populations are likely to continue to increase into the foreseeable future. Given that greater sage-grouse have been extirpated from half of their historic range and experienced rangewide population declines of 65% or more (Garton et al. 2009 in *Studies in Avian Biology*), the future survival of the greater sage-grouse as a viable species in the wild is very much in doubt.

It is now widely agreed that it will be necessary to maintain large expanses of suitable sagebrush habitat across the landscape to conserve greater sage-grouse populations (*see Studies in Avian Biology* 4). The greater sage-grouse is a landscape species, with large annual ranges that can exceed 1000 square miles. Birds often migrate long distances (12-50 miles) between seasonal habitats (*Studies in Avian Biology* 4). In addition, sage-grouse use a variety of habitat types and landscapes across the large annual ranges. Loss or degradation of one type of seasonal habitat may cause population declines, even when the other seasonal habitat types are protected (*Studies in Avian Biology* 4). For example, if leks and breeding habitat are protected from adverse impacts but winter habitat is not, populations may decline in winter despite being protected during the breeding season. In addition, protection of seasonal habitats may fail to achieve the intended benefit if human activities reduce the ability of birds to move between different seasonal habitats *Studies in Avian Biology* Finally, disturbance and recovery dynamics may change the location of suitable seasonal habitats on the landscape over time. *Studies in Avian Biology*. Thus, in order to adequately conserve greater sage-grouse populations, it will be necessary to maintain large expanses of sagebrush over long time scales, and manage these areas in a manner that ensures the long-term persistence of sage-grouse populations *Studies in Avian Biology*. There is still uncertainty about 1) exactly how much sagebrush must be conserved, and in what spatial configuration, 2) whether it is necessary to set aside a permanent system of protected sagebrush reserves to conserve greater sage-grouse, or whether a suite of other management tools can adequately protect sage-grouse populations while allowing a greater level of multiple use (*Studies in Avian Biology*). A number of authors and agencies have discussed the necessity and challenge

of conserving sufficient expanses of sagebrush habitat, demonstrated that the current piecemeal approach to sage-grouse conservation is likely to fail; and proposed various ways to conserve sage-grouse populations, accommodate increasing development and other competing human uses of the landscape while meeting the requirements for keeping sage-grouse populations stable, and focus planning and management on large areas (e.g. core areas, population units, population components) needed to sustain populations. These documents contain information essential to determining how best to sustain greater sage-grouse populations while allowing other uses of the sagebrush landscape to continue. The recommendations contained within each of these documents should be carefully considered and weighed in Wyoming Bureau of Land Management (BLM) Resource Management plans that dictate how greater sage-grouse habitat will be managed for decades to come, and that will likely determine the fate of the greater sage-grouse in the much of the eastern portion of its range. BLM has not adequately considered any of the information in these documents in the Resource Management Plans that the proposed leasing is tiered to, and have therefore failed to 1) make an informed decision regarding what areas should be open and closed to oil and gas leasing and what lease stipulations should be applied to protect greater sage-grouse populations within areas that are open to leasing and development, and 2) have failed to take a hard look at the impacts, particularly cumulative impacts that the activities authorized by the Resource Management Plan (including the proposed leasing of the protested parcels) will have on greater sage-grouse.

Over 70% of the sagebrush habitats used by sage-grouse are on public lands managed by state or federal agencies, often for multiple uses (*Studies in Avian Biology*). Fifty-one percent of habitats managed by sage-grouse are on Bureau of Land Management (BLM) land. BLM is in the position of having the greatest management influence throughout a substantial portion of the range of the greater sage-grouse, and BLM management of greater sage-grouse habitat will thus largely determine the long-term fate of the greater sage-grouse. The Wyoming Basin sage-grouse management zone has one of the few remaining clusters of sagebrush landscapes, has the highest average lek size and largest average number of leks, contains the most highly connected network of greater sage-grouse leks, and is predicted to be one of the last strongholds of sagebrush in the face of climate change (*Studies in Avian Biology*). Thus, conservation of greater sage-grouse populations on BLM lands in Wyoming may be particularly important determining the future of the species.

BLM has systematically failed to take appropriate action to conserve greater sage-grouse habitat at a landscape scale. BLM has failed to include an alternative that maximizes conservation of sagebrush and greater sage-grouse habitat in each of its Resource Management Plans in Wyoming. These RMPs prioritize other uses over sagebrush habitat conservation across virtually all of the remaining greater sage-grouse habitat in Wyoming. Further, these RMPs authorize oil and gas development across a significant proportion of the remaining sage-grouse habitat in Wyoming, without considering setting aside core areas or other key habitat from oil and gas leasing; or leasing these areas with NSO stipulations; or stipulations recommended by recommended by Western Association of Fish and Wildlife Agencies, Wyoming Game and Fish

Department, U.S. Fish and Wildlife Service, or various other state wildlife agencies and sage-grouse experts. The RMPs in question also systematically fail to adequately consider the cumulative impacts of the human activities authorized over the life of the RMP on greater sage-grouse (*see Studies in Avian Biology* for comprehensive assessment of threats to greater sage-grouse and greater sage-grouse habitat that should be considered in each RMP), and fail to take into account the best available science, including significant new information.

B. White-tailed prairie dog and black-footed ferret

Several parcels would impact the Cisco complex of white-tailed prairie dog colonies. This important site represents an important segment of core habitat for a highly imperiled species, the white-tailed prairie dog, which is currently under consideration for Endangered Species Act protection, as well as a proposed reintroduction site for black-footed ferrets, North America's most endangered mammal, which is currently protected under the Endangered Species Act.

CNE recently protested the RMPs for the Moab, Price, and Vernal Field Offices due to inadequate consideration of white-tailed prairie dogs in the adopted management alternatives. The recently adopted RMP for the Moab Field Office imposed a 660-foot Controlled Surface Use stipulation around all active prairie dog colonies. This boundary is arbitrary and inadequate to protect the species and ensure its recovery from its current population decline. Multiple expert sources recommend at least a half-mile No Surface Occupancy stipulation for prairie dog colonies. Further, this stipulation should be expanded to include historical habitat as well. This is particularly important in the Cisco complex, where recent plague events have rendered several colony site unoccupied, but evidence suggests prairie dog populations can rebound and animals will eventually reoccupy currently abandoned burrows. Here we provide the relevant excerpt from our protest of the Moab Field Offices Proposed RMP:

> **The PRMP fails to conserve the white-tailed prairie dog**
>
> BLM provides no meaningful new protections for prairie dogs in the PRMP. Instead, it merely clarifies that prairie dogs are important, and fixes some typos about the size of the proposed buffers. BLM fails to demonstrate that adequate regulatory mechanisms are in place to avoid listing the Gunnison's prairie dog and white-tailed prairie dog under the Endangered Species Act, and does not take necessary steps to recover both species.
>
> **A. BLM relies on an arbitrary buffer that does not provide meaningful protection.**
>
> The reason why BLM asserts that avoidance of active prairie dog colonies can be implemented on *existing* leases is that the 660' buffer conveniently is basically within the 200m distance that BLM can request that facilities be moved under standard lease terms (technically 200m = 656', but BLM does not seem to be accounting for the 4' discrepancy).

Mitigations should be designed based on the biological needs of the resources at risk. Instead, BLM chose to tailor its mitigations for prairie dogs to existing standard lease terms. Using a 660' buffer is arbitrary and capricious, and is not based on the best available science. BLM acknowledges that "the buffer is within the parameters of Standard Operating Procedures " (BLM response to comment 485-2), and also discloses that the 1300' buffer in Alternative B is based on the distance at which Utah prairie dogs reacted to disturbance. Clearly 1300' should be the minimum buffer distance in all alternatives. BLM provides no evidence to back its claim that 660' buffers "are sufficient to facilitate colony protection" (*See* BLM Response to Comment 485-6).

Even the 1300' buffer only addresses the need for protection of active colonies from direct disturbance. As the states noted in the White-tailed Prairie Dog Conservation Assessment (which has been approved by the Western Association of Fish and Wildlife Agencies), unoccupied and suitable habitat *must* also be conserved because prairie dogs operate on a landscape scale.

Knowledge of where habitat loss has and will occur on both a local and landscape scales and in what spatial patterns is crucial for proper management of white-tailed prairie dogs. Identifying habitat patches and corridors between these patches will help determine the long-term viability of local populations, probability of dispersal among populations, and areas important for conservation. Critical areas identified during these analyses must be incorporated into Land Use Plans (RMPs) with conservation actions focusing on protecting unoccupied and occupied habitat, protecting corridors for immigration and emigration and allowing maintenance and expansion of white-tailed prairie dog colonies and complexes. *See* Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak and P. Schnurr. 2004. White-tailed Prairie Dog Conservation Assessment *at* 63-64.

The 1300' buffer, designed for protecting against the effects of physical disturbance, does not address the need for prairie dogs to be able to move from one colony to the next securely. A buffer for connectivity like that needs to be based on the average distance between colonies. Our own GIS analysis found that with 0.5 mile buffers, most colonies were provided with a connection to at least one other colony.

B. BLM seeks to maintain the status quo and thus the imperiled status of prairie dogs rather than providing for their recovery.

BLM claims that "Standard Operating Procedures" will be adequate to conserve white-tailed and Gunnison's prairie dogs. However, it also discloses that both species are imperiled in the Moab Field Office: "Currently prairie dog numbers are low" (*See* BLM Response to Comment 485-1); "Currently, active colonies are very limited on public lands" (*See* BLM Response to Comment 485-3). The status quo is one of endangerment. BLM also acknowledges that should prairie dogs recover, the SOP protections will have to be waived or excepted so that leases can still be developed: "if numbers approach those of earlier decades, it may become impossible to develop a lease and adhere to these stipulations. For that reason, exception language was developed to ensure there would not be a taking on a lease holding" (*See* BLM Response to Comment 485-1). This is true only because BLM has ignored the advice of its sister agency the U.S. Fish and Wildlife Service, which recommended No Surface Occupancy stipulations instead:

Some of the percentages of habitat designated NSO are very low -- for example, Alternative C (preferred) only sets 5% NSO for Gunnison sagegrouse, 1% for

Gunnison prairie dog; <1% for whitetailed prairie dog, and 20% for MSO. These are very low levels of protection from oil and gas development and would seemingly have significant impacts. *See* Comment 586-28.

NSO stips would have allowed the lease to be developed, it would just have to be accessed elsewhere.

BLM proposes to only actively conserve active prairie dog colonies and hope that prairie dogs are able to expand on their own. However, the story of the past 20 years in the Cisco Complex has been one of major declines, not expansion. The states (including UDWR) determined that the Complex declined by 84% between 1985 and 2002 (*See* Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak and P. Schnurr. 2004. White-tailed Prairie Dog Conservation Assessment). The states also noted that BLM planned to designate the Cisco Complex as an ACEC. Although BLM purports to want to allow UDWR to manage wildlife, BLM has ignored much of the states' input on prairie dog management needs.

UDWR has indicated that the Cisco Complex is actually the second highest priority reintroduction area in the state (*See* Comment 120-29), and BLM claims that it will support ferret recovery, but that requires bolstering prairie dog populations, which the PRMP does not do.

Instead, BLM must actively conserve historical habitat for the white-tailed and Gunnison's prairie dog. The U.S. Fish and Wildlife Service has revealed that "We would have liked to have gotten protection for historic-but-inactive areas as well, but BLM was unwilling to institute such restrictions" (*See* U.S. Fish and Wildlife Service. 2008. Pers. comm. (29 August 2008). Electronic mail correspondence.). By failing to take these kinds of steps BLM is demonstrating that it fails to provide adequate regulatory mechanisms to conserve these two species, and that the protections of the Endangered Species Act are needed to trump the expansive drilling rights that BLM has granted and will continue to grant within the range of both species.

C. BLM ignores the fact that a portion of the Gunnison's prairie dog's range has been protected under the Endangered Species Act, and the portion in Utah will likely be added soon. The Service is currently performing a status review for the white-tailed prairie dog and may protect it as well.

BLM attempts to maintain a distinction between Utah prairie dogs and other prairie dog species in Utah by pointing to the Utah prairie dog's status as Threatened under the Endangered Species Act and noting its smaller range. However, BLM does not acknowledge that the U.S. Fish and Wildlife Service has found that a portion of the range of the Gunnison's prairie dog has been found warranted for protection under the Act, and has been officially added to the Candidate list of species awaiting protection. The Service's attempt to only protect a portion of the range relies on a new interpretation of the Act that is being challenged, and BLM should be prepared for the Service's piecemeal approach to protection to be overturned and thus the entire range of the Gunnison's prairie dog to be added to the Candidate list.

Similarly, the U.S. Fish and Wildlife Service has made a positive 90-day finding on our petition to protect the white-tailed prairie dog under the Act, and must make a determination as to whether protection is warranted by June 2010. BLM's approach to white-tailed prairie dog management should be an important factor in this decision, yet BLM has failed to show that it will conserve this species.

BLM attempts to discount the importance of its management of white-tailed and Gunnison's prairie dogs by citing the larger acreages once occupied by these two species compared to the Utah prairie dog. However, more important than the size of the original range is the extent of the species' decline. BLM states that the original range of the white-tailed prairie dog included 50 million acres. However, the states (including UDWR) estimate that the white-tailed prairie dog now occupies 841,320 acres, or about 2% of its original range.

It also is important to note that while most of the occupied habitat for the Utah prairie dog occurs on private lands, most of the predicted habitat for white-tailed prairie dogs (56%) occurs on BLM lands. Thus, BLM management plays a much larger role in white-tailed prairie dog endangerment, and could also be instrumental for recovery.

It makes no sense, and is illegal, for BLM to provide absolutely no protection for Gunnison's prairie dogs under Alternative D. The fact that there are few colonies should if anything make protecting them uncontroversial. Failing to do so is contributing to the need to list the species under the Endangered Species Act and failing to meet the agency's special status species obligations.

D. BLM has its own obligations to wildlife and Sensitive species and cannot rely on UDWR to execute those.

BLM claims that it is UDWR's responsibility to conserve animals and BLM's only obligation is to habitat (*See* BLM Response to Comment 485-5). However, BLM fails to conserve habitat for white-tailed and Gunnison's prairie dogs and other Sensitive and special status species in the PRMP. BLM cannot rely on future actions by UDWR to remedy its own deficiencies in this area.

E. BLM claims that plague and drought are the biggest threats to prairie dogs, and ignores the states' assessment that oil and gas extraction on BLM lands is also a major threat.

BLM claims that it cannot affect prairie dog recovery because it has no control over plague and drought, "Two of the biggest threats to prairie dog populations" (*See* BLM Response to Comment 485-6). However, BLM fails to mention that the states actually found that oil and gas drilling on BLM lands may pose the larges threat of all:

the threat posed by oil and gas exploration and extraction could justify listing unless it is immediately addressed on public lands managed by the BLM. It is critical that the BLM through its Land Use Plans, manage oil and gas leasing and development in white-tailed prairie dog complexes to maximize prairie dog habitat potential. Land Use Plans must be revised on a state-by-state basis and white-tailed prairie dog protection initiated in order to prevent further, more drastic actions, possibly including listing the white-tailed prairie dog under the ESA. *See* Seglund, A.E., A.E. Ernst, M. Grenier, B. Luce, A. Puchniak and P. Schnurr. 2004. White-tailed Prairie Dog Conservation Assessment *at* 83.

The states also recommend maintaining landscape level connectivity to address plague, and adjusting grazing during times of drought, which BLM fails to do in the PRMP.

F. The PRMP is the correct place for BLM to plan for species conservation; deferring to some later HMP may be ineffective.

BLM repeatedly states that it will address Sensitive species conservation, including that for white-tailed and Gunnison's prairie dogs, as part of a later Habitat Management Plan. In fact, when the U.S. Fish and Wildlife Service requested that BLM describe the distribution of Sensitive species as part of the PRMP, BLM refused (*See* BLM Response to Comment 586-17). BLM also claims that it has funded an inventory for Sensitive species in the Cisco area, but it appears that this inventory has not yet been completed (*See* BLM Response to Comment 485-6). It is irresponsible to plan the future of the Field Office for the next 20 years without current data as to the status and distribution of Sensitive species. If BLM does indeed wait until after the RMP takes effect to obtain this information, it must then perform an RMP amendment and SEIS to analyze this new information under NEPA. Instead, BLM should obtain this information now and delay RMP implementation until it can be considered. Providing for the needs of special status species should be one of the highest priorities in RMP revision.

III. Protesting Party

Center for Native Ecosystems has a well-established history of participation in Bureau of Land Management ("BLM") planning and management activities, including participation in Utah BLM oil and gas leasing decisions and the planning processes for the various Utah BLM Field Offices. CNE's mission is to use the best available science to participate in policy and administrative processes, legal actions, and public outreach and education to protect and restore native plants and animals in the Greater Southern Rockies.

CNE's members visit, recreate on, and use lands on or near the parcels proposed for leasing. The staff and members of CNE enjoy various activities on or near land proposed for leasing, including viewing and studying rare and imperiled wildlife and native ecosystems, hiking, camping, taking photographs, and experiencing solitude. CNE's staff and members plan to return to the subject lands in the future to engage in these activities, and to observe and monitor rare and imperiled species and native ecosystems. We are collectively committed to ensuring that federal agencies properly manage rare and imperiled species and native ecosystems. Members and professional staff of CNE are conducting research and advocacy to protect the populations and habitat of rare and imperiled species discussed herein. CNE's members and staff value the important role that areas of high conservation value, should play in safeguarding rare species and communities and other unique resources on public land. Our members' interests in rare and imperiled species and ecosystems on BLM lands will be adversely affected if the sale of these parcels proceeds as proposed. Oil and gas leasing and subsequent mineral development on the protested parcels, if approved without adequate environmental analysis and appropriate safeguards to minimize negative impacts, is likely to result in significant, unnecessary and undue harm to rare and imperiled species, and native ecosystems. The proposed leasing of the protested parcels will harm our members' interests in the continued use of those public lands and the rare and imperiled species they support. Therefore protestors have legally recognizable interests that will be affected and impacted by the proposed action.

Josh Pollock, CNE's Conservation Director, like all other CNE employees, is authorized to file this protest on behalf of CNE.

IV. Statement of Reasons

For the reasons set forth below, the Bureau of Land Management should withdraw all of the protested parcels pending completion of an adequate National Environmental Policy Act ("NEPA") analysis of the environmental impacts of the proposed leasing. BLM should withdraw from the sale all protested parcels because there is credible evidence of resource conflicts and potentially significant environmental impacts which have not been properly analyzed. Oil and gas development authorized by the leasing of the protested parcels is likely to have significant impacts on greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species.

CNE and others have protested the Moab, Price, Vernal, and Monticello proposed Resource Management Plans and Final Environmental Impact Statements. These Resource Management Plans do not constitute adequate consideration of a range of alternatives for management of habitat for special status species, nominated Areas of Critical Environmental Concern and other sensitive resources, nor do they contain an adequate analysis of the potential impacts of oil and gas exploration and development over the next 15-20 years, across the range of each of the aforementioned rare and imperiled species. The BLM's conclusions in their resolution of our protests are arbitrary and capricious. We hereby incorporate our protests of these RMPs by reference. We incorporate by reference all of the information contained within any previous protests of Utah BLM oil and gas lease sales, or appeals to the Interior Board of Land Appeals, that are relevant to the protested parcels.

The BLM should withdraw the protested parcels pending completion of an adequate NEPA analysis of the impacts of the proposed leasing on special status species, nominated ACECs, and other sensitive resources. In addition, the BLM should suspend the protested leases until it has met its obligations under the Administrative Procedure Act, Endangered Species Act, and the Federal Land and Policy Management Act, and until it has met its obligations outlined in the BLM Manual with respect to special status species.

A. National Environmental Policy Act

1. BLM Has Failed to Take a "Hard Look" at the Environmental Effects of the Proposed Leasing

The National Environmental Policy Act (NEPA) requires federal agencies to prepare a statement on the environmental impacts of every major action significantly affecting the quality of the human environment. National Environmental Policy Act of 1969 § 102(2)(C), 42 U.S.C. § 4332(C) (2009). According to the Supreme Court, agencies must take a "hard look" at the environmental effects of major federal actions in order to satisfy that requirement. *Kleppe v. Sierra Club*, 427 U.S. 390, 410n.21 (1976). While NEPA does not mandate particular results, it does prescribe a necessary process that agencies must follow during their decision-making processes. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-51 (1989). "Federal agencies shall use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment." 40 C.F.R. §1500.2(e) (2009). Agencies are required to consider alternatives to a proposed action and must not prejudge whether it will take a certain course of action prior to completing the NEPA process.42 U.S.C § 4332(C). Federal regulations make clear that discussion of alternatives to the proposed action is "the heart" of the environmental impact statement. 40 C.F.R. §1502.14 (2009).

The BLM has not taken the required "hard look" at the potential impacts of the proposed action on greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species.

The BLM has not considered an adequate range of alternatives to minimize impacts to these species, including a 'No Surface Occupancy' alternative, or alternatives with lease stipulations and notices that provide varying degrees of protection; in any of the documents to which the proposed leasing is tiered.

None of the NEPA documents to which the proposed leasing is tiered, take the required "hard look at the potential impacts of the proposed leasing of the protested parcels.

Climate Change

Neither the Vernal nor Moab RMP/EIS gave sufficient consideration to the serious issue of climate change required by NEPA prior to selling the following five parcels: UTU0510-034, UTU0510-35, UTU0510-36, UTU0510-37, and UTU0510-38.

The best scientific evidence available shows that climate change is a real and compelling threat to public lands. *Massachusetts v. EPA*, 127 S. Ct. 1438, 1455 (2007).

In Secretarial Order 3289, Secretary Salazar stated that BLM "must consider and analyze potential climate change impacts when undertaking long-range planning exercises" and also made clear that the requirements in Secretarial Order No. 3226 remain in effect. Order 3226 requires BLM to "consider and analyze potential climate change impacts" when undertaking long-range planning exercises, including specifically "management plans and activities developed for public lands." These Orders are enforceable and demand BLM's compliance.

Under NEPA, BLM must adequately and accurately describe the environment that will be affected by the proposed action—the "affected environment." 40 C.F.R. § 1502.15. This includes the affected environment as modified by climate change. BLM must also consider a "no action" alternative, which describes the environmental baseline, and compare all alternatives to this baseline. 40 C.F.R. § 1502.14(d). Climate change is both part of the baseline as well as a reasonably foreseeable impact under each alternative analyzed in the RMPs.

BLM did not conduct any analysis of the effects of climate change on the lands managed under the Vernal and Moab RMPs or incorporate such analysis into the consideration of management alternatives. Nor did the agency consider the greenhouse gas contributions of reasonably foreseeable oil and gas development within the planning areas. Instead, BLM claimed that it could not analyze the impacts of climate change due to lack of tools for quantification, including a lack of guidance from EPA. *See, e.g.* Vernal PRMP/FEIS at 4-8; Director's Protest Resolution Report for Vernal RMP at 49-50 (Oct. 29, 2008). However, EPA rejected that precise argument in its comments on the Vernal RMP, stating that "NEPA requires federal agencies to take a hard look at potential environmental impacts associated with their proposed actions" and the "[l]ack of regulatory protocol or emission standards for greenhouse gases does not preclude BLM from fulfilling this responsibility." The RMPs also refused to consider the pressing issue of 'dust on snow,' which is directly related to the larger phenomenon of climate change. CNE Vernal RMP Protest at 40-51. Thomas H. Painter et al., Impact of Disturbed Desert Soils on Duration of Mountain Snow Cover, Geophysical Research Letters, Vol. 24, L12502 (June 23, 2007); J.C. Neff et al., Increasing Eolian Dust Deposition in the Western United States Linked to Human Activity, Nature Geoscience (Advanced Online Publication – February 24, 2008). The Painter and Neff papers are attached to this Protest as Exhibits 2 and 3, respectively.

The Vernal and Moab DNAs use exactly the same language in their Interdisciplinary Team Checklists to discuss 'greenhouse gas emissions' (presumably as a substitute for the larger issue of climate change) and assert that leasing and development of these tracts will not contribute meaningful amounts of greenhouse gas emissions and that in any event it is too soon to address issue of climate change. Vernal DNA at 13 Interdisciplinary Checklist (Greenhouse Gas Emissions); Moab DNA at Interdisciplinary Checklist (Greenhouse Gas Emissions).

BLM violated NEPA by failing to take a hard look at the issue of climate change and not analyzing either (a) the impacts that oil and gas leasing and development

authorized in the Vernal and Moab RMPs will have on climate change (including dust on snow) or (b) the negative impacts that climate change will have on the land use allocation decisions made in the Vernal and Moab RMPs. BLM also violated NEPA by not accurately describing baseline conditions and thus not accurately analyzing the no-action alternative.

Species Concerns

In addition, the relevant Resource Management Plans, Determinations of NEPA Adequacy and Environmental Assessments do not take a 'hard look' at the potential impacts of the proposed leasing on greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species.

2. <u>BLM Failed to Consider Significant New Information</u>

None of the NEPA documents, to which the leasing is tiered, adequately address the significant new information now available on the status of the greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species.

An "agency must be alert to new information that may alter the results of its original environmental analysis, and continue to take a 'hard look at the environmental effect of [its] planned action, even after a proposal has received initial approval.'" *Friends of the Clearwater v. Dombeck*, 222 F.3d 552, 557 (9th Cir. 2000), quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 374 (1989).

In order to satisfy the "hard look" requirement, the BLM must supplement its existing environmental analyses when new circumstances "raise[] significant new information relevant to environmental concerns . . . ." *Portland Audubon Soc'y v. Babbitt*, 998 F.2d 705, 708 (9th Cir. 2000). Agencies are required to "prepare supplements to either draft or final environmental impacts statements if . . . there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C.F.R. § 1502.9(c)(1)(ii) (2009). The Supreme Court has held that a supplemental EIS must be prepared if "new information is sufficient to show that the remaining action will 'affec[t] the quality of the human environment' in a significant manner or to a significant extent not already considered . . . ." *Marsh v. Or. Natural Res. Council*, 490 U.S. 390, 374 (1989); *see* 42 U.S.C. § 4332(2)(C) (2009). In a recent Utah case, the court held that the "Utah BLM ignored significant new information when it decided to lease the sixteen parcels at issue without first conducting a supplemental

NEPA analysis." *So. Utah Wilderness Alliance v. Norton*, 457 F. Supp. 2d 1253, 1267 (D. Utah 2006). The analysis relied upon failed to reflect significant new information regarding the wilderness characteristics of the parcels at issue. *Id.* Further, in *Center for Native Ecosystem),* the Interior Board of Land Appeals held that once the BLM has identified existing NEPA documents, it is the responsibility of the relevant field office reviewers to determine whether there were ""significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." *Center for Native Ecosystems*, 170 IBLA 331, 346 (2006) ("CNE 1").

The BLM has been provided with significant new information relevant to the potential impacts of the proposed leasing on a number of the special status species at issue here, including, but not limited to: greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species. See the section on affected resources for details on the new information available for some of the aforementioned species. In addition, Center for Native Ecosystems has provided BLM with significant new information on a number of these special status species, in each of our previous protests of BLM oil and gas lease sales, and in our comments submitted during the relevant Resource Management Plan revision processes, and in our recent appeals of BLM's decisions to implement several of the relevant revised Resource Management Plans. Though the BLM has completed new Resource Management Plans or Environmental Assessments, the BLM has still failed to adequately consider all of the significant new information that has been provided to them through our previous protests of oil and gas lease sales, our comments on Environmental Assessments and Resource Management Plans etc. We hereby incorporate the significant new information section in each of our past protests of UT BLM oil and gas lease sales by reference, as well as significant new information provided to BLM in our comments and protests throughout the RMP revision process, and provided to BLM as comments on oil and gas leasing environmental assessments. The BLM must address the significant new information on all of the aforementioned species, in order to comply with NEPA.

3. <u>BLM Failed to Conduct Adequate Direct, Indirect, Cumulative Impacts Analysis</u>

None of the NEPA documents, to which the leasing is tiered, adequately consider the potential direct, indirect, and cumulative effects of oil and gas drilling on greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species, and their habitat.

At a minimum, "the agency's [Environmental Assessment] must give a realistic evaluation of the total impacts and cannot isolate a proposed project, viewing it in a vacuum." *Grand Canyon Trust v. F.A.A.*, 290 F.3d 339, 342 (D.C. Cir. 2002). More specifically, "an environmental impact statement must analyze not only the direct impacts of a proposed action, but also the indirect and cumulative impacts." *Utahns for Better Transp. v. U.S. Dep't of Transp.*, 305 F.3d 1152, 1172 (10th Cir. 2002) (citing *Custer County Action Assoc. v. Garvey*, 256 F.3d 1024, 1035 (10th Cir. 2001)) (internal quotation omitted); *see also* 40 C.F.R. § 1509.25(a)(2) (2009) (scope of EIS is influenced by cumulative actions and impact); *Greenpeace v. Nat'l Marine Fisheries Serv.*, 80 F. Supp. 2d 1137, 1149 (W.D. Wash. 2000) (management plans were unlawful for failing to consider cumulative impacts on species). *Conner v. Burford* holds that the inability at the lease sale stage to fully ascertain effects of development "is not a justification for failing to estimate what those effects might be." *Conner v. Burford*, 848 F.2d 1441 (9th Cir. 1988); *see also Methow Valley Citizens Council*, 490 U.S. 332 (1989).

Cumulative impact is defined 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 regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." 40 C.F.R. § 1508.7 (2009).

For example, the NEPA documents to which the proposed leasing is tiered, do not provide adequate analysis of the potential direct and indirect effects of oil and gas exploration and development on the protested parcels on greater sage-grouse. In addition, the BLM has not adequately analyzed the potential cumulative impacts of oil and gas development, grazing, climate change, oil shale and tar sands development, geothermal development, alternative energy development, off-road vehicle use, and other activities on greater sage-grouse over the life of the Resource Management Plans. The BLM National Sage-Grouse Habitat Conservation Strategy (Nov. 2004) has failed, and BLM has contributed to significant declines in sage-grouse populations across the species' range, and has contributed to the need to list the species under the Endangered Species Act. On December 4, 2007, the Federal District Court for the District of Idaho reversed and remanded the U.S. Fish and Wildlife Service's ("FWS") decision not to list the sage grouse as "threatened" or "endangered" under the ESA. *Western Watersheds Project v. U.S. Forest Service,* 535 F. Sup. 2d 1173 (D. Idaho 2007). The court explained the perilous condition of the sage grouse and the impact suffered by its habitats to date. *Id.* at 1173. Further elaborating on the current state of grouse habitat, the court noted: "Nowhere is sage-grouse habitat described as stable. By all accounts, it is deteriorating, and that deterioration is caused by factors that are on the increase." *Id.* at 1186. The court specifically focused on the impact of oil and gas development on grouse habitat as identified by an independent expert team. *Id.* at 1179. The court noted "a singular lack of data on measures taken by the BLM to protect the sage-grouse from energy development, the single largest risk in the eastern region." *Id.* at 1188. The BLM has failed to adequately protect greater sage-grouse from significant declines on BLM lands across its range, in large part because it has systematically failed to adequately analyze

the direct, indirect and cumulative impacts of oil and gas development, and a variety of other BLM authorized activities, on the greater sage-grouse. An emerging scientific consensus amongst sage-grouse experts suggests that, in order to avoid significant continued declines of greater sage-grouse, BLM must: 1) set aside substantial areas of sage-grouse habitat as reserves free from oil and gas development, and 2) avoid development within breeding, summer and winter habitats, which are essential to the survival of populations, and 3) apply adequate mitigation measures as lease stipulations, to ensure against significant declines in response to energy development in areas outside of core reserves. In this instance the BLM is authorizing leasing of a significant amount of key sage-grouse habitat. Experts recommend avoiding development within breeding and winter habitats, particularly crucial breeding and winter habitats that have been identified as key to the survival of populations. BLM is authorizing oil and gas development within these key habitats, with lease stipulations that are unlikely to prevent significant declines in greater sage-grouse populations in these areas. The best available science on the greater sage-grouse suggests that BLM's lease stipulations (including those attached to the leases at issue here, are inadequate to prevent significant declines of greater sage-grouse in response to large-scale oil and gas development. Please see the references outlined in the Affected Resources section of this protest for details. BLM failed to conduct an adequate NEPA analysis of the proposed leasing. BLM's conclusion that sale of the leases at issue here, will not significantly impact the greater sage-grouse, is arbitrary and capricious.

Similarly, the BLM has not adequately consider the direct, indirect and cumulative impacts of oil and gas leasing and subsequent development on white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species. The BLM must address the effects of direct, indirect, and cumulative impacts of oil and gas leasing on the all of these special status species, in a NEPA document in order to comply with NEPA.

4. BLM Failed to Address an Adequate Range of Alternatives

The purpose of NEPA's alternatives requirement is to ensure that agencies do not undertake projects "without intense consideration of other more ecologically sounds courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means." *Envtl. Def. Fund, Inc. v. U.S. Army Corps of Eng'rs*, 492 F.2d 1123, 1135 (5th Cir. 1974); *see also Or. Envtl. Council v. Kunzman*, 614 F. Supp. 657, 660 (D. Or. 1985) (stating that the alternatives that must be considered under NEPA are those that would 'avoid or minimize' adverse environmental effects.) Federal agencies shall "use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment." 40 C.F.R. § 1500.2(e). Alternatives should include

reasonable alternatives to a proposed action that will accomplish the intended purpose, are technically and economically feasible, and yet have a lesser impact. *Headwaters, Inc. v. BLM*, 915 F.2d 1174, 1180-81 (9th Cir. 1990); *City of Aurora v. Hunt*, 749 F.2d 1457, 1466-67 (10th Cir. 1984).

In *Pennaco Energy,* the Tenth Circuit upheld the IBLA's ruling, which overturned BLM's decision to lease a number of parcels for oil and gas development because the NEPA analysis failed to consider an adequate range of alternatives. *Pennaco Energy, Inc. v. Dept. of Interior*, 377 F.3d 1147, 1150) (10th Cir. 2004). The court stated "in order to provide 'a clear basis for choice among options by the decision maker and the public,' an agency's EIS must consider the "no action" alternative." *Id.* at 1150; 40 C.F.R. § 1502.14(d) (EIS shall "[i]nclude the alternative of no action"). The court found that "the EIS did not consider reasonable alternatives available in a leasing decision, including whether specific parcels should be leased, appropriate lease stipulations, and NSO and non-NSO areas." *Pennaco,* 377 F.3d at 1154.

BLM must consider a "reasonable range of alternatives," in a site-specific NEPA analysis of leasing of each of the protested parcels. The BLM should analyze an adequate range of alternatives, including for example, permanently suspending leasing in key habitat for rapidly declining species that may be significantly impacted by oil and gas development at a landscape scale, applying 'no surface occupancy' stipulations to key habitat for special status species and in areas of high conservation value, and conducting phased leasing in key habitat for special status species. When new research suggests that existing lease stipulations are ineffective, and that alternative lease stipulations might better minimize impacts of oil and gas exploration and development on a particular special status species, or other sensitive resources, the BLM should consider a range of alternatives that include application of any such alternative lease stipulations.

In the present case, BLM must consider a "reasonable range of alternatives," including a no-action alternative, in site-specific NEPA analysis. The relevant NEPA documents do not contain an adequate range of alternatives to explore the best ways to minimize impacts of the proposed leasing to special status species, including greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species. For example, BLM's own National Sage-Grouse Habitat Conservation Strategy (cited above) obligates the agency to consider an alternative in its land management planning processes that would maximize sage-grouse conservation. Such an alternative would very likely require more protective stipulations for sage-grouse in all oil and gas leasing situations than the BLM currently provides.

5. <u>BLM Must Conduct NEPA Analysis Prior to Making an Irretrievable and Irreversible Commitment of Resources</u>

NEPA analysis must be conducted prior to a federal action that would result in an "irreversible and irretrievable commitment of resources." *Mobile Oil Corp. v. F.T.C.*, 562 F.2d 170, 173 (2d. Cir. 1977). Doing otherwise "would frustrate the fundamental purpose of the National Environmental Policy Act . . . which is to ensure that federal agencies take a 'hard look' at the environmental consequences of their actions, early enough so that it can serve as an important contribution to the decision making process." *Sierra Club v. Bosworth*, 510 F.3d 1016, 1026 (9th Cir. 2007). Leasing without a No Surface Occupancy ("NSO") stipulation has on-the-ground consequences and is an "irreversible and irretrievable commitment of resource," which requires NEPA analysis. *So. Utah Wilderness Alliance*, 166 IBLA 270, 276-77 (2005). In *Conner v. Burford*, the court addressed oil and gas leasing in the Flathead and Gallatin National Forests. 848 F.2d 1441 (9th Cir. 1988). That case mandates an EIS at the lease sale stage, even though it is difficult to ascertain whether, or where, drilling activity might occur. *Id.* at 1451; *see also Pennaco Energy, Inc. v. U.S. Dep't of Interior*, 377 F.3d 1147, 1160 (10th Cir. 2004). In a more recent Tenth Circuit case the court stated that "assessment of all 'reasonably foreseeable' impacts must occur at the earliest practicable point, and must take place before an 'irretrievable commitment of resources' is made." *N.M. ex rel Richardson v. BLM*, 565 F.3d 683, 717-18 (10th Circuit 2009). The Court went on to conclude that the issuance of an oil and gas lease without an NSO stipulation constituted such a commitment of resources. *Id.* at 718.

6. <u>Site-Specific NEPA Analysis Required Prior to Leasing</u>

Lease issuance is the point at which there has been an irretrievable and irreversible commitment of resources, therefore, "the appropriate time for considering the potential impacts of oil and gas exploration and development is when BLM <u>proposes to lease public land for oil and gas purposes</u> . . . ." *Ctr. for Native Ecosystems*, 170 IBLA 345 (2006) (emphasis added); *see also So. Utah Wilderness Alliance (SUWA)*, 166 IBLA 270, 276-77 (2005); *Sierra Club v. Peterson*, 717 F.2d 1409 (D.C.Cir. 1983) (concluding that an EIS must be prepared when the lease is issued); *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223 (9th Cir. 1988). In *Park County*, the court permitted the agency to forego preparation of an EIS when it had previously prepared an extensive environmental assessment covering the leases in question. *Park County Resource Council v. U.S. Dep't of Agric.*, 817 F.2d 609, 624 (10th Cir. 1987). That holding does not preclude BLM from preparing an EIS at the pre-leasing stage. *Pennaco Energy, Inc. v. U.S. Dep't of the Interior*, 377 F.3d 1147, 1162 (10th Cir. 2004). Rather, that holding is limited to cases where the agency prepared an "extensive" environmental assessment covering the leases in question. *Id.*

The BLM has not conducted a detailed site specific NEPA analysis of the impacts of oil and gas development in and adjacent to each protested parcel, on greater sage-grouse, Uinta Basin hookless cactus, black-footed ferret, white-tailed prairie dog, kit fox, burrowing owl, yellow-billed cuckoo, ferruginous hawk, bald eagle, roundtail chub, bluehead sucker, razorback sucker, flannelmouth sucker, Colorado pikeminnow, Maguire daisy, Last Chance Townsendia, Winkler's pincushion cactus, Despain pincushion cactus (San Rafael cactus), Wright fishhook cactus, and other special status species.

a. DNA's Cannot Substitute for Site-specific NEPA Analysis

"'DNAs, unlike EAs and [Findings of No Significant Impact], are not mentioned in [ ] NEPA or in the regulations implementing [ ] NEPA'. . . . Thus, DNAs are not themselves documents that may be tiered to NEPA documents, *but are used to determine the sufficiency of previously issued NEPA documents.*" *SUWA v. Norton*, 457 F. Supp. 2d 1253, 1262 (2006) (emphasis supplied); *Southern Utah Wilderness Alliance,* 164 IBLA at 123 (quoting *Pennaco,* 377 F.3d at 1162).

7. NEPA Requires Analysis of Effectiveness of Mitigation Measures, BLM's FONSI is Arbitrary and Capricious.

A complete discussion of steps that can be taken to mitigate adverse environmental impacts is an important ingredient of the NEPA process. *Robertson v. Methow Valley Citizens Council,* 490 U.S. 332, 351 (1989). "Without such a discussion, neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects." *Id.* In recognition of the importance of a discussion of mitigation measures, Council on Environmental Quality (CEQ) regulations "require that the agency discuss possible mitigation measures in defining the scope of the EIS, 40 CFR § 1508.25(b), in discussing alternatives to the proposed action, § 1502.14(f), and consequences of that action, § 1502.16(h), and in explaining its ultimate decision, § 1505.2(c)." *Id.* at 352.

a. FONSI Must be Based on NEPA Analysis of Effectiveness Unless the Leases Have NSO Stipulations

When a proposed action will result in impacts to resources, the Agency is obligated to describe what mitigating efforts it could pursue to off-set the damages that would result from the proposed action. *See* 40 C.F.R. § 1502.16(h) (stating that an EIS "shall include discussions of . . . [m]eans to mitigate adverse environmental impacts"). "Mitigation must 'be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated.'" *Carmel-the-Sea v. U.S. Dep't of Transp.*, 123 F.3d 1142, 1154 (9th Cir 1997) (quoting *Robertson v. Methow Valley Citizens Council,* 490 U.S. 332, 353 (1989)).

Agencies must "analyze the mitigation measures in detail [and] explain how effective the measures would be . . . . [a] mere listing of mitigation measures is insufficient to qualify as the reasoned discussion required by NEPA." *Northwest Indian Cemetery Protective Ass'n v. Peterson*, 764 F.2d 581, 588 (9th Cir. 1985), *rev'd on other grounds*, 485 U.S. 439 (1988). When an agency acknowledges that a proposed project will negatively impact a species, the agency must identify mitigation measures that decrease the negative impacts to the species in the area in question, provide and estimate of how effective the mitigation measures would be if adopted, or give a reasoned explanation as to why such an estimate is not possible. *Neighbors of Cuddy Mountain v.*

U.S. Forest Service, 137 F.3d 1372, 1381 (9th Cir. 1998). Further, the agency must make it clear that the mitigating measures in question will be adopted. *Id.*

In *Neighbors of Cuddy Mountain v. United States Forest Service* the court found that while the U.S. Forest Service ("USFS") had acknowledged that a proposed timber sale would negatively impact the redband trout by increasing sedimentation levels, the EIS prepared by the USFS did not identify which (or whether) mitigation measures might decrease sedimentation in the creeks affected by the sale. *Id.* Further, the court noted that "it is also not clear whether any mitigating measures would in fact be adopted. Nor has the Forest Service provided an estimate of how effective the mitigation measures would be if adopted, or given a reasoned explanation as to why such an estimate is not possible." *Id.* Further, the court found that "The Forest Service's broad generalizations and vague references to mitigation measures in relation to the streams affected by the Grand/Dukes project do not constitute detail as to mitigation measures that would be undertaken, and their effectiveness, that the Forest Service is required provide." *Id.*

None of the NEPA documents that the proposed leasing is tiered to contain an analysis of the likely effectiveness of mitigation measures applied as lease stipulations, lease notices, or conditions of approval of APDs, in mitigating impacts to greater sage-grouse, Uinta Basin hookless cactus, black-footed ferret, white-tailed prairie dog, kit fox, burrowing owl, yellow-billed cuckoo, ferruginous hawk, bald eagle, roundtail chub, bluehead sucker, razorback sucker, flannelmouth sucker, Colorado pikeminnow, Maguire daisy, Last Chance Townsendia, Winkler's pincushion cactus, Despain pincushion cactus (San Rafael cactus), Wright fishhook cactus, and other special status species.

Merely listing mitigation measures, without analyzing the effectiveness of the measures, is contrary to NEPA. *Northwest Indian Cemetery Protective Ass'n v. Peterson*, 764 F.2d 581, 588 (9th Cir. 1985*), rev'd on other grounds*, 485 U.S. 439 (1988). The BLM must evaluate the effectiveness of the mitigation measures used in oil and gas leasing with the best available science. "The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA." 40 C.F.R. §1500.1(b). The BLM is required to use "best available science and supporting studies conducted in accordance with sound and objective scientific practices." Thus, if there is scientific uncertainty NEPA imposes the mandatory duties to (1) disclose the scientific uncertainty; (2) complete independent research and gather information if no adequate information exists unless costs are exorbitant or the means of obtaining the information are not known; and (3) evaluate the potential, reasonably foreseeable impacts in the absence of relevant information. *See* 40 C.F.R. §1502.22. The BLM has not met these obligations with respect to the mitigation measures applied to the protested parcels to protect greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species. In fact, in a number of instances (e.g. greater sage-grouse), BLM continues to use mitigation measures that

have been demonstrated to be completely ineffective at mitigating impacts of oil and gas development to insignificance, and has not disclosed this fact, or evaluated the potential impacts of the proposed leasing on the species in question, given this fact.

The BLM is "proceeding in the face of uncertainty," contrary to the NEPA regulations. *Save Our Ecosystems v. Clark*, 747 F.2d at 1244.

None of the NEPA documents to which the proposed leasing is tiered, include an adequate analysis of likely effectiveness of the mitigation measures applied as lease notices and stipulations to protect the special status species, nominated ACECs and other sensitive resources that occur in the protested parcels.

For example, there is a broad scientific consensus that the lease stipulations applied to mitigate impacts to greater sage-grouse are ineffective, and will not prevent significant declines in greater sage-grouse populations in response to oil and gas development on the protested parcels. None of the NEPA documents to which the proposed leasing is tiered, provide an adequate analysis of the effectiveness of the mitigation measures proposed to protect greater sage-grouse from significant impacts associated with oil and gas development, particularly given the scientific consensus that these mitigation measures are inadequate. The BLM's conclusion that these mitigation measures will mitigate impacts of the oil and gas development authorized by this lease sale on greater sage-grouse to insignificance, is arbitrary and capricious.

Generally speaking, BLM's lease notices and stipulations may begin to minimize direct impacts, but are utterly incapable of preventing significant cumulative impacts to all of the special status species at issue here. In the case of nearly all of the rare and imperiled species at issue here, BLM proposes measures aimed at preventing direct impacts, but fails to address the impacts of habitat loss and fragmentation due to oil and gas development and other activities across the range of each species on BLM lands. None of BLM's lease stipulations and notices address the indirect and cumulative impacts of oil and gas development on greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species.

Due to concern that increasing oil and gas development in the Vernal Field Office may result in contamination of critical habitat for the four endangered Colorado Fish Species, FWS suggested that BLM require contaminant monitoring at major drainage intersections upstream from and within critical habitat for these species, as part of the lease stipulation for oil and gas lease parcels proposed for sale upstream of critical habitat. BLM has failed to require the contaminant monitoring requested by FWS.

Despite evidence that suggests mitigation measures may not mitigate impacts to insignificance, BLM provides little or no rational for its assertion that assorted lease

stipulations, notices and COAs will mitigate impacts to insignificance. The record is devoid of support for BLM's assertion that the lease stipulations and notices applied to the protested parcels, will mitigate impacts to special status species to insignificance.

b. BLM Must Demonstrate That Mitigation Measures Will Actually Be Implemented

NEPA requires that the "possibility of mitigation" should not be relied upon as a means to avoid further environmental analysis. *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*; *see Davis v. Mineta*, 302 F.3d 1104, 1125 (10th Cir. 2002). The Tenth Circuit found that the "Forty Questions" are "persuasive authority offering interpretive guidance" on NEPA. *Id.*

Many of the lease notices and stipulations applied to protect special status species at issue here (greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, and grizzly bear) contain language that allows them to be waived, but the conditions under which they may be waived are not clearly spelled out in the lease stipulations, leaving the public with little certainty regarding whether and under what circumstances the mitigation measures will actually be implemented. For example, the mitigation measures for greater sage-grouse can be waived if "...the lessee/operator demonstrates that adverse impacts can be mitigated." This language is so general that it may allow notices and stipulations to be waived under a wide range of circumstances, making it unclear when exactly the mitigation measures will be required, and under what specific circumstances they might be waived.. In addition, a number of the protested parcels do not contain any stipulations to protect one or more of the aforementioned special status species that occur on the parcel.

c. NEPA Analysis of Effectiveness of Mitigation Measures Must Have Scientific Integrity

The BLM must evaluate the effectiveness of the mitigation measures used in oil and gas leasing with the best available science. "The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA." 40 C.F.R. § 1500.1(b) (2009). "For this reason, agencies are under an affirmative mandate to 'insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements[,] identify any methodologies used and . . . make explicit reference by footnote to the scientific and other sources relied upon for conclusions[.]'" *Envtl. Def. v. U.S. Army Corps of Eng'rs*, 515 F. Supp. 2d 69, 78 (D.D.C. 2007) (citing 40 C.F.R. § 1502.24 (2009)). If there is scientific uncertainty NEPA imposes the mandatory duties to (1) disclose the scientific uncertainty; (2) complete independent research and gather information if no adequate information exists unless costs are exorbitant or the means of obtaining the information

are not known; and (3) evaluate the potential, reasonably foreseeable impacts in the absence of relevant information. *See* 40 C.F.R. § 1502.22 (2009).

The BLM is ignoring the best available science on the impacts of oil and gas development on special status species, and the adequacy of proposed mitigation measures with respect to greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species.

8. BLM Must Appropriately Address Expert Comments

Federal regulations require that agencies "make every effort to disclose and discuss at appropriate points in the draft statement all major points of view on the environmental impacts of the alternatives including the proposed action." 40 C.F.R. § 1502.9(a) (2009). The agency is required consider opposing views prior to approving any proposed action, in this case the lease sale. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350n.13(1989) (EIS should reflect critical views of other to whom copies of the draft were provided and responses to opposing views); *see also Seattle Audubon Society v. Lyons*, 871 F. Supp. 1291, 1318 (W.D. Wash. 1994) ("[An EIS] must also disclose responsible scientific opinions in opposition to the proposed action, and make a good faith, reasoned response to it."). In the final environmental impact statement, BLM must assess and consider comments, respond to each comment by one or more of the provided means, and state its responses. 40 C.F.R. § 1503.4 (2009).

The BLM has not appropriately dealt with expert comments on the potential impacts of the proposed leasing and the inadequacy of mitigation measures proposed to protect greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species. We have provided BLM with information on the inadequacy of mitigation measures proposed for the species at issue here on numerous instances in the past, including information developed by experts on these species. BLM's failure to disclose and thoroughly respond to differing scientific views violates NEPA.

B. Federal Land Policy and Management Act

1. BLM Must Prevent Unnecessary and Undue Degradation

The BLM has a duty under the Federal Land Policy and Management Act ("FLPMA") to prevent unnecessary and undue degradation to the lands under its

management. "In managing the public lands the [Secretary of Interior] shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands." 43 U.S.C. § 1732(b). "The court in *Mineral Policy Center v. Norton* [found] that in enacting FLPMA, Congress's intent was clear: Interior is to prevent, not only unnecessary degradation, but also degradation that, while necessary . . . is undue or excessive.") *Mineral Policy Center v. Norton*, 292 F.Supp.2d 30, 43 (D.D.C. 2003). In addition, that court held that "FLPMA, by its plain terms, vests the Secretary of the Interior with the authority – and indeed the obligation – to disapprove of an otherwise permissible . . . operation because the operation though necessary . . . would unduly harm or degrade the public land." *Id.* at 49.

Leasing the protested parcels will result in unnecessary and undue degradation to the following special status species and their habitats: greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, and grizzly bear.

2. <u>BLM Must Mitigate Adverse Effects</u>

The BLM must minimize the adverse effects on greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species that occur in the protested parcels, in order to comply with the "unnecessary and undue degradation" standard of FLPMA. "[T]he using department shall . . . minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved. 43 U.S.C. §1732(d)(2)(a). "If there are significant environmental effects that cannot be mitigated, an EIS must be prepared even if there is no unnecessary or undue degradation of the public lands." *Kendall's Concerned Area Residents*, 129 IBLA 130, 138 (1994); 42 U.S.C. § 4332(2)(C) (1988). "If there is unnecessary or undue degradation, it must be mitigated." *Kendall's Concerned Area Residents*, at 138; *see* 43 CFR 3809.2-1(b). "If unnecessary or undue degradation cannot be prevented by mitigating measures, BLM is required to deny approval of the plan." *Kendall's Concerned Area Residents*, at 138; *see* 43 CFR § 3809.0-3(b); *Department of the Navy*, 108 IBLA 334, 336 (1989); *see* 43 U.S.C. § 1732(b) (1988); 43 CFR § 3809.0-5(k).

The BLM has failed to do so.

In the case of the greater sage-grouse, the BLM has further committed to the principles of the Western Association of Fish and Wildlife Agencies' Greater Sage-

Grouse Conservation Assessment. These principles include a commitment not to contribute to the species' decline.

3. BLM Has Failed to Protect Sensitive Species as Required

We are aware that BLM recently completed a revision of Section 6840 of the BLM manual. This revision was illegal, and will likely be overturned by Congress and/or the Obama administration. Thus, BLM should implement the previous version of section 6840 of the BLM manual. The following paragraphs summarize BLM's requirements under the previous version of Section 6840 of the BLM manual.

Instruction Memorandum 97-118, issued by the national BLM office, governs BLM Special Status Species management and requires that actions authorized, funded, or carried out by BLM do not contribute to the need for any species to become listed as a candidate, or for any candidate species to become listed as threatened or endangered. It recognizes that early identification of BLM sensitive species is advised in efforts to prevent species endangerment, and encourages state directors to collect information on species of concern to determine if BLM sensitive species designation and special management are needed.

If Sensitive Species are designated by a State Director, the protection provided by the policy for candidate species shall be used as the minimum level of protection. BLM Manual 6840.06. The policy for candidate species states that the "BLM shall carry out management, consistent with the principles of multiple use, for the conservation of candidate species and their habitats and shall ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened/endangered." BLM Manual 6840.06. Specifically, BLM shall:

(1) Determinate the distribution, abundance, reasons for the current status, and habitat needs for candidate species occurring on lands administered by BLM, and evaluate the significance of lands administered by BLM or actions in maintaining those species.
(2) For those species where lands administered by BLM or actions have a significant affect on their status, manage the habitat to conserve the species by:
    a. Including candidate species as priority species in land use plans.
    b. Developing and implementing rangewide and/or site-specific management plans for candidate species that include specific habitat and population management objectives designed for recovery, as well as the management strategies necessary to meet those objectives.
    c. Ensuring that BLM activities affecting the habitat of candidate species are carried out in a manner that is consistent with the objectives for those species.
    d. Monitoring populations and habitats of candidate species to determine whether management objectives are being met.

(3) Request any technical assistance from FWS/NMFS, and any other qualified source, on any planned action that may contribute to the need to list a candidate species as threatened/endangered.

BLM Manual 6840.06. Despite this clear guidance, there is little evidence that BLM is fulfilling these obligations. Specifically, BLM failed to: 1) conduct surveys and/or inventories necessary to determine the distribution and abundance of Sensitive Species; 2) failed to assess the reasons for the current status of Sensitive Species; 3) failed to evaluate the potential impacts of leasing and subsequent oil and gas activities on Sensitive Species; 4) develop conservation strategies for Sensitive Species and ensure that the activities in question are consistent with those strategies; 5) monitor populations and habitats of Sensitive Species; and 6) request appropriate technical assistance from all other qualified sources; for any of the sensitive species at issue here. This failure has compromised BLM's NEPA analyses of the likely impacts of oil and gas development authorized by the leasing of the protested parcels, on greater sage grouse (including the Myton Bench crucial breeding area), white-tailed prairie dog, black-footed ferret (including designated black-footed ferret management areas), burrowing owl, short-eared owl, bald eagle, ferruginous hawk, long-billed curlew, yellow-billed cuckoo, Bluehead sucker, flannelmouth sucker, razorback sucker, roundtail chub, bonytail, Colorado pikeminnow, kit fox, grizzly bear, and other special status species.

4. <u>BLM has failed to adequately consider ACEC nominations</u>

This protest includes areas that have been nominated as Areas of Critical Environmental Concern ("ACEC"). CNE nominated several areas that may be included in this lease sale as ACECs to protect white-tailed prairie dog habitat. Protested parcels that contain white-tailed prairie dog habitat may be within areas that CNE nominated as ACECs. These areas were nominated as ACECs because of their relevance and importance as key habitat for white-tailed prairie dog, black-footed ferret and other species associated with white-tailed prairie-dogs, and because of their value as recovery habitat for this species. We hereby incorporate by reference CNE's white-tailed prairie dog ACEC nominations and all the references they contain. FLPMA and the BLM Manual are clear that Field Managers are required to determine whether nominated areas meet the relevance and significance criteria for ACEC designation and then decide whether interim management is necessary. The BLM did not respond to all of our ACEC nominations, and has not considered the impacts of oil and gas leasing and development on the resources for which these ACECs would be designated. We incorporate all of our comments on and protests of the relevant Resource Management Plans by reference. By not protecting this habitat, the BLM is contributing to the need to list the white-tailed prairie dog, black-footed ferret and other species associated with white-tailed prairie dogs, and is in violation of the BLM Manual.

NEPA regulations require that, while BLM is in the process of an EIS, such as during revision or amendment of a RMP, the agency must not take any action concerning a proposal that would "[l]imit the choice of reasonable alternatives." 40 C.F.R. § 1506.1. *See also* 40 C.F.R. § 1502.2(f) (while preparing environmental impact statements, federal

agencies "shall not commit resources prejudicing selection of alternatives before making a final decision"). BLM has historically interpreted this NEPA regulation to require that proposed actions that could prejudice selection of any alternatives under consideration "should be postponed or denied" in order to comply with 40 C.F.R. § 1506.1, and the Land Use Planning Handbook previously contained this direction. Another section of this same regulation directs that while BLM is preparing a required EIS "and the [proposed] action is not covered by an existing program statement," then BLM must not take any actions that may "prejudice the ultimate decision on the program." 40 C.F.R. § 1506.1(c). The regulation continues that "[i]nterim action prejudices the ultimate decision on the program when it tends to determine subsequent development <u>or limit alternatives</u>." *Id.* (emphasis added).

Granting valid and existing rights in these parcels before ACEC designation is fully considered and management prescriptions are developed could both adversely impact the environment and limit the choice of reasonable alternatives for the management of these areas. These parcels should be withdrawn until the nominated ACECs are evaluated and management prescriptions are developed. ACECs may be nominated even when plan revision is not in progress, and a preliminary evaluation should take place after receiving such a nomination. The District Manager may determine that either a plan amendment or temporary management is required.

> If an area is identified for consideration as an ACEC and a planning effort is not underway or imminent, the District Manager or Area Manager <u>must</u> make a preliminary evaluation on a timely basis to determine if the relevance and importance criteria are met. If so, the District Manager **must** initiate either a plan amendment to further evaluate the potential ACEC or provide temporary management until an evaluation is completed through resource management planning. Temporary management includes those reasonable measures necessary to protect human life and safety or significant resource values from degradation until the area is fully evaluated through the resource management planning process. BLM Manual 1613.21.E (emphasis added).

> The public has an opportunity to submit nominations or recommendations for areas to be considered for ACEC designation. Such recommendations are actively solicited at the beginning of a planning effort. However, nominations may be made at any time and <u>must</u> receive a preliminary evaluation to determine if they meet the relevance and importance criteria, and, therefore, warrant further consideration in the planning process....BLM Manual 1613.41 (emphasis added).

The presence of oil and gas leases should have no bearing on whether an area meets the criteria for ACEC designation, but may prejudice the development of ACEC management prescriptions. BLM Manual 1613.22.A states:

Identify Factors Which Influence Management Prescriptions....These factors are important to the development of management prescriptions for potential ACEC's. Factors to consider include, but are not limited to, the following:....
8. Relationship to existing rights. What is the status of existing mining claims or pre-FLPMA leases? How will existing rights affect management of the resource or hazard?

CNE strongly believes that temporary management is required to preserve the values of these areas as potential ACECs. Instead of approving leasing of key wildlife habitat -- and opening the floodgates for a wave of new APDs on these sensitive lands, the BLM should focus on evaluating our ACEC nominations in a timely fashion and managing exploration and development under *existing* leases.

It simply makes no sense for the BLM to waste its opportunity to designate ACECs that could help conserve white-tailed prairie dogs, black-footed ferrets and other special status species. Not only is this poor judgment, it is also a violation of NEPA, FLPMA, and the BLM Manual.

BLM presently has the opportunity to plan for rational, environmentally sound development of energy resources in the nominated ACECs while protecting other uses of these lands—as required by law. Allowing leasing prior to ACEC evaluation and RMP revision will sacrifice this opportunity – without taking a hard look at the consequences. BLM and the public will have lost the chance to prevent the haphazard, poorly planned development that has characterized other federal lands in the Rockies. As an irretrievable commitment of resources, leasing will severely limit the range of management prescriptions.

5. BLM Must Conduct Air Quality Modeling Before Selling the Vernal and Moab Leases[1]

Neither the Vernal nor Moab RMP/EISs conducted the sort of quantitative air quality modeling of all criteria pollutants that is required by FLPMA and NEPA prior to selling the following five parcels: UTU0510-034, UTU0510-35, UTU0510-36, UTU0510-37, and UTU0510-38.

FLPMA requires BLM to ensure that its approval of oil and gas development comply with all applicable air quality standards. 43 U.S.C. § 1712(c)(8); 43 C.F.R. § 2920.7(b)(3). These air quality standards include both the national ambient air quality standards (NAAQS) and the prevention of significant deterioration (PSD) increment limits created by the Clean Air Act. These standards are based on ambient concentrations of various air pollutants. BLM is obligated under the Clean Air Act to ensure that any activity it approves will not violate air quality standards such as NAAQS.

[1] This section details violations of FLPMA as well as NEPA's 'hard look' mandate.

NEPA requires that BLM model the impacts from the various activities—and fully inventory the pollutants generated by these activities—permitted by the Vernal and Moab RMPs. "NEPA 'prescribes the necessary process' by which federal agencies must 'take a "hard look" at the environmental consequences' of the proposed courses of action." *Pennaco Energy, Inc. v. U.S. Dept. of the Interior*, 377 F.3d 1147, 1150 (10th Cir. 2004). To comply with NEPA's "hard look" requirement, BLM must explain how its actions will or will not comply with environmental laws and policies. 40 C.F.R. § 1502.2(d); 40 C.F.R. § 1508.27(b). The fundamental objective of NEPA is to ensure that an "agency will not act on incomplete information only to regret its decision after it is too late to correct." *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1990).

To comply with NEPA, prior to selling oil and gas leases BLM must thoroughly analyze whether air pollution from the oil and gas development authorized will exceed relevant air quality standards or have adverse impacts on public health or national parks and must support its conclusions with relevant evidence. BLM has not done so.

With regard to the four Vernal parcels (UTU0510-034, UTU0510-35, UTU0510-36, and UTU0510-37), the Vernal DNA asserts that the Vernal RMP "included an air quality model to determine the impact of exploration activities in the Uinta Basin on Air Quality." Vernal DNA at 12 (Interdisciplinary Team Checklist). This is incorrect. The Vernal RMP/EIS did not conduct quantitative air quality dispersion modeling for ozone, a criteria pollutant under the Clean Air Act. The Vernal DNA also states that "[a] more comprehensive analysis with updated emissions inventory data was run for the Uinta Basin Air Quality Study. No exceedances of [NAAQS] were modeled for exploration activities." Vernal DNA at 12. This is incorrect for two reasons. First, the UBAQS study did in fact model exceedances of ozone. *See* Environ, Uinta Basin Air Quality Study (UBAQS) TS-28, TS-29, 3-153 (June 30, 2009) (showing exceedances in the Vernal Field Office area based on 2006 meteorological data). Second, a recent letter from the Environmental Protection Agency states that recent air quality modeling in the Uinta Basin confirms several exceedances of NAAQS for PM 2.5; the UBAQS analysis did not make use of this monitored data. EPA's letter is attached to this Protest as Exhibit 4. Because BLM ignored ozone pollution and did not conduct the required quantitative analysis in violation of FLPMA and NEPA it may not offer these four parcels for sale at the May 2010 oil and gas lease sale.

With regard to Moab parcel UTU0510-37, the Moab DNA states that "[a]ir quality was analyzed using a qualitative comparative emissions analysis in the RMP and BLM determined that there would be no significant effect to air quality or air quality related values based on the reasonable foreseeable development scenario provided in the analysis." Moab DNA at unnumbered page 4 and Interdisciplinary Team Checklist. Because the Moab RMP/EIS did not conduct quantitative air quality analysis for any criteria pollutants there is no basis for BLM's claim that leasing and development will have "no significant effect to air quality or air quality related values." Although the RMP/EIS concedes that oil and gas development will increase air pollution, including pollutants subject to NAAQS standards such as particulate matter, sulfur dioxide, and nitrogen oxides, it did not consider how that pollution will concentrate or disperse in the

atmosphere. The National Park Service confirmed as much in comments it submitted to BLM over an earlier lease sale: "The air quality analyses that BLM has performed to date do not provide the information necessary to determine whether air quality standards could be violated, or if visibility and other AQRVs could be adversely impacted. We believe a study using appropriate air quality models, and considering all other regional sources, needs to be done prior to lease offerings to determine whether additional safeguards are needed to keep the area as attainment and protect AQRVs." The National Park Service's letter is attached to this Protest as Exhibit 5. Because BLM did not conduct the required quantitative analysis in violation of FLPMA and NEPA it may not offer this parcel for sale at the May 2010 oil and gas lease sale.

C. Endangered Species Act

1. Consultation

Before the BLM makes any "irreversible or irretrievable commitment of resources" that may have an impact on a listed species, ESA § 7 requires it to comply with consultation requirements. BLM is required to prepare a biological assessment (BA) to determine whether the listed species is "likely to be affected" by the proposed action. 16 U.S.C. § 1536(c)(1); 50 C.F.R. § 402.12. If the species will be affected, then BLM must engage in formal consultation with FWS to determine whether the activity "is likely to jeopardize the continued existence of" the species or "result in the destruction or adverse modification of" its critical habitat. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14; *see also* 50 C.F.R. §402.02 (defining "jeopardy" as lessening the likelihood of survival and recovery of a species). At the conclusion of consultation, the FWS must prepare a "biological opinion" (BO) to evaluate the potential effects of the proposed action on the species or its critical habitat. If the Service concludes that the action will have a negative effect, it must suggest "reasonably and prudent alternatives" (RPAs) that will not cause jeopardy. Otherwise, the Service issues a "no jeopardy" opinion. 16 U.S.C. § 1535(b)(4). The Tenth Circuit stated that "despite its name, consultation is more than a mere procedural requirement, as it allows FWS to impose substantive constraints on the other agency's action if necessary to limit the impact upon an endangered species." *N.M. ex rel. Richardson v. BLM*, 565 F.3d 683 (10th Cir. 2009).

The consultation process is triggered by the action of leasing because it is likely to have an affect on the black-footed ferret, the yellow-billed cuckoo, and the four Colorado River fish species. *See Conner v. Burford*, 848 F.2d 1441, 1452 (1988). In *Connor*, the BLM could not issue oil and gas leases until the FWS analyzed consequences of all stages of the leasing plan in the Biological Opinion ("BiOp"). *Id.* at 1455. ESA's consultation requirement is not met by "incremental steps" and by mere notification of the potential presence of endangered species. *Id.* at 1452-58. Contrary to the BLM position that relies upon *Wyo. Outdoor Council v. Bosworth*, the Tenth Circuit stated that the critical stage for environmental analysis is the leasing stage, not the APD stage. *Pennaco Energy v. U.S. Dep't of the Interior*, 377 F.3d 1160 (10th Cir. 2004).

Under the ESA, the BLM must consult with FWS before offering parcels for lease because several species listed under the Act, including but not limited to the bald eagle, black-footed ferret, and Uinta Basin hookless cactus may be jeopardized by oil and gas development authorized through leasing of the protested parcels.

The FWS issued Biological Opinions for the recently released Resource Management Plans to which the leasing of the majority of the protested parcels is tiered. These BO's conclude that oil and gas development authorized under the Resource Management Plans will not jeopardize species listed under the Endangered Species Act. However, this conclusion is arbitrary and capricious. The BOs do not provide an adequate analysis of the indirect and cumulative impacts of oil and gas leasing on the survival and recovery of listed species, including black-footed ferret, yellow-billed cuckoo, and the four endangered Colorado River fish species. Such an analysis must include the cumulative impacts of oil and gas development that occurs not only on parcels occupied by listed species, but also on adjacent parcels. In addition, the BOs do not include an adequate analysis of the likely effectiveness of mitigation measures applied through lease stipulations and lease notices, at mitigating impacts such jeopardy to the survival or recovery of these species is avoided. In addition, the BO's largely rely on lease stipulations and notices that were developed as part of earlier consultation processes done at a time when the reasonable foreseeable oil and gas development in the region was expected to be much lower, and there was less information suggesting that oil and gas development might jeopardize listed species. The BO's did not adequately update the lease notices and stipulations in response to new circumstances and new information.

Finally, in addition to the programmatic consultation provided by the BOs, the BLM and FWS must conduct site-specific consultation at the leasing stage that considers not only direct impacts to species on lease parcels, but also indirect and cumulative impacts to listed species and their habitat both on lease parcels and on adjacent lands. The BLM and FWS must consider not only impacts to survival of the species, but also impacts to recovery. The BLM and FWS have failed to meet these requirements under the ESA with respect to black-footed ferret, yellow-billed cuckoo, and the four endangered Colorado River fish species.

2. <u>Duty to Conserve and Duty to Engage in Recovery Planning</u>

In addition to consultation requirements, federal agencies are bound by two affirmative obligations under the ESA. Section 7(a)(1) states that federal agencies shall "seek to conserve [listed] species and shall utilize their authorities in furtherance of the purposes of [the] Act." 16 U.S.C. § 1536(a)(1). A number of courts have held that the duty to conserve imposes an independent duty upon agencies to give the conservation of a listed species top priority. *Carson-Truckee Water Conserv. Dist. v. Watt*, 549 F. Supp. 704 (D. Nev. 1982) *citing TVA v. Hill*, 437 U.S. 153, 184 (1978); *Bensman v. U.S. Forest Serv.*, 984 F. Supp. 1242, 1246 (D. Mont. 1997). The ESA also states that the Secretary "shall develop and implement plans for the conservation and survival [of listed species]

unless he finds that such a plan will not promote the conservation of the species." 16 U.S.C § 1533(f)(1).

3. BLM Manual 6840 is Inconsistent with the ESA and with its Own Objective

The 2008 revisions to BLM manual 6840 on special status species are inconsistent with the mandate of the Endangered Species Act. The ESA states that agencies *shall* (1) utilize their authorities in furtherance of the Act; (2) carry out programs for the conservation of listed species; and (3) insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of, or result in the destruction or adverse modification of habitat of any listed species. ESA §§ 2(c)(1), § 7(a)(1)-(2). The nondiscretionary nature of these duties is evidenced by the use of the word "shall" in all three cases. As a result of the 2008 revisions, the manual purports to give the BLM discretion in performing duties where it does not exist under the ESA. For example, the manual allows the BLM to dispose of lands providing habitat for listed species, including critical habitat under certain circumstances. Disposal of critical habitat could result in a violation of ESA § 7(a)(2), which requires agencies to insure that actions will not result in destruction or adverse modification of critical habitat of listed species.

In addition, portions of the revised manual are inconsistent with the stated objective of the special status species policy. The weakening of protections for various categories of species could result in an increased likelihood that such species will need to be listed in the future. This is in direct conflict with one of the stated policy objectives which is to "initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA." BLM Manual 6840.02(B). For example, the 2008 revisions remove state-listed species from coverage under the policy. Instead, the manual directs State Directors to apply narrow criteria in designating sensitive species. This change could result in a number of state-listed species being removed from coverage under the policy and increasing the likelihood of future listing. Such a result would be contrary to the policy objective of the special status species policy.

4. BLM Has the Discretion to Not Lease

Under the statutory and regulatory provisions authorizing this lease sale, the BLM has full discretion over whether or not to offer these lease parcels for sale. The Mineral Leasing Act of 1920 ("MLA") provides that "[a]ll lands subject to disposition under this chapter which are known or believed to contain oil and gas deposits *may* be leased by the Secretary." 30 U.S.C. § 226(a) (2009) (emphasis added). The Supreme Court has concluded that this "left the Secretary discretion to refuse to issue any lease at all on a given tract." *Udall v. Tallman*, 380 U.S. 1, 4 (1965); *see also Wyo. Ex rel. Sullivan v. Lujan*, 969 F.2d 877 (10th Cir. 1992); *McDonald v. Clark*, 771 F.2d 460, 463 (10th Cir. 1985) ("While the [Mineral Leasing Act] gives the Secretary the authority to lease government lands under oil and gas leases, this power is discretionary rather than mandatory y."); *Burglin v. Morton*, 527 F.2d 486, 488 (9th Cir. 1975).

Submitting a leasing application vests no rights to the applicant or potential bidders. The BLM retains the authority not to lease. "The filing of an application which has been accepted does not give any right to lease, or generate a legal interest which reduces or restricts the discretion vested in the secretary whether or not to issue leases for the lands involved." *Duesing v. Udall*, 350 F.2d 748, 750-51 (D.C. Cir. 1965), *cert. den.* 383 U.S. 912 (1966); *see also Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1230 (9th Cir. 1988); *Pease v. Udall*, 332 F.2d 62, 63 (9th Cir. 1964); *Geosearch v. Andrus*, 508 F. Supp. 839, 842 (D.C. Wyo. 1981).

The arguments set forth in detail above demonstrate that exercise of the discretion not to lease the protested parcels, is appropriate and necessary. Withdrawing the protested parcels from the lease sale until BLM has met its legal obligations to conduct an adequate NEPA analysis is a proper exercise of BLM's discretion under the MLA. The BLM has no legal obligation to lease the disputed parcels and is required to withdraw them until the agencies have complied with the applicable law.

V. Conclusion and Request for Relief

CNE therefore requests that the BLM withdraw the protested parcels from the May 2010 Lease Sale.

Sincerely,

Josh Pollock
Conservation Director
Center for Native Ecosystems

Attachments:

Exhibit 1: List of Species and Habitat Values at Issue in This Sale.
Exhibit 2: Article: Neff, J.C., et al. 2008. Increasing Eolian Dust Deposition in the Western United States Linked to Human Activity. Nature Geoscience. Advance online publication.
Exhibit 3: Article: Painter, Thomas H., et al. 2007. Impact of Disturbed Desert Soils on Duration of Mountain Snow Cover. Geophysical Research Letters. Vol. 34.
Exhibit 4: Letter: to Utah BLM Director from Regional Director, National Park Service, dated November 24, 2008.
Exhibit 5: Letter: to David Garbett from Assistant Regional Administrator, Environmental Protection Agency, dated September 3, 2009.

EXHIBIT 1

EXHIBIT 1

Protested Parcel: Sale ID	Sale ID (from BLM GIS Data)	Parcel ID (from BLM GIS Data)	Field Office	Rare and Imperiled Species and/or Areas of High Conservation Value in Protested Parcel	Additional Information	
UT0510-034	034	5086	Vernal Field Office	Brown (Grizzly) Bear	Federally listed or candidate species	Federally listed as threatened in UT. Extirpated from UT
	034	5086	Vernal Field Office	Ferruginous Hawk	UT State Species of Concern	
	034	5086	Vernal Field Office	Greater Sage-grouse	UT State Species of Concern	
	034	5086	Vernal Field Office	greater sage-grouse crucial brooding use areas - Myton Bench		
UT0510-035	035	5098	Vernal Field Office	Bald Eagle	Federally listed or candidate species	Federally listed as threatened in UT
	035	5098	Vernal Field Office	Bald Eagle	Federally listed or candidate species	Federally listed as threatened in UT
	035	5098	Vernal Field Office	Bluehead Sucker	UT state species receiving special mgmt under a Conservation Agreement	
	035	5098	Vernal Field Office	Bonytail	Federally listed or candidate species	Federally listed as endangered in UT
	035	5098	Vernal Field Office	Burrowing Owl	UT State Species of Concern	
	035	5098	Vernal Field Office	Colorado Pikeminnow	Federally listed or candidate species	Federally listed as endangered in UT
	035	5098	Vernal Field Office	Ferruginous Hawk	UT State Species of Concern	
	035	5098	Vernal Field Office	Flannelmouth Sucker	UT state species receiving special mgmt under a Conservation Agreement	
	035	5098	Vernal Field Office	Greater Sage-grouse	UT State Species of Concern	
	035	5098	Vernal Field Office	Razorback Sucker	Federally listed or candidate species	Federally listed as endangered in UT

	035	5098	Vernal Field Office	Roundtail Chub	UT state species receiving special mgmt under a Conservation Agreement	
	035	5098	Vernal Field Office	Short-eared Owl	UT State Species of Concern	
	035	5098	Vernal Field Office	White-tailed Prairie-dog	UT State Species of Concern	
	035	5098	Vernal Field Office	Yellow-billed Cuckoo	Federally listed or candidate species	A candidate for federal listing in UT
UT0510-036	036	5093	Vernal Field Office	Ferruginous Hawk	UT State Species of Concern	
	036	5093	Vernal Field Office	Long-billed Curlew	UT State Species of Concern	
	036	5093	Vernal Field Office	White-tailed Prairie-dog	UT State Species of Concern	
	036	5093	Vernal Field Office	White-tailed Prairie-dog	UT State Species of Concern	
	036	5093	Vernal Field Office	black-footed ferret management area		
UT0510-037	037	5091	Moab Field Office	Bald Eagle	Federally listed or candidate species	Federally listed as threatened in UT
	037	5091	Moab Field Office	Black-footed Ferret	Federally listed or candidate species	Federally listed as endangered in UT.Experimental, non-essential in some counties
	037	5091	Moab Field Office	Burrowing Owl	UT State Species of Concern	
	037	5091	Moab Field Office	Ferruginous Hawk	UT State Species of Concern	
	037	5091	Moab Field Office	Kit Fox	UT State Species of Concern	
	037	5091	Moab Field Office	White-tailed Prairie-dog	UT State Species of Concern	
UT0510-039	039	5092	Vernal Field Office	Bald Eagle	Federally listed or candidate species	Federally listed as threatened in UT
	039	5092	Vernal Field Office	Burrowing Owl	UT State Species of Concern	
	039	5092	Vernal Field Office	Ferruginous Hawk	UT State Species of Concern	
	039	5092	Vernal Field Office	Long-billed Curlew	UT State Species of Concern	

039	5092	Vernal Field Office	Short-eared Owl	UT State Species of Concern
039	5092	Vernal Field Office	White-tailed Prairie-dog	UT State Species of Concern

EXHIBIT 2

Increasing eolian dust deposition in the western United States linked to human activity

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Mineral aerosols from dust are an important influence on climate and on marine and terrestrial biogeochemical cycles. These aerosols are generated from wind erosion of surface soils. The amount of dust emission can therefore be affected by human activities that alter surface sediments. However, changes in regional- and global-scale dust fluxes following the rapid expansion of human populations and settlements over the past two centuries are not well understood. Here we determine the accumulation rates and geochemical properties of alpine lake sediments from the western interior United States for the past 5,000 years. We find that dust load levels increased by 500% above the late Holocene average following the increased western settlement of the United States during the nineteenth century. We suggest that the increased dust deposition is caused by the expansion of livestock grazing in the early twentieth century. The larger dust flux, which persists into the early twenty-first century, results in a more than fivefold increase in inputs of K, Mg, Ca, N and P to the alpine ecosystems, with implications for surface-water alkalinity, aquatic productivity and terrestrial nutrient cycling.

Eolian dust is generated from a wide range of sources including industrial emissions and the wind erosion of soils[1]. Dust may affect ocean productivity[2,3], control terrestrial nutrient cycling[4] and alter regional and global climate[5,6]. Dust deposition onto snow cover in the western United States has recently been shown to accelerate melt and reduce snow-cover duration by approximately one month, a finding that has broad implications for water resources in mountainous regions of the United States[7]. At a global scale, the Sahara and Sahel deserts in Africa and the deserts of central Asia produce most of the world's mineral aerosol load[1]. Regional sources of dust, however, produce significant quantities of mineral aerosols with effects on soil fertility, air quality and human health[8,9]. Given the wide range of potential impacts of atmospheric dust, it is critical to improve our understanding of the past and present role of human activities on dust emission and deposition.

The Great Basin, Colorado Plateau, Mojave and Sonoran deserts of the southwestern United States are responsible for the majority of emissions in North America[1]. Like many arid environments, the drylands of the western United States have experienced widespread land-use change over the past two centuries, with rapid acceleration of agricultural and grazing activities following the westward expansion of the United States in the 1800s (ref. 10). Despite growing evidence of the impacts of land use on wind erosion of soils around the world[11–13], the history of human influences on atmospheric dust remains poorly documented. Records showing increased dust accumulation in Antarctic ice cores between the nineteenth and twentieth centuries[14], and evidence for changing chemistry of glacial dust during the twentieth century[15], suggest higher contemporary atmospheric mineral aerosol loads than during the pre-industrial period. Similar conclusions have been reached in studies of peat bogs in Europe[16]. Without more documentation of contemporary and palaeo-deposition rates, however, we are largely limited to speculation about how humans have altered regional and global dust emissions.

DUST PROXY RECORDS

We obtained proxy records of dust deposition from high-elevation lakes in the San Juan Mountains in southwestern Colorado to

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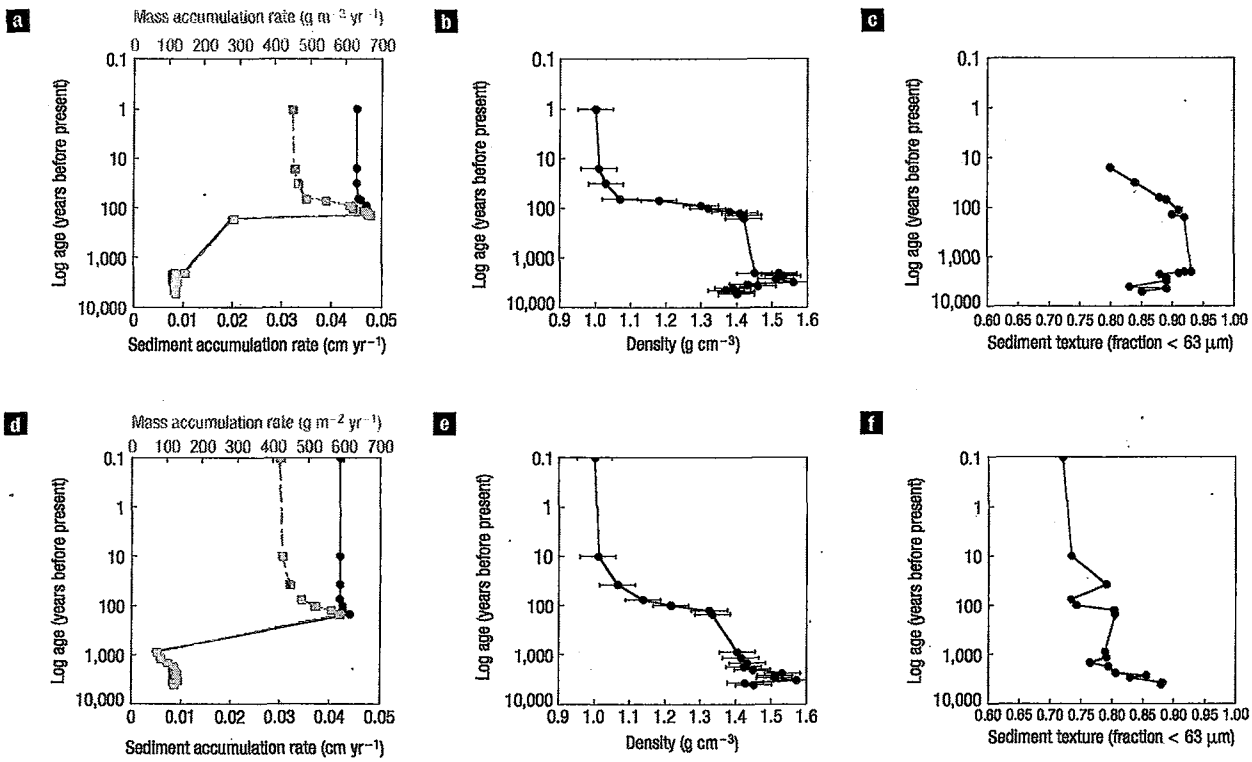

Figure 1 Sediment accumulation rates and physical properties. a–c, Sediments from Porphyry Lake including sediment and mass accumulation rates (**a**), density (**b**) and texture (**c**). **d–f,** Sediments from Senator Beck Lake, including sediment and mass accumulation rates (**d**), density (**e**) and texture (**f**). The age scale is on the basis of the depth–age model described in the supplementary online material, with age dates in the top 150 yr determined from ^{210}Pb measurements and those below from ^{14}C dating of terrestrial macrofossils. The error bars in **b** and **e** are estimated 95% confidence limits for density measurements.

examine the possibility of human-induced changes in atmospheric dust deposition. Located downwind of major western US deserts, this mountain range is prone to frequent eolian deposition events (see Supplementary Information, Fig. S1). The mountain range also contains a number of high-elevation lakes located above the tree line in areas with limited soil development. Given the frequent inputs of dust to snow cover[7], these alpine lakes provide ideal locations for studying changes in dust loading.

In two alpine lakes, sediment accumulation rates over the past ~150 yr are more than five times greater than average accumulation rates over the past 5,000 yr, on the basis of radiogenic ^{210}Pb and ^{14}C dates (Fig. 1). These recently elevated sedimentation rates are supported by an independent study on a larger, nearby subalpine lake that also shows large increases (7–17-fold) in recent- versus late-Holocene sedimentation rates[17] (Table 1). Changes in sedimentation rates in these lakes occurred in the transition between age records derived from terrestrial macrofossils and those derived from ^{210}Pb (see Supplementary Information, Fig. S2). Although it is impossible to assign an exact date to the onset of increasing sedimentation rate, there is a clear and abrupt transition in sedimentation rate from old (~1,000 yr before present) to recent (~150 yr before present) sediment ages in one of our study lakes (Senator Beck Lake). The age and thickness of lake sediments also provide evidence that sedimentation rates peaked ~100 yr before present. Taken together, these data strongly suggest that the period of increased sedimentation rate occurred within the past two centuries (Fig. 1, Supplementary Information, Tables S1,S2).

The San Juan Mountains currently experience four to seven large winter-time dust deposition events each year[7], and the recent increases in lake-sediment accumulation could be caused by these periodic deposition events. To test this possibility, we examined the physical and isotopic properties of dust, bedrock and lake sediments. The lake sediments are dominantly composed of fine-grained silts consistent with a far-travelled eolian origin rather than a local source[18]. To test further whether the sediment is dominantly dust derived, we compared the neodymium and strontium isotopic compositions of both the coarse- (>250 μm) and fine-grained (37–63 μm) lake sediments with those of the bedrock underlying their catchments. The range of ε_{Nd} values of ~−5 to −9.8 from the bedrock (Oligocene silicic volcanic rocks of the San Juan volcanic field) underlying these basins contrasts with values from fine-grained lake sediment that range from ~−10 to −11, despite similar values of ^{147}Sm/^{144}Nd ratios from ~0.10 to 0.11 (Fig. 2a, Supplementary Information, Table S3). The ε_{Nd} values (from −10.4 to −10.8) and ^{147}Sm/^{144}Nd ratios from dust, collected from San Juan snowpack in 2005, are indistinguishable from those in the fine-grained sediment in the lakes (Fig. 2a). Strontium isotopes show similar patterns, with ^{87}Sr/^{86}Sr ratios (<0.708) from the residual fraction of the local volcanic bedrock consistently lower than those from lake sediments (>0.713). As with the Nd isotopes, the ^{87}Sr/^{86}Sr ratios for the 37–63 μm fraction of sediments are nearly identical to values for contemporary dust (Fig. 2b). The combination of Sr and Nd isotopes and sediment texture provides unambiguous evidence that the fine fraction of lake sediments (>75% of typical sediment mass in these cores) is derived from exogenous sources rather than locally eroded bedrock.

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Table 1 Estimates of sediment accumulation rates for lakes in the San Juan Mountains, Colorado. The Mineral Basin, Senator Beck and Porphyry Lakes were sampled for this study, whereas the Molas Lake data are from ref. 17. Sediment accumulation rates are presented for dated intervals where information is sufficient to estimate sedimentation rates. Values in parentheses are standard errors estimated from propagation of analytical uncertainties through age/depth regression equations.

Alpine lake	Dated interval	Dating method*	Sediment accumulation rate (mm yr^{-1})	Mass accumulation rate (g m^{-2})
Mineral Basin Lake	~1,890-present	^{210}Pb	0.6 (0.06)	ND
Senator Beck Basin Lake	~1,910-present	^{210}Pb	0.42 (0.04)	457 (18)
	~1,850–1,910	^{210}Pb	0.44 (0.04)	555 (20)
	1,750–1,150 BP	^{14}C	0.050 (0.001)	92 (10)
	2,580–1,750 BP	^{14}C	0.078 (0.001)	124 (2)
Porphyry Lake	~1,910 to present	^{210}Pb	0.45 (0.05)	501 (26)
	~1,850 to 1,910	^{210}Pb	0.47 (0.05)	576 (74)
	5,178–3,183 BP	^{14}C	0.092 (0.001)	119 (1)
Molas Lake[17]	~1,880-present	^{210}Pb	5.31	ND
	1260–120 BP	^{14}C	1.70	ND
	2760–1260 BP	^{14}C	0.32	ND
	5920–2760 BP	^{14}C	0.28	ND

* ^{210}Pb refers to the use of lead-210 dating techniques for recent sediments, whereas older sediments were dated through the measurement of the ^{14}C content of terrestrial macrofossils.

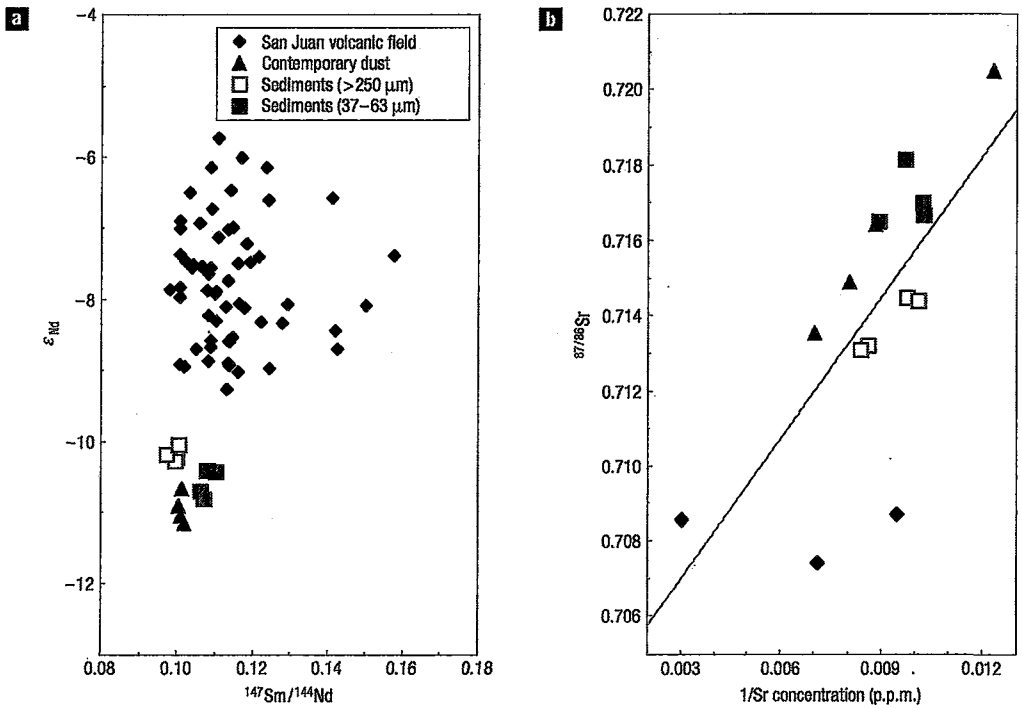

Figure 2 Dust, bedrock and sediment isotopic characteristics. a, The ε_{Nd} versus ^{147}Sm/^{144}Nd data, which illustrate the separation between local bedrock, dust and sediment. The bedrock values are from the San Juan volcanic field (referenced data in main text) plotted for comparison with contemporary dust and two size fractions from lake sediments. **b,** The strontium isotope values for dust, bedrock and sediments in the study area. All values are for residual fractions of samples (see Supplementary Information). Analytical errors for both Sr and Nd isotopic measurements are smaller than the marker size in the graphs.

SOURCES OF DUST TO THE SAN JUAN MOUNTAINS

There are a number of potential sources of dust to the San Juan Mountains including the deserts of the southwestern United States and desert sources in Asia that are known to contribute dust to the North American continent[19]. Although the precise provenance of San Juan dust samples is difficult to determine, the physical and isotopic properties of dust can be used to substantially narrow the potential source regions. The ε_{Nd} values of contemporary dust range from −10.4 to −10.8 at ^{147}Sm/^{144}Nd ratios between 0.106 and 0.110. These values overlap those of Palaeoproterozoic basement rocks that comprise the bulk of the continental crust underlying Arizona and New Mexico (Fig. 3a, Supplementary Information, Table S3)[20–27]. These isotopic compositions are

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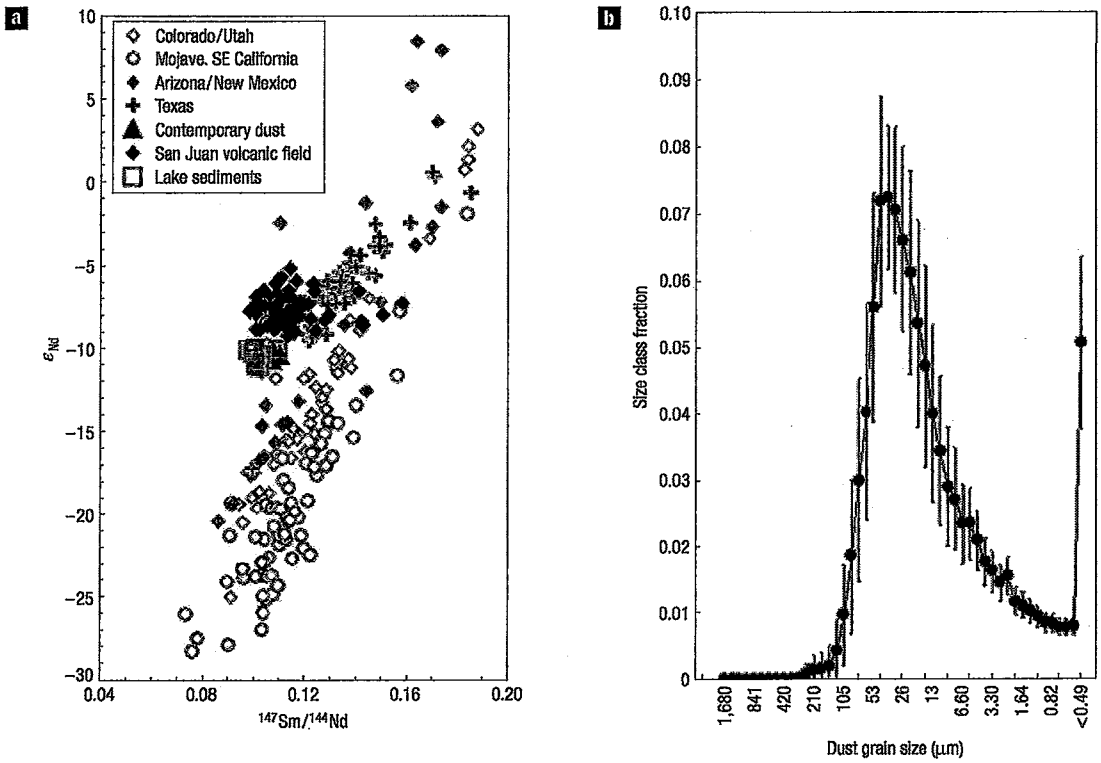

Figure 3 Dust isotopic properties and texture. a, ε_{Nd} and $^{147}Sm/^{144}Nd$ for potential sources of dust to the San Juan mountains. Except where otherwise noted, data in the graph are for Precambrian basement rocks for various portions of the western United States as cited in the main text. Analytical errors are smaller than the graph symbols. **b,** The average grain-size distribution for modern dust collected from five separate deposition events in 2005. Bars on the graph represent the 95% confidence interval.

consistent with dust sources to the south and/or southwest of the study area. Satellite detection of dust plumes and atmospheric back-trajectory modelling for this region also link wintertime dust deposition in the San Juan Mountains to dust plumes that originate in the deserts of the southwestern United States, further supporting a dust source indigenous to western North America[7].

Although Asian dust periodically falls on the San Juan Mountains, the textural distribution of dust samples also provides strong evidence for a regional source of dust. Nearly 40% of the mass of dust sampled from the snowpack occurs in the 10–37 μm size class, 26% in the 37–63 μm size class and 17% in the 63–180 μm size class (Fig. 3b). The relatively large proportion of particles over 37 μm is evidence for particles that have been transported hundreds, rather than thousands, of kilometres[28]. This result suggests that the dominant source of wintertime dust inputs to the San Juan Mountains is the western United States rather than far-travelled Asian dust, which would be much finer (that is, in the less than 10 μm size classes)[29].

CAUSES OF INCREASED DUST LOADING

Increased sedimentation in lakes in recent decades or centuries is generally attributed to catchment-scale disturbance[30] or changes in regional climate[31]. In the high-elevation setting sampled here, the lakes are surrounded by talus fields, with limited soil and vegetation development and no evidence of modern human disturbance. These factors together effectively rule out a local cause for the observed increase in lake sedimentation rates. Combined with the isotopic evidence for predominantly eolian sources for the lake sediments, we suggest that the large, recent increases in sedimentation rates are related to increased eolian deposition. Both lake-sediment core records indicate that increased dust loading began between 200 and 100 yr ago with peak deposition rates in the first half of the twentieth century (Fig. 1). Drought is a potential cause of increased wind erosion of soils. Although there have been multiple drought events during the nineteenth and twentieth centuries in the western United States, these droughts have been considerably shorter and less severe than several drought events that have occurred over the past 2,000 yr in the region[32], making it unlikely that drought is the primary cause for the increased dust loading observed in this study. Instead, the period of increased sedimentation rate is contemporaneous with an intensification of western US land use, and particularly livestock grazing activities, that began in the early 1800s.

The migration of settlers of European descent into the western United States led to widespread expansion of grazing, mining and agricultural activities in the nineteenth and twentieth centuries. In the period following the development of railroad lines (and heavy transport capabilities for livestock) in the late 1860s, cattle and sheep grazing greatly intensified across the western United States[10,33–35]. In the Navajo Nation tribal lands to the south and southwest of the San Juan Mountains, high animal densities and impacts of overgrazing became a major issue by the early 1890s. By the early 1930s, two-thirds of the land area in northeast Arizona had been significantly disturbed by heavy livestock use[36]. Overall, nearly 70% of the natural ecosystems of the western United States have been affected by livestock grazing[37], resulting in loss of soil stability and increases in wind erosion of soil[9,11]. The extensive degradation of western US rangelands led to the Taylor Grazing Act of 1934, which imposed regulations and restrictions on grazing activities in

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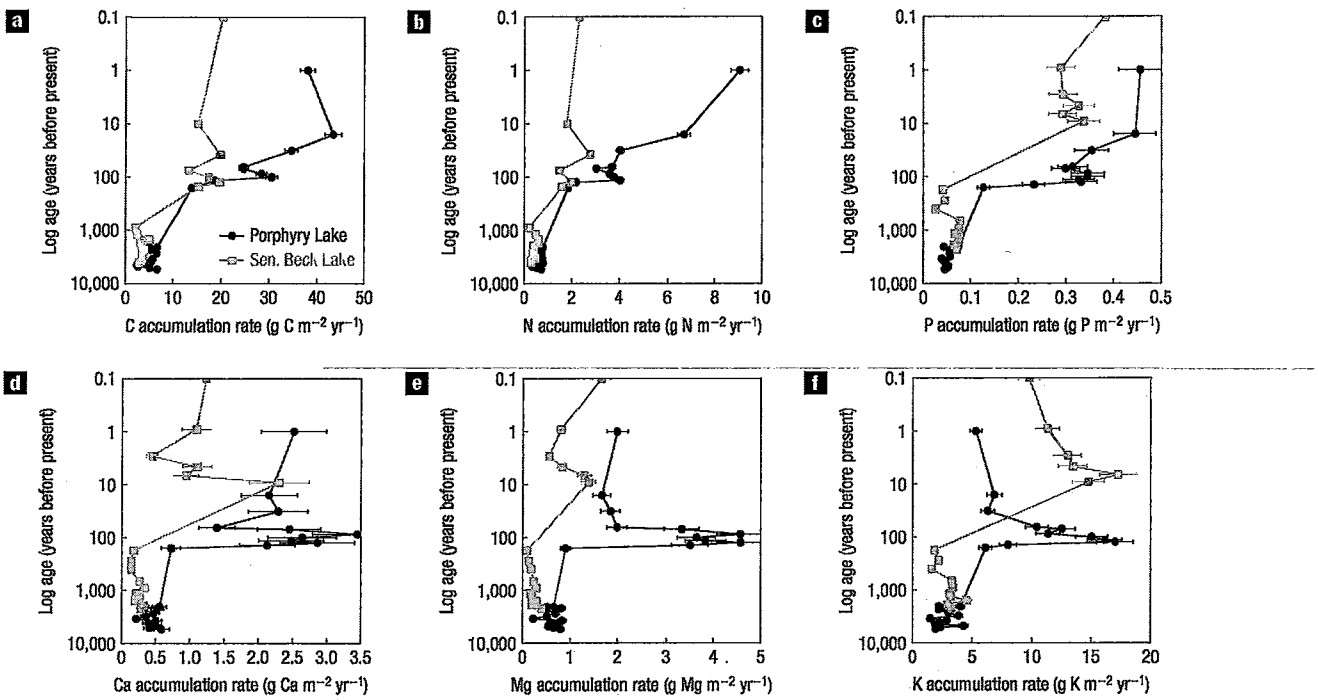

Figure 4 Elemental fluxes for two alpine lakes in the San Juan Mountains, Colorado. a–c, C, N and P fluxes, respectively, for Senator Beck and Porphyry Lakes. **d–f**, Ca, Mg and K loading, respectively, for Senator Beck and Porphyry Lakes. Element accumulation rates were calculated by multiplying mass accumulation rates by sediment elemental abundance and are expressed on an area basis. Error bars are on the basis of the propagation of error in density and element abundance measurements. Sediment ages for the top 150 yr were determined from ^{210}Pb measurements and those below from ^{14}C dating of terrestrial macrofossils.

these rangelands. At about this time the mass accumulation rates of the lake sediments begin a moderate decline, which persists through the second half of the twentieth century (Fig. 1).

BIOGEOCHEMICAL IMPLICATIONS OF INCREASED DUST DEPOSITION

Eolian dust mobilized from arid-land soils generally contains high concentrations of base cations, and dust typically has high concentrations of N and P, as well as elevated concentrations of a range of atmospheric pollutants[4,38]. High-elevation lakes and tundra ecosystems are generally low in nutrient content and vulnerable to increases in atmospheric deposition[39]. There is strong evidence for the impacts of changing N deposition in high-elevation settings[40], as well as suggestions of increasing P and base-cation deposition into high-elevation settings[39,41,42].

To evaluate the changes in element loading in the lake sediments examined here, we combined sediment mass-accumulation rates with geochemical analyses to estimate sediment element-accumulation rates in the two lakes. For the elements N, P, Ca, Mg and K, both lakes show large increases in element accumulation rates over the past 150 yr compared with background fluxes (Fig. 4). Element accumulation rates for the base cations, Ca, Mg and K, generally show a peak ~100 yr ago, with some decline to present and some variation (particularly with Mg) between the lakes. These early-twentieth-century peaks provide additional evidence that land-use change in the western United States led to a large destabilization of base-cation-rich, desert soils in the early twentieth century. There is evidence from a range of other settings that base-cation loading via dust deposition can change precipitation and surface-water alkalinity[43,44]. The relatively large perturbation to base-cation loading to these lakes suggests that dust inputs could be one factor mitigating the lake impacts of generalized regional increases in acid deposition[45].

Both lake-sediment records show an increase in C and N accumulation rates during the nineteenth and twentieth centuries. These records are complicated to interpret, both because of some variability between the lakes and because changes in the accumulation of these elements could be a product of either diagenesis in the sediment profile[46] or increases in aquatic productivity resulting from elevated dust and nitrogen deposition. For Porphyry Lake, the sediment N and organic C record shows increasing accumulation through the twentieth century, although this is less pronounced in Senator Beck Lake. Nitrogen deposition to alpine settings is the result of multiple potential sources, probably dominated by gas-phase emissions of nitrogen oxides during fossil-fuel combustion[47]. The timing and magnitude of N deposition changes to these lake sediments is generally reflective of global perturbations to the N cycle[48] although both lakes also show peaks in C and N accumulation that are consistent with the apparent dust deposition peak ~100 yr ago and suggest a potential stimulatory effect of this dust on lake productivity.

Phosphorus sedimentation accumulation rates show a large and sustained increase through the modern record in both cores, which indicates a more complex change in element loading than observed for the base cations. Phosphorus, like the base cations, shows elevated element accumulation rates early in the twentieth century in addition to more recent increases in loading rates. Phosphorus deposition is also subject to the diagenesis issues for C and N mentioned above. Nonetheless, the continued increase of P sedimentation rates through the twentieth century is contemporaneous with the widespread expansion of the use of P fertilizers in the second half of the twentieth century[49]. This

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increase is caused by both elevated rates of sediment accumulation and increasing P concentrations in sediments. The possibility of human disruption to the P cycle through agricultural activity and dust emission is a potentially significant finding, as relatively little is known about anthropogenic changes in P deposition rates to ecosystems. Although intriguing, more work is needed to establish the causes of these changes in P accumulation rates.

CONCLUSIONS

Land-use change in the western US over the past 200 yr is similar to agricultural intensification in semi-arid regions around the world, which often results in increased wind erosion of soils[12,14,50]. Recent studies of dust deposition records from Antarctica[14] suggest that the patterns observed in our study may be replicated elsewhere and may be indicative of a significant human role in regional dust generation. If human land-use change has altered the flux of dust between the biosphere and the atmosphere to the degree implied by our study, then there have also been substantial changes in elemental fluxes to ecosystems, with broad implications for nutrient deposition and biogeochemical cycling. In addition to its role in nutrient and contaminant transport, dust can also influence regional snowpack and climate. Effects on snowpack include accelerated spring snowmelt and decreased late-spring snowpack depth[7]. In the atmosphere, mineral aerosols play an important and highly uncertain role in climate change[51]. Most studies of mineral aerosols focus on the less than 10 μm size classes generated in, and transported from, Asia and Africa. The results of this study suggest the importance of regional sources for mineral aerosol fluxes in the western United States, and imply a strong and changing human role in controlling these fluxes. To the degree that these results are replicated in other areas with extensive, recent land-use change, human-caused changes in dust production and deposition may be far more important than previously thought.

METHODS

The alpine lakes sampled in this study are located between Silverton and Telluride, Colorado, USA. The lakes were located at ~3,500 m in alpine glacial cirques with shallow surrounding soils and limited vegetation development (grasses and small shrubs). Sediment cores were extracted using a Universal Core Head Corer from shallow alpine lakes (1–2 m depth). In the laboratory, the cores were subsampled into 0.5–1 cm increments. Terrestrial macrofossils were picked from the sediments during this initial sectioning procedure. We obtained as many macrofossils as possible for this study; however, these samples are limited owing to the high elevation and limited vegetation cover. All samples were freeze-dried and separated using a splitter to yield homogenous samples. Dust samples were collected from snowpack within 2–3 weeks of deposition in Senator Beck Basin. These samples were melted, evaporated and freeze-dried. Several samples of representative bedrock were also taken from Senator Beck Basin.

Surface sediments from lakes in all basins were dated using the radiogenic nuclide ^{210}Pb, and sediments at depth were dated by measuring ^{14}C of macrofossils. The sediment accumulation rate was estimated using the constant-rate-of-supply model fitted to measurements of unsupported ^{210}Pb activity[52] (see Supplementary Information, Table S1 and Methods). For each sediment core, we present two periods of accumulation related to the time intervals from the mid-1800s to early 1900s and from the early 1900s to the present. Our selection of these intervals enables the use of at least three ^{210}Pb measurements per period, with the intent of providing a relatively conservative estimate of recent temporal variation in sediment loading. The surface sample from Porphyry Lake was excluded from the sedimentation estimates because of a suggestion of disturbance of the top 1 cm during sampling. Inclusion of this sample point doubles recent sedimentation estimates, but with sufficient uncertainty to warrant a more conservative approach.

Terrestrial macrofossils, identified as roots or woody material, were sampled in Senator Beck and Porphyry lake sediments for ^{14}C analysis. Each macrofossil was sonicated and then freeze-dried. The samples were analysed for ^{14}C at the UC Irvine Keck Accelerator Mass Spectroscope facility (see Supplementary Information, Table S2). An oxalic acid standard of known ^{14}C age was also freeze-dried and analysed for ^{14}C content, yielding values within the range of analytical uncertainty, indicating that this method produces accurate radiocarbon ages. A depth-to-age model was constructed using the ^{210}Pb- and ^{14}C-based chronologies (see Supplementary Information, Fig. S2), and this model was used in combination with density and chemistry measurements described below to estimate mass and elemental accumulation rates through time. The offset between ^{210}Pb and ^{14}C records make it impossible to precisely constrain the timing of increased sedimentation; however, the record from Senator Beck Lake suggests that this period probably began in the 200 yr before present (see Supplementary Information for more information)

The density and texture of each core were also measured using methods described in the Supplementary Information. The elemental content of bedrock, sediments and dust were determined using inductively coupled plasma atomic emission spectroscopy and inductively coupled plasma mass spectroscopy. Samples were dissolved in HF using a microwave-assisted digestion method. Two bedrock standards and one soil standard were also analysed, yielding values within 5–7% of the expected values. We analysed five duplicate samples across the two cores, with the following coefficients of variation: Ca, 16%; K, 6%; Mg, 8%; P, 7%; Fe, 3%; Si, 13%. Relative elemental concentrations were measured for a duplicate core from Porphyry Lake using an EDAX Eagle III X-ray fluorescence analyser following methods described in the Supplementary Information. Carbon and nitrogen content was measured with a CNS combustion analyser. Carbon and nitrogen measurements were accurate to ~1%, with an average variance on duplicate samples of less than 1%.

Measurements of Sr, Sm and Nd were made on dust, bedrock and sediment samples from Senator Beck Basin. Samples were dissolved in concentrated HF and $HClO_4$ following removal of ammonium-acetate-soluble materials. For sediments, we analysed two distinct size fractions, 37–60 μm and over 250 μm. Strontium was separated from the solution using SrSpec resins, whereas Sm and Nd are obtained using reverse-phase chromatographic techniques[53]. Isotope dilution concentration and Sr and Nd isotopic determinations were obtained using a Finnigan-MAT 261 thermal ionization mass spectrometer. Isotope dilution concentrations were accurate to ~1% for Sr, and 0.5% for Sm and Nd. Total procedural blanks averaged ~1 ng for Sr, and 100 pg for Nd, during the study period. Thirty measurements of SRM-987 during the study period yielded mean $^{87}Sr/^{86}Sr = 0.71032 \pm 2$. Analyses were corrected to the SRM-987 value of 0.71028. Measured $^{143}Nd/^{144}Nd$ were normalized to $^{146}Nd/^{144}Nd = 0.7219$. Thirty-three measurements of the La Jolla Nd standard during the study period yielded a mean $^{143}Nd/^{144}Nd = 0.511838 \pm 8$ (2-σ mean). ε_{Nd} ($\varepsilon_{Nd} = \{[(^{143}Nd/^{144}Nd)(\text{sample})/(^{143}Nd/^{144}Nd)(\text{CHUR})] - 1\} \times 10^4$) values were calculated using a present-day $^{143}Nd/^{144}Nd(\text{CHUR}) = 0.512638$ (see Supplementary Information, Table S3).

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Author contributions

All authors commented on the manuscript and participated in the analysis of project results. J.C.N. and A.P.B. designed and carried out the study and J.C.N. developed the paper. G.L.F. carried out the isotopic analysis and aided in the interpretation of sediment isotopic chemistry. N.M.M. provided assistance in evaluating project results in comparison with global patterns in dust deposition. J.L.C., J.T.O., C.R.L. and R.L.R. analysed sediment core and dust chemistry. T.H.P. and C.C.L. developed and implemented dust sampling protocols for snowpack and assisted in sampling.

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EXHIBIT 3

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Impact of disturbed desert soils on duration of mountain snow cover

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[1] Snow cover duration in a seasonally snow covered mountain range (San Juan Mountains, USA) was found to be shortened by 18 to 35 days during ablation through surface shortwave radiative forcing by deposition of disturbed desert dust. Frequency of dust deposition and radiative forcing doubled when the Colorado Plateau, the dust source region, experienced intense drought (8 events and 39–59 Watts per square meter in 2006) versus a year with near normal precipitation (4 events and 17–34 Watts per square meter in 2005). It is likely that the current duration of snow cover and surface radiation budget represent a dramatic change from those before the widespread soil disturbance of the western US in the late 1800s that resulted in enhanced dust emission. Moreover, the projected increases in drought intensity and frequency and associated increases in dust emission from the desert southwest US may further reduce snow cover duration.
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1. Introduction

[2] Dust is commonly found in the surface layer of late season snow and on glacier surfaces in the world's mountain ranges [*Franzén et al.*, 1994; *Schwikowski et al.*, 1995; *Wake and Mayewski*, 1994]. Dust deposition on mountain snow cover has occurred throughout much of recent history as demonstrated by annual dust layers in high elevation ice cores [*Thompson et al.*, 2000], increasing with prolonged or intense drought and land disturbance in source regions. It is well known that dust in snow enhances absorbed solar radiation and melt rates [*Conway et al.*, 1996; *Warren and Wiscombe*, 1980], but the degree to which dust influences radiative forcing and snow cover duration in a natural system is not quantified. Early studies [*de Quervain*, 1947; *Jones*, 1913] suggested from simple observations that dust may shorten snow cover duration by as much as a month. However, unlike soot, which has received much attention as a potential climate forcing in snow cover [*Hansen and Nazarenko*, 2004; *Hansen et al.*, 2005], the influence of dust on surface shortwave radiative forcing and snow cover duration in mountain regions has been relatively ignored [*Hansen and Nazarenko*, 2004]. Until now, the detailed radiation and energy balance measurements needed to partition dust's influence on radiation and snow cover duration have not been available.

[3] Snow has the highest albedo of any naturally occurring surface on Earth. However, when impurities such as dust or soot are present, snow albedo decreases (particularly in visible wavelengths) [*Conway et al.*, 1996; *Warren and Wiscombe*, 1980] (Figure 1). With enhanced absorption by dust, grain growth rates increase and further depress snow albedo. Dust has high potential to sustain shortwave radiative forcing after deposition because particles tend to accumulate near the snow surface as ablation advances [*Conway et al.*, 1996]. Deposition in mountain ranges comes primarily in the spring when frontal systems entrain dust particles from disturbed and loose soils [*Wake and Mayewski*, 1994], coinciding with solar irradiance approaching its annual maximum.

[4] Mountain snow cover is a critical resource as these high elevation mountain regions provide the majority of fresh water supply in arid and semi-arid environments to more than a billion of the Earth's population [*Bales et al.*, 2006]. The duration of snow pack in mountain regions critically controls the timing and magnitude of water supplies, power generation, agriculture timing, and forest fire regimes [*Westerling et al.*, 2006], as well as the duration over which glacial ice is exposed to absorption and enhanced ablation. Some studies already suggest that climate change has induced earlier snowmelt-fed runoff [*Mote*, 2003; *Stewart et al.*, 2005].

[5] The radiative forcing of dust in snow is considered in terms of its direct effect (absorption by dust, Figure 1a), 1st indirect effect (enhanced absorption by larger grain size due to accelerated grain growth from direct effect), and the 2nd indirect effect (enhanced absorption by darker substrate exposed earlier due to direct and 1st indirect effect) [*Hansen and Nazarenko*, 2004]. In this work, we use the term 'radiative forcing' to mean the instantaneous surface enhanced absorption due to dust through these effects. Here we perform the first coupled determination of the radiative forcing of dust in mountain snow and its impact on snow cover duration through detailed radiation measurements that isolate the effects of dust from other controls.

[6] The simulations show that radiative forcing by desert dust deposits shorten snow cover duration by order 1 month in the San Juan Mountains. That the dust originates in disturbed desert sources rather than locally suggests that this mechanism of increasing radiative forcing and shortened snow cover duration is widely active where the world's mountains receive dust from disturbed lands. Moreover,

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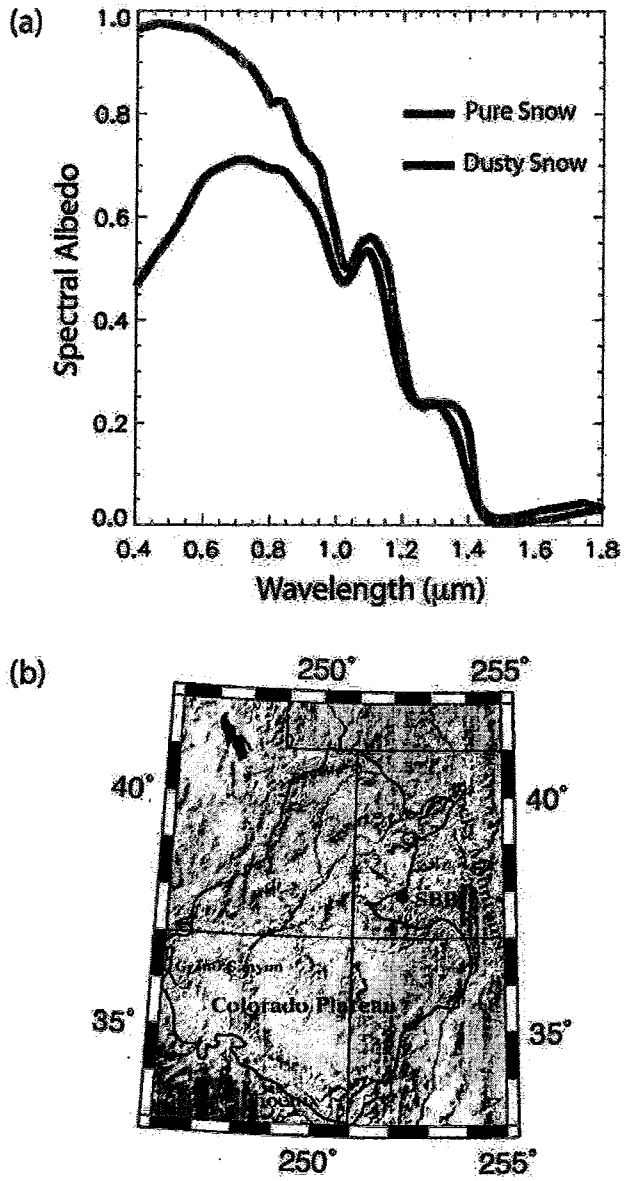

Figure 1. Spectral albedo of dust-laden snow and Colorado Plateau/San Juan Mountains. (a) Spectral albedo of pure snow (modeled with same grain size as that measured in the field) and snow with concentrated dust in surface layer (0.37 mg dust per g snow water equivalent) measured with an Analytical Spectral Devices FieldSpec FR spectroradiometer. (b) Colorado Plateau in southwestern US and Senator Beck study site (SBB) indicated in San Juan Mountains of southwest Colorado.

under global warming and associated desertification, the process could threaten snowmelt-fed water resources to arid and semi-arid regions.

2. Site and Methods

[7] We estimate radiative effects of dust and changes in snow cover duration in the San Juan Mountains, Colorado (Figure 1b) in two dramatically different dust deposition years, 2005 (4 dust events) and 2006 (8 dust events). The San Juan Mountains cover 32,000 km^2 (6900 km^2 above tree line at ~3400 m) and have a strong continental climatic regime. Headwaters for major western US rivers including the Rio Grande and the Colorado lie in the range. According to anecdotal evidence, historical research, and recent observations presented here, the San Juan Mountains receive multiple dust deposition events annually in February through May, arriving before and during the snowmelt period (Auxiliary Material Table S1).

2.1. Radiative Forcing

[8] Incident and reflected broadband shortwave and near-infrared/shortwave infrared (NIR/SWIR) radiation, along with standard meteorological variables, were measured at two towers, one in the alpine zone at 3719 m and one in the subalpine zone at 3368 m of the Senator Beck Basin. From these measurements, we determine the range of potential radiative forcings due only to dust. Minimum surface radiative forcing $F_{d\min}$ (W m^{-2}) is calculated as

$$F_{d\min} = E_{VIS}\Delta_{VIS} \tag{1}$$

where E_{VIS} is the visible irradiance (W m^{-2}) determined from the difference between the broadband and NIR/SWIR irradiances, $\Delta_{VIS} = 0.92 - \alpha_{VIS}$, α_{VIS} is calculated visible albedo and 0.92 is the mean visible albedo for dust-event-free snow.

[9] Maximum surface radiative forcing $F_{d\max+i1}$ is calculated as

$$F_{d\max+i1} = 0.5\left(E_{VIS}\Delta_{VIS} + E_{NIR}\alpha_{NIR}\left(\frac{1}{\xi} - 1\right)\right) \tag{2}$$

where

$$\xi = 1 - 1.689\Delta_{VIS}; \quad \Delta_{VIS} \in [0, 0.17]$$
$$\xi = 0.67; \quad \Delta_{VIS} > 0.17$$

E_{NIR} is the NIR/SWIR net shortwave flux, and α_{NIR} is NIR/SWIR albedo. The latter relationship gives the proportion of the change in NIR/SWIR albedo due to presence of dust versus grain coarsening in the absence of dust (see Auxiliary Material).[1]

2.2. Snowmelt Modeling

[10] Snow cover duration was simulated for observed net surface shortwave fluxes (K^*) and for the observed net surface shortwave fluxes minus $F_{d\min}$ ($K^*_{d\min} = K^* - F_{d\min}$) and $F_{d\max+i1}$ ($K^*_{d\max+i1} = K^* - F_{d\max+i1}$), respectively, using the snow energy balance model SNOBAL [*Marks et al.*, 1998]. SNOBAL uses a two-layer snowmelt approach with an active 25 cm surface layer and the remainder of the snow pack as a second layer. Initial conditions for snow pack properties came from detailed weekly measurements in the field at each site. SNOBAL is driven with hourly averages of observed and estimated dust-free net shortwave, and

[1]Auxiliary material data sets are available at ftp://ftp.agu.org/apend/gl/2007gl030284. Other auxiliary material files are in the HTML.

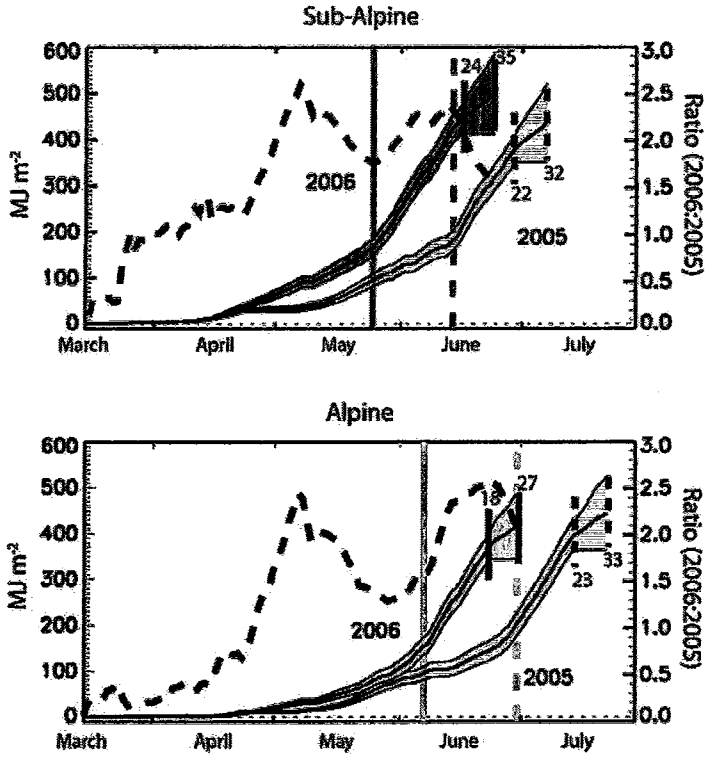

Figure 2. Cumulative surface radiative forcing by dust (MJ m^{-2}) for subalpine and alpine. The full-length vertical lines indicate observed date of disappearance of snow whereas the shorter vertical lines indicate the modeled date of disappearance of snow in the minimum and maximum forcing cases, with differences from observed date in number of days indicated. Dashed lines show the ratios of daily mean forcing in 2006 with respect to 2005.

observed incident longwave radiation, and air temperature, relative humidity, and wind speed measured at known heights above the snow surface at the respective meteorological towers.

[11] The difference between observed and simulated snow melt out-date for the measured scenario provides a measure of the accuracy of SNOBAL. In all simulations, complete snow ablation occurred within 1 day of observed ablation except in the 2005 subalpine case (2 days), due to discrimination between rain and snow near the end of snow cover.

[12] The second indirect effect for the minimum and maximum cases is the difference between simulated net shortwave radiation for snow free conditions (post ablation) and the net shortwave radiation for snow cover for minimum and maximum forcing scenarios. We add the respective 2nd indirect effect to the minimum and maximum radiative forcings after observed melt-out to obtain total forcings.

2.3. Isotopic Analysis

[13] Each dust event was collected from the mountain snow pack by excavating dust layers of snow, melting the snow into HDPE collection vessels and then refreezing the sample until analysis. The samples were freeze-dried to a powder. Resulting solids were dissolved in concentrated HF and $HClO_4$. Rb and Sr were separated from the solution using SrSpec® resins, while Sm and Nd were obtained using conventional reverse phase chromatographic techniques [*Farmer et al.*, 1991]. Isotope dilution concentration and Sr and Nd isotopic determinations were obtained using a Finnigan-MAT thermal ionization mass spectrometer. ε_{Nd} represents a comparison of the $^{143/144}$Nd of the measured sample to a ratio for CHUR (chrondritic uniform reservoir) where

$$\varepsilon_{Nd}(0) = \left[\left(\left(^{143/144}\mathrm{Nd}\right)\mathrm{Sample}\left(^{143/144}\mathrm{Nd}\right)\mathrm{CHUR}\right)/\left(^{143/144}\mathrm{Nd}\right)\mathrm{CHUR}\right] \quad (3)$$

all at the present time (t = 0).

3. Results

[14] Between 2003 and 2005, three to four significant dust deposition events occurred in winter and spring of each year, whereas in 2006, eight significant deposition events occurred (Auxiliary Material Table S1). Broadband albedo (α_{BB}) of new, dust-free snow was 0.85 ± 0.01 but declined between snow events through grain size increase when dust was not exposed (Auxiliary Material Figure S1). Once dust emerged near or at the surface, α_{BB} decreased more rapidly due to the additional decrease in α_{VIS} from its dust event-free value of 0.92 ± 0.01.Dust events led to large increases in the daily averaged absorption of incident radiation at the surface in 2005 and 2006 (Figure 2 and Auxiliary Material Figures S2–S3).

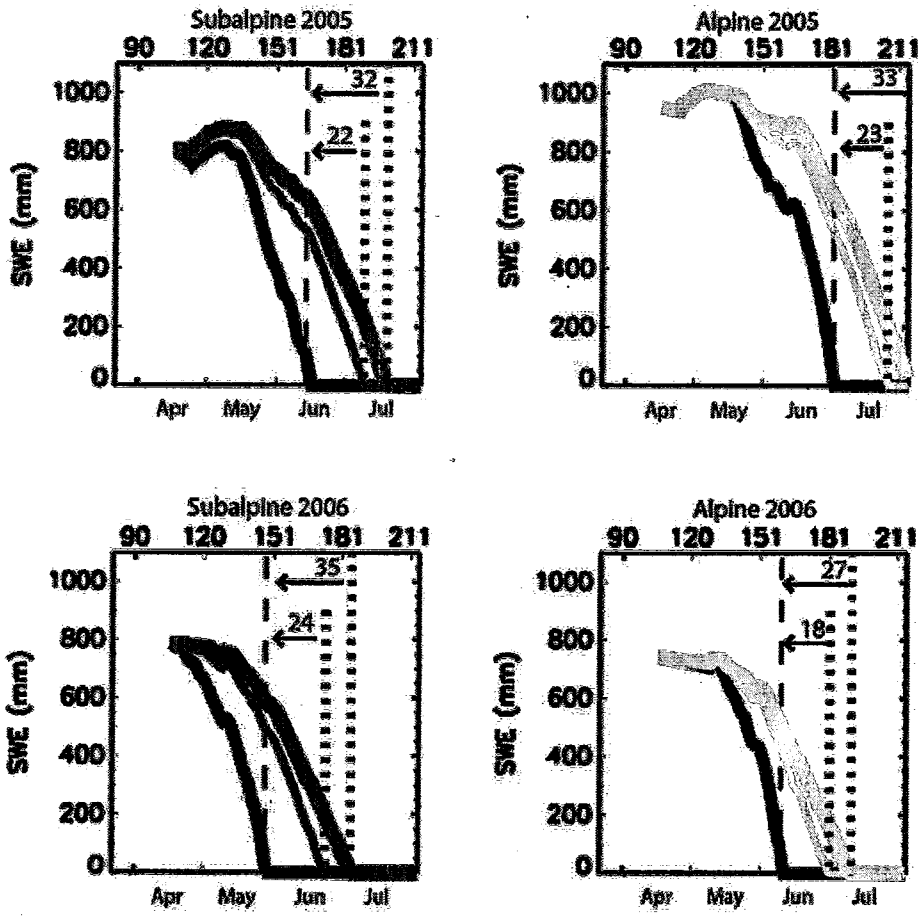

Figure 3. Time series of snow water equivalent scenarios with number of days difference from observed indicated: snowmelt model results for subalpine 2005 in measured case (black), dust free $K^*_{d\min}$ (thin), and dust free $K^*_{d\max+i1}$ (thick), where differences in snow cover duration are indicated for respective cases above the horizontal arrows; subalpine snowmelt in 2006; alpine snowmelt in 2005; and alpine snowmelt in 2006.

[15] During the winter/spring 2005, α_{BB} dropped in two periods from 0.85 (subalpine and alpine) to 0.45 (subalpine) and 0.51 (alpine), respectively, and α_{VIS} dropped in the same periods from 0.92 to 0.50 and 0.61, respectively, due to the accumulation of dust at the snow surface (Auxiliary Material Figure S1). In 2006, α_{BB} dropped quasi-monotonically from 0.85 to 0.40 and 0.46, respectively, and α_{VIS} dropped likewise from 0.92 to 0.45 and 0.58, respectively (Auxiliary Material Figure S1).

[16] In 2005, the radiative forcing had two periods of mean forcings of 30–50 (subalpine) and 20–40 (alpine) W m^{-2} as dust layers were exposed at the surface, covered by snowfall and exposed again through melt (Auxiliary Material Figure S2). In 2006, the radiative forcing increased steadily from early April to maxima of 80 (subalpine) and 60 (alpine) W m^{-2} later in ablation despite frequent but small snowfalls (Auxiliary Material Figure S3). For the period March 21 to June 21 (spring), mean daily radiative forcing in 2005 ranged from 31 to 37 W m^{-2} (subalpine) and 14 to 19 W m^{-2} (alpine), respectively, and in 2006 ranged from 56 to 64 W m^{-2} and 36 to 42 W m^{-2}, respectively. Radiative forcings in the alpine are generally lower than those in the subalpine because dust concentrations were consistently lower at the wind-exposed alpine tower. However, other slopes and aspects in the alpine collect scoured dust and have higher concentrations.

[17] The combination of more frequent and heavy dust events, less post-event snowfall and thus greater exposure, and clearer skies in 2006 compared with in 2005 resulted in distinctly larger radiative forcing and shorter snow cover duration in 2006 than in 2005. Figure 2 presents the cumulative radiative forcings and the time series of the ratios of daily mean forcings for year 2006 to 2005 for both sites. The ratio generally increased at both sites lying between 1.5 and 2.5 for most of the ablation season, indicating that the net shortwave energy made available by dust for melting was approximately doubled in 2006. Ratios less than 1 result from small but non-zero dust forcing before late April 2005.

[18] SNOBAL snowmelt simulations indicate that in 2005 the subalpine melted out 22 to 32 days earlier relative to the dust free cases and the alpine snow cover melted out 23 to 33 days earlier (Figure 3). In 2006, the subalpine melted out completely 24 to 35 days earlier and the alpine melted out 18 to 27 days earlier. Far smaller peak snow water equivalents in 2006 relative to 2005 (67% in alpine, 85% in subalpine) resulted in the small differences between 2005 and 2006 with respect to snow cover duration despite

the doubling in shortwave radiative forcing. This gave less snow cover duration over which the differences in melt rates could be manifested. Therefore, the associated melt rates were greater in 2006 by up to 40%. In the period after snow cover disappears, the 2nd indirect radiative forcing from enhanced absorption was relatively constant between the two years and sites at 147 ± 8 W m^{-2} in 2006.

[19] Dust is generated by several processes and can originate from a spatial range of sources. We determined provenance of deposited dust through a combination of isotopic analysis, back-trajectory analyses, and remote sensing. For dust from the snow pack, strontium isotope ratios, $^{87/86}$Sr, and a comparison of the neodymium isotope ratios with a ratio for chrondritic uniform reservoir, $\varepsilon_{Nd}(0)$, were compared with the isotopic compositions of exposed surface rocks within the Senator Beck Basin. Sr and Nd isotopic values for the deposited dust were significantly different from the surrounding surface rocks (Auxiliary Material Table S2) and therefore a local, volcanic rock origin for the dust samples taken from the snow pack was highly unlikely.

[20] Precambrian basement rocks in western North America, and sedimentary rocks derived thereof, have geographic variations in their Nd isotopic compositions that constrain the sources of dust found in the San Juan Mountains snow cover. The dust samples have Nd isotopic compositions that overlap those of Paleoproterozoic intermediate to silicic compositions rocks that comprise much of the Mazatzal Province in Arizona and New Mexico (Province 3 of *Bennett and Depaolo* [1987] which lies to the west and south of Senator Beck Basin), indicating that dust deposited in the San Juan Mountains originated in the SW US.

[21] Backtrajectory analysis of atmospheric transport and remotely sensed imagery further narrowed the likely source of the dust. The Stochastic Time-Integrated Lagrangian Transport model (STILT) [*Lin et al.*, 2003] with archived data from the Eta Data Assimilation System (EDAS) 40 km weather analysis produces ensembles of 48-hour back-trajectories from the time of dust deposition. Auxiliary Material Figure S4 shows the mean back-trajectories for the 18 dust events that we have documented since 2003. With the exception of a single event with northwesterly flow (February 22, 2003) across southeast Utah, the remaining events had southwesterly flow across northeastern Arizona and northwestern New Mexico. Clear-sky data from the Geostationary Operational Environmental Satellite 10 (GOES-10) consistently show rising dust plumes from northeastern Arizona and northwestern New Mexico close to the time of dust deposition (Auxiliary Material Figure S5, April 2–3, 2003, as example).

[22] These data are consistent with the combination of trajectories determined by the STILT analyses and isotopic data in showing that dust deposited in the San Juan Mountains comes primarily from the Colorado Plateau. Precipitation in the fall 2005/winter 2006 on the Colorado Plateau was the lowest on record and contributed to the doubling of the number of deposition events over those in 2003–2005. We conclude then that snow cover duration across the San Juan Mountains is reduced by 18–35 days due to the deposition of dust from the disturbed deserts of the Colorado Plateau and not from sources local to the mountain basins.

4. Discussion

[23] Expansion and intensification of grazing, recreational use and agriculture over the past ~140 years has increased the dust emission from the Colorado Plateau and other desert regions of the western US [*Belnap and Gillette*, 1997; *Neff et al.*, 2005; *Reynolds et al.*, 2001]. Therefore it is likely that the above changes in snow cover duration and surface radiative forcing increased significantly with human activity in the late-1800s, as desert surface crusts were disturbed and dust was more freely emitted to the Rocky Mountains and other mountain ranges of the western US that are downwind of disturbed soils. Analyses similar to those performed for the San Juan Mountains and an analysis of time series of dust deposition from mountain lake sediments across the western US will provide a clearer understanding of the spatial and temporal extent of this shortening of snow cover duration.

[24] The phenomenon of increasing dust emission exists beyond the western US and is global in nature with the potential to continue to perturb resource-critical mountain snowmelt systems. Dust emission frequency in China from the Taklimakan and Gobi deserts (proximal to the Tien Shan and Altai ranges) has increased from one event in ~35 years for the period AD85-1949 to annual since 1990 [*Liu and Diamond*, 2005]. A four-fold increase in dust deposition over the previous two centuries was found in the Dasuopu glacier ice core at elevation 7200 m in Tibet [*Thompson et al.*, 2000], with the continuum increase attributed to increased land usage whereas the interannual variability attributed to interannual changes in precipitation. The drying of the Aral Sea has affected enormous increases in dust emission that frequently deposits in the Tien Shan, Pamir, Himalaya, and Altai Mountains [*Waltham and Sholji*, 2001]. Dust deposition to the Antarctic Peninsula has doubled in the 20th Century due to the coupled effects of changing climate and land degradation [*McConnell et al.*, 2007].

[25] Under global warming, increased drought is projected for the southwest US, Middle East, and the expanding Sahel [*Cook et al.*, 2004; *Hansen et al.*, 2005; *Intergovernmental Panel on Climate Change*, 2007]. All of these deserts are known dust sources for winter and spring deposition to mountain snow cover in the Rocky Mountains (this work), Central Asia (Pamir Mountains, Hindu Kush, Karakoram) [*Wake and Mayewski*, 1994], and the Alps [*Franzén et al.*, 1994; *Schwikowski et al.*, 1995], respectively. Future drying in desert regions [*Cook et al.*, 2004; *Hansen et al.*, 2005] and projected expansion and intensification of use of arid and semi-arid lands [*Asner et al.*, 2004] could cause regional dust emission to increase in frequency and magnitude. Therefore, earlier snowmelt and its effects on mountain water resources and glacial extent is a likely scenario in many of the world's mountain ranges under enhanced dust deposition.

[26] **Acknowledgments.** This research was funded by the National Science Foundation Atmospheric Sciences grants ATM-0432327 and ATM-0431955 and support to JCN from the A.W. Mellon Foundation. Many thanks to Adam Winstral (USDA) for the SNOBAL modeling runs and Max Bleiweiss (New Mexico State University) for use of the GOES-10

data. We thank Michael Barton, Jon Carrasco, Jeffrey Deems, Koren Nydick, Tania Painter, and Richard Painter for their hard work.

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EXHIBIT 4

United States Department of the Interior

NATIONAL PARK SERVICE
INTERMOUNTAIN REGION
12795 West Alameda Parkway
PO Box 25287
Denver, Colorado 80225-0287

In reply refer to:
(L30) IMR

November 24, 2008

Memorandum

To: Director, Utah State Office, Bureau of Land Management

From: Regional Director, Intermountain Region, National Park Service

Subject: Notice of December 19, 2008 Competitive Oil & Gas Lease Sale of Lands Proximal to Arches National Park, Canyonlands National Park and Dinosaur National Monument

I would like to personally extend my appreciation to the BLM field office managers who worked with our park superintendents on the parcel-by-parcel review of these oil and gas lease parcels. They did an outstanding job working in collaboration with us, providing information, insight and expertise as we went through the process of examining these tracts and their potential impact on park lands and values.

This was a significant work load, and we appreciate the dedication and commitment of your staff. We met with your staff from November 7-12, and while we originally thought that there were about 45 parcels in the proposed lease sale that were of concern to us, higher resolution maps provided by your staff showed that there were actually 93 parcels of concern, totaling 139,737 acres. With these 93 parcels we have identified three overarching concerns: air quality, water resources and natural sound.

In reviewing the lease sale parcels, we reviewed the stipulations that would apply to each parcel. We found that stipulations commonly contain exemption and waiver clauses whereby the BLM may make exceptions, modifications, or waivers to the stipulations. This makes it very difficult for the NPS to determine whether the stipulations are sufficient to protect NPS interests, since the stipulations may or may not be applied as written. In order to proceed with this process, the NPS reviewed the parcels and made its recommendations on the assumption that no exceptions, modifications, or waivers of the stipulations would be made. Our recommendations are only valid if BLM can assure that.

Air Quality:

We recognize that the BLM is committed to maintaining existing air quality. The Moab RMP includes air quality objectives including:

> "Manage all BLM and BLM-authorized activities to maintain air quality within the thresholds established by the State of Utah Ambient Air Quality Standards and to ensure that those activities continue to keep the area as attainment, meet prevention of significant deterioration (PSD) Class II standards, *and protect the Class I air shed of the National Parks* (e.g., Arches and Canyonlands National Parks)." Moab Field Office Proposed Resource Management Plan and Final Environmental Impact Statement, August 2008, page 2-7, emphasis added.

The Vernal RMP's air quality goal is to:

> "Ensure that authorizations granted to use public lands and the BLM's own management programs comply with and support applicable local, state, and federal laws, regulations, and implementation plans pertaining to air quality."

In addition, the Vernal Field Office is preparing an air quality study that centers on the Uintah Basin and will establish a baseline and then evaluate incremental changes to air quality from development proposals. The study should be released in the next few months.

Stipulations MBFO-S-1 and VFO-01 require tighter pollution controls on most gas field internal combustion engines. However, we are very concerned that these and other mechanisms cited in the Plans might not be sufficiently protective of air quality from the cumulative impacts of oil and gas activities.

Canyonlands and Arches National Parks are Class 1 air sheds under the Clean Air Act. As such, resources in these parks (e.g., visibility, vegetation and water) known as Air Quality Related Values (AQRVs) under the Clean Air Act are provided additional protection from the harmful effects of air pollution. The National Ambient Air Quality Standard for ozone is .75 ppm or below for all areas of the country. Canyonlands is barely meeting that standard.In 2008, ozone levels at Canyonlands reached .75 ppm. The fourth high 8-hour average at Dinosaur National Monument for 2008 is 0.69 ppm. The air quality analyses that BLM has performed to date do not provide the information necessary to determine whether air quality standards could be violated, or if visibility and other AQRVs could be adversely impacted. We believe a study using appropriate air quality models, and considering all other regional sources, needs to be done prior to lease offerings to determine whether additional safeguards are needed to keep the area as attainment and protect AQRVs. NPS air quality experts are available to assist with the needed analyses.

Natural Sound:

Natural sounds and quiet are important characteristics of units of the National Park System. The opportunity to experience natural sounds and quiet are an integral part of the visitor experience. Natural soundscapes include wind, water, wildlife, and other sounds produced by the environment. The opportunity to hear natural sounds depends upon the natural ambient sound level, or the consistent background sound level that exists in the absence of noise.

The NPS has collected acoustic data from 23 locations in parks in the Southeast Utah Group and found that typical median sound levels (L_{50}) for the acoustic monitoring location in Arches closest to parcels 193 and 194 ranged from 22.3 dBA (winter) to 23.8 dBA (summer). A site on the southeast side of Canyonlands had a median L_{50} of 24.9 dBA in summer and 17.9 dBA in winter.

Using reference sound levels from NIOSH for drill rigs, 90-97 dBA at 24 meters; it is possible to estimate the sound levels at other distances from the source. Even at 1500 meters from the source, sound levels would still be 53 to 46 dBA which is 30-40 dBA above typical median ambient sound levels at both parks. Visitors to areas that have elevated ambient levels due to noise from oil and gas exploration and development would experience reduced opportunities to hear natural sounds. For example, a 20 dBA increase in ambient sound level would result in a 99% reduction in listening area.

Pertinent to all three parks, the stipulations to mitigate noise from oil and gas exploration and development activities should be protective enough so as not to reduce the ability of visitors to hear natural sounds at long distances. Moving operations 200 meters from park boundaries, as suggested in the Vernal BLM planning document, is insufficient and may still result in noise levels well above 60 dBA at the park boundary, which is the level at which noise starts to interfere with close range conversational speech.

Water Resources:

The NPS is concerned about the effects of this sale on ground water supplies that feed seeps and springs in Arches and Dinosaur, and on surface waters flowing into the parks. While a groundwater analysis for the Courthouse and 7-Mile Canyon drainages on the west side of Arches have been completed, the NPS needs time to analyze ground water relationships on the park's north and east sides. The NPS also needs provisions to ensure effective input into BLM permitting actions at the APD stage where park aquifers or ground water resources might be affected.

The NPS is also concerned about the potential for contamination of surface and ground waters by contaminants from oil and gas activities upstream of the parks. In our quick review of the lease sale and the associated stipulations, we did not find provisions to prevent such contaminants from being released into waters, including floodwaters, which flow into the parks.

Specific Parcel Recommendations

Our recommendations about the specific parcels as they relate to the individual parks affected are as follows:

Dinosaur National Monument

Category 1: Defer these parcels unless there is full implementation of existing stipulations without exceptions, modifications, or waivers (8,157 acres)

119, 121,122, 124, 125

<u>Category 2:</u> Defer these parcels unless additional provisions recommended by NPS are included in lease with no exceptions, modifications or waivers of existing stipulations (4,961 acres).

Parcel 101, 130, 131,132,143, 144, 145, 146, 147

The additional provisions are:

1. that night lighting stipulations apply per VFO-15
2. that BLM add a lease notice to clarify that there is no access over park lands or roads to lease operation

<u>Category 3:</u> Defer parcels with concerns; additional time required for review and analysis. (4,961 acres).
102, 128 129

Defer so that Monument and BLM staff can conduct a sight visit to determine the visual impacts on visitor use areas.

Arches and Canyonlands National Parks

<u>Category 1:</u> Defer these parcels unless there is full implementation of existing stipulations without exceptions, modifications, or waivers (47,220 acres):

170, 171, 172, 173, and the western portion of 174
175, 176, 177, 178, 179
161, 162, 163,
164, 165, 166, 167, 168, 169,
200
231
361, 362, 363, 364, 365,
366, 367, 368, 369, 370, 371

<u>Category 2:</u> Defer these parcels unless additional provisions recommended by NPS are included in lease with no exceptions, modifications or waivers of existing stipulations (31,140 acres).

180, 181, 182, 183, 184, 185, 186,
198, 199, 201, 202, 203, 204, 205, 206, 207, 208, 214,
east portion of 174,
parts of 196 and 197

The additional provisions are:

1 that night lighting stipulations apply per MBFO-LN-2
2 that provisions are made to prevent depletion of water quantity in Arches seeps and springs from oil and gas activities on these parcels
3 that provisions are made to prevent contamination of surface and ground waters that flow into Arches from oil and gas activities on these parcels

4 that stronger sound stipulations are applied to the southern ¾ mile of 199, and the southwest portion of 214, per MBFO-LN-2, so that, to a park visitor, noise levels are not audible above natural sounds.
5 that oil and gas activities in parcels 198, 199, and 201 through 208 are sufficiently screened from viewers within Arches and Canyonlands National Parks by topography

Category 3: Defer parcels with concerns; additional time required for review and analysis. (35,450 acres).

215, 216, 217, 218, 219, 221, 222, 223, 224, 225, and parts of 242, 243, and 244. The NPS needs more time for review and analysis of these parcels related to park viewsheds, light and noise, wildlife, and water resource concerns. These parcels are within key viewsheds from Delicate Arch, the Windows, the scenic drive, and other key observation points within Arches National Park.

NE quarter of 196 and the most eastern portion of 197. The NPS needs more time for review and analysis of these parcels, which are within the groundwater protection zone for part of Arches National Park.

189, 190, 191, 192, 193, 194, The NPS needs more time for review and analysis of these parcels related to park viewsheds, noise, and adjacent wilderness recommendation lands.

For your convenience the following table summarizes National Park Service recommendations. The attached maps show these parcels in relation to the parks.

	Canyonlands/Arches (parcels/acres)	Dinosaur (parcels/acres)	Total (parcels/acres)
Category 1: Defer these parcels unless there is full implementation of existing stipulations without exceptions, modifications or waivers, and additional evaluation of overall air quality, natural sound and water resources impacts.	30 parcels/ 46,575 acres	5 parcels/ 8,157 acres	35 parcels/ 54,732 acres
Category 2: Defer these parcels unless additional provisions recommended by NPS are included in leases with no exceptions, modifications or waivers of existing stipulations.	20 parcels/ 33,665 acres	9 parcels/ 4,961 acres	29 parcels/ 38,586 acres
Category 3: Defer parcels with concerns: Additional time required for review and analysis.	21 parcels/ 32,560 acres	3 parcels/ 4,559 acres	24 parcels/ 37,119 acres

Through early collaboration and continued dialog with your field and state offices, we feel a solution can be formulated to accommodate quarterly oil and gas leasing postings in a manner that is considerate of and compatible with coexisting area and park values.

Continuing to defer the parcels identified above from oil and gas leasing is prudent and in the public interest. It ensures that needed analyses are completed before making a decision to create a property right in leases that the Federal Government may need to buy back later in order to protect adjacent park resources and values.

In an effort to preserve the Secretary's goal of collaborative conservation, we suggest that we meet before December 31. 2008 to update the previous 1993 Supplemental Agreement for Planning and Program Coordination among the NPS units in Utah and the BLM Utah State Office and associated Oil and Gas Lease Notification Instruction Memorandum. These documents were previously provided to your office by Utah Sate Coordinator Cordell Roy.

Again, please know of our sincere thanks to the BLM and its field office mangers for their exceptional work during this process. If there are questions about these comments, please feel free to contact me at (303) 969-2503.

Sincerely,

Michael D. Snyder
Regional Director
Intermountain Region

EXHIBIT 5

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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DENVER, CO 80202-1129
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SEP 0 3 2009

Ref: 8P-AR

David Garbett
Staff Attorney
Southern Utah Wilderness Alliance
425 E 100 S
Salt Lake City, UT 84111

RE: "$PM_{2.5}$ Monitor in Vernal, Utah", your August 6, 2009 letter

Dear Mr. Garbett:

Thank you for your August 6, 2009 letter to Carol Rushin, Acting Regional Administrator for EPA Region 8, regarding ambient air monitoring in Vernal and the greater Uintah Basin. Ms. Rushin has asked me to address your letter in detail.

You expressed three specific concerns in your letter, which we address below.

1) First, you asked why the Utah Division of Air Quality (DAQ) was permitted to remove a monitor in Vernal after it recorded high $PM_{2.5}$ concentrations in 2007. 40 CFR Part 58, Appendix D, Section 4.7 requires $PM_{2.5}$ monitoring in any Metropolitan Statistical Area (MSA) with a population of more than 500,000 people. That section also requires monitoring in any MSA with more than 50,000 people if monitors in that MSA have a 3-year $PM_{2.5}$ design value greater than 85% of the NAAQS (that is, a design value of 30 $\mu g/m^3$ or greater). Since Vernal has a population of only 8,696, and Uintah County as a whole has a total population of only 29,885 (U. S. Census Bureau 2008 population estimates), the Code of Federal Regulations contains no requirement mandating monitoring in Vernal or the Uintah Basin. DAQ staff have explained that the monitoring the State conducted in Vernal in 2006, 2007, and 2008 was done exclusively with State funds, and so the monitoring did not need to comply with the monitoring requirements of 40 CFR Part 58.

We do want to note that EPA Region 8 funded the Utah DAQ to conduct limited survey ambient air monitoring in 2009 aimed at better understanding the nature of the $PM_{2.5}$ problem in Vernal. The data collected in 2009 is relevant to your second question. Also, related to your third question, two industry funded ambient air monitors located within the Uintah and Ouray Reservation will soon be collecting additional $PM_{2.5}$ data.

2) Your second question was whether the Utah DAQ had conducted speciation analysis of

$PM_{2.5}$ samples from Vernal. In 2008, DAQ collected $PM_{2.5}$ samples in February and March. The 2008 data included one exceedance of the $PM_{2.5}$ NAAQS on February 19, 2008. The Utah DAQ conducted chemical speciation analysis of this sample, and stated in its "Uintah Basin Special Study" monitoring plan from January 2009 that:

> "The levels of ammonia were non-detected on the passive ammonia samplers. The low molecular weight hydrocarbons were higher than samples from the Wasatch Front. The organic and elemental carbon fraction of the filters collected on the day with the highest $PM_{2.5}$ concentration were double and the concentration of Nitrate was about half of that observed from Wasatch Front filters."

We have not seen further data from 2008 apart from the statements included in this January 2009 monitoring plan.

In order to gain more information on $PM_{2.5}$ air quality in Vernal, EPA Region 8 agreed to provide funding to Utah under the annual EPA $PM_{2.5}$ monitoring grant to conduct episodic monitoring during wintertime inversions in the 1st quarter of 2009 using non-regulatory monitors. Utah monitored $PM_{2.5}$ in Vernal and Roosevelt from January 21, 2009 through March 5, 2009. Of the 30 days in that period on which Utah collected samples in each community, exceedances of the 24-hour $PM_{2.5}$ standard were recorded on three days in Roosevelt and four days in Vernal. Concentrations in Vernal were as high as 60.9 $\mu g/m^3$ while those in Roosevelt were as high as 42.4 $\mu g/m^3$.

Speciation analysis was done on the samples collected in 2009 that were above the level of the NAAQS. The Utah DAQ's draft project report describes the speciation analysis. However, the DAQ has noted that because of the small study size and uncertainties in the laboratory analysis, more data is needed in order to make final conclusions.

With the above qualifications, the DAQ does state in its draft project report:

> "The analysis of the filter data for the filters with mass concentrations greater than 35 $\mu g/m^3$ results in more unexplained mass than typically observed compared to previous sampling conducted along the Wasatch Front. Blank concentrations for the Teflon filter do not substantially affect the mass calculations but without the carbon fraction the unexplained mass is quite large. Prior sampling and analysis of filters from the Uintah Basin has attributed a large fraction of the total mass to the elemental carbon. The inversion period chemical profile for the Uintah Basin is not consistent with profiles observed along the urbanized Wasatch Front or in Cache Valley where elemental carbon (or "unexplained mass" from the Teflon filters) represents a smaller portion of the chemical speciation."

3) With regard to future data, EPA Region 8 can provide you a copy of the Utah DAQ final report on monitoring done in the Uintah Basin in 2009 once it is released by the Utah DAQ, as well as a copy of the January 2009 monitoring plan. You may also be able to obtain these documents directly from the Utah DAQ. In addition, ambient $PM_{2.5}$ data will soon be collected

by two industry funded monitors located on the Uintah and Ouray Indian Reservation. This $PM_{2.5}$ data will be loaded into AQS, and will be accessible through public portals to ambient air monitoring data (http://www.epa.gov/air/data/ for example) or directly from EPA Region 8 upon request. This continuous (hourly), but non-regulatory $PM_{2.5}$ monitoring, is currently expected to begin at the two sites in the Uintah Basin in October 2009. The data will be collected with Federal Equivalent Method (FEM) $PM_{2.5}$ monitors.

As a follow up on the $PM_{2.5}$ data collection activities over the past four years, and in light of the air quality issues identified, EPA Region 8 will be discussing Uintah Basin air quality and next steps with the Utah DAQ in the near future.

I hope that the information provided is helpful. If you have further questions, you may contact Richard Payton of my staff at (303) 312-6439.

Sincerely,

Stephen S. Tuber
Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

cc: Cheryl Heying, UT DAQ

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