CENTER for BIOLOGICAL DIVERSITY *Because life is good.*

December 14, 2015

**VIA FAX (303-239-3799 )**

Ruth Welch, State Director
Colorado State Office
BLM
2850 Youngfield St.
Lakewood, CO 80215

Dear Ms. Welch:

The Center for Biological Diversity (the "Center") hereby files this Protest of the Bureau of Land Management ("BLM")'s planned February 11, 2016 oil and gas lease sale and Determination of NEPA Adequacy ("DNA") DOI-BLM-COS010-2015-0020-DNA pursuant to 43 C.F.R. § 3120.1-3. The Center formally protests the inclusion of each of the following parcels, covering 4,912.33 acres in the Tres Rios Field Office in Dolores and Montezuma Counties:

COC77454
COC77455
COC77456
COC77457
COC77458

## PROTEST

**1. Protesting Party: Contact Information and Interests:**

This Protest is filed on behalf of the Center for Biological Diversity and their board and members by:

Wendy Park
Staff Attorney
Center for Biological Diversity
1212 Broadway #800
Oakland, CA 94612
wpark@biologicaldiversity.org

The Center is a non-profit environmental organization with 50,400 member activists, including members who live and recreate in the Tres Rios planning area, including the Jim Olterman-Lone Cone State Wildlife Area. The Center uses science, policy and law to advocate for the conservation and recovery of species on the brink of extinction and the habitats they need to survive. The Center has and continues to actively advocate for increased protections for species and habitats in the planning area on lands managed by the BLM and Colorado Parks & Wildlife. The lands that will be affected by the proposed lease sale include habitat for listed, rare, and imperiled species that the Center has worked to protect including the Gunnison's sage-grouse. The Center's board, staff, and members use the lands within the planning area, including the lands and waters that would be affected by actions under the lease sale, for quiet recreation (including hiking and camping), scientific research, aesthetic pursuits, and spiritual renewal.

**2. Statement of Reasons as to Why the Proposed Lease Sale Is Unlawful:**

BLM's proposed decision to lease the parcels listed above is substantively and procedurally flawed for the reasons discussed below.

## I. BLM Must End All New Fossil Fuel Leasing and Hydraulic Fracturing.

Expansion of fossil fuel production will substantially increase the volume of greenhouse gases emitted into the atmosphere and jeopardize the environment and the health and well being of future generations. BLM's mandate to ensure "harmonious and coordinated management of the various resources *without permanent impairment of the productivity of the land and the quality of the environment*" requires BLM to limit the climate change effects of its actions.[1] Accordingly, BLM must keep all unleased fossil fuels in the ground by ending new leasing and banning fracking and other unconventional well stimulation methods in the Tres Rios Field Office and all other areas that it manages.

Halting all new leasing is necessary to preserve any reasonable chance of averting catastrophic climate disruption. The internationally agreed-on target for avoiding dangerous climate change and its disastrous consequences is limiting average global temperature rise caused by greenhouse gas pollution to two degrees Celsius (2°C), or 3.6 degrees Fahrenheit.[2] Climate experts have estimated that the world can emit 1,000 gigatons of carbon dioxide (1,000 $GtCO_2$ or 1 trillion tons of $CO_2$) after 2010 to have a reasonable chance of staying below 2°C of warming.[3] Given uncertainties, coupled with the dire predictions of climate change impacts, a more conservative carbon budget would be more prudent. Nonetheless, using this budget, the IPCC has found that proven fossil fuel reserves amount to **four to seven times more** than what

[1] *See* 43 U.S.C. §§ 1701(a)(7), 1702(c), 1712(c)(1), 1732(a) (emphasis added); *see also id.* § 1732(b) (directing Secretary to take any action to "prevent unnecessary or undue degradation" of the public lands).
[2] The Copenhagen Accord forged under the United Nations Framework Convention on Climate Change talks formally recognized the international objective of limiting warming to 2°C above pre-industrial.
[3] The Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change, established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). In its Fifth Assessment Report, the IPCC reported that the remaining carbon budget to have a "likely" (at least 66%) chance of staying below 2°C is 1000 GtCO2. See IPCC Climate Change 2014 Synthesis Report 63-64, available at http://ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf.

we can afford to burn, to have only a *likely* chance of staying within the 2°C target.[4] In short, the vast majority of *proven* reserves must be kept in the ground for preserving a livable planet. Minimizing new development of these reserves is critical. Opening up new *unleased, unproven* areas to exploration and potential extraction—which are deemed unburnable—on the other hand, runs completely counter to staying within the 2°C target.[5]

According to a recent report by EcoShift Consulting commissioned by the Center and Friends of the Earth, unleased, unproven federal fossil fuels represent a significant source of potential greenhouse gas emissions:

- Potential GHG emissions of federal fossil fuels (leased and unleased) if developed would release up to 492 gigatons (Gt) (one gigaton equals 1 billion tons) of carbon dioxide equivalent pollution (CO2e); representing 46 percent to 50 percent of potential emissions from all remaining U.S. fossil fuels.
- Of that amount, up to 450 Gt CO2e have not yet been leased to private industry for extraction;
- Releasing those 450 Gt CO2e (the equivalent annual pollution of more than 118,000 coal-fired power plants) would be greater than any proposed U.S. share of global carbon limits that would keep emissions below scientifically advised levels.[6]

Further, existing federal leases are already a significant source of greenhouse gas emissions. Between 2003 and 2014 approximately 25 percent of all U.S. and three to four percent of global fossil fuel greenhouse gas emissions were attributable to federal fossil fuel production.[7] Halting new leasing within the Tres Rios Field Office and across all BLM lands would represent a significant opportunity to lock away millions of tons of greenhouse gas emissions.

At minimum, BLM must suspend leasing until it has evaluated the potential greenhouse gas impacts of its leasing program. BLM has *never* comprehensively considered the cumulative climate change impacts of all potential fossil fuel extraction across all BLM lands. But climate change is a problem of regional and global proportions resulting from the cumulative greenhouse

---

[4] *Id.* at 63. In addition, a recent analysis by some of the world's leading climate scientists estimated that burning the Earth's proven fossil fuel reserves (i.e., those that are currently economically recoverable) would emit 4196 $GtCO_2$, over four times the 1000 $GtCO_2$ budget. *See* Raupach M. et al. Sharing a quota on cumulative carbon emissions. Nature Climate Change 4, 873-79 (2014), available at http://www.nature.com/nclimate/journal/v4/n10/full/nclimate2384.html. Analyses by the Carbon Tracker Initiative and Australian Climate Commission estimated that 80% of proven fossil fuel reserves must be kept in the ground to have a reasonable probability (75-80%) of staying below 2°C. This estimate includes only the fossil fuel reserves that are considered currently economically recoverable with a high probability of being extracted. *See* Carbon Tracker Initiative, Unburnable Carbon – Are the world's financial markets carrying a carbon bubble? (2011), available at http://www.carbontracker.org/wp-content/uploads/2014/09/Unburnable-Carbon-Full-rev2-1.pdf; Steffen, Will et al., Australian Climate Commission. The Critical Decade 2013: Climate Change Science, Risks and Responses (2013), available at http://apo.org.au/files/Resource/ClimateCommission_The-Critical-Decade-2013.pdf

[5] Unleased reserves are not considered proven reserves. *See* note 6 below at 9.

[6] EcoShift Consulting et al., The Potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels (Aug. 2015), available at http://www.ecoshiftconsulting.com/wp-content/uploads/Potential-Greenhouse-Gas-Emissions-U-S-Federal-Fossil-Fuels.pdf.

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

gas emissions of countless individual sources, which cannot simply be addressed piecemeal on a project-by-project basis. BLM would be remiss to continue leasing when it has never stepped back and taken a hard look at this problem at the appropriate scale. Before allowing more oil and gas extraction in the planning area, BLM must: (1) comprehensively analyze the total greenhouse gas emissions which result from fossil fuel leasing and all other activities on BLM lands, (2) consider their cumulative significance in the context of global climate change, carbon budgets, and other greenhouse gas pollution sources outside the planning area, and (3) formulate measures that avoid or limit their climate change effects. By continuing leasing in the absence of any overall plan addressing climate change BLM is effectively burying its head in the sand.

Exploration and development would likely involve the highly controversial industry practices of hydraulic fracturing or "fracking" and horizontal drilling. As discussed further below these practices deplete enormous water resources, risk toxic spills, contaminate air, and fragment and degrade habitat for species. For areas that are leased but not yet developed, BLM can further limit greenhouse gas emissions and minimize environmental degradation by banning fracking and other unconventional well stimulation practices.

Because continued leasing and fracking are incompatible with slowing the effects of global warming and preserving the health of our public lands, BLM must end new leasing and fracking immediately.

## II. BLM's Determination of NEPA Adequacy Is Erroneous.

NEPA regulations and case law require that BLM evaluate all "reasonably foreseeable" direct and indirect effects of its leasing. 40 C.F.R. § 1508.8; *Davis v. Coleman*, 521 F.2d 661, 676 (9th Cir. 1975); *Center for Biological Diversity, et al. v. Bureau of Land Management, et al.*, 2013 U.S. Dist. LEXIS 52432 (N.D. Cal. March 31, 2013) (holding that oil and gas leases were issued in violation of NEPA where BLM failed to prepare an EIS and unreasonably concluded that the leases would have no significant environmental impact because the agency failed to take into account all reasonably foreseeable development under the leases). Oil and gas leasing is an irrevocable commitment to convey rights to use of federal land – a commitment with readily predictable environmental consequences that BLM is required to address. These include the specific geological formations, greenhouse gas emissions, surface and ground water resources, seismic potential, or human, animal, and plant health and safety concerns present in the area to be leased. Analysis of the consequences of this practice, prior to irrevocable consequences, is therefore required at the leasing stage.

BLM's Determination of NEPA Adequacy improperly tiers to the Tres Rios Resource Management Plan Environmental Impact Statement (RMP EIS or EIS) for environmental analysis of various impacts that the RMP EIS does not address. For example:

- The EIS does not quantify methane leakage from pipelines and other fugitive sources, nor does it adequately discuss mitigation for these greenhouse gas sources. It also fails to quantify GHG emissions from construction, venting, flaring, transportation, refining, and end-user combustion. *See* EIS at 364-65 (quantifying GHGs only from drilling rig engines, hydraulic fracturing engines, compressor engines, and well pad

separators/heaters). The EIS also does not provide an analysis of the "social costs of carbon." *See* section III(2) below.

- According to the Grand Junction RMP EIS, COGCC studies indicate that "surface and groundwater contamination, due to oil and gas development...occurred between 1,000 to 1,800 feet from the drilling."[8] NSOs to protect streams and other water bodies are inadequate, in that they require setbacks of only 325 feet for streams and other perennial water bodies and 50 feet for ephemeral streams. FEIS at 247, H-12. For lakes and reservoirs, a setback of only 0.25 mile (1320 feet) is required. FEIS at 247. These setbacks are also inadequate to protect the ESA-listed bonytail, Colorado pikeminnow, humpback chub, and razorback sucker ("endangered fish"), found downstream of the parcels in the tributaries or mainstems of the Dolores and San Juan Rivers, as well as the ESA-listed greenback cutthroat trout found within the planning area. *See* FEIS at 231.

In addition, the Tres Rios RMP EIS does not address effects on local resources that are reasonably foreseeable. For example:

- The RMP EIS acknowledges that "water used for [oil and gas] operations on state and private lands would likely come from ground or surface water sources within the planning area," which "has the potential to place pressure on existing domestic, municipal and agricultural groundwater uses at a time period when municipal demand for water is expected to grow." FEIS at 279. A number of streams are near the parcels for lease, but BLM has failed to analyze the potential for depletion of these streams (including direct effects or indirect effects through depletion of interconnected groundwater).

- The RMP requires an NSO to apply to all state wildlife areas (NSO Exhibit 3.13.1). Parcel 77456 is partially within the Jim Olterman-Lone Cone State Wildlife Area, but the lease sale notice does not indicate application of an NSO to this parcel. Valuable habitat for deer, elk, black bears, and dusky blue grouse would be harmed by drilling within this area. In addition, this NSO only provides that "NSO and other mitigations would be determined by the managing Agencies in cooperation with CPW," but there is no analysis of specific measures that would be applied to oil and gas development within or around parcels overlapping the State Wildlife Area.

- According to BLM's map of the parcels for lease there is very little oil and gas development within the vicinity of the parcels for lease. The sale of these parcels, which all appear to be within about 12 miles or less of each other and surround a cluster of several non-producing leased parcels, could foreseeably result in cumulative impacts to various local resources. This includes cumulative effects on local air quality as a result of increased traffic, drilling, methane venting and leakage, and construction; increased runoff pollution due to greater surface disturbance, new roads, and more vehicle traffic; cumulative effects on valuable habitat for mule deer, elk, and wild turkey due to habitat fragmentation and noise; and industrialization of the landscape and degradation of scenic

[8] Grand Junction Field Office RMP FEIS 6-271.

areas with increased well pads and other oil and gas infrastructure.[9] The Tres Rios RMP EIS did not address cumulative impacts within specific locales.

- Stipulations to protect sensitive plant species, including the "globally critically impaired" cushion bladderpod and Lone Mesa snakeweed, are subject to exceptions, waivers, and modifications without any specific criteria for how these exceptions will be applied. *See* Lease Sale Notice, Attachment D, Exhibit 2.2.1 ("Exceptions, modifications, and waivers would be considered for BLM leases."). Thus, there is no reason to believe that BLM will objectively apply protective measures to areas where they are needed, and no assurance that impacts to sensitive plant species will be mitigated. The same goes for numerous other stipulations attached to the lease parcels. *See generally* Lease Sale Notice, Attachment D. An EIS must reveal the impact of the failure to fully apply lease stipulations to the parcels at issue, including impacts to streams and other surface waters, groundwater, soil, lynx habitat, big game, raptors, state wildlife areas, and visual resources. BLM's environmental review must also address what alternative mitigation measures would be required where exceptions to lease stipulations are granted.

The following sections describe in greater detail foreseeable impacts that BLM must address in an EIS, or at the very least, an Environmental Assessment.

## III. Fossil Fuel Development Will Exacerbate Climate Change

BLM cannot ignore the mounting evidence proving that oil and gas operations are a major cause of climate change. This is due to emissions from the operations themselves, and emissions from the combustion of the oil and gas produced. Every step of the lifecycle process for development of these resources results in significant carbon emissions, including but not limited to:

*End-user oil and gas combustion emissions.* The combustion of extracted oil, gas, and coal will add vast amounts of carbon dioxide to the atmosphere, further heating the climate and moving the Earth closer to catastrophic and irreversible climate change. Though much of the oil is used as gasoline to fuel the transportation sector, the produced oil may also be used in other types of products. The EIS should study all end-uses as contributors to climate change.

*Combustion in the distribution of product.* To the extent that distribution of raw and end-use products will rely on rail or trucks, the combustion of gasoline or diesel to transport these products will emit significant greenhouse gas emissions.

---

[9] *See* Rocky Mountain Wild, Assessment of Biological Impact (ABI) Screen for Colorado February 2016 Lease Sale Notice and associated maps of species habitat and sensitive areas. ABI screen available at http://rockymountainwild.org/_site/wp-content/uploads/15-142_COFeb2016LeaseSaleNoticeScreen.xlsx. Maps available at http://rockymountainwild.org/_site/wp-content/uploads/15-142_COFeb2016LeaseSale_Map_1.pdf, http://rockymountainwild.org/_site/wp-content/uploads/15-142_COFeb2016LeaseSale_Map_2.pdf, http://rockymountainwild.org/_site/wp-content/uploads/15-142_COFeb2016LeaseSale_Map_3.pdf, http://rockymountainwild.org/_site/wp-content/uploads/15-142_COFeb2016LeaseSale_Game_Map_1.pdf, http://rockymountainwild.org/_site/wp-content/uploads/15-142_COFeb2016LeaseSale_Game_Map_2.pdf, http://rockymountainwild.org/_site/wp-content/uploads/15-142_COFeb2016LeaseSale_Game_Map_3.pdf.

*Emissions from Refineries and Production.* Oil and gas must undergo intensive refinery and production processes before the product is ready for consumption. Refineries and their auxiliary activities constitute a significant source of emissions.

*Vented emissions.* Oil and gas wells and coal mining operations may vent gas that flows to the surface at times where the gas cannot otherwise be captured and sold. Vented gas is a significant source of greenhouse gas emissions and can also pose a safety hazard.

*Combustion during construction and extraction operations.* Operators rely on both mobile and stationary sources of power to construct and run their sites. The engines of drilling or excavation equipment, pumps, trucks, conveyors, and other types of equipment burn large amounts of fuel to operate. Carbon dioxide, methane, and nitrous oxide (another potent greenhouse gas) are emitted from oxidized fuel during the combustion process. Engines emit greenhouse gases during all stages of oil and gas recovery, including drilling rig mobilization, site preparation and demobilization, completion rig mobilization and demobilization, well drilling, well completion (including fracking and other unconventional extraction techniques), and well production. Transportation of equipment and chemicals to and from the site is an integral part of the production process and contributes to greenhouse gas emissions. Gas flaring is another important source of carbon dioxide emissions.

*Fugitive emissions.* Potent greenhouse gases can leak as fugitive emissions at many different points in the production process, especially in the production of gas wells. Recent studies suggest that previous estimates significantly underestimate leakage rates.[10]

Natural gas emissions are generally about 84 percent methane.[11] Methane is a potent greenhouse gas that contributes substantially to global climate change. Its global warming potential is approximately 34 times that of carbon dioxide over a 100 year time frame and at least 86 times that of carbon dioxide over a 20 year time frame.[12] Oil and gas operations release large amounts of methane. While the exact amount is not clear, EPA has estimated that "oil and gas systems are the largest human-made source of methane emissions and account for 37 percent of methane emissions in the United States and is expected to be one of the most rapidly growing sources of anthropogenic methane emissions in the coming decades."[13] That proportion is based on an estimated calculation of methane emissions, rather than measured actual emissions, which indicate that methane emissions may be much greater in volume than calculated.[14]

---

[10] Brandt, A. R. *et al.*, Methane leaks from North American natural gas systems, *343* Science 733 *(2014);* Miller, S. M. et al. Anthropogenic Emissions of Methane in the United States, Proc. Natl. Acad. Sci. Early Edition, DOI: 10.1073/pnas.1314392110 (2013) ("Miller 2013").

[11] Brown Memo to EPA at 3; Power, Thomas, The Local Impacts of Natural Gas Development in Valle Vidal, New Mexico, University of Montana (2005) ("Power").

[12] Intergovernmental Panel on Climate Change, Chapter 8: Anthropogenic and Natural Radiative Forcing in Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Table 8.7 (2013); Howarth, Robert, et al., Methane and the greenhouse-gas footprint of natural gas from shale formations, Climactic Change (Mar. 31, 2011) ("Howarth 2011"); Shindell, Drew, Improved Attribution of Climate Forcing to Emissions, 326 Science 716 (2009).

[13] U.S. Environmental Protection Agency, Natural Gas STAR Program, Basic Information, Major Methane Emission Sources and Opportunities to Reduce Methane Emissions ("USEPA, Basic Information"); *see also* Petron, Gabrielle, et al., Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study, 117 Journal of Geophysical Research (2012).

[14] Miller, S. M. et al. Anthropogenic Emissions of Methane in the United States, Proc. Natl. Acad. Sci. Early

For natural gas operations, production generates the largest amount; however, these emissions occur in all sectors of the natural gas industry, from drilling and production, to processing, transmission, and distribution.[15] Fracked wells leak an especially large amount of methane, with some evidence indicating that the leakage rate is so high that shale gas is worse for the climate than coal.[16] In fact, a research team associated with the National Oceanic and Atmospheric Administration recently reported that preliminary results from a field study in the Uinta Basin of Utah suggest that the field leaked methane at an eye-popping rate of nine percent of total production.[17]

For the oil industry, emissions result "primarily from field production operations . . . , oil storage tanks, and production-related equipment . . . ."[18] Emissions are released as planned, during normal operations and unexpectedly due to leaks and system upsets.[19] Significant sources of emissions include well venting and flaring, pneumatic devices, dehydrators and pumps, and compressors.[20]

BLM's environmental analysis must address the following:

1. *Sources of Greenhouse Gases*

In performing a full analysis of climate impacts, BLM must consider all potential sources of greenhouse gas emissions (e.g. greenhouse gas emissions generated by transporting large amounts of water for fracking). BLM should also perform a full analysis of all gas emissions that contribute to climate change, including methane and carbon dioxide. The EIS should calculate the amount of greenhouse gas that will result on an annual basis from (1) each of the fossil fuels that can be developed within the areas for lease, (2) each of the well stimulation or other extraction methods that can be used, including, but not limited to, fracking, acidization, acid fracking, and gravel packing, and (3) cumulative greenhouse gas emissions expected over the long term (expressed in global warming potential of each greenhouse pollutant as well as $CO_2$ equivalent), including emissions throughout the entire fossil fuel lifecycle discussed above.

2. *Effects of Climate Change*

---

Edition, DOI: 10.1073/pnas.1314392110 (2013); PSE Healthy Energy Science Summary, "Climate Impacts of Methane Losses from Modern Natural Gas & Petroleum Systems," October 2015 (noting 3.8% methane loss from natural gas drilling to distribution based on atmospheric measurements; loss rates above 2.8% negate any climate benefit associated with lower carbon dioxide emissions during fuel combustion).

[15] USEPA, Basic Information.

[16] Howarth 2011; Brune, Michael, Statement of Sierra Club Executive Director Michael Brune Before the Committee on Oversight & Government Reform (May 31, 2012); Wang, Jinsheng, et al., Reducing the Greenhouse Gas Footprint of Shale (2011); Alvarez, Ramon et al., Greater focus needed on methane leakage from natural gas infrastructure, Proc of Nat'l Acad. Science Early Edition (Feb 13, 2012) at 3; *see also* Howarth, Robert, et al., Venting and Leaking of Methane from Shale Gas Development: Response to Cathles et al., (2012); Hou, Deyi, et al., Shale gas can be a double-edged sword for climate change, Nature Climate Change at 386 (2012)

[17] Tollefson, Jeff, Methane leaks erode green credentials of natural gas, Nature News (Jan 2, 2013).

[18] Williams, Megan & Cindy Copeland, Earthjustice, Methane Controls for the Oil and Gas Production Sector (2010).

[19] *Id.*

[20] USEPA, Basic Information.

In addition to quantifying the total emissions that would result from the lease sale, an EIS should consider the social costs of these emissions, resulting from climate disruption's ecological and social effects. Although cost-benefit analysis is not necessarily the ideal or exclusive method for assessing contributions to an adverse effect as enormous, uncertain, and potentially catastrophic as climate change, BLM does have tools available to provide one approximation of external costs and has previously performed a "social cost of carbon" analysis in prior environmental reviews.[21] Its own internal memo identifies one available analytical tool: "For federal agencies the authoritative estimates of [social cost of carbon] are provided by the 2013 technical report of the Interagency Working Group on Social Cost of Carbon, which was convened by the Council of Economic Advisers and the Office of Management and Budget."[22] As explained in that report:

> The purpose of the "social cost of carbon" (SCC) estimates presented here is to allow agencies to incorporate the social benefits of reducing carbon dioxide ($CO_2$) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions. The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change.[23]

Leasing and development of unconventional wells could exact extraordinary financial costs to communities and future generations, setting aside the immeasurable loss of irreplaceable, natural values that can never be recovered. The EIS must provide an accounting of these potential costs in addition to the social cost of carbon.

Development of oil and gas resources will fuel climate disruption and undercut the needed transition to a clean energy economy. The no-action alternative is therefore not only reasonable but also imperative.

---

[21] *See High Country Conserv'n Advocates v. United States Forest Serv.*, 2014 U.S. Dist. Lexis 87820 (D. Colo. 2014) (invalidating environmental assessment ["EA"] for improperly omitting social cost of carbon analysis, where BLM had included it in preliminary analysis); Taylor, P. "BLM crafting guidance on social cost of carbon -- internal memo," Greenwire, April 15, 2015, available at http://www.eenews.net/greenwire/stories/1060016810/; BLM Internal Memo from Assistant Director of Resources and Planning Ed Roberson ("Roberson Internal Memo"), April 2015, available at http://www.eenews.net/assets/2015/04/15/document_gw_01.pdf (noting "some BLM field offices have included estimates of the [social cost of carbon] in project-level NEPA documents") (accessed July 29, 2015); *see also* Council on Environmental Quality, Revised Draft Guidance for Greenhouse Gas Emissions and Climate Change Impacts, p. 18, available at www.whitehouse.gov/administration/eop/ceq/initiatives/nepa/ghg-guidance (accessed Jul 29, 2015) (quantitative analysis required if GHGs > 25k tons/yr).

[22] BLM, Roberson Internal Memo.

[23] *See* Interagency Working Group on Social Cost of Carbon, United States Government, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866, May 2013, available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/social_cost_of_carbon_for_ria_2013_update.pdf (accessed July 29, 2015); *see also* Interagency Working Group on Social Cost of Carbon, United States Government, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Feb. 2010, available at http://www.epa.gov/otaq/climate/regulations/scc-tsd.pdf (accessed July 29, 2015).

## IV. The Dangers of Hydraulic Fracturing and Horizontal Drilling

If any of the leased parcels reach the development phase, there is a reasonably foreseeable probability that the controversial practice of hydraulic fracturing would be employed. Fracking brings with it all of the harms to water quality, air quality, the climate, species, and communities associated with traditional oil and gas development, but also brings increased risks in many areas. Analysis of the consequences of this practice, prior to irrevocable consequences, is therefore required at the leasing stage.

Elements of these technologies have been used individually for decades. However, the combination of practices employed by industry recently is new: "Modern formation stimulation practices have become more complex and the process has developed into a sophisticated, engineered process in which production companies strive to design a hydraulic fracturing treatment to emplace fracture networks in specific areas."[24]

Hydraulic fracturing, a dangerous practice in which operators inject toxic fluid underground under extreme pressure to release oil and gas, has greatly increased industry interest in developing tightly held oil and gas deposits such as those in the proposed lease area. The first aspect of this technique is the hydraulic fracturing of the rock. When the rock is fractured, the resulting cracks in the rock serve as passages through which gas and liquids can flow, increasing the permeability of the fractured area. To fracture the rock, the well operator injects hydraulic fracturing fluid at tremendous pressure. The composition of fracturing fluid has changed over time. Halliburton developed the practice of injecting fluids into wells under high pressure in the late 1940s;[25] however, companies now use permutations of "slick-water" fracturing fluid developed in the mid-1990s.[26] The main ingredient in modern fracturing fluid (or "frack fluid") is generally water, although liquefied petroleum has also been used as a base fluid for modern fracking.[27] The second ingredient is a "proppant," typically sand, that becomes wedged in the fractures and holds them open so that passages remain after pressure is relieved.[28] In addition to the base fluid and proppant, a mixture of chemicals are used, for purposes such as increasing the viscosity of the fluid, keeping proppants suspended, impeding bacterial growth or mineral deposition.[29]

Frack fluid is hazardous to human health, although industry's resistance to disclosing the full list of ingredients formulation of frack fluid makes it difficult for the public to know exactly how dangerous.[30] A congressional report sampling incomplete industry self-reports found that

---

[24] Arthur, J. Daniel et al., Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale at 2 (Sep. 2008) ("Arthur") at 9.

[25] Tompkins, *How will High-Volume (Slick-water) Hydraulic Fracturing of the Marcellus (or Utica) Shale Differ from Traditional Hydraulic Fracturing?* Marcellus Accountability Project at 1 (Feb. 2011).

[26] New York State Department of Environmental Conservation, *Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs* at 5-5 (Sep. 7, 2011) ("NYDEC SGEIS") at 5-5.

[27] *Id.*; Arthur at 10; United States House of Representatives, Committee on Energy and Commerce, Minority Staff, *Chemicals Used in Hydraulic Fracturing* (Apr. 2011) ("Waxman 2011b").

[28] Arthur at 10.

[29] Arthur at 10.

[30] Waxman 2011b; *see also* Colborn, Theo et al., Natural Gas Operations for a Public Health Perspective, 17 Human

"[t]he oil and gas service companies used hydraulic fracturing products containing 29 chemicals that are (1) known or possible human carcinogens, (2) regulated under the Safe Drinking Water Act for their risks to human health, or (3) listed as hazardous air pollutants under the Clean Air Act."[31] Recently published scientific papers also describe the harmfulness of the chemicals often in fracking fluid. One study reviewed a list of 944 fracking fluid products containing 632 chemicals, 353 of which could be identified with Chemical Abstract Service numbers.[32] The study concluded that more than 75 percent of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems; approximately 40 to 50 percent could affect the brain/nervous system, immune and cardiovascular systems, and the kidneys; 37 percent could affect the endocrine system; and 25 percent could cause cancer and mutations.[33] Another study reviewed exposures to fracking chemicals and noted that trimethylbenzenes are among the largest contributors to non-cancer threats for people living within a half mile of a well, while benzene is the largest contributor to cumulative cancer risk for people, regardless of the distance from the wells.[34]

The impacts associated with the fracking-induced oil and gas development boom has caused some jurisdictions to place a moratorium or ban on fracking. For instance, in 2011 France became the first country to ban the practice.[35] In May, Vermont became the first state to ban fracking. Vermont's governor called the ban "a big deal" and stated that the bill "will ensure that we do not inject chemicals into groundwater in a desperate pursuit for energy."[36] New York State halted fracking within its borders in 2008, continued the moratorioum in 2014 and banned the practice in 2015, stating "New York State officially banned fracking for natural gas by issuing its final environmental impact statement, concluding a seven-year review. The environmental agency said fracking posed risks to land, water, natural resources and public health."[37] [38] Also, New Jersey's legislature recently passed a bill that would prevent fracking waste, like toxic wastewater and drill cuttings, from entering its borders,[39] and Pennsylvania, ground zero for the fracking debate, has banned "natural-gas exploration across a swath of suburban Philadelphia . . . ."[40] Numerous cities and communities, like Buffalo, Pittsburgh, Raleigh, Woodstock, and Morgantown have banned fracking.[41]

---

and Ecological Risk Assessment 1039 (2011) ("Colborn 2011"); McKenzie, Lisa et al., Human Health Risk Assessment of Air Emissions form Development of Unconventional Natural Gas Resources, Sci Total Environ (2012), doi:10.1016/j.scitotenv.2012.02.018 ("McKenzie 2012").

[31] Waxman 2011b at 8.

[32] Colborn 2011 at 1.

[33] Colborn 2011 at 1.

[34] McKenzie 2012 at 5.

[35] Castelvecchi, Davide, *France becomes first country to ban extraction of natural gas by fracking*, Scientific American (Jun. 30, 2011).

[36] CNN Staff Writer, *Vermont first state to ban fracking*, CNN U.S. (May 17, 2012).

[37] Public News Service - NY, *Cuomo Declares: No Fracking for Now in NY.* See: http://www.publicnewsservice.org/2014-12-18/health-issues/cuomo-declares-no-fracking-for-now-in-ny/a43579-1 .

[38] RT Network. June 30, 2015. *It's official: New York bans fracking.* https://www.rt.com/usa/270562-new-york-fracking-ban/ .

[39] Tittel, Jeff, *Opinion: Stop fracking waste from entering New Jersey's borders* (Jul 14, 2012).

[40] Philly.com, *Fracking ban is about our water*, The Inquirer (Jul. 11, 2012).

[41] *CBS, Pittsburgh Bans Natural Gas Drilling*, CBS/AP (Dec 8, 2010); Wooten, Michael *City of Buffalo Bans Fracking* (Feb. 9, 2011); The Raleigh Telegram, *Raleigh City Council Bans Fracking Within City Limits* (Jul. 11, 2012); Kemble, William, *Woodstock bans activities tied to fracking*, Daily Freeman (Jul. 19, 2012); MetroNews.com, *Morgantown Bans Fracking* (June 22, 2011),

Notwithstanding the grave impacts that these practices have on the environment, this new combination of multi-stage slickwater hydraulic fracturing and horizontal drilling (hereinafter "fracking") has made it possible to profitably extract oil and gas from formations that only a few years ago were generally viewed as uneconomical to develop.[42] In large part through the use of fracking, the oil and gas sector is now producing huge amounts of oil and gas throughout the United States, rapidly transforming the domestic energy outlook. Fracking is occurring in the absence of any adequate federal or state oversight. The current informational and regulatory void on the state level makes it even more critical that the BLM perform its legal obligations to review, analyze, disclose, and avoid and mitigate the impacts of its oil and gas leasing decisions.

## V. All Oil and Gas Operations Pose Risks to Water Resources

Oil and gas operations, including hydraulic fracturing and other unconventional stimulation methods, are significant threats to water resources.

### A. Hydraulic Fracturing and Other Unconventional Stimulation Methods

While much remains to be learned about fracking,[43] it is clear that the practice poses major dangers to water resources. Across the U.S., in states where fracking or other types of unconventional oil and gas recovery has occurred, surface water and groundwater have been contaminated. Recent studies have concluded that water contamination attributed to unconventional oil and gas activity has occurred in several states, including Colorado,[44] Wyoming,[45] Texas,[46] Pennsylvania,[47] Ohio,[48] and West Virginia.[49] Despite this danger, fracking

---

http://www.wvmetronews.com/news.cfm?func=displayfullstory&storyid=46214.

[42] CITI, *Resurging North American Oil Production and the Death of the Peak Oil Hypothesis* at 9 (Feb. 15, 2012) ("CITI"); USEIA 2011 at 4; Orszag, Peter, *Fracking Boom Could Finally Cap Myth of Peak Oil* (Jan. 31, 2011) ("Orszag").

[43] United States Government Accountability Office, Unconventional Oil and Gas Development – Key Environmental and Public Health Requirements (2012); United States Government Accountability Office, Oil and Gas – Information on Shale Resources, Development, and Environmental and Public Health Risks (2012).

[44] Trowbridge, A. *Colorado Floods Spur Fracking Concerns*, CBS News, Sept. 17, 2013, available at http://www.cbsnews.com/8301-201_162-57603336/colorado-floods-spur-fracking-concerns/ ("Trowbridge 2013") (accessed July 30, 2015).

[45] U.S. Environmental Protection Agency, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming (2011) ("USEPA Draft Pavillion Investigation").

[46] Fontenot, Brian et al., An Evaluation of Water Quality in Private Drinking Water Wells Near Natural Gas Extraction Sites in the Barnett Shale Formation, Environ. Sci. Technol., 47 (17), 10032–10040 DOI: 10.1021/es4011724, available at http://pubs.acs.org/doi/abs/10.1021/es4011724 ("Fontenot 2013").

[47] Jackson, Robert et al., Increased Stray Gas Abundance in a Subset of Drinking Water Wells near Marcellus Shale Gas Extraction, Proc. Natl. Acad. of Sciences Early Edition, doi: 10.1073/pnas.1221635110/-/DCSupplemental (2013) ("Jackson 2013").

[48] Ohio Department of Natural Resources, Report on the Investigation of the Natural Gas Invasion of Aquifers in Bainbridge Township of Geauga County, Ohio (Sep. 2008) ("ODNR 2008").

[49] Begos, K, *Four States Confirm Water Pollution*, Associated Press, January 5, 2014, http://www.usatoday.com/story/money/business/2014/01/05/some-states-confirm-water-pollution-from-drilling/4328859/ (accessed July 29, 2015); *see also* U.S. EPA, Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources, External Review Draft (June 2015) ("EPA 2015"), available at http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=523539 (accessed July 30, 2015)..

remains essentially unregulated in many states. Around the country, federal and state laws have not kept pace with the dramatic growth in drilling and impacts.[50]

*1. Surface Water Contamination*

Surface waters can be contaminated in many ways from unconventional well stimulation. In addition to storm water runoff, surface water contamination may also occur from chemical and waste transport, chemical storage leaks, and breaches in pit liners.[51] The spilling or leaking of fracking fluids, flowback, or produced water is a serious problem. Harmful chemicals present in these fluids can include volatile organic compounds ("VOCs"), such as benzene, toluene, xylenes, and acetone.[52] As much as 25 percent of fracking chemicals are carcinogens,[53] and flowback can even be radioactive.[54] As described below, contaminated surface water can result in many adverse effects to wildlife, agriculture, and human health and safety. It may make waters unsafe for drinking, fishing, swimming and other activities, and may be infeasible to restore the original water quality once surface water is contaminated. BLM should consider this analysis in the EIS.

i. Chemical and Waste Transport

Massive volumes of chemicals and wastewater used or produced in oil and gas operations have the potential to contaminate local watersheds. Between 2,600 to 18,000 gallons of chemicals are injected per hydraulically fracked well depending on the number of chemicals injected.[55]

Several billions of gallons of wastewater are produced by oil and gas production per year.[56] Onshore oil and gas operations in the United States create about 56 million barrels of produced water *per day*.[57] California wells, for instance, produced roughly 3 billion barrels of wastewater in 2011, which is about 15 times the amount of oil the state produced.[58]

---

[50] NRDC, In Fracking's Wake: New Rules are Needed to Protect Our Health and Environment from Contaminated Wastewater (2012).

[51] Vengosh, Avner et al., A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development and Hydraulic Fracturing in the United States, Environ. Sci. Technol., DOI: 10.1021/es405118y (2014) ("Vengosh 2014").

[52] U.S. Environmental Protection Agency, Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (Nov. 2011) ("EPA Plan to Study Fracking Impacts").

[53] Colborn 2011.

[54] EPA Plan to Study Fracking Impacts; White, Ivan E., Consideration of radiation in hazardous waste produced from horizontal hydrofracking, National Council on Radiation Protection (2012).

[55] EPA 2015 at ES-12.

[56] California Division of Oil, Gas, and Geothermal Resources, 2011 Preliminary Report of California Oil and Gas Production Statistics at 3 (Apr. 2012); California Department of Conservation Division of Oil, Gas, and Geothermal Resouces, Producing Wells and Production of Oil, Gas, and Water by County - 2011, Excerpted from Final Report of 2011 California Oil and Gas Production Statistics (2012).

[57] U.S. Government Accountability Office, Energy-Water Nexus: Information on the Quantity, Quality, and Management of Water Produced during Oil and Gas Production, Report to the Ranking Member, Committee on Science, Space and Technology, House of Representatives at 13 (January 2012).

[58] California Division of Oil, Gas, and Geothermal Resources, 2011 Preliminary Report of California Oil and Gas Production Statistics at 3 (Apr. 2012); California Department of Conservation Division of Oil, Gas, and Geothermal Resouces, Producing Wells and Production of Oil, Gas, and Water by County - 2011, Excerpted from Final Report

Approximately 2,019 billion gallons of wastewater are produced by oil and gas production per year in Colorado.[59] This waste can reach fresh water aquifers and drinking water.[60]

Fluids must be transported to and/or from the well, which presents opportunities for spills.[61] Unconventional well stimulation relies on numerous trucks to transport chemicals to the site as well as collect and carry disposal fluid from the site to processing facilities. A U.S. GAO study found that up to 1,365 truck loads can be required just for the drilling and fracturing of a single well pad[62] while the New York Department of Conservation estimated the number of "heavy truck" trips to be about 3,950 per horizontal well (including unloaded and loaded trucks).[63] Accidents during transit may cause leaks and spills that result in the transported chemicals and fluids reaching surface waters. Chemicals and waste transported by pipeline can also leak or spill. There are also multiple reports of truckers dumping waste uncontained into the environment.[64]

Surface pits are a major source of pollution. In California, pollution from an unlined surface pit killed numerous almond trees.[65] Also, New Mexico data shows 743 instances of groundwater contamination over the last three decades.[66] Underground waste injection wells are another major threat. This is of particular concern because the U.S. EPA has found that DOGGR's Class II underground injection well program to be insufficiently protective of groundwater resources.[67]

COGCC data show that numerous spills have occurred in Dolores, Montezuma, La Plata, San Miguel, and other counties within the Tres Rios planning area, including spills that have

---

of 2011 California Oil and Gas Production Statistics (2012).

[59] EPA 2015 at 8-5.

[60] Natural Resources Defense Council, Petition for Rulemaking Pursuant to Section 6974(a) of the Resource Conservation and Recovery Act Concerning the Regulation of Wastes Associated with the Exploration, Development, or Production of Crude Oil or Natural Gas or Geothermal Energy at 17 (Sep. 8, 2010) ("NRDC Petition for Rulemaking").

[61] Warco, Kathy, *Fracking truck runs off road; contents spill*, Observer Reporter (Oct 21, 2010).

[62] U.S. Government Accountability Office, *Oil and Gas: Information on Shale Resources, Development, and Environmental and Public Health Risks*, GAO 12-732 (2012) at 33.

[63] New York Department of Environmental Conservation, *Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program*, Ch. 6 Potential Environmental Impacts (2011) at 6-303.

[64] Kusnetz, Nicholas, *North Dakota's Oil Boom Brings Damage Along with Prosperity* at 4, ProPublica (June 7, 2012) ("Kusnetz North Dakota"); E&E News, Ohio man pleads not guilty to brine dumping (Feb. 15, 2013).

[65] See/Speak No Fracking at 6; *see also* Miller, Jeremy, Oil and Water Don't Mix with California Agriculture, High Country News (2012);

[66] New Mexico Oil and Conservation Division, OGAP Analysis of data provided in New Mexico Energy, Minerals and Natural Resources Dep't, Oil and Conservation Div., Cases Where Pit Substances Contaminated New Mexico's Ground Water (2008); *see generally* NRDC Petition for Rulemaking; Nicholas, Kusnetz, *A Fracking First in Pennsylvania: Cattle Quarantine*, ProPublica (July 2, 2010).

[67] NRDC Petition for Rulemaking at 20; Walker, James, California Class II UIC Program Review, Report submitted to Ground Water Office USEPA Region 9 at 119 (Jun. 2011); U.S. Environmental Protection Agency Region IX, Letter from David Albright, Manager Ground Water, to Elena Miller, State Oil and Gas Supervisor Dept of Conservation re California Class II Underground Injection Control (UIC) Program Review final report (July 18, 2011); Miller, Elena, Letter from Elena M. Miller, State Oil and Gas Supervisor, California Division of Oil, Gas, & Geothermal Resources to The Honorable Fran Pavley, California State Senate re hydraulic fracturing in California (February 16, 2011).

reached surface and groundwater.[68] The data suggest that existing spill prevention measures are not adequate to minimize spills.

Produced waters that fracking operations force to the surface from deep underground can contain high levels of total dissolved solids, salts, metals, and naturally occurring radioactive materials.[69] Flowback waters (i.e., fracturing fluids that return to the surface) may also contain similar constituents along with fracturing fluid additives such as surfactants and hydrocarbons.[70] Given the massive volumes of chemicals and wastewater produced and their potentially harmful constituents, the potential for environmental disaster is real.

Also, many other extremely harmful spills and releases occur before those wastes reach storage or disposal sites, including spills from equipment failures, accidents, negligence, or intentional dumping.[71] Construction of oil and gas infrastructure, such as well pads and roads, can also harm water quality by increasing sediment levels.[72]

The EIS should evaluate how often accidents can be expected to occur, and the effect of chemical and fluid spills. Such analysis should also include identification of the particular harms faced by communities near oil and gas field. The EIS must include specific mitigation measures and alternatives based on a cumulative impacts assessment, and the particular vulnerabilities of environmental justice communities in both urban and rural settings.

ii. On-site Chemical Storage and Processing

Thousands of gallons of chemicals can be potentially stored on-site and used during hydraulic fracturing and other unconventional well stimulation activities.[73] These chemicals can be susceptible to accidental spills and leaks. Natural occurrences such as storms and earthquakes may cause accidents, as can negligent operator practices.

Some sites may also use on-site wastewater treatment facilities. Improper use or maintenance of the processing equipment used for these facilities may result in discharges of contaminants. Other spill causes include equipment failure (most commonly, blowout preventer failure, corrosion and failed valves) and failure of container integrity.[74]

The EIS should examine and quantify the risks to human health and the environment associated with on-site chemical and wastewater storage, including risks from natural events and

---

[68] *See* COGCC data, available at http://cogcc.state.co.us/data.html (click "spill/release" and Dolores, Montezuma, La Plata, Archuleta, and Mesa counties).
[69] Brittingham, Margaret C. et al. Ecological Risks of Shale Oil and Gas Development to Wildlife, Aquatic Resources and their Habitats. *Environ. Sci. Technol.* 2014, 48, 11034-11047, p. 11039.
[70] *Id.*
[71] California Dept. of Fish and Game, Environmental Incident Report: Vintage Production California LLC Tar Creek Crude Oil and Produced Water Spills, January 30, 2007 and February 6, 2007.
[72] Entrekin, Sally, et al., Rapid Expansion of Natural Gas Development Poses a Threat to Surface Waters, 9 Front Ecol Environ 503, 507 (2011) ("Entrekin").
[73] EPA 2015 at ES-10.
[74] EPA 2015 at ES-11.

negligent operator practices. Again, such analysis must also include an analysis of potential impacts faced by environmental justice communities in both rural and urban settings.

*2. Groundwater Contamination*

Studies have reported many instances around the country of groundwater contamination due to surface spills of oil and gas wastewater, including fracking flowback.[75] Fracking and other unconventional techniques likewise pose inherent risks to groundwater due to releases below the surface, and these risks must be properly evaluated.[76] Once groundwater is contaminated, it is very difficult, if not impossible, to restore the original quality of the water. As a result, in communities that rely on groundwater drinking water supplies, groundwater contamination can deprive communities of usable drinking water. Such long-term contamination necessitates the costly importation of drinking water supplies.

Groundwater contamination can occur in a number of ways, and the contamination may persist for many years.[77] Surface spills and poorly constructed or abandoned wells are recognized as one of the most likely ways by which contaminants may reach groundwater. Faulty well construction, cementing, or casing,[78] as well as the injection of fracking waste underground, can all lead to leaks.[79] Improper well construction and surface spills are cited as a confirmed or potential cause of groundwater contamination in numerous incidents at locations across the U.S. including but not limited to Colorado,[80] Wyoming,[81] Pennsylvania,[82] Ohio,[83] West Virginia,[84] and Texas.[85] Also, fluids may contaminate groundwater by migrating through newly created or natural fractures.[86] These sorts of problems at the well are not uncommon. Dr. Ingraffea of Cornell has noted an 8.9 percent failure rate for wells in the Marcellus Shale.[87] Also, the Draft

[75] *See, e.g.*, Fontenot 2013, Jackson 2013.
[76] Vengosh 2014.
[77] Myers, Tom, Potential Contamination Pathways from Hydraulically Fractured Shale to Aquifers, National Groundwater Association (2012).
[78] NRDC, Water Facts at 2; Food & Water Watch 2012 at 7.
[79] Kusnetz, North Dakota; Lustgarten, Abraham, Polluted Water Fuels a Battle for Answers, ProPublica (2012); Lustgarten, Abraham, Injection Wells: The Poison Beneath Us, ProPublica at 2 (2012); Lustgarten, Abraham, Whiff of Phenol Spells Trouble, ProPublica (2012).
[80] Gross, Sherilyn A. et al., Abstract: Analysis of BTEX groundwater concentrations from surface spills associated with hydraulic fracturing operations, 63 J. Air and Waste Mgmt. Assoc. 4, 424 doi: 10.1080/10962247.2012.759166 (2013).
[81] USEPA Draft Pavillion Investigation.
[82] Darrah, Thomas H. et al., Noble Gases Identify the Mechanisms of Fugitive Gas Contamination in Drinking-Water Wells Overlying the Marcellus and Barnett Shales, Proc. Natl. Acad. Of Sciences Early Edition, doi: 10.1073/pnas.1322107111 (2014) ("Darrah 2014").
[83] Begos, Kevin, *Some States Confirm Water Pollution from Oil, Gas Drilling*, Seattle Times Jan. 6, 2014, http://www.seattletimes.com/business/some-states-confirm-water-pollution-from-oil-gas-drilling/ (accessed July 29, 2015) ("Begos, Seattle Times, Jan 6, 2014"). *See also,* ODNR 2008, *supra.*
[84] Begos, Seattle Times, Jan 6. 2014.
[85] Darrah 2014.
[86] U.S. Environmental Protection Agency, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming (2011) ("EPA Draft Pavillion Investigation."); Warner, Nathaniel R., et al., Geochemical Evidence for Possible Natural Migration of Marcellus Formation Brine to Shallow Aquifers in Pennsylvania, PNAS Early Edition (2012).
[87] Ingraffea, Anthony R., Some Scientific Failings within High Volume Hydraulic Fracturing Proposed Regulations 6 NYCRR Parts 550-556, 560, Comments and Recommendations Submitted to the NYS Dept. of Environmental

EPA Investigation of Ground Water Contamination near Pavillion, Wyoming, found that chemicals found in samples of groundwater were from fracked wells.[88] These results have been confirmed with follow-up analyses.[89] Moreover, another study based on modeling found that active transport of fracking fluid from a fracked well to an aquifer could occur in less than 10 years.[90]

Fracking fluid can also spill at the surface during the fracking process. For instance, mechanical failure or operator error during the process has caused leaks from tanks, valves, and pipes.[91] At the surface, pits or tanks can leak fracking fluid or waste.[92]

Mechanical integrity, which refers to an absence of leakage pathways through the casing and cement, can degrade over time, eventually leading to mechanical integrity failures that may impact groundwater. Older wells that may not have been designed to withstand the stresses of hydraulic fracturing but which are reused for this purpose are especially vulnerable.[93] A well in which stimulation operations are being conducted may also "communicate" with nearby wells, which may lead to groundwater contamination, particularly if the nearby wells are improperly constructed or abandoned.[94] Nearby active and abandoned wells provided additional pathways for contamination. In the last 150 years, as many as 12 million "holes" have been drilled across the United States in search of oil and gas, many of which are old and decaying, or are in unknown locations.[95] Fracking can contaminate water resources by intersecting one of those wells. For instance, one study found at least nineteen instances of fluid communication in British Columbia and Western Alberta.[96]

Current federal rules do not ensure well integrity. The well casing can potentially fail over time and potentially create pathways for contaminants to reach groundwater. Well casing

---

Conservation (Jan 8, 2013).

[88] EPA Draft Pavillion Investigation.

[89] Drajem, Mark, *Wyoming Water Tests in Line with EPA Finding on Fracking*, Bloomberg (Oct. 11, 2012); U.S. Environmental Protection Agency, Investigation of Ground Water Contamination near Pavillion, Wyoming Phase V Sampling Event - Summary of Methods and Results (September 2012); Myers, Tom, Review of DRAFT: Investigation of Ground Water Contamination near Pavillion Wyoming Prepared by the Environmental Protection Agency, Ada OK (Apr. 30, 2012).

[90] Myers, Tom, Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers (Feb. 2012).

[91] Natural Resources Defense Council, Water Facts: Hydraulic Fracturing can potentially Contaminate Drinking Water Sources at 2 (2012) ("NRDC, Water Facts"); Food & Water Watch, The Case for a Ban on Fracking (2012) ("Food & Water Watch 2012") at 5.

[92] *See, e.g.*, E&E Staff Writer, Fracking Fluid leaks from wellhead in Colo., E&E News (Feb 14, 2013). ("At least 84,000 gallons of water contaminated from hydraulic fracturing seeped from a broken wellhead and into a field . . ."); Michaels, Craig, et al., Fractured Communities: Case Studies of the Environmental Impacts of Industrial Gas Drilling, Riverkeeper (2010).at 12; NRDC Petition for Rulemaking at 20.

[93] EPA 2015 at 6-11.

[94] *See* Detrow, Scott. (2012) *Perilous Pathways: How Drilling Near An Abandoned Well Produced a Methane Geyser*, StateImpact Pennsylvania, National Public Radio (October 9, 2012), available at https://stateimpact.npr.org/pennsylvania/2012/10/09/perilous-pathways-how-drilling-near-an-abandoned-well-produced-a-methane-geyser/ (accessed July 29, 2015); Alberta Energy Board, Directive 083: Hydraulic Fracturing – Subsurface Integrity, Alberta Energy Regulator (2013), *available at* http://www.aer.ca/documents/directives/Directive083.pdf.

[95] Kusnetz, Nicholas, *Deteriorating Oil and Gas Wells Threaten Drinking Water, Homes Across the Country*, ProPublica (April 4, 2011).

[96] BC Oil & Gas Commission, Safety Advisory 2010-03, Communication During Fracture Stimulation (2010).

failure can occur due to improper or negligent construction. The EIS should study the rates of well casing failures over time and evaluate the likelihood that well casing failures can lead to groundwater contamination.

Chemicals and naturally occurring substances can also migrate to groundwater through newly created fractures underground. Many unconventional techniques intentionally fracture the formation to increase the flow of gas or oil. New cracks and fissures can allow the additives or naturally occurring elements such as natural gas to migrate to groundwater. "[T]he increased deployment of hydraulic fracturing associated with oil and gas production activities, including techniques such as horizontal drilling and multi-well pads, may increase the likelihood that these pathways could develop," which, "in turn, could lead to increased opportunities for impacts on drinking water sources."[97] Fluids can also migrate through pre-existing and natural faults and fractures that may become pathways once the fracking or other method has been used.

Further, according to the EPA, "evidence of any fracturing-related fluid migration affecting a drinking water resources...could take years to discover."[98] The EIS must consider long-term studies on the potential for fluid migration through newly created subsurface pathways. Fluid migration is of particular concern when oil and gas operations are close to drinking water supplies.

Unfiltered drinking water supplies, such as drinking water wells, are especially at risk because they have no readily available means of removing contaminants from the water. Even water wells with filtration systems are not designed to handle the kind of contaminants that result from unconventional oil and gas extraction.[99] In some areas hydraulic fracturing may occur at shallower depths or within the same formation as drinking water resources, resulting in direct aquifer contamination.[100] The EIS must disclose where the potential for such drilling exists.

Setbacks may not be adequate to protect groundwater from potential fracking fluid contamination. A recent study by the University of Colorado at Boulder suggests that setbacks of even up to 300-feet may not prevent contamination of drinking water resources.[101] The study found that 15 organic compounds found in hydraulic fracturing fluids may be of concern as groundwater contaminants based on their toxicity, mobility, persistence in the environment, and frequency of use. These chemicals could have 10 percent or more of their initial concentrations remaining at a transport distance of 300 feet, the average "setback" distance in the U.S. The effectiveness and feasibility of the RMP's setbacks must be evaluated. As described above on p. 5, setbacks of at 1,800 feet at minimum are required to prevent contamination of water resources.

---

[97] EPA 2015 at 6-55.
[98] EPA 2015 at 6-56 – 6-57.
[99] Physicians Scientist & Engineers for Healthy Energy, Letter from Robert Howarth Ph.D. and 58 other scientists to Andrew M. Cuomo, Governor of New York State re: municipal drinking water filtration systems and hydraulic fracturing fluid (Sept 15, 2011), *available at* http://www.psehealthyenergy.org/data/Cuomo_ScientistsLetter_15Sep20112.pdf (accessed July 29, 2015).
[100] EPA 2015 at ES-15.
[101] University of Colorado--Boulder, New study identifies organic compounds of potential concern in fracking Fluids (July 1, 2015), available at http://www.colorado.edu/news/releases/2015/06/30/newstudyidentifiesorganiccompoundspotentialconcernfrackingfluids (accessed July 29, 2015).

*3. Disposal of Drilling and Fracking Wastes*

Finally, disposal of wastes from oil and gas operations can also lead to contamination of water resources. Potential sources of contamination include:

- leaching from landfills that receive drilling and fracking solid wastes;
- spreading of drilling and fracking wastes over large areas of land;
- wastewaters discharged from treatment facilities without advanced "total dissolved solids" removal processes, or inadequate capacity to remove radioactive material removal; and
- breaches in pits or underground disposal wells.[102]

The EIS must evaluate the potential for contamination from each of these disposal methods.

**B. More Intensive Oil and Gas Development Will Increase Storm Water Runoff**

Oil and gas operations require land clearance for access roads, pipelines, well pads, drilling equipment, chemical storage, and waste disposal pits. As a result, new oil and gas development will cause short-term disturbance as well as long-term disturbance within the planning area. While undisturbed land can retain greater amounts of water through plants and pervious soil, land that has been disturbed or developed may be unable to retain as much water, thereby increasing the volume of runoff. The area of land that is able to retain water will be significantly decreased if unconventional oil and gas extraction methods are permitted to expand.

Water from precipitation and snowmelt can serve as an avenue through which contaminants travel from an operation site to sensitive areas, including population centers. Contaminated water runoff may seep into residential areas, polluting streets, sidewalks, soil, and vegetation in urban areas, adversely affecting human health. Thus, not only do these oil and gas activities create pollution, they create greater conduits for storm water runoff to carry those pollutants from the operation site, into areas in which significant harm can be caused.

Rapid runoff, even without contaminants, can harm the environment by changing water flow patterns and causing erosion, habitat loss, and flooding. Greater runoff volumes may also increase the amount of sediment that is carried to lakes and streams, affecting the turbidity and chemical content of surface waters. Because a National Pollutant Discharge Elimination System permit is not required for oil and gas operations,[103] it is particularly important that the impact of runoff is considered as part of the NEPA process.

**C. Fossil Fuel Development Depletes Enormous Amounts of Water**

Some unconventional extraction techniques, most notably fracking, require the use of tremendous amounts of freshwater. Typically between 2 and 5.6 million gallons of water are

[102] EPA 2015, 8-20, 8-36, 8-48, 8-65, 8-70.
[103] 33 U.S.C. § 1342(l)(2).

required to frack each well.[104] Such high levels of water use are unsustainable. Water used in large quantities may lead to several kinds of harmful environmental impacts. The extraction of water for fracking can, for example, lower the water table, affect biodiversity, harm local ecosystems, and reduce water available to communities.[105]

Withdrawal of large quantities of freshwater from streams and other surface waters will undoubtedly have an impact on the environment.[106] Withdrawing water from streams will decrease the supply for downstream users, such as farmers or municipalities. Rising demand from oil and gas operators has already led to increased competition for water between farmers and oil and gas operators. In some regions of the state, farmers have had to fallow fields due to astronomical water prices.[107] For example, in prior years, farmers in Colorado have paid at most $100 per acre-feet of water in auctions held by cities with excess supplies, but in 2013 energy companies paid $1200 to $2,900 per acre-feet.[108] Reductions in stream flows may also lead to downstream water quality problems by diminishing the water bodies' capacity for dilution and degradation of pollutants. The EIS must examine these issues.

Furthermore, withdrawing large quantities of water from subsurface waters to supply oil and gas production will likely deplete and harm aquifers. Removing water from surface water or directly from underground sources of water faster than the rate that aquifers can be replenished will lower the volume of water available for other uses. Depletion can also lead to compaction of the rock formation serving as an aquifer, after which the original level of water volume can never be restored.[109] Depleted aquifer water resources may also adversely affect agriculture, species habitat and ecosystems, and human health.

The freshwater in the area therefore would be greatly affected by the increased demand for water if fracking and other unconventional oil and gas extraction are permitted. A no-leasing-no-fracking alternative would preserve scarce water resources and keep critical sources of drinking water in the planning area safe and clean. The EIS must analyze where water will be sourced, how much, and the effects on water sources under different alternatives. All of these effects must be analyzed in the context of increasing water scarcity in the state due to climate change, drought, and increasing population growth.

### D. Oil and Gas Developments Harm Aquatic Life and Habitat

When streams and other surface waters are depleted, the habitat for countless plants and animals will be harmed, and the depletion places tremendous pressure on species that depend on having a constant and ample stream of water. Physical habitats such as banks, pools, runs, and

---

[104] U.S. Government Accountability Office 2012 at 17.
[105] International Energy Agency, Golden Rules for the Golden Age of Gas at 31-32 (2012).
[106] *See* Entrekin, Sally et al., Rapid Expansion of Natural Gas Development Poses a Threat to Surface Waters, 9 Front Ecol. Environ. 9, 503 (2011); EPA 2015 at 4-16.
[107] Healy, Jack. For Farmers in the West, Oil Wells are Thirsty Rivals, The New York Times (Sept. 5,2012), available at http://www.nytimes.com/2012/09/06/us/struggle-for-water-in-colorado-with-rise-in-fracking.html?_r=0 (accessed July 29, 2015); Burke, Garance. Fracking fuels water fights in nation's dry spots, Associated Press (June 17, 2013), available at http://news.yahoo.com/fracking-fuels-water-fights-nations-dry-spots-133742770.html.
[108] *Id.*
[109] Freyman 2013.

glides (low gradient river sections) are important yet susceptible to disturbance with changing stream flows. Altering the volume of water can also change the water's temperature and oxygen content, harming some species that require a certain level of oxygenated water. Decreasing the volume of streamflow and stream channels by diverting water to fracking would have a negative impact on the environment and should be included in the EIS.

The physical equipment itself that is designed to intake and divert water may also pose a threat to certain wildlife. If not properly designed, such equipment and intake points may be a risk to wildlife.

### E. Harm to Wetlands

High volume removal of surface or groundwater can result in damage to wetlands, which rely on ample water supplies to maintain the fragile dynamics of a wetland habitat. Damage can also occur from spills of chemicals or wastewater, filling operations, and sediment runoff.[110] BLM in its environmental document must fully vet the impacts from every potential aspect of the proposed sale.

Many plant and animal species depend on wetland habitats, and even small changes can lead to significant impacts. Wetlands provide a variety of "eco-service" functions, including water purification, protection from floods, and functioning as carbon sinks.[111] The ecological importance of wetlands is unquestionable, and their full protection is paramount. The EIS must analyze these potential impacts to wetlands, and the related, potential indirect impacts that may stem from such impacts.

## VI. Oil and Gas Operations Harm Air Quality

Oil and gas operations emit numerous air pollutants, including volatile organic compounds (VOCs), $NO_X$, particulate matter, hydrogen sulfide, and methane. Fracking operations are particularly harmful, emitting especially large amounts of pollution, including air toxic air pollutants. Permitting fracking and other well stimulation techniques will greatly increase the release of harmful air emissions in these and other regions. On the other hand, a no-leasing-no-fracking alternative would prevent further degradation of local air quality, respiratory illnesses, premature deaths, hospital visits, as well as missed school and work days.

### A. Types of Air Emissions

[110] U.S. Department of Justice, *Trans Energy Inc. to Restore Streams and Wetland Damaged by Natural Gas Extraction Activities in West Virginia* (Sep. 2, 2014), http://www.justice.gov/opa/pr/trans-energy-inc-restore-streams-and-wetland-damaged-natural-gas-extraction-activities-west (accessed July 29, 2015); *See also,* Pennsylvania Department of Environmental Protection, Commonwealth of Pennsylvania, *DEP Fines Seneca Resources Corp. $40,000 for Violations at Marcellus Operation in Tioga County* (Jul. 10, 2010), http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=14655&typeid=1 (accessed July 29, 2015).

[111] U.S. Environmental Protection Agency, Wetlands and People, http://water.epa.gov/type/wetlands/people.cfm (accessed July 29, 2015).

Unconventional oil and gas operations emit large amounts of toxic air pollutants,[112] also referred to as Hazardous Air Pollutants, which are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.[113] The reporting requirements recently implemented by the California South Coast Air Quality Management District ("SCAQMD") have shown that at least 44 chemicals known to be air toxics have been used in fracking and other types of unconventional oil and gas recovery in California.[114] Through the implementation of these new reporting requirements, it is now known that operators have been using several types of air toxics in California, including crystalline silica, methanol, hydrochloric acid, hydrofluoric acid, 2-butoxyethanol, ethyl glycol monobutyl ether, xylene, amorphous silica fume, aluminum oxide, acrylic polymer, acetophenone, and ethylbenzene. Many of these chemicals also appear on the U.S. EPA's list of hazardous air pollutants.[115] EPA has also identified six "criteria" air pollutants that must be regulated under the National Ambient Air Quality Standards (NAAQS) due to their potential to cause primary and secondary health effects. Concentrations of these pollutants—ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead—will likely increase in regions where unconventional oil and gas recovery techniques are permitted.

VOCs, from car and truck engines as well as the drilling and completion stages of oil and gas production, make up about 3.5 percent of the gases emitted by oil or gas operations.[116] The VOCs emitted include the BTEX compounds – benzene, toluene, ethyl benzene, and xylene – which are listed as Hazardous Air Pollutants.[117] There is substantial evidence showing the grave harm from these pollutants.[118] Recent studies and reports confirm the pervasive and extensive amount of VOCs emitted by unconventional oil and gas extraction.[119] In particular, a study covering sites near oil and gas wells in five different states found that concentrations of eight volatile chemicals, including benzene, formaldehyde and hydrogen sulfide, exceeded risk-based comparison values under several operational circumstances.[120] Another study determined that vehicle traffic and engine exhaust were likely the sources of intermittently high dust and benzene concentrations observed near well pads.[121] Recent studies have found that oil and gas operations are likely responsible for elevated levels of hydrocarbons such as benzene downwind of the

---

[112] Sierra Club et al. comments on New Source Performance Standards: Oil and Natural Gas Sector; Review and Proposed Rule for Subpart OOOO (Nov. 30, 2011) ("Sierra Club Comments") at 13.
[113] http://www3.epa.gov/airtoxics/allabout.html#what
[114] Center for Biological Diversity, Air Toxics One Year Report, p. 1 (June 2014).
[115] U.S. Environmental Protection Agency, The Clean Air Act Amendments of 1990 List of Hazardous Air Pollutants, Technology Transfer Network Air Toxics Web Site, http://www.epa.gov/ttnatw01/orig189.html (accessed July 29, 2015).
[116] Brown, Heather, Memorandum to Bruce Moore, U.S.EPA/OAQPS/SPPD re Composition of Natural Gas for use in the Oil and Natural Gas Sector Rulemaking, July 28, 2011 ("Brown Memo") at 3.
[117] 42 U.S.C. § 7412(b).
[118] Colborn 2011; McKenzie 2012; Food & Water Watch 2012.
[119] McCawley, M., Air, Noise, and Light Monitoring Plan for Assessing Environmental Impacts of Horizontal Gas Well Drilling Operations (ETD-10 Project), West Virginia University School of Public Health, Morgantown, WV (2013) ("McCawley 2013"), available at http://www.dep.wv.gov/oil-and-gas/Horizontal-Permits/legislativestudies/Documents/WVU%20Final%20Air%20Noise%20Light%20Protocol.pdf; Center for Biological Diversity, Dirty Dozen: The 12 Most Commonly Used Air Toxics in Unconventional Oil Development in the Los Angeles Basin (Sept. 2013).
[120] Macey, G.P. et al., (2014): Air Concentrations of Volatile Compounds Near Oil and Gas Production: A Community-Based Exploratory Study, 13 Environmental Health 82 (2014) at 1.
[121] McCawley 2013.

Denver-Julesburg Fossil Fuel Basin, north of Denver.[122] Another study found that oil and gas operations in this area emit approximately 55% of the VOCs in northeastern Colorado.[123]

VOCs can form ground-level (tropospheric) ozone when combined with nitrogen oxides ("$NO_X$"), from compressor engines, turbines, other engines used in drilling, and flaring,[124] and sunlight. This reaction can diminish visibility and air quality and harm vegetation. Tropospheric ozone can also be caused by methane, which is leaked and vented at various stages of unconventional oil and gas development, as it interacts with nitrogen oxides and sunlight.[125] In addition to its role as a greenhouse gas, methane contributes to increased concentrations of ground-level ozone, the primary component of smog, because it is an ozone precursor.[126] Methane's effect on ozone concentrations can be substantial. One paper modeled reductions in various anthropogenic ozone precursor emissions and found that "[r]educing anthropogenic $CH_4$ emissions by 50% nearly halves the incidence of U.S. high-$O_3$ events . . . ."[127] Like methane, VOCs and $NO_X$ are also ozone precursors; therefore, many regions around the country with substantial oil and gas operations are now suffering from extreme ozone levels due to heavy emissions of these pollutants.[128] Ozone can result in serious health conditions, including heart and lung disease and mortality.[129] A recent study of ozone pollution in the Uintah Basin of northeastern Utah, a rural area that experiences hazardous tropospheric ozone concentrations, found that oil and gas operations were responsible for 98 to 99 percent of VOCs and 57 to 61 percent of $NO_X$ emitted from sources within the Basin considered in the study's inventory.[130]

Oil and gas operations can also emit hydrogen sulfide. The hydrogen sulfide is contained in the natural gas and makes that gas "sour."[131] Hydrogen sulfide may be emitted during all stages of operation, including exploration, extraction, treatment and storage, transportation, and

---

[122] Pétron, G. et al., Hydrocarbon Emissions Characterization in the Colorado Front Range – A Pilot Study, 117 J. GEOPHYSICAL RESEARCH D04304 (2012), at 8, 13 ("Pétron 2012).

[123] Gilman, J.B. et al., Source Signature of Volatile Organic Compounds from Oil and Natural Gas Operations in Northeastern Colorado, 47 ENVTL. SCI & TECH. 1297, 1303 (2013).

[124] *See, e.g.*, U.S. Environmental Protection Agency, Oil and Gas Sector: Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution: Background Technical Support Document for Proposed Standards at 3-6 (July 2011); Armendariz, Al, Emissions for Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements (2009) ("Armendariz") at 24.

[125] Fiore, Arlene et al., Linking Ozone Pollution and Climate Change: The Case for Controlling Methane, 29 Geophys. Res Letters 19 (2002).

[126] U.S. Environmental Protection Agency, Oil and Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews Proposed Rule, 76 Fed. Reg 52,738 (Aug 23, 2011).

[127] Fiore, Arlene et al., Linking ozone pollution and climate change: The case for controlling methane, 29 Geophys. Res Letters 19 (2002); *see also* Martin, Randal et al., Final Report: Uinta Basin Winter Ozone and Air Quality Study Dec 2010 - March 2011 (2011) at 7.

[128] Armendariz at 1, 3, 25-26; Wendy Koch, *Wyoming's Smog Exceeds Los Angeles' Due to Gas Drilling*, USA Today (May 9, 2011); Craft, Elena, Environmental Defense Fund, Do Shale Gas Activities Play a Role in Rising Ozone Levels? (2012); Colorado Dept. of Public Health and Environment, Conservation Commission, Colorado Weekly and Monthly Oil and Gas Statistics (July 6, 2012) at 12.

[129] U.S. Environmental Protection Agency, Integrated Science Assessment (ISA) for Ozone (O3) and Related Photochemical Oxidants (2013).

[130] Lyman, Seth and Howard Shorthill, Final Report: 2012 Uintah Basin Winter Ozone & Air Quality Study, Utah Department of Environmental Quality (2013); *see also* Gilman, Jessica et al., Source signature of colatile organic compounds from oil and natural gas operations in northeastern Colorado, Envtl Sci and Technology (Jan 14, 2013), DOI: 10.1021/es304119a.

[131] Sierra Club Comments.

refining. Long-term exposure to hydrogen sulfide is linked to respiratory infections, eye, nose, and throat irritation, breathlessness, nausea, dizziness, confusion, and headaches.[132]

The oil and gas industry is also a major source of particulate matter. The heavy equipment regularly used in the industry burns diesel fuel, generating fine particulate matter[133] that is especially harmful.[134] Vehicles traveling on unpaved roads also kick up fugitive dust, which is particulate matter.[135] Further, both $NO_X$ and VOCs, which as discussed above are heavily emitted by the oil and gas industry, are also particulate matter precursors.[136] Some of the health effects associated with particulate matter exposure are "premature mortality, increased hospital admissions and development of chronic respiratory disease."[137]

Fracking results in additional air pollution that can create a severe threat to human health. One analysis found that 37 percent of the chemicals found at fracked gas wells were volatile, and that of those volatile chemicals, 81 percent can harm the brain and nervous system, 71 percent can harm the cardiovascular system and blood, and 66 percent can harm the kidneys.[138] Also, the SCAQMD has identified three areas of dangerous and unregulated air emissions from fracking: (1) the mixing of the fracking chemicals; (2) the use of the silica, or sand, as a proppant, which causes the deadly disease silicosis; and (3) the storage of fracking fluid once it comes back to the surface.[139] Preparation of the fluids used for well completion often involves onsite mixing of gravel or proppants with fluid, a process which potentially results in major amounts of particulate matter emissions.[140] Further, these proppants often include silica sand, which increases the risk of lung disease and silicosis when inhaled.[141] Finally, as flowback returns to the surface and is deposited in pits or tanks that are open to the atmosphere, there is the potential for organic compounds and toxic air pollutants to be emitted, which are harmful to human health as described above.[142]

The EIS should study the potential for oil and gas operations sites in the planning area to emit such air toxics and any other pollutants that may pose a risk to human health, paying particular attention to the impacts of air pollution on environmental justice communities that

---

[132] USEPA, Office of Air Quality Planning and Standards, Report to Congress on Hydrogen Sulfide Air Emissions Associated with the Extraction of Oil and Natural Gas (EPA-453/R-93-045) at i (Oct. 1993) ("USEPA 1993").
[133] Earthworks, Sources of Oil and Gas Pollution (2011).
[134] Bay Area Air Quality Management District, Particulate Matter Overview, Particulate Matter and Human Health (2012).
[135] U.S. Environmental Protection Agency, Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Particulate Matter (June 2012), http://www.epa.gov/ttnecas1/regdata/RIAs/PMRIACombinedFile_Bookmarked.pdfat 2-2, ("EPA RIA")
[136] EPA RIA at 2-2.
[137] U.S. Environmental Protection Agency, National Ambient Air Quality Standards for Particulate Matter Proposed Rule, 77 Fed. Reg. 38,890, 38,893 (June 29, 2012).
[138] Colborn 2011 at 8.
[139] South Coast Air Quality Management District, Draft Staff Report on Proposed Rule 1148.2 - Notification and Reporting Requirements for Oil and Gas Wells and Chemical Suppliers (January 2013).at 15 ("SCAQMD Revised Draft Staff Report PR1148-2").
[140] *Id.*
[141] South Coast Air Quality Management District, Response to Questions re Air Quality Risks of Hydraulic Fracturing in California, Submission to Joint Senate Hearing (2013) at 3.
[142] SCAQMD Revised Draft Staff Report PR1148-2 at 15.

already bear the burden of disproportionately high levels of air pollution. The EIS should rely on the most up-to-date information regarding the contribution of oil and gas operations to VOC and air toxics levels. Recent studies in Weld County show that existing emissions inventories likely underestimate the contribution of oil and gas operations to VOC levels by a factor of two.[143] Further, researchers have found that existing emissions inventories vastly underestimate the contribution of oil and gas operations to hazardous air pollution concentrations in Weld County, suggesting that the health risk assessments conducted using these inventories are similarly inaccurate and therefore underestimate exposures and health risks.[144] This study estimated benzene emission rates and other VOCs using air quality measurements taken from an airplane over Weld County. Current inventories estimating benzene emissions from oil and gas operators in the study area underestimated emissions by four to nine times. The study suggests that other hazardous air pollutants (such as toluene, ethylbenzene, etc.) could similarly be underestimated and that oil and gas sites could be a bigger source of benzene than vehicle emissions, previously thought to be the largest source in the area.

### B. Sources of Air Emissions

Harmful air pollutants are emitted in all stages of unconventional oil and gas recovery, including drilling, completion, well stimulation, production, and disposal. Drilling and casing the wellbore require substantial power from large equipment. The engines used typically run on diesel fuel, which emits particularly harmful types of air pollutants when burned. Similarly, high-powered pump engines are used in the fracturing and completion phase. This too can amount in large volumes of air pollution. Flaring, venting, and fugitive emissions of gas are also a potential source of air emissions. Gas flaring and venting can occur in both oil and gas recovery processes when underground gas rises to the surface and is not captured as part of production. Fugitive emissions can occur at every stage of extraction and production, often leading to high volumes of gas being released into the air. Methane emissions from oil and gas production is as much as 270 percent greater than previously estimated by calculation.[145] Recent studies show that emissions from pneumatic valves (which control routine operations at the well pad by venting methane during normal operation) and fugitive emissions are higher than EPA estimates.[146]

Evaporation from pits can also contribute to air pollution. Pits that store drilling waste, produced water, and other waste fluid may be exposed to the open air. Chemicals mixed with the wastewater—including the additives used to make fracking fluids, as well as volatile hydrocarbons, such as benzene and toluene, brought to the surface with the waste—can escape into the air through evaporation. Some pits are equipped with pumps that spray effluents into the

---

[143] *Id.* at 1302; Pétron 2012 at 1, 18 (noting state and federal inventories likely underestimate hydrocarbon emissions from oil and gas operations by as much as factor of two).

[144] Pétron, G. et al., A New Look at Methane and Non-Methane Hydrocarbon Emissions from Oil and Natural Gas Operations in the Colorado Denver-Julesburg Basin, accepted for publication, online May 7, 2014, J. GEOPHYSICAL RESEARCH: ATMOSPHERES, available at http://onlinelibrary.wiley.com/doi/10.1002/2013JD021272/abstract.

[145] Miller 2013.

[146] Allen 2013; Harriss, Robert et al. Using Multi-Scale Measurements to Improve Methane Emission Estimates from Oil and Gas Operations in the Barnett Shale Region, Texas, Environ. Sci. Technol., 2015, 49 (13), pp 7524–7526.

air to hasten the evaporation process. Even where waste fluid is stored in so-called "closed loop" storage tanks, fugitive emissions can escape from tanks.

As mentioned above, increased truck traffic will lead to more air emissions. Trucks capable of transporting large volumes of chemicals and waste fluid typically use large engines that run on diesel fuel. Air pollutants from truck engines will be emitted not only at the well site, but also along truck routes to and from the site.

### C. Impact of Increased Air Pollution

The potential harms resulting from increased exposure to the dangerous air pollutants described above are serious and wide ranging. The negative effects of criteria pollutants are well documented and are summarized by the U.S. EPA's website:

> *Nitrogen oxides* (NOx) react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. $NO_x$ and volatile organic compounds react in the presence of heat and sunlight to form ozone.
>
> *Particulate matter* (PM) - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: premature death in people with heart or lung disease, increased mortality, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.[147]
>
> *Sulfur Dioxide* ($SO_2$) – has been shown to cause an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms.[148] Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.[149]
>
> *Carbon Monoxide* (CO) can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death.[150] Exposure to CO can reduce the oxygen-carrying capacity of the blood. People with several types of heart disease already have a reduced capacity for pumping oxygenated blood to the heart, which can cause them to experience myocardial ischemia

[147] U.S. Environmental Protection Agency, Particulate Matter, (PM) http://www.epa.gov/airquality/particlepollution/health.html (accessed July 30, 2015); Ostro, Bart et al., Long-term Exposure to Constituents of Fine Particulate Air Pollution and Mortality: Results from the California Teachers Study, 118 Environmental Health Perspectives 3 (2010)

[148] U.S. Environmental Protection Agency, Sulfur Dioxide http://www.epa.gov/airquality/sulfurdioxide/health.html, available at (accessed July 29, 2015).

[149] *Id.*

[150] U.S. Environmental Protection Agency, Carbon Monoxide, available at http://www.epa.gov/airquality/carbonmonoxide/health.html (accessed July 29, 2015).

(reduced oxygen to the heart), often accompanied by chest pain (angina), when exercising or under increased stress.[151] For these people, short-term CO exposure further affects their body's already compromised ability to respond to the increased oxygen demands of exercise or exertion.[152]

*Ozone* ($O_3$) can trigger or worsen asthma and other respiratory ailments.[153] Ground level ozone can have harmful effects on sensitive vegetation and ecosystems. Ozone may also lead to loss of species diversity and changes to habitat quality, water cycles, and nutrient cycles.

Air toxics and hazardous air pollutants, by definition, can result in harm to human health and safety. The full extent of the health effects of exposure is still far from being complete, but already there are numerous studies that have found these chemicals to have serious health consequences for humans exposed to even minimal amounts. The range of illnesses that can result are summarized in a study by Dr. Theo Colburn, which charts which chemicals have been shown to be linked to certain illnesses.[154]

Natural gas drilling operations result in the emissions of numerous non-methane hydrocarbons (NMHCs) that have been linked to numerous adverse health effects. A recent study that analyzed air samples taken during drilling operations near natural gas wells and residential areas in Garfield County, detected 57 chemicals between July 2010 and October 2011, including 44 with reported health effects.[155] For example:

> Thirty-five chemicals were found to affect the brain/nervous system, 33 the liver/metabolism, and 30 the endocrine system, which includes reproductive and developmental effects. The categories with the next highest numbers of effects were the immune system (28), cardiovascular/blood (27), and the sensory and respiratory systems (25 each). Eight chemicals had health effects in all 12 categories. There were also several chemicals for which no health effect data could be found.[156]

The study found extremely high levels of methylene chloride, which may be used as cleaning solvents to remove waxy paraffin that is commonly deposited by raw natural gas in the region. These deposits solidify at ambient temperatures and build up on equipment.[157] While none of the detected chemicals exceeded governmental safety thresholds of exposure, the study

---

[151] *Id.*
[152] *Id.*
[153] U.S. Environmental Protection Agency, Ground Level Ozone, available at http://www.epa.gov/airquality/ozonepollution/health.html (accessed July 29, 2015).
[154] Colborn, Theo et al., Natural Gas Operations from a Public Health Perspective, 17 Human and Ecological Risk Assessment 1039 (2011) ("Colborn 2011"); Colborn, Theo, et al., An Exploratory Study of Air Quality near Natural Gas Operations, Human and Ecological Risk Assessment: An International Journal doi:10.1080/10807039.2012.749447 (2012); *see* note 120 & accompanying text below.
[155] Colborn et al. An Exploratory Study of Air Quality Near Natural Gas Operations, Human and Ecological Risk Assessment: An International Journal, Vol. 20, Iss. 1, 2014, pp. 21-22 (pages refer to page numbers in attached manuscript and not journal pages) ("Colborn 2014), available at http://www.tandfonline.com/doi/full/10.1080/10807039.2012.749447.
[156] Colborn 2014, p. 11.
[157] *Id.*, p. 10.

noted that such thresholds are typically based on "exposure of a grown man encountering relatively high concentrations of a chemical over a brief time period, for example, during occupational exposure."[158] Consequently, such thresholds may not apply to individuals experiencing "chronic, sporadic, low-level exposure," including sensitive populations such as children, the elderly, and pregnant women.[159] For example, the study detected polycyclic aromatic hydrocarbon (PAH) levels that could be of "clinical significance," as recent studies have linked low levels of exposure to lower mental development in children who were prenatally exposed.[160] In addition, government safety standards do not take into account "the kinds of effects found from low-level exposure to endocrine disrupting chemicals..., which can be particularly harmful during prenatal development and childhood.[161]

The EIS should incorporate a literature review of the harmful effects of each of these chemicals known to be used in fracking and other unconventional oil and gas extraction methods. Without knowing the effects of each chemical, the EIS cannot accurately project the true impact of unconventional oil and gas extraction.

### D. Air Modeling

BLM should use air modeling to understand what areas and communities will most likely be affected by air pollution. It is crucial to gather independent data rather than relying on industry estimates, which may be inaccurate or biased. Wind and weather patterns, and atmospheric chemistry, determine the fate and transport of air pollution over a region, over time. The EIS should be informed by air modeling to show where the air pollution will flow.

## VII. Impacts to Sensitive Species of Plants and Wildlife

The areas for sale are relatively pristine and contain very few oil and gas wells. New development would significantly impact ESA-listed Gunnison's sage grouse habitat, potential lynx habitat, elk migration corridors and production areas, mule deer migration corridors, and wild turkey production and winter concentration areas.[162] Sensitive state-protected areas are at risk. Several parcels (COC77455, COC77456, COC77457) cover most of the Jim Olterman-Lone Cone State Wildlife Protection Area, which provides habitat for deer, elk, black bears, and dusky blue grouse. Another parcel significantly overlaps the Plateau Creek Potential Conservation Area, in which two rare and "globally critically impaired" plants are found—the cushion bladderpod and Lone Mesa snakewood. In addition, water depletions would impact the endangered fish.

The expansion of oil and gas development activities will harm these species through habitat destruction and fragmentation, stress and displacement caused by development-related activities (e.g., construction and operation activities, truck traffic, noise and light pollution), surface water depletion leading to low stream flows, water and air contamination, introduction of

[158] *Id.*, pp. 11-12.
[159] *Id.* p. 12.
[160] *Id.*, p. 10-11.
[161] *Id.*, p. 12.
[162] *See* Rocky Mountain Wild ABI Screen and associated maps, note 9 above.

invasive species, and climate change. These harms can result in negative health effects and population declines. Studies and reports of observed impacts to wildlife from unconventional oil and gas extraction activities are summarized in the Center's "Review of Impacts of Oil and Gas Exploration and Development on Wildlife," submitted herewith.[163] Because the allowance of destructive oil and gas extraction runs contrary to BLM's policy of managing resources in a manner that will "protect the quality of...ecological...values" and "provide...habitat for wildlife,"[164] a no fracking alternative minimizing industrial development and its harmful effects on wildlife must be considered.

The EIS must disclose how oil and gas drilling within the vicinity of these sensitive habitat areas will affect these species.

**A. Habitat Loss**

Oil and gas development creates a network of well pads, roads, pipelines, and other infrastructure that lead to direct habitat loss and fragmentation, as well as displacement of wildlife from these areas due to increased human disturbance. Habitat loss occurs as a result of a reduction in the total area of the habitat, the decrease of the interior-to-edge ratio, isolation of one habitat fragment from another, breaking up of one habitat into several smaller patches of habitat, and decreasing the average size of a habitat patch. New research has revealed the extent of this habitat loss. For example, in the western United States, the amount of high-quality habitat for the pronghorn has shrunk drastically due to oil and gas development.[165] A recent study shows that oil and gas development causes significant habitat loss to mule deer in the Piceance Basin of Colorado:

> Energy development drove considerable alterations to deer habitat selection patterns, with the most substantial impacts manifested as avoidance of well pads with active drilling to a distance of at least 800 m. Deer displayed more nuanced responses to other infrastructure, avoiding pads with active production and roads to a greater degree during the day than night. In aggregate, these responses equate to alteration of behavior by human development in over 50% of the critical winter range in our study area during the day and over 25% at night.[166]

Significant habitat for elk and mule deer are adjacent to the proposed parcels for lease but there is no analysis of specific measures to address impacts to these species.

The indirect effects from unconventional oil and gas development can often be far greater than the direct disturbances to habitat. The impacts from the well site—including noise, light,

---

[163] *See* Center for Biological Diversity, Review of Impacts of Oil and Gas Exploration and Development on Wildlife (June 20, 2015). This review presents the findings of numerous studies and reports on the impacts of hydraulic fracturing on wildlife.

[164] 43 U.S. Code § 1701(a)(8).

[165] Beckmann, J.P. et al. Human-mediated shifts in animal habitat use: Sequential changes in pronghorn use of a natural gas field in Greater Yellowstone, 147 Biological Conservation 1:222 (2012).

[166] Northrup, J. M. et al. Quantifying spatial habitat loss from hydrocarbon development through assessing habitat selection patterns of mule deer, Global Change Biology (Aug. 2015), available at http://onlinelibrary.wiley.com/doi/10.1111/gcb.13037/epdf.

and pollution—extend beyond the borders of the operation site and will consequently render even greater areas uninhabitable for some wildlife. Species dependent on having an "interior" habitat will lose their habitat as operation sites or other infrastructure fragment previously buffered and secluded areas. These and other indirect effects can be far greater than the direct disturbances to land. In the Marcellus shale of Pennsylvania, for instance, research shows that 8.8 acres of forest on average are cleared for each drilling pad along with associated infrastructure, but after accounting for ecological edge effects, each drilling station actually affected 30 acres of forest.[167]

While individual well sites may cause some disturbance and destruction, the cumulative impacts of oil and gas production using unconventional methods must receive attention as well. While the actual well pads may only occupy a small proportion of a particular habitat, their impact can be much greater when their aggregate impact is considered. As discussed above, interior habitats will be destroyed by removing the buffer between the interior habitat and the operation site.

### B. Water Depletion

Water depletion also affect species whose habitats are far removed from the actual well site. Because of the high volume of water required for even a single well that uses unconventional extraction methods, the cumulative water depletion has a significant impact on species that rely on water sources that serve to supply oil and gas operations. In addition, water depletion adversely impacts water temperature and chemistry, as well as amplifies the effects of harmful pollutants on wildlife that would otherwise be diluted without the depletion.

### C. Contamination from Wastewater Causing Harm and Mortality

Accidental spills or intentional dumping of wastewater contaminate surface water and cause large-scale harm to wildlife. Numerous incidents of wastewater contamination from pipelines, equipment blowouts, and truck accidents have been reported, and have resulted in kills of fish, aquatic invertebrates, and trees and shrubs, as well as negative health effects for wildlife and domestic animals. Contamination incidents that have occurred actually demonstrate that wildlife harm from contamination is a real, not just theoretical, impact that must be considered. In 2013, a company admitted to dumping wastewater from fracking operations into the Acorn Fork Creek in Kentucky, causing a massive fish kill.[168] Among the species harmed was the blackside dace, a threatened minnow species.[169] An analysis of water quality of Acorn Creek and fish tissues taken shortly after the incident was exposed showed the fish displayed general signs of stress and had a higher rate of gill lesions, than fish in areas not affected by the dumping.[170] The discharge of fracking wastewater into the Susquehanna River in Pennsylvania is suspected

[167] Johnson, N., Pennsylvania energy impacts assessment: Report 1: Marcellus shale natural gas and wind, Nature Conservancy – Pennsylvania Chapter (2010) at 10.
[168] Vaidyanathan, Gayathri, *Fracking Spills Cause Massive Ky. Fish Kill*, E&E News, Aug. 29. 2013, http://www.eenews.net/greenwire/2013/08/29/stories/1059986559 (accessed July 30, 2015).
[169] *Id.*
[170] Papoulias, D.M. and A.L. Velasco. Histopathological analysis of fish from Acorn Fork Creek, Kentucky, exposed to hydraulic fracturing fluid releases, 12 Southwestern Naturalist (Special Issue 4):92 (2013).

to be the cause of fish abnormalities, including high rates of spots, lesions, and intersex.[171] In West Virginia, the permitted application of hydrofracturing fluid to an area of mixed hardwood forest caused extensive tree mortality and a 50-fold increase in surface soil concentrations of sodium and chloride.[172]

In addition, open air pits that store waste fluid pose risks for wildlife that may come into contact with the chemicals stored in the pits. Already, there have been several documented cases of animal mortality resulting from contact with pits. A field inspection of open pits in Wyoming found 269 bird carcasses, the likely cause of death being exposure to toxic chemicals stored in the open pits.[173] Open pits can also serve as breeding grounds for mosquitoes, which serve as a vector for West Nile virus, a threat to humans and animals alike. In Wyoming, an increase of ponds led to an increase of West Nile virus among greater sage-grouse populations.[174] Recently, new information has come to light that operators in California have been dumping wastewater into hundreds of unpermitted open pits.[175] The EIS must take into account the impact of both unpermitted, illegal waste pits as well as those that are regulated.

### D. Invasive Species

Invasive species may be introduced through a variety of pathways that would be increasingly common if oil and gas activity is allowed to expand. Machinery, equipment, and trucks moved from site to site can carry invasive plant species to new areas. In addition, materials such as crushed stone or gravel transported to the site from other locations may serve as a conduit for invasive species to migrate to the well site or other areas en route.

Aquatic invasive species may also spread more easily given the large amounts of freshwater that must be transported to accommodate new drilling and extraction techniques. These species may be inadvertently introduced to new habitats when water is discharged at the surface. Alternatively, hoses, trucks, tanks, and other water use equipment may function as conduits for aquatic invasive species to access new habitats.

### E. Climate Change

Anthropogenic climate change poses a significant threat to biodiversity.[176] Climate disruption is already causing changes in distribution, phenology, physiology, genetics, species

---

[171] Piette, Betsy, BP Oil Spill, Fracking Cause Wildlife Abnormalities, Workers World (April 27, 2012) *available at* http://www.workers.org/2012/us/bp_oil_spill_fracking_0503/; Pennsylvania Fish & Boat Commission, Ongoing Problems with the Susquehanna River smallmouth bass, a Case for Impairment (May 23, 2012), www.fish.state.pa.us/newsreleases/2012press/senate_susq/SMB_ConservationIssuesForum_Lycoming.pdf

[172] Adams, Mary Beth, Land Application of Hydrofracturing Fluids Damages a Deciduous Forest Stand in West Virginia, 40 Journal of Environmental Quality 1340 (2011).

[173] *See, e.g.*, Ramirez, P. Jr., Bird Mortality in Oil Field Wastewater Disposal Facilities, 46 Environ Mgmt 5: 820 ( 2010).

[174] Zou, Li et al., Mosquito Larval Habitat Mapping Using Remote Sensing and GIS: Implications of Coalbed Methane Development and West Nile Virus, 43 J. Med. Entomol. 5:1034 (2006).

[175] Cart, Julie. *Hundreds of Illicit Oil Wastewater Pits Found in Kern County*, (Feb. 26, 2015), *available at* http://www.latimes.com/local/lanow/la-me-ln-pits-oil-wastewater-20150226-story.html.

[176] Warren, R. et al.,Quantifying the benefit of early climate change mitigation in avoiding biodiversity loss, 3 Nature Climate Change 678 (2013) ("Warren 2013").

interactions, ecosystem services, demographic rates, and population viability: many animals and plants are moving poleward and upward in elevation, shifting their timing of breeding and migration, and experiencing population declines and extinctions.[177] Because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to significantly increase extinction risk for many species. The IPCC concludes that it is extremely likely that climate change at or above 4°C will result in substantial special extinction.[178] Other studies have predicted similarly severe losses: 15-37 percent of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario[179]; the extinction of 10 to 14 percent of species by 2100 if climate change continues unabated.[180] Another recent study predicts the loss of more than half of the present climatic range for 58 percent of plants and 35 percent of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species.[181] Because expansion of oil and gas production in the planning area will substantially increase the emissions of greenhouse gases, this activity will further contribute to the harms from climate change to wildlife and ecosystems.

### F. Population-level Impacts

Oil and gas development has been linked to population-level impacts on wildlife, including lower reproductive success of sage grouse and declines in the abundance of songbirds and aquatic species. For example, young greater-sage grouse avoided mating near infrastructure of natural-gas fields, and those that were reared near infrastructure had lower annual survival rates and were less successful at establishing breeding territories compared to those reared away from infrastructure.[182] In Wyoming, an increasing density of wells was associated with decreased numbers of Brewer's sparrows, sage sparrows, and vesper sparrows.[183] In the Fayetteville Shale of central Arkansas, the proportional abundance of sensitive aquatic taxa, including darters, was negatively correlated with gas well density.[184] The EIS must consider the population-level impacts that oil and gas development may have on wildlife in the proposed areas for lease.

---

[177] Cahill, A.E. et al., How Does Climate Change Cause Extinction? Proceedings of the Royal Society B, doi:10.1098/rspb.2012.1890 (2012); Chen, I. et al., Rapid range shifts of species associated with high levels of climate warming, 333 Science 1024 (2011); Maclean, I.M.D., and R.J. Wilson, Recent ecological responses to climate change support predictions of high extinction risk, 108 Proc. Natl. Acad. Sci. Early Edition 12337 (2011) ("Maclean and Wilson 2011"); Parmesan, C., Ecological and Evolutionary Responses to Recent Climate Change, 37 Annual Review of Ecology Evolution & Systematics 637 (2006); Parmesan, C., and G. Yohe, A globally coherent fingerprint of climate change impacts across natural systems, 421 Nature 37 (2003); Root, T.L. et al., Fingerprints of Global Warming on Wild Animals and Plants, 421 Nature 57 (2003); Warren, Rachel et al., Increasing Impacts of Climate Change Upon Ecosystems with Increasing Global Mean Temperature Rise, 106 Climatic Change 141 (2011). ("Warren 2011").

[178] Intergovernmental Panel on Climate Change, *Climate Change 2014: Synthesis Report, Summary for Policy Makers IPCC Fifth Assessment Synthesis Report*, 18 (2014).

[179] Thomas, C.D. et al., Extinction Risk from Climate Change, 427 Nature 8:145 (2004).

[180] Maclean and Wilson 2011.

[181] Warren 2013.

[182] Holloran, M.J. et al., Yearling Greater Sage-Grouse Response to Energy Development in Wyoming, 74 Journal of Wildlife Management 1:65 (2010).

[183] Gilbert, Michelle M. & Anna D. Chalfoun, Energy Development Affects Populations of Sagebrush Songbirds in Wyoming, 75 The Journal of Wildlife Management 4:816 (2011).

[184] Green, Jessie J. et al., Abstract: Examining Community Level Variables of Fishes in Relation to Natural Gas Development, Southeastern Fishes Council, Annual Meeting Program, November 8 - 9, 2012, New Orleans, Louisiana (2012).

### G. Endangered, Threatened, and Sensitive Species

BLM must perform an adequate environmental review of the impacts of oil and gas development on ESA-listed species, including the Gunnison sage-grouse, Colorado greenback cutthroat trout, and the endangered fish. In addition, it must perform an adequate section 7 consultation under the Endangered Species Act to ensure that the lease sale does not jeopardize the continued existence of these species.

#### 1. BLM Must Analyze the Lease Sale's Impacts on Recovery of Gunnison Sage-Grouse

Rocky Mountain Wild's review of 2014 Colorado Parks and Wildlife GIS data indicates that Parcel COC77454 contains historic habitat for the Gunnison sage-grouse.[185] The parcel in question appears to consist of a small area of BLM-managed surface at the edge of the San Juan National Forest. The proposed stipulation CO-34 for this parcel contains general language notifying the prospective lessee that listed species and/or habitat may be present, but contains no specific provisions to mitigate impacts to Gunnison sage-grouse, and the DNA contains no analysis whatsoever of the nature of and impacts to habitat on this parcel. The DNA has no information as to when use of the historic habitat was last observed, its current condition, proximity to other occupied habitats, suitability for restoration and/or re-occupation, or its potential role in the recovery of the species.

Although the parcel in question does not appear to contain listed critical habitat or currently-occupied habitat, it appears to be located approximately ten miles east of the currently-occupied Unit 1, Monticello-Dove Creek population and its corresponding designated critical habitat.[186] Importantly, however, the critical habitat designation does not include BLM or Forest Service lands, which are assumed to be protected by the planning and Section 7 consultation processes.

The recently-revised Tres Rios RMP was found to be likely to adversely effect Gunnison sage-grouse and its critical habitat.[187] BLM is also currently in the process of preparing range-wide plan revisions and an accompanying EIS to "incorporate clear and consistent conservation measures" into its planning for Gunnison sage-grouse habitat.[188]

The Gunnison sage-grouse, *Centrocercus minimus*, was listed as threatened under the Endangered Species Act in November 2014.[189] Habitat loss and fragmentation is the primary

---

[185] Rocky Mountain Wild, Assessment of Biological Impact Screen for Colorado February 2016 Lease Sale Notice, *available at* http://rockymountainwild.org/_site/wp-content/uploads/15-148_COMay2016LeaseSaleEAScreen.xlsx

[186] *See* U.S. Fish and Wildlife Service, Final Rule, Designation of Critical Habitat for Gunnison Sage-Grouse, 79 Fed. Reg. 69,312; 69,340-41; 69,357 (Nov. 20., 2014).

[187] *See* Bureau of Land Management, Record of Decision, Tres Rios Resource Management Plan Revision I-16 (2015);

[188] BLM, Notice of Intent To Incorporate Gunnison Sage-Grouse Conservation Measures Into the Bureau of Land Management Land Use Plans, Colorado and Utah and Prepare an Associated Environmental Impact Statement , 79 Fed. Reg. 42,033 (July 18, 2014).

[189] U.S. Fish and Wildlife Service, Final Rule, Threatened Status for Gunnison Sage-Grouse, 79 Fed. Reg. 69,192

cause of the species' decline in abundance and distribution.[190] The listing decision found substantial negative effects on Gunnison sage-grouse from oil and gas development, including both direct loss of habitat, and more significantly, disruption from habitat fragmentation:

> Energy development impacts sage grouse and sagebrush habitats through direct habitat loss from well pad construction, seismic surveys, roads, powerlines and pipeline corridors, and indirectly from noise, gaseous emissions, changes in water availability and quality, and human presence. The interaction and intensity of effects could cumulatively or individually lead to habitat degradation and fragmentation (Suter 1978, pp. 6–13; Aldridge 1998, p.12; Braun 1998, pp. 144–148; Aldridge and Brigham 2003, p. 31; Knick *et al.* 2003, pp. 612, 619; Lyon and Anderson 2003, pp. 489–490; Connelly *et al.* 2004, pp. 7–40 to 7–41; Holloran 2005, pp.56–57; Holloran *et al.* 2007, pp. 18–19; Aldridge and Boyce 2007, pp. 521–522; Walker *et al.* 2007a, pp. 2652–2653; Zou *et al.* 2006, pp. 1039–1040; Doherty *et al.* 2008, p. 193; Leu and Hanser 2011, pp. 270–271). Increased human presence resulting from oil and gas development can also impact sagegrouse either through avoidance of suitable habitat or disruption of breeding activities (Braun *et al.* 2002, pp. 4–5; Aldridge and Brigham 2003, pp. 30–31; Aldridge and Boyce 2007, p.518; Doherty *et al.* 2008, p. 194).
>
> **
>
> Habitat fragmentation resulting from oil and gas development infrastructure, including access roads, may have greater effects on sage-grouse than habitat loss associated with drill sites. Energy development and associated infrastructure works cumulatively with other human activity or development to decrease available habitat and increase fragmentation. Greater sage-grouse leks had the lowest probability of persisting (40–50 percent) in a landscape with less than 30 percent sagebrush within 6.4 km (4 mi) of the lek. These probabilities were even less in landscapes where energy development also was a factor (Walker *et al.* 2007a, p. 2652).[191]

The Dove Creek, Colorado area in particular has been a principle area of sagebrush loss[192] and oil and gas development is identified as a stressor likely to increase in the future.[193]

Significantly, the Fish and Wildlife Service found that the Monticello-Dove Creek population only barely exceeds the population and habitat requirements necessary to sustain a viable population[194]and that currently-occupied population may not be enough to sustain the long-term viability of that population:

---

(Nov. 20, 2014). As BLM is no doubt aware, this decision is currently the subject of pending litigation by both the Protester and the State of Colorado. *See Center for Biological Diversity v. U.S. Fish and Wildlife Service*, No. 1:15-cv-00130-CMA (D. Colo. amended complaint filed April 21, 2015).

[190] Final Listing Rule, 79 Fed. Reg. at 69,227.

[191] *Id.* at 69,255-56.

[192] *Id.* at 69,228.

[193] *Id.* at 69,256.

[194] Final Critical Habitat Rule, 79 Fed. Reg. at 69,316.

> Two other populations—Monticello-Dove Creek and San Miguel Basin—slightly exceeds [minimum viable habitat] amount. This suggests that currently occupied habitat alone may not be sufficient to maintain long-term viability for at least three and possibly five of the six populations included in this final designation. Declining trends in the abundance of Gunnison sage-grouse outside of the Gunnison Basin further indicate that currently occupied habitat for the five satellite populations included in this final designation may be less than the minimum amount of habitat necessary for their long-term viability. Therefore, we consider the designation of unoccupied critical habitat, including areas outside the CSA in the Monticello population area, essential for conservation of the species.

79 Fed. Reg. 69,316. As best we can ascertain, however, neither this DNA, nor the Tres Rios RMP Revision FEIS, address the question of whether the area west of Fish Creek subject to proposed COC77454 is potentially suitable for habitat or species restoration or recovery and therefore potentially essential for the conservation of the Monticello-Dove Creek population or the species as a whole.

Under the ESA, 16 U.S.C. §1536(a)(2), action agencies must consult with the Fish and Wildlife Service to evaluate the effects and cumulative effects of a proposed project on listed species and critical habitat in the formal consultation process.[195] The courts have held that:

> An agency's failure to adequately consider recovery needs in its adverse modification or jeopardy analysis renders the agency's determination arbitrary and capricious. *Gifford Pinchot Task Force*, 378 F.3d at 1070 (critical habitat); *Nat'l Wildlife Fed'n*, 524 F.3d at 933–34 (explaining that although recovery impacts alone may not necessarily require a jeopardy finding, an agency must consider recovery)

*Nw. Envtl. Advocates v. EPA*, 855 F. Supp. 2d 1199, 1223 (D. Or. 2012) Here, the Service has acknowledged that unoccupied habitat may be essential to recover the Gunnison sage-grouse as a whole and the Monticello-Dove Creek population in particular. Yet neither the DNA for the proposed lease sale nor the Tres Rios RMP FEIS to which it tiers contains any analysis of whether the area in question is suitable and/or necessary for recovery of a viable Gunnison sage-grouse Dove Creek population. The DNA makes no mention whatsoever of unoccupied Gunnison sage-grouse habitat. The mere inclusion of a stipulation that BLM "may recommend modifications" pursuant to future ESA Section 7 consultation does not satisfy either BLM's requirement to consult now, at the time of lease issuance, or to analyze the effects of its actions under NEPA.

### 2. BLM Must Analyze the Impacts of New Drilling on the Endangered Fish

Under section 7 of the Endangered Species Act, BLM must consult with Fish and Wildlife Service regarding the impacts of increased drilling and associated water depletions on the endangered fish. Leasing of the parcels at issue would foreseeably entail significant water

[195] 50 C.F.R. §402.14(g)(3).

depletions within the Dolores River watershed and adversely affect endangered fish that inhabit areas downstream of the lease areas, such as the Dolores River and its tributaries. While the 2008 "Programmatic Biological Opinion for Water Depletions Associated with Bureau of Land Management's Fluid Mineral Program within the Upper Colorado River Basin in Colorado" (PBO) is designed to address any depletions resulting from oil and gas development within the Tres Rios Field Office and other western Colorado field offices, BLM can no longer rely on that consultation for its section 7 compliance. The PBO did not consider the likely increase in horizontal drilling and other unconventional drilling practices that deplete enormous amounts of water to develop the Gothic Shale Gas Play (GSGP) and the Paradox Leasing Analysis Area. Nor did it consider the use of these water-intensive practices throughout the rest of the programmatic action area, including the Grand Junction, Little Snake, White River, and Colorado River Valley Field Offices.[196] To the extent that approval of the lease sale would rely on the PBO, such reliance is arbitrary and cannot constitute BLM's section 7 compliance. BLM must either reinitiate consultation on the PBO or initiate section 7 consultation on the lease sale.

BLM's Programmatic Biological Assessment (PBA) which informed the PBO estimated very low average water use per well within the Dolores River Basin. The PBA assumed that 1.1 acre-feet per well would be used to develop a single conventional well within the San Juan Public Lands Center, which includes the Dolores River Basin, and that a total of 700 wells would be developed over a 15-year period within this sub-watershed of the Upper Colorado River Basin.[197]

The Tres Rios RMP EIS--published in 2013, five years after the PBO was adopted--however, reveals the potential for water use within the Dolores River Basin that could be many times higher than this amount:

> Substantial quantities of water are projected to be used in the drilling, fracturing, and completion process for both the GSGP and Paradox conventional development (Table 3.5.4). The major river basins affected by the projected development in the PLAA are the Dolores and San Juan River Basins. GSGP gas wells in the Paradox Basin would use approximately 7.9 to 13.1 acre-feet of water per well in the drilling and completion process. This level of water consumption is 6 to 11 times the amount of water used to drill and complete a conventional gas well and 11 to 18 times the amount of water used to drill and complete a CBM gas well. Paradox conventional gas wells would use 3.3 acre-feet of water per well in the drilling and completion process. This level of water use is 2.5 times the amount of water used to drill and complete other conventional wells and five times the amount of water used to drill and complete a CBM well.[198]

The Tres Rios RMP EIS estimates the total amount of water depletions within the Dolores River Basin under existing and future leases over a 15-year period to be between 7,444 and 8,840 acre-

[196] BLM Instruction Memorandum CO-2011-022 (April 11, 2011) ("All of the estimates in the PBO were based on using conventional vertical drilling technology.").
[197] PBA at 8.
[198] Tres Rios RMP EIS at 244.

feet, or approximately 496 acre-feet to 589 acre-feet per year.[199] This annual depletion rate is approximately ten times the amount of depletions that the PBA projected would occur in the San Juan Public Lands Center (51.8 acre-feet per year), despite that the PBA's estimated annual rate for this area includes development in other watersheds and not just the Dolores River Basin.[200]

Water use within other areas of the Upper Colorado River Basin have also been grossly underestimated, because they fail to take into account increased horizontal drilling that could be used to develop the Mancos/Mowry and Niobrara shale plays, as well as the water depletion impacts of hydraulic fracturing.[201] For example, under the Grand Junction RMP, over half of all wells developed within the GJFO could be horizontal wells, but the PBO did not take into account the greater water use of such wells.[202] Water depletion records maintained by the BLM Colorado State Office, indicate that horizontal wells depleted an average of 13.34 acre-feet of water per well between 2011 and 2014,[203] but the PBO assumed that within the Grand Junction planning area 0.77 acre-feet per well would be depleted.[204] The increased water use within the Grand Junction planning area and other parts of the upper Colorado River Basin could alter the Service's analysis of the lease sale's effects on the endangered fish, as all BLM-authorized fluid mineral development activity within the Basin is part of a single programmatic action that impacts the endangered fish. Failure to take into account this new information would be arbitrary.

### H. Metrics

BLM should conduct a full assessment of the direct and indirect impacts of unconventional oil and gas development activities on wildlife and ecosystems through a suite of comprehensive studies on all species and ecosystems that could be affected. The studies should be particularly detailed for federally and state listed species, federal and state candidates for listing, and state species of special concern. The studies should address the following impacts: (1) habitat loss, degradation, and fragmentation, including edge effects; (2) water depletion; (3) air and water contamination; (4) introduction of invasive species; (5) climate change impacts; (6) health and behavioral effects such as increased stress and changes in life history behaviors; (7) changes in demographic rates such as reproductive success and survival; and (8) potential for population-level impacts such as declines and extirpations. These studies should consider these harms individually and cumulatively.

## VIII. Unconventional Extraction Techniques and Underground Wastewater Disposal Pose Seismic Risks

If oil and gas development is allowed to proliferate in the planning area, increased unconventional oil and gas extraction and underground waste injection will increase the risk of

---

[199] *Id.* at 245.
[200] The San Juan Public Lands Center includes the Columbine, Uncompahgre, and Gunnison Field Offices, Dolores Public Lands Center, and Pagosa Springs Public Lands Center. PBA at 8.
[201] *See* Center for Biological Diversity Protest of White River RMP (April 27, 2015) at 3-9; Center for Biological Diversity Protest of Grand Junction RMP (2015) (May 11, 2015) at 3-9.
[202] *See id.*
[203] BLM 2011-2014 Water Depletion Logs submitted to Fish & Wildlife Service.
[204] PBA at 8.

induced seismicity. Induced seismic events could damage or destroy property and cause injuries or even death, especially in a state where earthquakes are rare and communities are typically not prepared for them. A no-leasing-no-fracking alternative would minimize these risks, while continued leasing and unconventional well development would increase them.

Research has shown that in regions of the central and eastern United States where unconventional oil and gas development has proliferated in recent years, earthquake activity has increased dramatically.[205] More than 300 earthquakes with magnitude (M) ≥ 3 occurred between 2010 through 2012, compared with an average of 21 per year between 1967 and 2000.[206] Moreover, although earthquakes with magnitude (M) ≥ 5.0 are very uncommon east of the Rocky Mountains, the number per year recorded in the midcontinent increased 11-fold between 2008 and 2011, compared to 1976 to 2007.[207] Mid-continent states experiencing elevated levels of seismic activity include Arkansas, Colorado, New Mexico, Ohio, Oklahoma, Texas, and Virginia.[208]

Research has linked much of the increased earthquake activity and several of the largest earthquakes in the U.S. midcontinent in recent years to the disposal of wastewater into deep injection wells, which is well-established to pose a significant seismic risk.[209] Much of the fracking wastewater is a byproduct of oil and gas production and is routinely disposed of by injection into wells specifically designed and approved for this purpose. The injected fluids push stable faults past their tipping points, and thereby induce earthquakes.[210] In 2015, a study published in *Science* found that, the unprecedented increase in earthquakes in the U.S. mid-continent began in 2009 has been caused solely by the instability caused by fluid injection wells associated with fracking waste disposal.[211] To put an exclamation point on this finding, a 4.7 magnitude earthquake struck northern Oklahoma that was felt in 7 additional states, leading the Oklahoma Geological Survey to reiterate the connection between disposal wells and earthquakes and to shut down the most high risk wells.[212] Earthquakes at magnitudes (M) that are felt (M3 and M4) or destructive (M4 and M5) have been attributed to wastewater injection wells in at least five states - Arkansas, Colorado, Ohio, Oklahoma, and Texas. The largest of these was a M5.7 earthquake in Prague, Oklahoma, which was the biggest in the state's history, destroying 14 homes and injuring two people.[213] Other large earthquakes attributed to wastewater injection include an M5.3 in Colorado,[214] M4.9 in Texas,[215] M4.7 in Arkansas,[216] and M3.9 in Ohio.[217]

---

[205]Ellsworth, W.L. Injection-Induced Earthquakes, 341 Science 1225942 (2013) ("Ellsworth 2013"); Keranen, Katie et al., Potentially Induced Earthquakes in Oklahoma, USA: Links Between Wastewater Injection and the 2011 Mw5.7 Earthquake Sequence, Geology doi:10.1130/G34045.1 (March 26, 2013) ("Keranen 2013").

[206]Ellsworth 2013.

[207]Keranen 2013.

[208]Ellsworth 2013.

[209] *Id.*

[210] Lamont-Doherty Earth Observatory, Columbia University. Distant Quakes Trigger Tremors at U.S. Waste-Injection Sites, Says Study. July 11, 2013. Available at: https://www.ldeo.columbia.edu/news-events/distant-quakes-trigger-tremors-us-waste-injection-sites-says-study.

[211] M. Weingarten, S. Ge, J. W. Godt, B. A. Bekins, and J. L. Rubinstein. June 19, 2015. High-rate injection is associated with the increase in U.S. mid-continent seismicity. Science, VOL 348 ISSUE 6241, pages 1336-1340.

[212] Chow, Lorraine. November 19, 2015. Strong Earthquake Rattles Oklahoma, Felt in 7 Other States. https://ecowatch.com/2015/11/19/oklahoma-earthquake-fracking/

[213]Ellsworth 2013, Keranen 2013.

[214] Rubinstein, J L. et al., The 2001–present triggered seismicity sequence in the Raton Basin of southern

The proliferation of unconventional oil and gas development, including increases in extraction and injection, will increase earthquake risk in the areas for lease. Accordingly, the EIS must fully assess the risk of induced seismicity cause by all unconventional oil and gas extraction and injection activities, including wastewater injection wells.

The analysis should assess the following issues based on guidance from the scientific literature, the National Research Council,[218] and the Department of Energy[219]:

(1) whether existing oil and gas wells and wastewater injection wells in the area covered by the RMP have induced seismic activity, using earthquake catalogs (which provide an inventory of earthquakes of differing magnitudes) and fluid extraction and injection data collected by industry;

(2) the region's fault environment by identifying and characterizing all faults in these areas based on sources including but not limited to the USGS Quaternary Fault and Fold database and the most recent Colorado Geological Survey Fault Activity Map GIS layer. In its analysis, BLM should assess its ability to identify all faults in these areas, including strike-slip faults and deep faults that can be difficult to detect;

(3) the background seismicity of oil- and gas-bearing lands including the history of earthquake size and frequency, fault structure (including orientation of faults), seismicity rates, failure mechanisms, and state of stress of faults;

(4) the geology of oil- and gas-bearing lands including pore pressure, formation permeability, and hydrological connectivity to deeper faults;

(5) the hazards to human communities and infrastructure from induced seismic activity; and

(6) the current state of knowledge on important questions related to the risk and hazards of induced seismicity from oil and gas development activities, including:

   (a) how the distance from a well to a fault affects seismic risk (i.e., locating wells in close proximity to faults can increase the risk of inducing earthquakes);

---

Colorado/northern New Mexico, 104 Bull. Seismol. Soc'y of America 5 (2014).

[215] Brown, W.A. et al. Abstract: Investigating the cause of the 17 May 2012 M4.8 earthquake near Timpson, East Texas, Abstract 84 Seismol. Res. Lett 374 (2013).

[216] Horton, S., Disposal of Hydrofracking Waste Fluid by Injection into Subsurface Aquifers Triggers Earthquake Swarm in Central Arkansas with Potential for Damaging Earthquake, 83 Seismol. Res. Lett. 2 (2012).

[217] Kim, Won-Young, Induced Seismicity Associated with Fluid Injection into a Deep Well in Youngstown, Ohio, 118 J. of Geophys. Res.: Solid Earth 3506 (February 1, 2013).

[218] National Research Council, *Induced Seismicity Potential in Energy Technologies*. National Academies Press (2012).

[219] U.S. Department of Energy, *Protocol for Addressing Induced Seismicity Associated with Enhanced Geothermal Systems*, DOE/EE-0662 (2012); U.S. Department of Energy, *Best Practices for Addressing Induced Seismicity Associated with Enhanced Geothermal Systems - Draft* (2013).

(b) how fluid injection and extraction volumes, rates, and pressures affect seismic risk;

(c) how the density of wells affects seismic risk (i.e., a greater density of wells affects a greater volume of the subsurface and potentially contacts more areas of a single fault or a greater number of faults);

(d) the time period following the initiation of injection or extraction activities over which earthquakes can be induced (i.e., studies indicate that induced seismicity often occurs within months of initiation of extraction or injection although there are cases demonstrating multi-year delays);

(e) how stopping extraction or injection activities affects induced seismicity (i.e., can induced seismicity be turned off by stopping extraction and injection and over what period, since studies indicate that there are often delays—sometimes more than a year—between the termination of extraction and injection activities and the cessation of induced earthquake activity);

(f) the largest earthquake that could be induced by unconventional oil and gas development activities in areas covered by the RMP, including earthquakes caused by wastewater injection; and

(g) whether active and abandoned wells are safe from damage from earthquake activity over the short and long-term.

## IX. Fossil Fuel Development Will Impact Land Use

Increased oil and gas extraction and production have the potential to dramatically and permanently change the landscape of the areas for lease, which are relatively pristine and are unspoiled by oil and gas development. Countless acres of land will likely be leveled to allow for the construction and operation of well pads and related facilities such as wastewater pits. Roads may have to be constructed or expanded to accommodate trucks transporting chemicals and the large quantities of water needed for some recovery methods. Transmission lines and other utilities may also be required. The need for new distribution, refining, or waste treatment facilities will expand industrial land use. With new roads and other industrial infrastructure, certain areas could open up to new industrial or extractive activities, permanently changing the character and use of the land.

The conversion of substantial acreages from rural or natural landscapes to industrial sites will also mar scenic views throughout the planning area. Given BLM's failure to ensure full reclamation of idle wells and the difficulty of restoring sites to their original condition, scenic resources may be permanently impaired.

## X. BLM Must Prepare an Environmental Impact Statement

NEPA demands that a federal agency prepare an EIS before taking a "'major [f]ederal action[] significantly affecting the quality' of the environment." *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1067 (9th Cir. 2002). In order to determine whether a project's impacts may be

"significant," an agency may first prepare an Environmental Assessment ("EA"). 40 C.F.R. §§ 1501.4, 1508.9. If the EA reveals that "the agency's action may have a significant effect upon the . . . environment, an EIS must be prepared." *Nat'l Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 730 (9th Cir. 2001) (internal quotations omitted). If the agency determines that no significant impacts are possible, it must still adequately explain its decision by supplying a "convincing statement of reasons" why the action's effects are insignificant. *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1212 (9th Cir. 1998). Further, an agency must prepare all environmental analyses required by NEPA at "the earliest possible time." 40 C.F.R. § 1501.2. "NEPA is not designed to postpone analysis of an environmental consequence to the last possible moment," but is "designed to require such analysis as soon as it can reasonably be done." *Kern*, 284 F.3d at 1072.

BLM is therefore required under NEPA to prepare an EIS to support this proposed project. This is especially true in light of the likelihood that fracking would occur on the leases. *Center for Biological Diversity, et al. v. Bureau of Land Management, et al.*, 2013 U.S. Dist. LEXIS 52432; 43 ELR 20076 (N.D. Cal. March 31, 2013) (holding that oil and gas leases were issued in violation of NEPA where BLM failed to prepare an EIS and failed to properly address the significance factors for context and intensity in 40 C.F.R. § 1508.27).

In considering whether the lease sale would have significant effects on the environment, NEPA's regulations require BLM to evaluate ten factors regarding the "intensity" of the impacts. 40 C.F.R. § 1508.27(b). The Ninth Circuit has held that the existence of any "one of these factors may be sufficient to require preparation of an EIS." *Ocean Advocates*, 402 F.3d at 865; *Nat'l Parks & Conservation Ass'n*, 241 F.3d at 731. Several of these "significance factors" are implicated in the lease sale and clearly warrant the preparation of an EIS:

> The degree to which the effects on the quality of the human environment are likely to be highly controversial.
>
> The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
>
> The degree to which the proposed action affects public health or safety.
>
> The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

40 C.F.R. § 1508.27(b)(4), (5), (2) & (9). *See Center for Biological Diversity, et al. v. Bureau of Land Management, et al.*, 2013 U.S. Dist. LEXIS 52432; 43 ELR 20076 (N.D. Cal. March 31, 2013) (holding that BLM failed to properly address the significance factors regarding controversy and uncertainty that may have been resolved by further data collection (citing *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005)). Here, individually and considered as a whole, there is no doubt that significant effects may result from the lease sale; thus, NEPA requires that BLM should have prepared an EIS for the action.

### i. The effects on the human environment will be highly controversial

A proposal is highly controversial when "substantial questions are raised as to whether a project . . . may cause significant degradation" of a resource, *Nw. Envtl. Def. Ctr. v. Bonneville Power Admin.*, 117 F.3d 1520, 1536 (9th Cir. 1997), or when there is a "substantial dispute [about] the size, nature, or effect of the" action. *Blue Mtns. Biodiversity*, 161 F.3d at 1212. A "substantial dispute exists when evidence, raised prior to the preparation of [a] . . . FONSI, casts serious doubt upon the reasonableness of an agency's conclusions." *Nat'l Parks & Conserv. Ass'n*, 241 F.3d at 736. When such a doubt is raised, "NEPA then places the burden on the agency to come forward with a 'well-reasoned explanation' demonstrating why those responses disputing the EA's conclusions 'do not . . . create a public controversy.'" *Id.* See also *Center for Biological Diversity, et al. v. Bureau of Land Management, et al.*, 2013 U.S. Dist. LEXIS 52432, 839; 43 ELR 20076 (N.D. Cal. March 31, 2013).

Here, the controversy regarding the lease sale is fully evident. This comment letter provides abundant evidence that oil and gas operations can cause significant impacts to human health, water resources, air quality, imperiled species, and seismicity. The potential for these significant impacts to occur is particularly clear in light of the potential for fracking to result from the lease sale.

Fracking is among the top, if not the most controversial energy issue facing America today. The controversy spans the public arena, scientific discourse, local governments, and the halls of Congress. At the request of Congress, EPA is conducting a study into the effects of fracking on drinking and ground water.[220] Similarly, the New York Draft DEC concluded that the health and environmental risks from fracking supports its ban in New York State. In Nevada, several anti-fracking grassroots groups have emerged along with petitions to ban the practice in Nevada, which to date have garnered more than 3200 signatures.[221] However, in addition to the presence of controversy, it is already evident, as discussed above, that fracking is harmful. Clearly, the level of controversy associated with fracking and its expansion in Colorado in association with the lease sale is sufficient to trigger the need for an EIS. 40 C.F.R. § 1508.27(b)(4).

### ii. The lease sale presents highly uncertain or unknown risks

An EIS must also be prepared when an action's effects are "highly uncertain or involve unique or unknown risks." 40 C.F.R. § 1508.27(b)(5). As the Ninth Circuit has held, "[p]reparation of an EIS is mandated where uncertainty may be resolved by further collection of data, or where the collection of such data may prevent speculation on potential . . . effects." *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005) (internal

---

[220] U.S. Environmental Protection Agency, Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (November 2011).

[221] Petitions available at: http://petitions.moveon.org/sign/nevadas-public-health.fb28?source=c.fb&r_by=5006637
http://org.credoaction.com/petitions/nevada-s-public-health-is-at-risk-we-want-a-moratorium-on-hydraulic-fracturing
http://petitions.moveon.org/sign/prevent-fracking-in-nevada/?source=search
http://org.credoaction.com/petitions/ban-fracing-in-nevada?source=facebook-share-button&time=1374605460

citations omitted); *Blue Mtns. Biodiversity*, 161 F.3d at 1213-1214 (finding "EA's cursory and inconsistent treatment of sedimentation issues . . . raises substantial questions about . . . the unknown risks to" fish populations). As one court recently explained regarding oil and gas leasing that may facilitate fracking, "BLM erroneously discounted the uncertainty from fracking that may be resolved by further data collection. 'Preparation [of an EIS] is mandated where uncertainty may be resolved by further collection of data, or where collection of such data may prevent speculation on potential effects.'" *Center for Biological Diversity, et al. v. Bureau of Land Management, et al.*, 2013 U.S. Dist. LEXIS 52432, *42; 43 ELR 20076 (N.D. Cal. March 31, 2013) quoting *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005)).

While it is clear that oil and gas activities can cause great harm, there remains much to be learned about the specific pathways through which harm may occur and the potential degree of harm that may result. Additional information is needed, for example, about possible rates of natural gas leakage, the potential for fluids to migrate through the ground in and around the parcels, and the potential for drilling to affect local faults. NEPA clearly dictates that the way to address such uncertainties is through the preparation of an EIS.

### iii. The lease sale poses threats to public health and safety

As discussed in great detail above, the oil and gas activities that may occur as a result of the lease sale could cause significant impacts to public health and safety. 40 C.F.R. § 1508.27(b)(2). Fracking would pose a grave threat to the region's water resources, harm air quality, pose seismic risks, negatively affect wildlife, and fuel climate change.

As a congressional report noted, oil and gas companies have used fracking products containing at least 29 products that are known as possible carcinogens, regulated for their human health risk, or listed as hazardous air pollutants.[222] The public's exposure to these harmful pollutants alone would plainly constitute a significant impact. Operational accidents also pose a significant threat to public health. For example in August 2008, Newsweek reported that an employee of an energy-services company got caught in a fracking fluid spill and was taken to the emergency room, complaining of nausea and headaches.[223] The fracking fluid was so toxic that it ended up harming not only the worker, but also the emergency room nurse who treated him. Several days later, after she began vomiting and retaining fluid, her skin turned yellow and she was diagnosed with chemical poisoning.[224] Furthermore, and as previously discussed, information continues to emerge on the risk of earthquakes induced by wastewater injected into areas near faults. It is undeniable that these earthquakes pose risks to the residents of the area and points beyond

The use of fracking fluid, which is likely to occur as a result of the lease sale, poses a major threat to public health and safety and therefore constitutes a significant impact. BLM therefore must evaluate such impacts in an EIS.

---

[222] Waxman, Henry et al., United States House of Representatives, Committee on Energy and Commerce, Minority Staff, Chemicals Used in Hydraulic Fracturing (Apr. 2011) ("Waxman 2011")
[223] Wiserman at 138-39.
[224] *Id.*

### iv. The Lease Sale Action Will Adversely Affect Candidate and Agency Sensitive Species and Their Habitat

An EIS may also be required when an action "may adversely affect an endangered or threatened species or its habitat." 40 C.F.R. § 1508.27(b)(9). Although a finding that a project has "some negative effects does not mandate a finding of significant impact," an agency must nonetheless fully and closely evaluate the effects on listed species and issue an EIS if those impacts are significant. *Klamath-Siskiyou Wildlands Ctr. v. U.S. Forest Serv.*, 373 F. Supp. 2d 1069, 1081 (E.D. Cal. 2004) (finding agency's conclusion that action "may affect, is likely to adversely affect" species due to "disturbance and disruption of breeding" and "degradation" of habitat is "[a]t a minimum, . . . an important factor supporting the need for an EIS").

Impacts to BLM sensitive and other rare species threatened by the proposed lease have been highlighted in section "V" subsection "G" of these comments.

## XI. BLM Must Ensure That the Federal Land Policy and Management Act and the Mineral Leasing Act Are Not Violated

The Mineral Leasing Act ("MLA") requires BLM to demand lessees take all reasonable measures to prevent the waste of natural gas. The MLA states:

> All leases of lands containing oil or gas, made or issued under the provisions of this chapter, shall be subject to the condition that the lessee will, in conducting his explorations and mining operations, use all reasonable precautions to prevent waste of oil or gas developed in the land, or the entrance of water through wells drilled by him to the oil sands or oil-bearing strata, to the destruction or injury of the oil deposits.

30 U.S.C. § 225; *see also id.* § 187 (stating that for the assignment or subletting of leases that "[e]ach lease shall contain . . . a provision . . . for the prevention of undue waste"). This statutory mandate is unambiguous and must be enforced. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 184 n.29 (1978) (stating that "[w]hen confronted with a statute which is plain and unambiguous on its face," "it is not necessary to look beyond the words of the statute."). As already discussed in previous sections, oil and gas operations emit significant amounts of natural gases, including methane and carbon dioxide, which can be easily prevented. [225]

Pursuant to the Federal Land Policy and Management Act ("FLPMA"), BLM must "take any action necessary to prevent unnecessary or undue degradation of the [public] lands." 43 U.S.C. § 1732(b). Written in the disjunctive, BLM must prevent degradation that is "unnecessary" and degradation that is "undue." *Mineral Policy Ctr. v. Norton*, 292 F.Supp.2d 30, 41-43 (D. D.C. 2003). The protective mandate applies to BLM's planning and management decisions. *See Utah Shared Access Alliance v. Carpenter*, 463 F.3d 1125, 1136 (10th Cir. 2006)

[225] *See* U.S. Government Accountability Office, Federal Oil and Gas Leases, Opportunities Exist to Capture Vented and Flared Natural Gas, Which Would Increase Royalty Payments and Reduce Greenhouse Gases 20(2010)

(finding that BLM's authority to prevent degradation is not limited to the RMP planning process). Greenhouse gas pollution for example causes "undue" degradation. Even if the activity causing the degradation may be "necessary," where greenhouse gas pollution is avoidable, it is still "unnecessary" degradation. 43 U.S.C. § 1732(b).

In addition to being harmful to human health and the environment, the emissions from oil and gas operations are also an undue and unnecessary waste and degredation of public lands. Consequently, BLM's proposed gas and oil lease sale violates FLPMA. *See* 43 U.S.C. § 1732(b).

**Conclusion**

Unconventional oil and gas development not only fuel the climate crisis but entail significant public health risks and harms to the environment. Accordingly, BLM should end all new leasing on BLM lands. Should BLM proceed with the lease sale it must thoroughly analyze the alternatives of no new leasing (or no action), and no fracking or other unconventional well stimulation methods in an EIS. Thank you for your consideration of these comments. The Center looks forward to reviewing a legally adequate EIS for this proposed oil and gas leasing action.

Sincerely,

Wendy Park
Staff Attorney
Center for Biological Diversity

# *Gutierrezia elegans*

**Author: A. Schneider & P. Lyon**

**Lone Mesa snakeweed**

**Asteraceae (sunflower family)**

Close up of *Gutierrezia elegans* by Peggy Lyon

## Ranks and Status

**Global rank:** G1
**State rank:** S1
**Federal protection status:** USFS Sensitive, BLM Sensitive
**State protection status:** None

Close up of *Gutierrezia elegans*. Photo ©Al Schneider, www.swcoloradowildflowers.com.

## Description and Phenology

**General description:** A low, compact subshrub with woody caudex branches and decumbent-ascending leafy stems, yellow flowers in short-pedunculate heads in congested corymboid clusters, and short 3-nerved leaves (Schneider et al. 2008).

**Look Alikes:** Differs from other species of *Gutierrezia* in having larger flowers and shorter, broader leaves (CNHP 2012).

**Phenology:** Flowers July through early September; fruits are produced in August and September (Colorado Natural Heritage Program 2012).

*Gutierrezia elegans*; by Dorothy DePaulo

## Habitat

This species is found on outcrops of grayish, argillaceous, bare Mancos shale outcrops with thin soil over the shale. *Gutierrezia elegans* is scattered to abundant in the barrens and also occurs with *Artemisia nova* and other species in sites with deeper soil over the shale. Associated species inlcude *Helianthella microcephala*, *Tetraneuris acaulis*, *Eriogonum lonchophyllum*, *Petradoria*

*pumila, Astragalus missouriensis* var. *amphibolus,* and *Heterotheca villosa Pinus ponderosa* and pinyon-juniper characterize the surrounding slopes (Schneider et al. 2008, CNHP 2012).

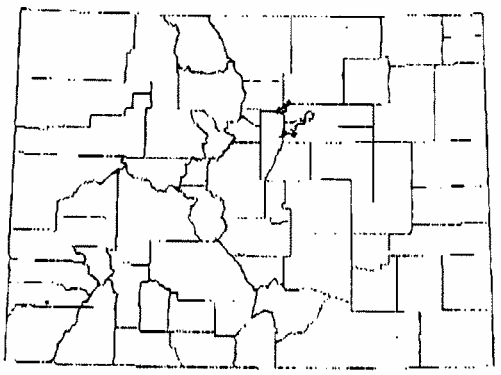
**Elevation Range:** 7,526 - 7,808 feet (2,294 - 2,380 meters)

Habitat of *Gutierrezia elegans* by Peggy Lyon

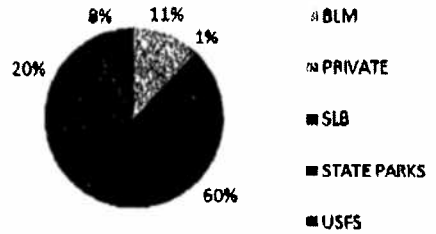
## Distribution

**Colorado endemic:** Yes

**Global range:** This species is known only from Dolores County, Colorado.



Distribution of *Gutierrezia elegans* in Colorado




*Gutierrezia elegans*

Distribution of *Gutierrezia elegans* in Colorado according to mapped land ownership/management boundaries (CNHP 2012, COMaP v9 ).

## Threats and Management Issues

The species may be threatened by oil and gas development, seismic testing, excessive or repeated erosion, motorized recreation, over-grazing, water development, and climate change (Panjabi et al. 2011).

## References

Ackerfield, J. 2012. The Flora of Colorado. Colorado State University Herbarium. 433 pp.

Colorado Natural Heritage Program. 2005. The Second Annual Colorado Rare Plant Symposium: G1 Plants of Colorado. Symposium Minutes. Available on-line http://www.cnhp.colostate.edu/teams/botany.asp#symposia.

Colorado Natural Heritage Program. 2010. The Seventh Annual Colorado Rare Plant Symposium: G1 Plants of Colorado. Symposium Minutes. Available on-line http://www.cnhp.colostate.edu/teams/botany.asp#symposia.

Colorado Natural Heritage Program. 2012. Biodiversity Tracking and Conservation System. Colorado State University, Fort Collins, CO.

Lavender, A.E., M.M. Fink, S.E. Linn, D.M. Theobald. 2011. Colorado Ownership, Management, and Protection v9 Database. Colorado Natural Heritage Program and Geospatial Centroid, Colorado State University, Fort Collins, CO. (30 September).

Neely, B., S. Panjabi, E. Lane, P. Lewis, C. Dawson, A. Kratz, B. Kurzel, T. Hogan, J. Handwerk, S. Krishnan, J. Neale, and N. Ripley. 2009. Colorado Rare Plant Conservation Strategy, Developed by the Colorado Rare Plant conservation Initiative. The Nature Conservancy, Boulder, Colorado, 117 pp.

Panjabi, S., B. Neely and P. Lyon. 2011. Preliminary Conservation Action Plan for Rare Plants in the Plateau Creek and Miramonte Reservoir West Priority Action Areas. Prepared by The Nature

Conservancy and the Colorado Natural Heritage Program. Unpublished report prepared for the National Fish and Wildlife Foundation. 28 pp.

Schneider, A. 2013. Wildflowers, Ferns, and Trees of the Four Corners Regions of Colorado, New Mexico, Arizona, and Utah. Accessed on-line at http://www.swcoloradowildflowers.com.

Schneider, A., P. Lyon, and G. Nesom. 2008. Gutierrezia elegans sp. nov. (Asteraceae: Astereae), a shale barren endemic of southwestern Colorado. J. Bot. Res. Inst. Texas 2(2): 771-774.

USDA, NRCS. 2013. The PLANTS Database. National Plant Data Team, Greensboro, NC 27401-4901 USA.

Weber, W. A. and R. C. Wittmann. 2012. Colorado Flora, Western Slope, A Field Guide to the Vascular Plants, Fourth Edition. Boulder, Colorado. 532 pp.

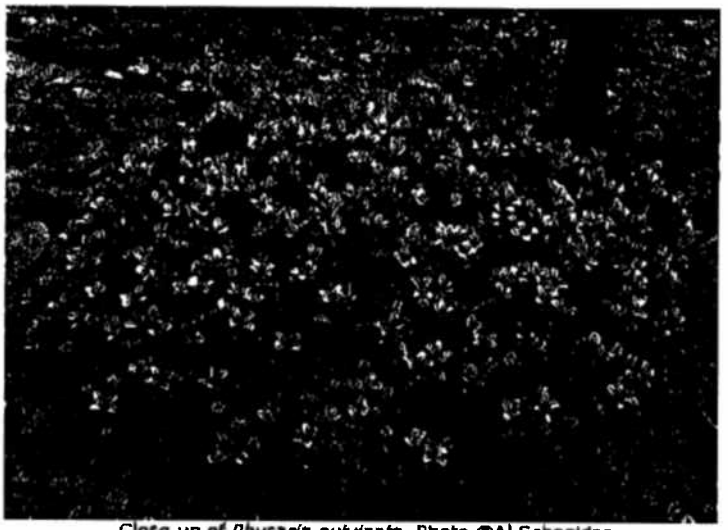
## Last Updated

2013-02-26

## *Physaria pulvinata*
## Author: O'Kane & Reveal

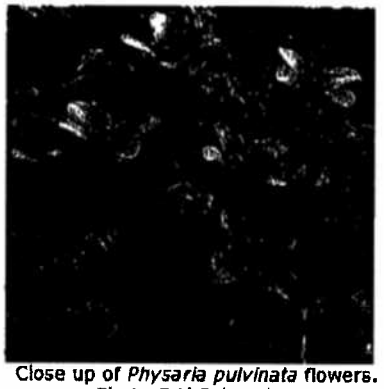
**Cushion bladderpod**

**Brassicaceae (mustard family)**



Close up of *Physaria pulvinata*. Photo ©Al Schneider, www.swcoloradowildflowers.com.

Close up of *Physaria pulvinata* fruit. Photo ©Al Schneider, www.swcoloradowildflowers.com.



Close up of *Physaria pulvinata* flowers. Photo ©Al Schneider, www.swcoloradowildflowers.com.

### Taxonomic Comments

Recently described species by O'Kane and Reveal (2006).

### Ranks and Status

**Global rank:** G1
**State rank:** S1
**Federal protection status:** USFS Sensitive, BLM Sensitive
**State protection status:** None

### Description and Phenology

**General description:** Plants are low and compact, densely matted and densely hairy. A long-lived perennial, less that 3 dm across with reddish stems and gray-green foliage arising from a deep-seated taproot terminated by a buried, densely branched caudex system of up to several hundred branches each ending in a tufted cluster of leaves. Flowers are yellow with four narrowly spatulate petals 4-7 mm long. Fruits are ellipsoid, compressed, 4-6 mm long and densely

*Physaria pulvinata*: artwork in progress

pubescent (O'Kane and Reveal 2006).

**Look Alikes:** Not likely to be confused with other species in this habitat in this part of Colorado.

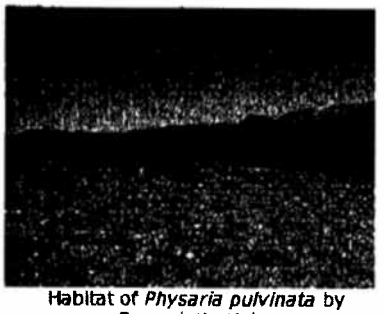
**Phenology:** Plants flower in June-July and produce fruit in August (Colorado Natural Heritage Program 2012).

## Habitat

This species is known from widely scattered outcrops of grayish, argillaceous (Mancos) shale. It grows in openings between low shrubs *Artemisia nova, Chrysopsis,* and *Tetraneuris*, and forbs *Sphaeralcea* and *Cryptantha* (O'Kane and Reveal 2006).

**Elevation Range:** 7,543 - 8,487 feet (2,299 - 2,587 meters)

Habitat of *Physaria pulvinata*. Photo ©Al Schneider, www.swcoloradowildflowers.com.

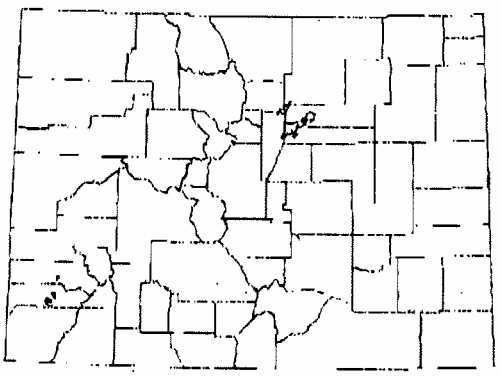


Habitat of *Physaria pulvinata* by Bernadette Kuhn

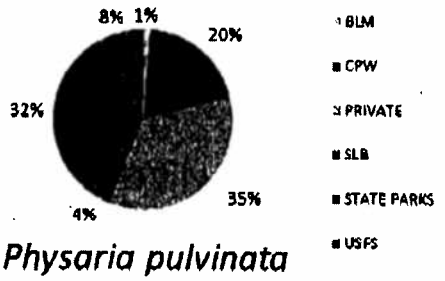
## Distribution

**Colorado endemic:** Yes

**Global range:** Endemic to Colorado; known from San Miguel and Dolores counties. Estimated range is 55 square kilometers (21 square miles), calculated in GIS by drawing a minimum convex polygon around the known occurrences (calculated by the Colorado Natural Heritage Program in 2008).



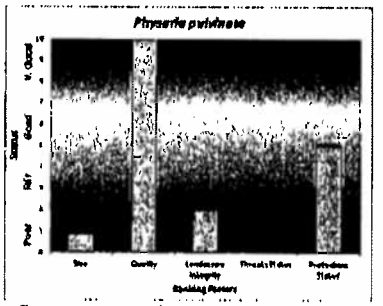
Distribution of *Physaria pulvinata* in Colorado




Distribution of *Physaria pulvinata* in Colorado according to mapped land ownership/management boundaries (CNHP 2012, COMaP v9 ).

## Threats and Management Issues

The primary threat is considered to be recreation, both motorized and non-motorized. This species also is threatened by over-grazing, and removal of shale for road work (Colorado Natural Heritage Program 2012, O'Kane and and Reveal 2006).




Summary results of an analysis of the status of *Physaria pulvinata* based on several ranking factors. This species was concluded to be "Weakly Conserved". From Rondeau et al. 2011.

## References

Ackerfield, J. 2012. The Flora of Colorado. Colorado State University Herbarium. 433 pp.

Colorado Natural Heritage Program. 2005. The Second Annual Colorado Rare Plant Symposium: G1 Plants of Colorado. Symposium Minutes. Available on-line http://www.cnhp.colostate.edu/teams/botany.asp#symposia.

Colorado Natural Heritage Program. 2010. The Seventh Annual Colorado Rare Plant Symposium: G1 Plants of Colorado. Symposium Minutes. Available on-line http://www.cnhp.colostate.edu/teams/botany.asp#symposia.

Colorado Natural Heritage Program. 2012. Biodiversity Tracking and Conservation System. Colorado State University, Fort Collins, CO.

Flora of North America Editorial Committee, ed. (FNA). 1993+. Flora of North America North of Mexico. Oxford Univ. Press, New York, Oxford.

Lavender, A.E., M.M. Fink, S.E. Linn, D.M. Theobald. 2011. Colorado Ownership, Management, and Protection v9 Database. Colorado Natural Heritage Program and Geospatial Centroid, Colorado State University, Fort Collins, CO. (30 September).

Neely, B., S. Panjabi, E. Lane, P. Lewis, C. Dawson, A. Kratz, B. Kurzel, T. Hogan, J. Handwerk, S. Krishnan, J. Neale, and N. Ripley. 2009. Colorado Rare Plant Conservation Strategy, Developed by the Colorado Rare Plant conservation Initiative. The Nature Conservancy, Boulder, Colorado, 117 pp.

O'Kane, S. L. and J. L. Reveal. 2006. Physaria pulvinata (Brassicaceae), a new species from southwestern Colorado. Brittonia 58(1): 74-77.

Panjabi, S., B. Neely and P. Lyon. 2011. Preliminary Conservation Action Plan for Rare Plants in the Plateau Creek and Miramonte Reservoir West Priority Action Areas. Prepared by The Nature Conservancy and the Colorado Natural Heritage Program. Unpublished report prepared for the National Fish and Wildlife Foundation. 28 pp.

Reveal, J.L. 2005. University Of Maryland: An Array of Botanical Images, Physaria pulvinata. URL: http://www.life.umd.edu/emeritus/reveal

Rondeau, R., K. Decker, J. Handwerk, J. Siemers, L. Grunau, and C. Pague. 2011. The state of Colorado's biodiversity 2011. Prepared for The Nature Conservancy. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado.

Schneider, A. 2013. Wildflowers, Ferns, and Trees of the Four Corners Regions of Colorado, New Mexico, Arizona, and Utah. Accessed on-line at http://www.swcoloradowildflowers.com.

Weber, W. A. and R. C. Wittmann. 2012. Colorado Flora, Western Slope, A Field Guide to the Vascular Plants, Fourth Edition. Boulder, Colorado. 532 pp.

## Last Updated

2013-02-04

# Level 4 Potential Conservation Area (PCA) Report

**Name** Plateau Creek **Site Code** S.USCOHP*26172

## IDENTIFIERS

**Site ID** 2340 **Site Class** PCA

**Site Alias** None

**Network of Conservation Areas (NCA)**

| NCA Site ID | NCA Site Code | NCA Site Name |
|---|---|---|
| - | | No Data |

**Site Relations** No Data

## SITE DESCRIPTION

**Minimum Elevation** 7,400.00 **Feet** 2,255.52 **Meters**

**Maximum Elevation** 7,900.00 **Feet** 2,407.92 **Meters**

**Site Description**

The site includes sparsely vegetated areas of light gray Mancos Shale, and sagebrush flats with Gambel oak (*Quercus gambelii*) woodland on upper slopes. The shale areas support a number of unusual plant species, including the recently described cushion bladderpod (*Physaria pulvinata*) and Lone Mesa snakeweed (*Gutierrezia elegans*), another species yet to be described (an un-named *Packera*) is known from this site. Other species that occur on the shale are mat penstemon (*Penstemon caespitosus*), *Tetraneuris* sp., common Townsend daisy (*Townsendia leptotes*), buckwheat (*Eriogonum lonchophyllum*), and Missouri milkvetch (*Astragalus missouriensis* ssp. *amphibolus*). Black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) occur together in the sagebrush areas.

**Key Environmental Factors**

No Data

**Climate Description**

No Data

**Land Use History**

The area has primarily been used for cattle grazing and big game hunting. Lone Mesa State Park has not yet been opened to the public.

**Cultural Features**

No Data

## SITE DESIGN

**Site Map** Y - Yes **Mapped Date** 06/06/2009

**Designer** Lyon, M.J.

**Boundary Justification**

The boundary includes all known locations of cushion bladderpod (*Physaria pulvinata*) and Lone Mesa snakeweed (*Gutierrezia elegans*), as well as a population of *Physaria cinerea*. An un-named *Packera* species is included within the *Physaria pulvinata* occurrences. Some additional habitat that appears suitable for these species, but is not known to be occupied, is included. With additional surveys, this boundary may be adjusted in the future.

**Primary Area** 11,983.94 **Acres** 4,849.75 **Hectares**

## SITE SIGNIFICANCE

**Biodiversity Significance Rank** B1: Outstanding Biodiversity Significance

**Biodiversity Significance Comments**

The site supports excellent (A-ranked) and good (B-ranked) occurrences of two plants that are globally critically imperiled (G1/S1), cushion bladderpod (*Physaria pulvinata*) and Lone Mesa snakeweed (*Gutierrezia elegans*). There is also a good (B-ranked) occurrence of the state imperiled (G5/S1) King's clover (*Trifolium kingii*).

**Other Values Rank** No Data

**Other Values Comments**

No Data

# Level 4 Potential Conservation Area (PCA) Report

**Name** Plateau Creek **Site Code** S.USCOHP*26172

## ASSOCIATED ELEMENTS OF BIODIVERSITY

| Element State ID | State Scientific Name | State Common Name | Global Rank | State Rank | Driving Site Rank |
|---|---|---|---|---|---|
| 40393 | *Physaria pulvinata* | Cushion bladderpod | G1 | S1 | Y |
| 40393 | *Physaria pulvinata* | Cushion bladderpod | G1 | S1 | N |
| 40393 | *Physaria pulvinata* | Cushion bladderpod | G1 | S1 | Y |
| 44159 | *Gutierrezia elegans* | Lone Mesa snakeweed | G1 | S1 | Y |
| 23560 | *Trifolium kingii* | King's clover | G5 | S1 | N |

## LAND MANAGMENT ISSUES

**Land Use Comments**

No Data

**Natural Hazard Comments**

No Data

**Exotics Comments**

Although not competing directly with the rare plants, there are several exotics, including musk thistle ( *Carduus nutans*), mountain tarweed (*Madia glomerata*) and a number of pasture grasses.

**Offsite**

No Data

**Information Needs**

Further surveys are warranted for *Gutierrezia elegans* and *Physaria pulvinata*. Confirmation of taxonomic status and publication of *Physaria cinerea* and the *Packera* species (if they are determined to be good species) is needed.

## REFERENCES


| Reference ID | Full Citation |
|---|---|
| 198365 | Lyon, M.J. 2009. Final Report: Rare Plant Survey of Lone Mesa State Park. Dolores County, Colorado. Colorado Natural Heritage Program, Fort Collins, CO. |
| 194256 | Lyon, P. and J. Hanson. 2006. Final Report: 2005 Rare Plant Survey of San Juan Public Lands, Colorado. Colorado Natural Heritage Program, Fort Collins, CO. |


## ADDITIONAL TOPICS

**Additional Topics**

Original site design by Lyon, M.J. 2005-10-16.

## LOCATORS

**Nation** United States **Latitude** 374138N

**State** Colorado **Longitude** 1082722W

| Quad Code | Quad Name |
|---|---|
| 37108-F4 | Willow Spring |

**County**

Dolores (CO)

| Watershed Code | Watershed Name |
|---|---|
| 14030002 | Upper Dolores |

## VERSION

**Version Date** 06/06/2009

**Version Author** Lyon, M.J.

## DISCLAIMER

# Level 4 Potential Conservation Area (PCA) Report

**Name** Plateau Creek **Site Code** S.USCOHP*26172

These data are a product and property of Colorado State University, Colorado Natural Heritage Program (CNHP). These data are strictly "on loan" and should be considered "works in progress". Data maintained in the Colorado Natural Heritage Program database are an integral part of ongoing research at CSU and reflect the observations of many scientists, institutions and our current state of knowledge. These data are acquired from various sources, with varying levels of accuracy, and are continually being updated and revised. Many areas have never been surveyed and the absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. These data should not be regarded as a substitute for on-site surveys required for environmental assessments. Absence of evidence is NOT evidence of absence. Absence of any data does not mean that other resources of special concern do not occur, but rather CNHP files do not currently contain information to document this presence. CNHP is not responsible for whether other, non-CNHP data providers have secured landowner permission for data collected.

These data are provided for non-commercial purposes only. Under no circumstances are data to be distributed in any fashion to outside parties. To ensure accurate application of data, tabular and narrative components must be evaluated in conjunction with spatial components. Failure to do so constitutes a misuse of the data. The Colorado Natural Heritage Program shall have no liability or responsibility to the data users, or any other person or entity with respect to liability, loss, or damage caused or alleged to be caused directly or indirectly by the data, including but not limited to any interruption of service, loss of business, anticipatory profits or indirect, special, or consequential damages resulting from the use of operation of the data. Data users hereby agree to hold CNHP, Colorado State University, and the State of Colorado harmless from any claim, demand, cause of action, loss, damage or expense from or related to data users use of or reliance on the data, regardless of the cause or nature thereof, and even in the event that such cause is attributable to the negligence or misconduct of CNHP.

These data are provided on an as-is basis, as-available basis without warranties of any kind, expressed or implied, INCLUDING (BUT NOT LIMITED TO) WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT. Although CNHP maintains high standards of data quality control, CNHP, Colorado State University, and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied

(finding that BLM's authority to prevent degradation is not limited to the RMP planning process). Greenhouse gas pollution for example causes "undue" degradation. Even if the activity causing the degradation may be "necessary," where greenhouse gas pollution is avoidable, it is still "unnecessary" degradation. 43 U.S.C. § 1732(b).

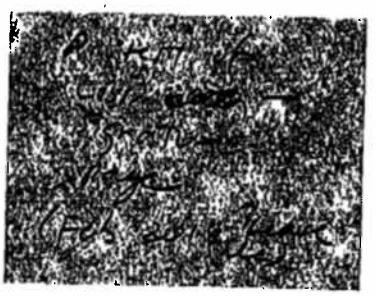
In addition to being harmful to human health and the environment, the emissions from oil and gas operations are also an undue and unnecessary waste and degredation of public lands. Consequently, BLM's proposed gas and oil lease sale violates FLPMA. *See* 43 U.S.C. § 1732(b).

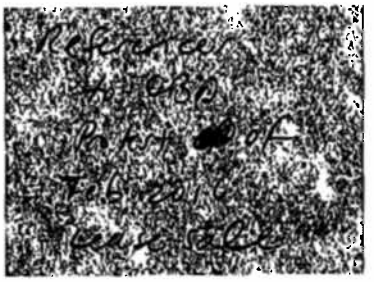
**Conclusion**

Unconventional oil and gas development not only fuel the climate crisis but entail significant public health risks and harms to the environment. Accordingly, BLM should end all new leasing on BLM lands. Should BLM proceed with the lease sale it must thoroughly analyze the alternatives of no new leasing (or no action), and no fracking or other unconventional well stimulation methods in an EIS. Thank you for your consideration of these comments. The Center looks forward to reviewing a legally adequate EIS for this proposed oil and gas leasing action.

Sincerely,

Wendy Park
Staff Attorney
Center for Biological Diversity





# CHAPTER 6
# RESPONSE TO COMMENTS ON THE DRAFT RMP/EIS

## 6.1 INTRODUCTION

After publishing the Draft RMP/EIS, the initial 90-day public comment period to receive comments on the Draft RMP/EIS was extended by an additional 60 days in response to requests from the Mesa County Commission and other public requests. The BLM received written comments by mail, fax, email, and at public meetings. Comments covered a wide spectrum of thoughts, opinions, ideas, and concerns. The BLM recognizes that commenters invested considerable time and effort to submit comments on the Draft RMP/EIS, and developed a comment analysis methodology to ensure that all comments were considered as directed by NEPA regulations.

The BLM has identified and formally responded to all substantive public comments. A systematic process for responding to comments was developed to ensure all substantive comments were tracked and considered. Upon receipt, each comment letter was assigned an identification number and logged into a database that allowed the BLM to organize, categorize, and respond to comments. Substantive comments from each letter were coded to appropriate categories based on content of the comment, retaining the link to the commenter. The categories generally follow the sections presented in the Draft EIS, though some relate to the planning process or editorial concerns.

Comments similar to each other were grouped under a topic heading. The BLM then drafted a statement summarizing the issue(s) contained in each group of comments. The responses were crafted to respond to the comments and note whether a change to the EIS was warranted.

Although each comment letter was diligently considered, the comment analysis process involved determining whether a comment was substantive or nonsubstantive in nature. In performing this analysis, the BLM relied on CEQ regulations to determine what constituted a substantive comment.

A substantive comment does one or more of the following:

- Questions, with a reasonable basis, the accuracy of the information and/or analysis in the EIS

Submission No: emc0853
Commenter: Suzanne Bohan, US Environmental Protection Agency
Comment: The Draft EIS provides an NSO stipulation for municipal watersheds in the planning area, and provides Controlled Surface Use (CSU) stipulations for the Mesa/Powderhorn source water protection areas (SWPAs) and the Jerry Creek watershed. Two other designated drinking water supply sources, the Collbran groundwater protection area and Vega groundwater protection area, are not provided protections through stipulations. Both of these drinking water supply sources are identified in the Draft EIS as "notable municipal water supply areas" (p. 3-58). In keeping with the Draft EIS water resource objective regarding protection of sources of drinking water, we recommend that the Final EIS include at a minimum the CSU stipulation for these resources. Alternatively, we suggest including an explanation of why protective measures are not provided.

Submission No: emc0853
Commenter: Suzanne Bohan, US Environmental Protection Agency
Comment: Finally, the Draft EIS states that there will be "restriction of wells near domestic supplies." The EPA recommends that the Final EIS clarify what this restriction will entail. Similarly, Lease Notice I included in the Preferred Alternative requires "special protective measures" if there is drilling within a source water protection zone. The EPA recommends a description in the Final EIS of these special protective measures.

Submission No: emc0847
Commenter: Bo Meulengracht, Trout Unlimited
Comment: RFD Analysis and Water Use. The BLM's Reasonably Foreseeable Development (RFD) Scenario for Oil and Gas, Grand Junction Field Office, Colorado (2012) predicts from 2009-2028 that 3,938 conventional, shale and coal bed methane wells could be drilled on BLM lands. This does not factor in development that most likely will take place on other lands within the planning area. Given this scenario every effort must be made to include actions that protect the planning areas' watersheds, especially since more than 60% of runoff occurs from BLM lands. In order to reduce the risk of groundwater contamination incidents, the final RMP must include the requirement for the BLM to complete a groundwater vulnerability assessment in order to understand the impacts of oil and gas development to the planning resources watershed. Such an investment should determine the risk factors associated with chemicals of concern which are released during oil and gas operations and which impact groundwater within the GJFO planning area. Once groundwater is contaminated, it is difficult, if not impossible, to completely restore groundwater quality. Such an assessment would increase the ability to provide protection measures which benefit everyone in the resource community including agricultural producers, livestock operators, local municipal communities, homeowners, recreationalists, tourists, and businesses.

Submission No: emc0711
Commenter: Claire Moseley, Public Lands Advocacy
Comment: What is BLM's scientific justification for the proposed CSU and NSO stipulations around major river corridors? We are concerned that they are excessive and will unnecessarily preclude oil and natural gas development in the planning area and do not provide the needed flexibility for oil and gas activities to take place. While BLM declares that "stipulations around wetland and riparian areas and major river corridors would reduce the likelihood of erosion and sedimentation of waterways" (Page 4- 146), BLM has omitted any scientific evidence which justifies the actual size of those buffers. In addition, why are the proposed buffers around major river corridors dramatically larger than those for hydrologic features and riparian areas, where BLM would apply CSU restrictions within 152 meters (500 feet) from the edge of any hydrologic feature including perennial and intermittent streams, wetlands (including fens), lakes, springs, seeps, and riparian areas? Historic buffers have been limited to 300 to 500 feet, which has been proven a reliable mitigation measure. Without scientific evidence

proving its need, this new restriction is unwarranted and should be eliminated from the FEIS. We are also concerned that the requirements for major river corridors are inconsistent with existing state and federal regulations.

*Response*

To minimize risk to municipal water supplies (both surface and groundwater), streams, wetlands, seeps, springs, and aquatic habitat, strict adherence to BMPs, project design features, and buffers are necessary. The soils, water, and aquatic stipulations were crafted as part of the ongoing BLM-wide oil and gas leasing reform policy. Part of BLM leasing reform is to enact minimum stipulations (for the various programs) that could be applied across the state and to significantly reduce the number of stipulations the operators have to implement. The water/aquatic group reduced the number of stipulations from approximately 70 to approximately 12 in Colorado.

To accomplish the objective of minimizing risk to water/aquatic resources, the BLM decided NSO and CSU stipulations were necessary to minimize risk to the various types of water resources on-the-ground, and reduce the number of stipulations. The use of setbacks, buffers or streamside management zones have been used for decades to minimize risk to water quality, water quantity (e.g. dewatering), and fish and riparian habitat, as it relates to various management activities. There may be other ancillary benefits (of stream buffers) to other resources, such as migratory birds and other wildlife habitat - both terrestrial and aquatic species.

Buffers have been used for agriculture, range, timber harvest, pesticide/herbicide use, road construction, and in more urban areas to protect water and aquatic resources. Over the years, studies have found greater impacts to these resources when buffers were not implemented (COGCC 2014). For example, water quality and fish populations had declined in the Pacific Northwest due to increases in peak flows, sedimentation of streams/wetlands, loss of spawning gravel and rearing habitat, and increases in stream temperature due to activities associated with timber harvest and lack of buffers (COGCC 2014). Potential salinity impacts are of concern to the GJFO per the Colorado River Salinity Control Act and the associated Forum.

The 1,000-foot NSO buffer proposed for municipal watersheds (developed by the BLM's statewide water/fish group in February 2011) was rooted in a Statewide Source Water Risk Assessment for the various uses throughout the state, such as oil and gas development and agriculture. This source water risk assessment was directed by EPA to the states, as part of new regulations under the Safe Drinking Water Act. Moreover, the group reviewed several documented instances of surface and groundwater contamination, due to oil and gas development, and found that these occurred between 1,000 to 1,800 feet from the drilling (COGCC 2014). NSO and CSU restrictions would also likely minimize the risk of hazardous waste and chemical spills. Colorado experienced approximately 400 documented chemical spills (i.e., spills reported by the operator) (COGCC 2014). Anecdotal reports suggest that a number of spills do not get reported. Since the water lease stipulation development was completed over two years ago, the State has gone from a 50-foot to a proposed 1,000-foot buffer for schools.

The major river corridor NSO stipulation is proposed on a 0.5-mile buffer in the adjacent Colorado River Valley RMP based on site conditions in that planning area. For the Draft RMP/ EIS, based on select resources to be protected by the NSO, it was determined that a 0.25-mile buffer would suffice given the topography and river channel type in this planning area. Where the 100-year floodplain for the listed fish

is greater than 0.25-mile the buffer would extend to 100 meters beyond the 100-year floodplain boundary as determined by existing mapping or site specific delineation.

30 CFR 816.57 are regulations for the Office of Surface Mining, not the BLM, and do not apply to BLM policy or guidance. No change has been made to the Proposed RMP/Final EIS.

Restrictions on oil and gas operations near domestic water supplies would be developed and analyzed at the project-specific level. Chapter 2 states that these restrictions "may include conditions of approval, mitigation and design features developed in the NEPA analysis, and the regulations at 43 CFR 3101.1-2." The BLM believes that the appropriate restrictions can only be applied once the location and nature of the proposed project is known; therefore no change has been made to the Proposed RMP/Final EIS.

As stated in Appendix B, a lease notice (LN) "provides more-detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders. An LN also addresses special items that lessees should consider when planning operations but does not impose additional restrictions." Lease Notice 1 is intended to notify the lessee that special restrictive measures are required. In addition to this LN, the Proposed RMP/Final EIS includes stipulations (e.g., CSU-4 and NSO-5) designed to protect municipal watersheds and other source water protection areas. Specific protections would arise from law, lease terms, regulations, or operational orders. They may also be identified during project-level analysis on a site-specific basis. No change has been made to the Proposed RMP/Final EIS.

A groundwater vulnerability assessment would not provide meaningful results at the land use plan level. Similar to other attempts to quantify impacts on water resources, site-specific data is needed that includes information on the exact type, nature, and location of proposed disturbances. Because the RMP can only allocate areas as open or closed to leasing, it would be speculative to input exact information about projects and developments before they are proposed. This analysis would be more appropriate at a project-specific level. No change has been made to the Proposed RMP/Final EIS.

For a discussion of domestic water supplies, see **Section 6.2.3.3**, Water Resources.

---

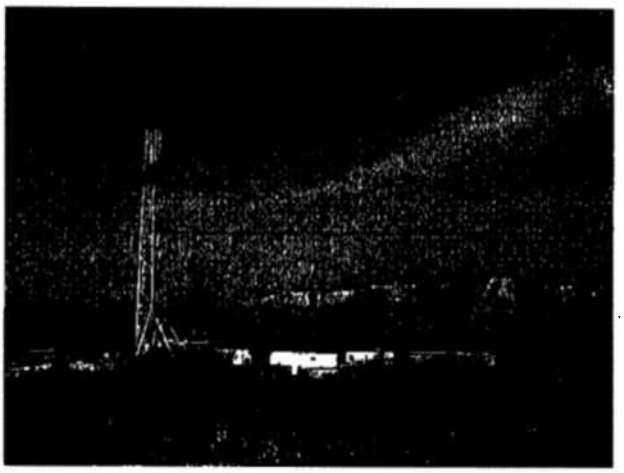
***Wildlife***

*Summary*
The Draft RMP/EIS applies stipulations for wildlife over too broad an area, for too many months during each year, and in a manner inconsistent with protections outlined by other agencies.

Some lease notices are similarly flawed. Regarding LN-5, the BLM has failed to provide any justification for an additional set of operating procedures for employees and contractors working in important wildlife habitats. Moreover, this proposed lease notice is extremely vague and fails to define the items that would be required in such a plan. LN-1 requires "special protective measures" for drilling within a source water protection zone; there should be a description in the Final EIS of these special protective measures.

# Programmatic Biological Assessment for BLM's Fluid Minerals Program in Western Colorado re: Water Depletions and effects on the Four Endangered Big River Fishes: Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*)

Bonytail | Colorado pikeminnow | Humpback chub | Razorback sucker



**November 3, 2008**

**Prepared by:**

_____ Date: _____
**Tom Fresques,**
**West Slope Fisheries Biologist**

**Reviewed by:**

_____ Date: _____
**Jay Thompson,**
**State Fisheries and Riparian Lead**

# I. Introduction/Background

Fluid mineral development in Colorado has increased dramatically in recent years, particularly on Colorado's western slope. Up to this point, BLM Colorado has not been accounting for water depletions associated with the retrieval of fluid minerals. However, many aspects of fluid mineral development require the use of water including the drilling of wells (drilling fluids, fracing, and completion activities), access road dust abatement, and hydrostatic pipeline testing. The U.S. Fish and Wildlife Service (Service, or USFWS) has already determined that any water depletions occurring within the Colorado River Basin may adversely affect the four Big River Fishes and their designated critical habitat. This consultation addresses water depletions associated with fluid mineral development across western Colorado.

The humpback chub and Colorado pikeminnow were listed as Endangered on March 11, 1967 (32 FR 4001 [USFWS 1967]). The bonytail chub was added to the list of endangered species on April 23, 1980 (45 FR 27710 [USFWS 1980]), and the razorback sucker was listed on October 23, 1991 (56 FR 54957 [USFWS 1991]). Critical habitat for all four species was designated simultaneously on March 21, 1994 (59 FR 13374-13400 [USFWS 1994a]).
The FWS has designated critical habitat for all of these species in Colorado. The following table summarizes where critical habitat exists within each of the 10 Field Offices located in western Colorado.

**Table 1. Designated Critical Habitat by River/Affected Field Office in the Action Area**

| River | Field Offices | Species | Location of DCH |
|---|---|---|---|
| Colorado River | Kremmling FO, Glenwood Springs FO, Grand Junction, FO | BTC, CPM, HBC, RBS | In the river and its 100-year floodplain from the Colorado River Bridge at exit 90 north off Interstate 70 in Rifle, Colorado downstream to Lake Powell |
| Dolores River | San Juan Public Lands Center, Grand Junction FO | N/A | No portions of the Dolores River in Colorado are identified as Designated Critical Habitat for any of the 4 endangered fishes |
| Gunnison River | Gunnison FO, Uncompahgre FO, Grand Junction FO | CPM, RBS | In the river and its 100-year floodplain from the Uncompahgre River confluence in Delta, Colorado downstream to the confluence of the Colorado River |
| Green River | Little Snake FO | BTC, CPM, HBC, RBS | The Green River downstream from its confluence with the Yampa River and its 100-year floodplain |
| Yampa River | Little Snake FO, White River FO | BTC, CPM, HBC, RBS | In the river and its 100-year floodplain from the Colorado Highway 394 bridge downstream to its confluence with the Green River |
| White River | White River FO, Little Snake FO, Grand Junction FO | CPM | In the river and its 100-year floodplain from the dam on Rio Blanco Reservoir downstream to the Utah border |

BTC = Bonytail
CPM = Colorado pikeminnow
HBC = Humpback chub
RBS = Razorback sucker

Federal land management agencies must consult with the U.S. Fish and Wildlife Service on any action, which may affect listed species or designated critical habitat. Section 7(c)(1) of the Act requires a biological assessment be completed if a listed species and/or critical habitat may be present in the action area (USDI-FWS-NMFS,1998). It is optional if only proposed species or proposed critical habitat is involved (USDI-FWS-NMFS, 1998). The biological assessment ensures the agency's early involvement and increases the chance for resolution during informal consultation. One of the purposes of the biological assessment is to help make the determination of whether the proposed action is "likely to adversely affect" listed species and critical habitat (USDI-FWS-NMFS, 1998).

## II. Consultation History

To date, the Four Big River Fishes have undergone the following consultations regarding water depleting activities:

- Prior to completion of the 1994 Programmatic Biological Assessment (PBA), BLM completed several individual consultations on projects that depleted small amounts of water. The time and effort involved for both BLM and USFWS in completing these individual consultations led to the preparation and completion of the PBA in May 1994.

- In May 1994, BLM Colorado prepared a Programmatic Biological Assessment (PBA) that addressed water-depleting activities in the Colorado River Basin. In response to the PBA, the USFWS issued a Biological Opinion (BO) on June 13, 1994 (USFWS 1994b), which determined that water depletions from the Colorado River Basin would jeopardize the continued existence of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker and result in the destruction or adverse modification of their critical habitat. The BO included reasonable and prudent alternatives developed by USFWS to allow BLM to authorize projects with resultant water depletions of less than 125 acre-feet. Projects or actions resulting in depletions of greater than 125 acre-feet per year fall outside the PBA and require individual consultation with USFWS.

  The PBA and BO were written to remain in effect until a total depletion threshold of 1,417 acre-feet of new depletions is reached. The threshold for historic depletions is 1,588 acre-feet. As of January 2008, BLM has depleted or authorized the depletion of approximately 1,354 acre-feet of new depletions under the 1994 PBA (and 1,019 acre-feet of historic depletions). The 1994 consultation did not fully account for fluid mineral activities and their associated water depletions; however these activities were not excluded from inclusion under the document. This BO was amended March 2, 2000 and September 27, 2005.

- In January 2007, the GSFO prepared a Biological Assessment (BA) for the Resource Management Plan Amendment, Roan Plateau Planning Area that among other things, addressed water-depleting activities within the planning area including those associated with fluid mineral development. In response to the BA, The USFWS issued a memo dated February 7, 2007, which concurred with BLM's determination that, among other things, water depletions from the Colorado River Basin would adversely affect the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker and their critical

habitat. Because the average annual depletion was less than 125 acre-feet (83.6 acre-feet/year), these depletions were addressed by the programmatic biological opinion issued to the BLM on June 13, 1994 (amended March 2, 2000 and September 27, 2005) for small water depletions authorized by BLM in Colorado (biological opinion number ES/GJ-6-CO-94-F017).

- *This Programmatic Consultation is for the Four Big River Fishes, and addresses the entire Fluid Mineral Program in western Colorado as administered by BLM Colorado. This consultation will be valid until such factors trigger the need for a reassessment. These factors include, but are not limited to, any newly proposed critical habitat, new and relevant information regarding any of the four listed fishes and/or their habitats, impacts not previously considered, major changes in the Fluid Mineral Program (e.g. new or revised RFD's if higher than anticipated) and/or its implementation.*

## III. Species Considered & Species Evaluated

This PBA only addresses the Four Big River Fishes and specifically water depletions associated with the fluid mineral program as administered by the BLM in western Colorado.

**Table 2. List of Species Considered**

| Common Name | Scientific Name | Federal Status |
|---|---|---|
| Razorback sucker | *Xyrauchen texanus* | (Endangered - Critical Habitat) |
| Bonytail | *Gila elegans* | (Endangered - Critical Habitat) |
| Colorado pikeminnow | *Ptychocheilus lucius* | (Endangered - Critical Habitat) |
| Humpback chub | *Gila cypha* | (Endangered - Critical Habitat) |

Several other federally listed species occur across western Colorado. However, these other listed species will be addressed in separate consultations in the event of any "May Effect" determination associated with fluid mineral development.

## IV. Project Description (Proposed Action)

This programmatic biological assessment (PBA) addresses anticipated water depletions from the Upper Colorado River Basin on lands administered by the BLM across 8 administrative units/Field Offices located in western Colorado.

Across western Colorado, public lands administered by the BLM encompass 28% (7,189,639 acres) of the land area. Other government agencies that manage land in western Colorado include the U.S. Forest Service (USFS) (for oil and gas development, the USFS approves the surface rights while BLM approves the drilling), U.S. National Park Service (NPS), U.S. Fish and Wildlife Service (Service), U.S. Bureau of Reclamation (BOR), Colorado Division of Wildlife (CDOW), and Colorado State Trust Lands. Additional lands are held in private ownership or are located within the boundaries of the Southern Ute and Ute Mountain Indian Reservations (See Map Attachments 1 & 2).

The proposed action consists of ongoing and projected Fluid Mineral Development as administered by the BLM in Colorado. Projections are based on the Reasonable Foreseeable Development (RFD) scenarios of fluid mineral activity across western Colorado for the next 15 – 20 years. For purposes of analysis, we will assume that all drilling will occur within the smaller 15 year time frame to ensure the capture of possible higher annual activity levels. The assumptions used to arrive at the RFD's for each Field Office were based on current development trends, downspacing of drilling units, maturing oil & gas fields, predicted energy needs for the future, and the overall professional opinion of Field Office and State Office Geologists and Petroleum Engineers, as well as private industry professionals. This activity includes all Federal natural gas wells, oil wells, and coalbed methane natural gas wells including split estate. For the purposes of Cumulative Impact analysis, an estimate of proposed wells for non federal, non split estate activity is also included (see Table 3.).

Table 3. RFD's for each of the 8 Field Offices located in western Colorado for next 15 years

| Field Office | No. of Fed. Wells | No. of non-federal wells | Total No. of wells |
|---|---|---|---|
| San Juan Public Lands Center[b] | 700 | 234 | 934 |
| Glenwood Springs | 6400 | 8600 | 15000 |
| Grand Junction[a] | 1000 | 1200 | 2200 |
| Gunnison[a] | 10 | 5 | 15 |
| Kremmling[b] | 24 | 107 | 131 |
| Little Snake | 2122 | 909 | 3031 |
| Uncomphagre[a] | 200 | 100 | 300 |
| White River | 18475[c] | 2057 | 20532 |

[a]In lieu of an updated RFD, these estimates are based on discussions with office petroleum engineers and other professional staff, and for non-federal wells professional opinion, the COGCC website, and discussions with industry personnel.

[b]This estimate is a percentage of the full RFD to account for activity occurring only within the Dolores River Basin and not the San Juan River Basin for the San Juan Public Lands Center, and for activity only in the Colorado River Basin and not the North Platte River Basin in the Kremmling Field Office.

[c]The federal estimate of 18,475 is the mid-range of the RFD range provided by the WRFO.

Water depletions for the purpose of this analysis have been defined to include:

- Water used for access road dust abatement
- Water used for hydrostatic testing of newly constructed pipelines
- Water used to drill and complete wells (drilling and fracing fluids)

- Water associated with connected federal actions (e.g., BLM authorization of a pipeline, road, or utility line across public lands that is connected to the action of developing privately owned fluid mineral estate located on private lands)
- Water use associated with Seismic activity

The exceptions to this are historic depletions (occurring prior to January 1988). The Service addresses new and historic depletions differently under the new section 7 agreement of March 11, 1993. Historic depletions, regardless of size, do not pay a depletion fee, whereas new depletions over 100 acre-feet per year pay the fee.

***Dust Abatement***

One use of freshwater is dust suppression of roadways used for oil and gas access. Because dust suppression would be required only on roadways actively used for oil and gas access, and only during certain times of the year, the exact number of miles or acres of roads that would require dust suppression in any given year is not known. Other variables affecting the amount of water needed for dust abatement include the type of road surface and local climate conditions. Information provided by an oil and gas operator in BLM's Vernal, Utah, resource area estimates an average of 0.1 acre-foot per well per year for dust abatement. This additional amount of water will be added to the per well water use for all fluid mineral development in western Colorado.

Methods to reduce depletions related to dust suppression include surface treatments such as magnesium chloride or gravel. Surface treatments would not be allowed in areas where they could adversely affect surface water quality. Other water conservation measures could include onsite treatment and reuse of imported or produced waters.

***Hydrostatic Pipeline Testing***

Typically, new gas transmission pipelines are filled with water under pressure as a means of checking for leaks. According to an operator in BLM's Glenwood Springs Field Office hydrostatic testing of a pipeline is conducted sequentially in shorter segments controlled by valves. Each of the segments is about 10 percent of the total length being tested. When testing of one segment is completed, the same water is directed into the next segment for testing. Based on discussions with operators it is estimated that an average of 0.11 acre-feet of water is used per well for hydrostatic pipeline testing. This additional amount of water will be added to the per well water use for all fluid mineral development in western Colorado.

***Well Drilling (drilling, completion, and fracing)***

Water use associated with well drilling and completion is the largest use of freshwater. Water use can vary greatly depending on several factors including local geology, depth of wells, time of year, and ability to re-use water. In western Colorado, the majority of drilling activity is occurring primarily in 3 geographic areas/Field Offices: White River Field Office, Glenwood Springs Field Office, and San Juan Public Lands Center. The remaining Field Offices make up a smaller amount of the overall activity and as such will be lumped in with the appropriate adjoining Field Office regarding water use estimates.

Conventional natural gas development generally requires the use of more fresh water than coalbed methane (CBM) development. CBM development while using less water for retrieval, results in more produced water. In Colorado, CBM produced water, like water produced from any other type of oil or gas well, is handled as waste by COGCC Rule 907, and it remains under the jurisdiction of the COGCC. However, if CBM produced water is put to a beneficial use beyond the uses allowed under Rule 907, it is subject to DWR regulation through a permitting process and water users are subject to various controls to avoid injury to vested water rights. In general, most CBM produced water is disposed of in evaporation ponds or into Class II UIC injection wells due to the poor quality of the produced water. Where water is of sufficient quality, surface discharge for beneficial use could occur.

***Federally Connected Actions***
Water use associated with connected federal actions (e.g., water use associated with the development of fee wells as actions connected to the authorization of a right-of-way to construct a natural gas pipeline, or utility or access road across federal lands.

It is impossible to foresee in advance how many road, utility, or pipeline rights-of-ways that would qualify as federal connected actions would be requested or authorized each year or how many connected fee wells would be completed in association with these authorizations. However, the BLM can track and tally the number of federal connected actions that result in the depletion of water on private lands associated with fluid mineral development and add in this depletion amount to the federal tally at the end of the year. It is the BLM's belief that the amount of water depletions associated with connected federal actions will be minimal and not cause the amount being consulted on to change.

***Seismic Activity***
Water use associated with Seismic activities is primarily associated with road access dust abatement. Seismic work generally occurs as a pre cursor to field development to locate desired minerals. It is impossible to foresee how much seismic activity would be authorized each year or how much water would be used in conjunction with this activity. However, the BLM can track and tally the amount of water used for seismic activity and add this depletion amount to the federal log at the end of the year. It is the BLM's belief that the amount of water depletions associated with connected federal actions will be minimal and not cause the amount being consulted on to change.

## ESTIMATED AVERAGE ANNUAL WATER DEPLETION BY BLM FIELD OFFICE

***White River Field Office (includes the Little Snake Field Office) Primarily Conventional Natural Gas Development with some Limited Coalbed Methane Activity***
Based on information from BLM's Petroleum Engineer in conjunction with discussions with various operators in the area, and on prevalent geology and current technology, it has been determined that an average of 2.41 acre-feet of Colorado River Basin water is used during the drilling of a single well in this area. This number is derived via a weighted average of 22 days to drill an individual well, and an estimated 850 barrels (42 gallons/barrel) of fresh (non-recycled) water per well per day. The primary gas fields located within the WRFO and LSFO are relatively new and have not been in place for many years. As such, sophisticated water

treatment, holding, reuse, and associated transmission facilities are not in place. Thus limited water reuse is occurring in this region which accounts for the relatively high estimated water use per well figure.

The average depletion amount per well is calculated as follows: [(drilling and completion)=2.41 af] + [(dust abatement)=0.10 af] + [(hydrostatic pipeline testing)=0.11 af] = **2.62** af/well. For the White River geographic area, 2.62 acre-feet of water is used on average per well. It is recognized that individual wells may require the use of more or less water, but 2.62 acre-feet per well is has been calculated as a reasonable depletion amount per well drilled.

***Glenwood Springs Field Office (includes the Grand Junction and Kremmling Field Offices) Primarily Conventional Natural Gas Development***

Based on information from BLM's Petroleum Engineer in conjunction with discussions with various operators in the area, and on prevalent geology and current technology, it has been determined that an average of 0.56 acre-feet of Colorado River Basin water is used during the drilling of a single well in this area. This number is derived via a weighted average of 22 days to drill an individual well, and an estimated 200 barrels (42 gallons/barrel) of fresh (non-recycled) water per well per day. The primary gas fields located within the GSFO and GJFO are mature and have been in place for many years. As such, sophisticated water treatment, holding, reuse, and associated transmission facilities are in place. A significant amount of water reuse for well completion is occurring in this area which accounts for the relatively low estimated water use per well.

The average depletion amount per well is calculated as follows: [(drilling and completion)=0.56 af] + [(dust abatement)=0.10 af] + [(hydrostatic pipeline testing)=0.11 af] = **0.77** af/well. For the Glenwood Springs geographic area, 0.77 acre-feet of water is used on average per well. It is recognized that individual wells may require the use of more or less water, but 0.77 acre-feet per well is has been calculated as a reasonable depletion amount per well drilled.

***San Juan Public Lands Center (includes the Columbine, Uncompahgre, and Gunnison Field Offices, Dolores Public Lands Center, and Pagosa Springs Public Lands Center) A Mix of both Convention and Coalbed Methane Natural Gas Development***

Based on information from BLM's Petroleum Engineer in conjunction with discussions with various operators in the area, and on prevalent geology and current technology, it has been determined that an average of 0.90 acre-feet of Colorado River Basin water is used during the drilling of a single well in this area. CBM well water use averages 0.5 ac-ft/well, while convention gas development averages 1.2 ac-ft/well. This number is derived via a weighted average of 22 days to drill an individual well, and an estimated 318 barrels (42 gallons/barrel) of fresh (non-recycled) water per well per day. The primary gas fields located within the SJPLC are mature and have been in place for many years. The existence of CBM gas development coupled with existence of water treatment, holding, reuse, and transmission infrastructure accounts for the relatively low estimated water use per well figure.

The average depletion amount per well is calculated as follows: [(drilling and completion)=0.90 af] + [(dust abatement)=0.10 af] + [(hydrostatic pipeline testing)=0.11 af] = **1.11** af/well. For the San Juan geographic area, 1.11 acre-feet of water is used on average per well. It is recognized

that individual wells may require the use of more or less water, but 1.11 acre-feet per well is has been calculated as a reasonable depletion amount per well drilled.

Using the above well depletion figures by geographic area, and the information in Table 3, BLM has calculated the estimated number of wells that could be drilled in a given Field Office in any one year and the amount of fresh water used per well by Field Office. The estimated number of wells is used to calculate the average annual water depletion by Field Office (based on the number of wells drilled per year x depletion amount per well). In addition, these figures are used to calculate the average annual water deletion by River Basin. Finally, BLM will add the average annual water depletion figure for each Field Office/River Basin together to arrive at an overall average annual depletion amount associated with Fluid Mineral development in western Colorado. In addition, estimated water depletion associated with anticipated non federal wells will also be calculated to show and account for potential cumulative impacts.

| | |
|---|---|
| **Glenwood Springs FO** | **6400 wells/15 years = 427 wells/year x 0.77 acre-feet/well = 329 acre-feet/year** |
| Non Federal | 8600 wells/15 years = 573 wells/year x 0.77 acre-feet/well = 441.5 acre-feet/year |
| **Grand Junction FO** | **1000 wells/15 years = 67 wells/year x 0.77 acre-feet/well = 52 acre-feet/year** |
| Non Federal | 1200 wells/15 years = 80 wells/year x 0.77 acre-feet/well = 61.6 acre-feet/year |
| **Gunnison FO** | **10 wells/15 years = 0.66 wells/year x 1.11 acre-feet/well = 0.74 acre-feet/year** |
| Non Federal | 5 wells/15 years = 0.33 wells/year x 1.11 acre-feet/well = 0.37 acre-feet/year |
| **Kremmling FO** | **24 wells/15 years = 1.6 wells/year x 0.77 acre-feet/well = 1.25 acre-feet/year** |
| Non Federal | 107 wells/15 years = 7.2 wells/year x 0.77 acre-feet/well = 5.5 acre-feet/year |
| **Little Snake FO** | **2122 wells/15 years = 141.5 wells/year x 2.62 acre-feet/well = 369 acre-feet/year** |
| Non Federal | 909 wells/15 years = 60.6 wells/year x 2.62 acre-feet/well = 159 acre-feet/year |
| **San Juan Public Lands** | **700 wells/15 years = 46.7 wells/year x 1.11 acre-feet/well = 51.8 acre-feet/year** |
| Non Federal | 234 wells/15 years = 15.6 wells/year x 1.11 acre-feet/well = 17.3 acre-feet/year |
| **Uncompahgre FO** | **200 wells/15 years = 13.3 wells/year x 1.11 acre-feet/well = 15 acre-feet/year** |
| Non Federal | 100 wells/15 years = 6.7 wells/year x 1.11 acre-feet/well = 7.4 acre-feet/year |

| | |
|---|---|
| **White River FO** | **18475 wells/15 years = 1232 wells/year x 2.62 acre-feet/well = 3227 acre=feet/year** |
| Non Federal | 2057 wells/15 years = 137 wells/year x 2.62 acre-feet/well = 359.2 acre-feet/year |

FEDERAL
**Total = 4,046 acre-feet**

NON FEDERAL
**Total = 1,052 acre-feet**

Given the above equations, the estimated TOTAL average annual water depletion for the Fluid Mineral program is 4,046 acre-feet/year. Several factors contribute to the amount of development and exploration activity that occurs in any given year and in any given area including: price of oil and gas, commodity demand, technology improvements, level of field development, increases in pipeline capacity, and discovery of untapped resources, among others. Taking all of these factors into account, 4,046 acre-feet/year is the amount that BLM is consulting on with regard to federally administered fluid mineral activity in western Colorado.

**ESTIMATED AVERAGE ANNUAL WATER DEPLETION BY AFFECTED RIVER BASIN**

All of the water depletions analyzed in the Biological Assessment will occur within the Upper Colorado River Basin. Within the Upper Colorado River Basin, individual sub basins will be affected to varying degrees. RFD's and other fluid mineral development projections estimate the amount of activity that is expected to occur in each Field Office over the next 15 – 20 years. However, these estimates in no way dictate where activity within each Field Office will occur. In offices where only one river basin is affected (e.g., the Glenwood Springs Field Office which is located entirely within the Colorado River mainstem watershed), it is easy to discern that all activity within the FO will deplete water from the Colorado River. In Field Offices where multiple river basins exist (e.g., the Grand Junction Field Office which encompasses portions of the Colorado, Dolores, and Gunnison River basins), BLM will use the following assumptions regarding where fluid mineral development is anticipated to occur:

- Activity will continue to occur where it currently is occurring in developed and maturing gas fields
- New activity will be concentrated near existing development with the greatest well densities occurring in areas that already have numerous wells

**Colorado River Basin**

Glenwood Springs FO – 100% of the fluid mineral activity is occurring within this basin
Grand Junction FO – approximately 96% of the fluid mineral activity is occurring in the basin
Kremmling FO – 100% of the fluid mineral activity is occurring within the basin

Based on these figures, the following equations estimate the amount of water to be depleted in the Colorado River:

| | |
|---|---|
| **Glenwood Springs FO** | **6400 wells/15 years = 427 wells/year x 0.77 acre-feet/well = 329 acre-feet/year** |
| Non Federal | 8600 wells/15 years = 573 wells/year x 0.77 acre-feet/well = 440.6 acre-feet/year |
| **Grand Junction FO** | **960 wells/15 years = 64 wells/year x 0.77 acre-feet/well = 49 acre-feet/year** |
| Non Federal | 1152 wells/15 years = 76.8 wells/year x 0.77 acre-feet/well = 59 acre-feet/year |
| **Kremmling FO** | **24 wells/15 years = 1.6 wells/year x 0.77 acre-feet/well = 1.4 acre-feet/year** |
| Non Federal | 107 wells/15 years = 7.2 wells/year x 0.77 acre-feet/well = 5.5 acre-feet/year |

TOTAL FEDERAL = **379.4 acre-feet**

**Gunnison River Basin**

Gunnison FO – 100% of the fluid mineral activity is occurring in the basin
Grand Junction FO – approximately 4% of the fluid mineral activity is occurring in the basin
Uncompahgre FO – approximately 85% of the fluid mineral activity is occurring in the basin

Based on these figures, the following equations estimate the amount of water to be depleted in the Gunnison River:

| | |
|---|---|
| **Grand Junction FO** | **40 wells/15 years = 2.7 wells/year x 0.77 acre-feet/well = 2.2 acre-feet/year** |
| Non Federal | 48 wells/15 years = 3.2 wells/year x 0.77 acre-feet/well = 2.4 acre-feet/year |
| **Gunnison FO** | **10 wells/15 years = 0.66 wells/year x 1.11 acre-feet/well = 0.76 acre-feet/year** |
| Non Federal | 5 wells/15 years = 0.33 wells/year x 1.11 acre-feet/well = 0.35 acre-feet/year |
| **Uncompahgre FO** | **170 wells/15 years = 11.3 wells/year x 1.11 acre-feet/well = 13 acre-feet/year** |
| Non Federal | 85 wells/15 years = 6 wells/year x 1.11 acre-feet/well = 7 acre-feet/year |

TOTAL FEDERAL = **15.9 acre-feet**

**Dolores River Basin**

Uncomphagre FO – approximately 15% of the fluid mineral activity is occurring in the basin
San Juan Public Lands – approximately 30% of the fluid mineral activity is occurring in the basin
Grand Junction FO – no fluid mineral activity is currently being conducted in this basin

Based on these figures, the following equations estimate the amount of water to be depleted in the Dolores River:

| | |
|---|---|
| **Grand Junction FO** | **0 wells/15 years = 0 wells/year x 0.77 acre-feet/well = 0 acre-feet/year** |

| | |
|---|---|
| Non Federal | 0 wells/15 years = 0 wells/year x 0.77 acre-feet/well = 0 acre-feet/year |
| **San Juan Public Lands** | **700 wells/15 years = 46.7 wells/year x 1.11 acre-feet/well = 51.8 acre-feet/year** |
| Non Federal | 234 wells/15 years = 15.6 wells/year x 1.11 acre-feet/well = 17 acre-feet/year |
| **Uncompahgre FO** | **234 wells/15 years = 2 wells/year x 1.11 acre-feet/well = 2.4 acre-feet/year** |
| Non Federal | 15 wells/15 years = 1 wells/year x 1.11 acre-feet/well = 1.1 acre-feet/year |

**TOTAL FEDERAL = 54.2 acre-feet**

**Yampa River Basin**

Little Snake FO – 100% of the fluid mineral activity is occurring in the basin

Based on these figures, the following equations estimate the amount of water to be depleted in the Yampa River:

| | |
|---|---|
| **Little Snake FO** | **2122 wells/15 years = 142 wells/year x 2.62 acre-feet/well = 369 acre-feet/year** |
| Non Federal | 909 wells/15 years = 61 wells/year x 2.62 acre-feet/well = 160 acre-feet/year |

**TOTAL FEDERAL = 369 acre-feet**

**White River Basin**

White River FO – 100% of the fluid mineral activity is occurring in the basin

Based on these figures, the following equations estimate the amount of water to be depleted in the White River:

| | |
|---|---|
| **White River FO** | **18475 wells/15 years = 1232 wells/year x 2.62 acre-feet/well = 3227 acre=feet/year** |
| Non Federal | 2057 wells/15 years = 137 wells/year x 2.62 acre-feet/well = 359.2 acre-feet/year |

**TOTAL FEDERAL = 3,227 acre-feet**

**Green River Basin**

Little Snake FO – no fluid mineral activity is currently being conducted in this basin

**TOTAL FEDERAL = 0.00 acre-feet**

FEDERAL

**GRAND TOTAL OF ALL RIVER BASINS = 4,046 acre-feet**

NON FEDERAL

**GRAND TOTAL OF ALL RIVER BASINS = 1,052 acre-feet**

**Conservation Measures:**

As a means of minimizing negative effects, the following conservation measures are proposed up front as part of the proposed action:

- Water may be extracted directly out of the Colorado, Gunnison, White, Yampa, or Green River, which all have occupied and critical habitat for the four endangered Colorado River fish. The 8 western slope Field Offices/Administrative Units have committed to implement the following measures to minimize direct impacts to federally listed species from pumping water directly out of these rivers:

  1. The best method to avoid entrainment is to pump from off-channel locations (e.g., ponds, lakes, and diversion ditches), not directly connected to the mainstem rivers even during high spring flows.
  2. If the pump head must be located in the river channel where larval fish are known to occur (generally within Designated Critical Habitat), the following measures apply:
     a. do not situate the pump in a low-flow or no-flow area as these habitats tend to concentrate larval fishes. Instead place the pump into fast moving/riffle habitat;
     b. limit the amount of pumping, to the greatest extent possible, during that period of the year when larval fish may be present (June 1 to August 15); and
     c. avoid pumping, to the greatest extent possible, during the pre-dawn hours (two hours prior to sunrise) as larval fish drift studies indicate that this is a period of greatest daily activity.
  3. Screen all pump intakes with ¼" or finer mesh material.
  4. Report any fish impinged on any intake screens to the Fish and Wildlife Service (970.243.2778) or the Colorado Division of Wildlife:

     **Northwest Region**
     711 Independent Ave., Grand Junction, CO 81505
     Phone: (970) 255-6100

     **Southwest Region**
     415 Turner Dr., Durango, CO 81303
     Phone: (970) 375-6700

  The above conservation measure will be implemented via the BLM working with the individual companies, their sub-contractors and industry representative groups directly to inform and educate on the ground personnel of the need to implement this conservation measure. In addition, the above conservation measure will be added to all Applications for Permit to Drill (APD's) as a condition of approval (COA) prior to commencement of development activity.

- As a means of offsetting the impacts associated with the proposed action, the BLM proposes to solicit a one-time contribution from an industry representative group in the form of a monetary payment to the National Fish and Wildlife Foundation on behalf of the Recovery Program in the current amount of $17.79 per acre-foot of the project's average annual depletion.

- Water depletion in the Colorado and Yampa River sub-basins has been addressed in programmatic biological opinions. These opinions require water users to sign Recovery Agreements that state the water users won't interfere with the implementation of recovery

actions and the Fish and Wildlife Service will provide ESA compliance. The BLM will ensure Recovery Agreements are initiated by individual operators, or on the behalf of individual operators via industry representative groups, with the USFWS as appropriate.

# V. Description of the Species and their Habitat

**V.1 Bonytail chub**

The bonytail chub *(Gila elegans)* is a large cyprinid fish endemic to the Colorado River Basin (Valdez and Clemmer 1982). Bonytail are medium-sized (less than 600 mm) fish in the minnow family. Adult bonytail are gray or olive-colored on the back with silvery sides and a white belly. The adult bonytail has an elongated body with a long, thin caudal peduncle. The head is small and compressed compared to the rest of the body. The mouth is slightly overhung by the snout and there is a smooth low hump behind the head that is not as pronounced as the hump on a humpback chub. Adults attain a maximum size of about 550 mm total length (TL; Bozek et al. 1984) and 1.1 kg in weight (Vanicek 1967). The bonytail is currently listed as "endangered" under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et. seq.*), under a final rule published on April 23, 1980 (45 FR 27710). A recovery plan was approved on September 4, 1990 (U.S. Fish and Wildlife Service 1990a). The final rule for determination of critical habitat was published on March 21, 1994 (59 FR 13374), and the final designation became effective on April 20, 1994.

"Bonytail" is the accepted common name for *Gila elegans*. The synonym "bonytail chub" was used when the species was listed in 1980 and is an often-used common name (Valdez and Clemmer 1982). It is one of four mainstem, big-river fishes currently listed as endangered under the ESA. The native fish assemblage of the Colorado River is jeopardized by large mainstem dams, water diversions, habitat modification, and nonnative fish species, and degraded water quality (Miller 1961; Minckley and Deacon 1968).

Little is known about the specific habitat requirements of bonytail because the species was extirpated from most of its historic range prior to extensive fishery surveys. The bonytail is adapted to mainstem rivers where it has been observed in pools and eddies. Similar to other closely related *Gila* spp., bonytail in rivers probably spawn in spring over rocky substrates; spawning in reservoirs has been observed over rocky shoals and shorelines. It is hypothesized, based on available distribution data that flooded bottomland habitats are important growth and conditioning areas for bonytail, particularly as nursery habitats for young. Flow recommendations have been developed that specifically consider flow-habitat relationships within historic habitat of bonytail in the upper basin, and were designed to enhance habitat complexity and to restore and maintain ecological processes. The following is a description of observed habitat uses in various parts of the Colorado River Basin.

It has been suggested that the large fins and streamlined body of the bonytail is an adaptation to torrential flows (Miller 1946; Beckman 1963). Of five specimens captured recently in the upper basin, four were captured in deep, swift, rocky canyon regions (i.e., Yampa Canyon, Black Rocks, Cataract Canyon, and Coal Creek Rapid), but the fifth was taken in a reservoir (Lake Powell). Also, all fish taken from the lower basin since 1974 were caught in reservoirs. Specimens encountered in reservoirs are believed to inhabit their former habitats now inundated

**UNITED STATES DEPARTMENT OF THE INTERIOR**
**BUREAU OF LAND MANAGEMENT**
**COLORADO STATE OFFICE**
**2850 YOUNGFIELD STREET**
**LAKEWOOD, COLORADO 80215**

In Reply Refer To:
6840 (CO-932) **I**

July 20, 2010

EMS TRANSMISSION 07/23/2010
Instruction Memorandum No. CO-2010-023
Expires: 09/30/2011

To: District Managers and Field Office Managers

From: State Director

Subject: Process for Tracking and Reporting Water Depletions and Requirement for Signed Recovery Agreements for Energy Companies

**Program Area:** Fisheries/Threatened and Endangered Species

**Purpose:** The Bureau of Land Management (BLM) Colorado has received a Programmatic Biological Opinion (PBO) from the U.S. Fish and Wildlife Service (FWS) that address water depletions and the endangered Big River fish (Colorado pikeminnow, razorback sucker, humpback chub, and bonytail). The PBO (ES/GJ-6-CO-08-F-0006) signed on December 19, 2008, addresses water depletions associated with fluid minerals development on the BLM lands. The purpose of the PBO is to streamline the consultation process for both the BLM and FWS by allowing the State Office (SO) to track water depletions resulting from fluid minerals activities on the BLM lands over the course of the fiscal year and then report all depletions to FWS in a single standardized log. Under the terms of the PBO, the SO will be required to submit a log of fluid minerals depletions to the FWS by October 31 each year. The PBO addresses depletions in the upper Colorado River Basin in western Colorado including the Yampa, White, Colorado, Gunnison, and Dolores River basins and their tributaries. Water depletions in the San Juan River basin are not covered by the PBO, but are addressed in a separate 2008 PBO (ES/GJ-6-CO-08-F-0002). Water depleting actions resulting from all actions (i.e., stock ponds, spring developments) other than fluid minerals development are addressed in a separate PBO, which has been in effect since 1993 (renewed in 2009). Additional detail regarding the new fluid minerals PBO is provided below.

**Policy/Action:** The Fluid Minerals PBO addresses all water depletions associated with the BLM's fluid minerals program including:

- Water used for access road dust abatement, including roads used for geophysical exploration.

- Water used for hydrostatic testing of newly constructed pipelines.
- Water used to drill and complete wells (drilling and fracing fluids).
- Water associated with connected Federal actions (e.g., BLM authorization of a pipeline, road, or utility line across public lands that is connected to the action of developing privately owned fluid mineral estate located on private lands.
- Water use associated with seismic activity.

The PBO is intended to cover all depletions associated with the fluid minerals program for a period of approximately 15 years, based on reasonable foreseeable development (RFD) estimates provided by FOs in 2008. The PBO estimates that up to a total of 4,046 acre-feet (AF) of water will be depleted each year as a result of fluid mineral actions on the BLM lands. The 4,046 AF total includes depletions in all the BLM FOs in western Colorado. The estimated depletion amount by FO and by river basin is estimated in the PBO. Fluid minerals water depletion tracking logs (Attachment 1) will be used by FWS to ensure that the 4,046 AF/yr threshold depletion amount is not exceeded (which would trigger the need to reinitiate consultation).

The PBO includes a mandatory conservation measure designed to minimize the possibility of endangered larval fish being accidentally entrained when water is pumped from critical habitat in the large rivers (Colorado, White, Yampa, and Gunnison) for use in fluid minerals activities. To implement the conservation measure, the BLM State Office resources staff will work with Field Office staff to inform and educate on-the-ground energy industry personnel and their sub-contactors regarding preferred water pumping techniques, times, and locations in order to minimize the possibility of impacting the endangered fish.

**Recovery Agreements:** Water depletions in the Colorado and Yampa River basins have been addressed in earlier, separate (non-BLM) programmatic biological opinions. These earlier PBOs require water users to sign Recovery Agreements (Attachment 2) that state that water users won't interfere with the implementation of recovery actions; and in return, Recovery Agreement (RA) signers will be assumed to be in compliance with ESA by FWS and the BLM. **Individual operators in the Colorado and Yampa Rivers basins, who wish to use BLM's Fluid Minerals PBO for their compliance with ESA, must have a signed Recovery Agreement on file with the FWS. If a Recovery Agreement is not on file, the BLM will defer processing any APD for that operator in those two river basins.** The BLM has strongly encouraged any company that will be operating in the Colorado or Yampa River basins in the next 15 years to sign a Recovery Agreement. Companies that decide not to sign a Recovery Agreement cannot use the BLM's PBO for ESA compliance. In this case, the company will be responsible for all costs associated with preparing a Biological Assessment that the BLM will use in its consultation with FWS for each individual well that the company requests to drill in the affected river basins. It is anticipated that preparation of a Biological Assessment for each well to be drilled will result in significant additional costs and delays in APD processing and approval for the company. **Recovery Agreements are only required in the Colorado and Yampa River basins; operators in the White, Gunnison, and Dolores River basins are not required to sign a Recovery Agreement in order to use the BLM's Fluid Minerals PBO.**

In August 2009, the BLM sent a letter to all energy operators in Colorado explaining the rationale behind Recovery Agreements and requesting that they sign one in order to use the BLM's PBO as their compliance with the ESA. A follow up letter to non-signing companies

was sent in February 2010. As of the date on this IM, the following operators have a signed Recovery Agreement on file with FWS (therefore are permitted to use the BLM's PBO as their compliance with the ESA):

Antero Resources Piceance Corp.
Aspen Operating LLC
Augustus Energy Partners LLC
Axia Energy
Berry Petroleum
Black Hills Petroleum

Bill Barrett Corporation
BOPCO
Chevron USA Incorporated
Conoco Phillips
Delta Petroleum Corp.
Encana Oil & Gas
EOG Resources Inc.
Exxon-Mobil (Recovery Agreement for Colorado River only; not for Yampa River)
Genesis Gas & Oil
J-W Operating Company
Julander Energy Company
Laramie Energy II, LLC
Marathon
Merrion Oil & Gas
Noble Energy Inc.
OXY USA
Petroleum Development Company
Pioneer Oil & Gas
Plains Exploration & Production Company
Questar Exploration & Production Company
Robert Bayless
True Oil Company
Wellstar Corp.
WexPro Company
Whiting Oil & Gas Corp.
Williams Production Company
Yates Petroleum

If your Field Office is issuing an APD within the Colorado or Yampa River basins, please check to ensure that the company requesting the APD is on the list above. If not, defer processing of the APD and inform the company of the requirement that they sign a Recovery Agreement or provide proof of ESA compliance to the BLM. This list will be updated as new operators sign Recovery Agreements. To view the most up-to-date list, visit:

\\Ilmcoso3ds2\co\pub\Fluid Minerals\Water Depletion Recovery Agreements

**Timeframe:** This policy is effective immediately.

**Budget Impact:** None.

**Background:** A complete copy of the Programmatic Biological Assessment (PBA) for the BLM's Fluid Minerals Program in Western Colorado Regarding Water Depletions and Effects on the Four Endangered Big River Fishes: Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) is posted at the site listed above for Recovery Agreements. The PBA includes detailed background information as well as a description of how depletion amounts for fluid minerals activities were calculated.

**Directives Affected:** This IM affects the BLM Manual 6840, Special Status Species Management. A Colorado Supplemental Manual will be issued to incorporate the policy contained in this directive.

**Coordination:** This IM has been reviewed by Tom Fresques, Western Slope Fisheries Biologist in the Colorado River Valley Field Office; and by the CO-920 staff at the Colorado State Office.

**Contact:** If you have questions regarding this IM, please contact Jay Thompson, Fisheries Program Lead, at (303)-239-3724.

Signed by:
John Mehlhoff
Acting State Director

Authenticated by:
Cathy Cooney
Branch of IRM & Access

2 Attachments:
1 - Recovery Agreement (3 pp)
2 - Fluid Minerals Water Depletion Tracking Log (1 pp)

# United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7093
www.blm.gov/co

TAKE PRIDE IN AMERICA

In Reply Refer To:
6840 (CO-932)

JUN 27 2012



Ms. Patty Gelatt
Assistant Colorado Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services, GJ Field Office
764 Horizon Drive, S. Annex A
Grand Junction, CO 81506

Dear Patty:

The Bureau of Land Management (BLM), Colorado State Office, completed a Programmatic Biological Assessment in 2008 to address water depletions associated with fluid minerals development on BLM lands in western Colorado. The Fish and Wildlife Service (FWS) issued Biological Opinion #ES/GJ-6-CO-08-F-0073 on December 19, 2008, requiring the BLM to track the number of wells drilled annually, by river basin, and report this information to your office.

Enclosed are BLM's "wells drilled" logs for FY 2011. The first log (Vertical Wells Drilled Log 2011_Statewide_Final) tracks a total of 448 wells drilled in 5 separate river basins. These 448 wells resulted in a total depletion of 519 acre-feet (AF) in the Upper Colorado River Basin. The second log (Horizontal Well & Other Activities_Water Depletion Log_Statewide_2011) tracks horizontal wells and other activities. Drilling of horizontal wells and other activities resulted in a total depletion of 163.11 AF of water; entirely from the Colorado River basin. The cumulative total of water depleted by BLM's fluid minerals program in 2011 was 682.11 AF.

The BLM looks forward to continuing to work with the FWS to protect habitat for the endangered big river fishes. If you have any questions, please contact Jay Thompson, Fishery Biologist at (303) 239-3724.

Sincerely,

Leigh D. Espy
Deputy State Director
Resources & Fire

Enclosures

# Vertical Wells Drilled by BLM Field Office – 2011 Statewide

| Field Office | River Basin | # Wells Drilled (spudded) | Depletion /Well (AF) | Total Depletion (AF) |
|---|---|---|---|---|
| Glenwood Springs | Colorado | 335 | 0.77 | 258 |
| Kremmling | Colorado | 0 | 0.77 | 0 |
| Grand Jct. | Colorado | 9 | 0.77 | 7 |
| Grand Jct. | Gunnison | 0 | 0.77 | 0 |
| Gunnison | Gunnison | 0 | 1.11 | 0 |
| Uncompahgre | Gunnison | 0 | 1.11 | 0 |
| Uncompahgre | Dolores | 0 | 1.11 | 0 |
| San Juan | Dolores | 13 | 1.11 | 15 |
| Little Snake | Yampa | 17 | 2.62 | 45 |
| White River | White | 74 | 2.62 | 194 |
| **Totals** | | | | **519** |

# Horizontal Wells Drilled + Other Activities
# 2011 Statewide

| Field Office | River Basin | Well Location (T, R, Section) | Operator | Net Fresh Water Used (AF) |
|---|---|---|---|---|
| CRVFO | Colorado | Keinath Federal 17-11H (C16OU) Sec 16 T8S-R96W | Encana Oil & Gas (USA) Inc | 9.63 |
| CRVFO | Colorado | Keinath Federal 17-11AH (C16OU) Sec 16 T8S-R96W | Encana Oil & Gas (USA) Inc | 9.63 |
| CRVFO | Colorado | Keinath Federal 10-10H (C16OU) Sec 16 T8S-R96W | Encana Oil & Gas (USA) Inc | 9.63 |
| GJFO | Colorado | Federal 28-11H (PL28SW) Sec 28 T9S-R96W | Encana Oil & Gas (USA) Inc | 2.73 |
| CRVFO | Colorado | Five R 15-1HM (C10OU) Sec 10 T8S-R96W | Encana Oil & Gas (USA) Inc | 12.34 |
| CRVFO | Colorado | 9-12H (C10OU) Sec 10 T8S-R96W | Encana Oil & Gas (USA) Inc | 12.45 |
| CRVFO | Colorado | 9-12H2 (C10OU) Sec 10 T8S-R96W | Encana Oil & Gas (USA) Inc | 12.03 |
| CRVFO | Colorado | 9-14H (C10OU) Sec 10 T8S-R96W | Encana Oil & Gas (USA) Inc | 11.75 |
| WRFO | Colorado | Fletcher Gulch Coalbed Methane* | N/A | 5.16 |
| WRFO | Colorado | Ryan Gulch Gathering Project-Black Sulphur | N/A | 6.29 |
| WRFO | Colorado | Ryan Gulch, Pitchers Mound, Gas Gathering Project | N/A | 5.3 |
| WRFO | Colorado | Piceance Creek Pipeline Looping Project | N/A | 29.1 |
| WRFO | Colorado | Ryan Gulch Gathering Project-Ryan Ridge Project | N/A | 2.32 |
| WRFO | Colorado | Pipeline from Corral Creek to Sagebrush Plant | /A | 0.75 |
| WRFO | Colorado | Rio Blanco County Road 5 Improvement Project | N/A | 9 |
| WRFO | Colorado | Shell Fronteir Plan of Development (Oil Shale) | N/A | 25 |
| **Total** | | | | **163.11** |

# United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7210
www.co.blm.gov

NOV 28 2012



In Reply Refer To:
6840 (CO-932)

Ms. Patty Gelatt
Colorado Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services, GJ Field Office
764 Horizon Drive, S. Annex A
Grand Junction, CO 81506

Dear Ms. Gelatt:

The Bureau of Land Management (BLM), Colorado State Office, completed a Programmatic Biological Assessment in 2008 to address water depletions associated with fluid minerals development on BLM lands in western Colorado. The Fish and Wildlife Service (FWS) issued Biological Opinion #ES/GJ-6-CO-08-F-0073 on December 19, 2008, requiring the BLM to track the number of wells drilled annually by river basin and report this information to your office.

Enclosed are the BLM's wells drilled logs for FY 2012. The first log (Vertical Wells Drilled Log 2012 Statewide Final) tracks a total of 264 wells drilled in 3 separate river basins (enclosure 1). These 264 wells resulted in a total depletion of 306.88 acre-feet (AF) in the upper Colorado River Basin. The second enclosure (Horizontal Well & Other Activities Water Depletion Log Statewide 2012) tracks water depletions resulting from horizontal wells and other minerals activities. Drilling of horizontal wells and other activities resulted in a total depletion of 29.34 AF of water from the Yampa and White River basins. The cumulative amount of water depleted in the upper Colorado River Basin by the BLM's fluid minerals program in 2012 was 336.22 AF.

The BLM looks forward to continuing to work with the FWS to protect habitat for the endangered big river fishes. If you have any questions, please contact Jay Thompson, Fisheries Biologist at (303) 239-3724.

Sincerely,

Leigh D. Espy
Deputy State Director
Division of Resources & Fire

Enclosures

# Vertical Wells Drilled by BLM Field Office – 2012 Statewide

| Field Office | River Basin | # Wells Drilled (spudded) | Depletion /Well (AF) | Total Depletion (AF) |
|---|---|---|---|---|
| Glenwood Springs | Colorado | 193 | 0.77 | 148.61 |
| Kremmling | Colorado | 0 | 0.77 | 0 |
| Grand Jct. | Colorado | 15 | 0.77 | 11.55 |
| Grand Jct. | Gunnison | 0 | 0.77 | 0 |
| Gunnison | Gunnison | 0 | 1.11 | 0 |
| Uncompahgre | Gunnison | 0 | 1.11 | 0 |
| Uncompahgre | Dolores | 0 | 1.11 | 0 |
| San Juan | Dolores | 0 | 1.11 | 0 |
| Little Snake | Yampa | 31 | 2.62 | 81.22 |
| White River | White | 25 | 2.62 | 65.50 |
| **Totals** | | **264** | | **306.88** |

# BLM Horizontal Wells Drilled + Other Activities
# 2012 Statewide

| Field Office | River Basin | Well Location (T, R, Section) | Operator | Net Fresh Water Used (AF) |
|---|---|---|---|---|
| LSFO | Yampa | 5N, 90W, 31 | SWEPI | 4.06 |
| LSFO | Yampa | 4N, 90W, 9 | SWEPI | 4.06 |
| | | | | |
| WRFO | White | Oil Shale RD & D | ExxonMobil/Natural Soda | 12.00 |
| WRFO | White | DOI-BLM-CO-110-2010-0200-EA | North Hatch Gulch Project | 2.14 |
| WRFO | White | DOI-BLM-CO-110-2011-0087-EA | Buckhorn Draw Unit Well Pad | 7.08 |
| | | | | |
| **Total** | | | | **29.34** |

# United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7210
www.co.blm.gov

BoES/GJ-6-CO-08-F-006

FEB 2 1 2014

In Reply Refer To:
6840 (CO-932)

RECEIVED
FEB 2[illegible] 2014
Ecological Services
Grand Junction, CO

Ms. Patty Gelatt
Colorado Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services, GJ Field Office
445 W. Gunnison Ave., Suite 240
Grand Junction, CO 81501

Tails: 06541-2008-F-0073

Dear Ms. Gelatt:

The Bureau of Land Management (BLM), Colorado State Office, completed a Programmatic Biological Assessment (PBA) in 2008 to address water depletions associated with fluid minerals development on BLM lands in western Colorado. The Fish and Wildlife Service (FWS) issued Biological Opinion (BO) #ES/GJ-6-CO-08-F-0073 on December 19, 2008, requiring the BLM to track the number of wells drilled annually by river basin and report this information to your office.

Enclosed are the BLM's wells drilled logs for FY 2013. The first log (Vertical Wells Drilled Log 2013_ Statewide) tracks a total of 156 wells drilled in 3 separate river basins. These 156 wells resulted in a total depletion of 157.4 acre-feet (AF) in the upper Colorado River Basin. The second enclosure (Horizontal Wells Drilled Log 2013_Statewide) tracks water depletions resulting from horizontal wells and other minerals activities. Drilling of horizontal wells and other activities resulted in a total depletion of 16.33 AF of water from the White, Yampa, and Colorado River basins. The cumulative amount of water depleted in the upper Colorado River Basin by the BLM's fluid minerals program in 2013 was 173.73 AF.

The BLM looks forward to continuing to work with the FWS to protect habitat for the endangered big river fishes. If you have any questions, please contact Jay Thompson, Fisheries Biologist, at (303) 239-3724.

Sincerely,

Leigh D. Espy
Deputy State Director, Resources & Fire

Enclosures

# Vertical Wells Drilled by BLM Field Office – 2013 Statewide

| Field Office | River Basin | # Wells Drilled (spudded) | Depletion /Well (AF) | Total Depletion (AF) |
|---|---|---|---|---|
| Glenwood Springs | Colorado | 132 | 0.77 | 101.6 |
| Kremmling | Colorado | 0 | 0.77 | 0 |
| Grand Jct. | Colorado | 3 | 0.77 | 2.3 |
| Grand Jct. | Gunnison | 0 | 0.77 | 0 |
| Gunnison | Gunnison | 0 | 1.11 | 0 |
| Uncompahgre | Gunnison | 0 | 1.11 | 0 |
| Uncompahgre | Dolores | 0 | 1.11 | 0 |
| San Juan | Dolores | 1 | 1.11 | 1.1 |
| Little Snake | Yampa | 1 | 2.62 | 2.6 |
| White River | White | 19 | 2.62 | 49.8 |
| **Totals** | | **156** | | **157.4** |

# Horizontal Wells Drilled by BLM Field Office 2013

| Field Office | River Basin | Well Location (T, R, Section) | Operator | Net Fresh Water Used (AF) |
|---|---|---|---|---|
| WRFO | White River | T2S, R100W, Sec.11 DV01D-12 A11 2100 | Encana Oil & Gas | Changed to directional 4/23/2013 |
| WRFO | White River | T2S, R100W, Sec.11 DHN8B-1 A11 2100 | Encana Oil & Gas | 2.27 |
| WRFO | White River | T1S, R104W, Sec.23 23-7H | Robert Bayless | 3.34 |
| WRFO | White River | T1S, R104W, Sec.14 14-15H | Robert Bayless | 3.79 |
| CRVFO | Colorado River | 7S 96W 4 NE | WPX Energy | 4.78 |
| LSFO | Yampa | 5N 90W 16 | SWEPI LP | 2.15 |
| **Total** | | | | **16.33** |

# United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215-7210
www.co.blm.gov

Creed

In Reply Refer To:
6840 (CO-932)

JAN 12 2015

Mr. Creed Clayton
Colorado Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services, GJ Field Office
445 West Gunnison Avenue, Suite 240
Grand Junction, CO 81501

RECEIVED
JAN 16 2015
Ecological Services
Grand Junction, CO

Dear Mr. Clayton:

The Bureau of Land Management (BLM) Colorado completed a Programmatic Biological Assessment (PBA) in 2008 to address water depletions associated with fluid minerals development on BLM lands in western Colorado. U.S. Fish and Wildlife Service (FWS) issued Biological Opinion (BO) #ES/GJ-6-CO-08-F-0073 on December 19, 2008, requiring the BLM to track the number of wells drilled annually by river basin and report this information to your office.

Enclosed are the BLM's wells drilled logs for Fiscal Year (FY) 2014. The first enclosure (Vertical & Directional Wells Drilled Log 2014 Statewide Final) tracks a total of 153 wells drilled in five separate river basins. These 153 wells resulted in a total depletion of 178.3 acre-feet (AF) in the upper Colorado River Basin. The second enclosure (Horizontal Well & Other Activities Water Depletion Log Statewide 2014) tracks water depletions resulting from horizontally drilled wells. Drilling of five horizontal wells resulted in a total depletion of 162.1 AF of water from the upper Colorado River Basin. The cumulative amount of water depleted in the upper Colorado River Basin by the BLM's fluid minerals program in FY 2014 was 340.4 AF.

The BLM looks forward to continuing to work with FWS to protect habitat for the endangered big river fishes. If you have any questions, please contact Jay Thompson at (303) 239-3724.

Sincerely,

BSG

Brian St. George
Deputy State Director
Resources & Fire Management

Enclosures

# Vertical & Directional Wells Drilled by BLM Field Office – 2014
## Colorado Statewide

| Field Office | River Basin | # Wells Drilled (spudded) | Depletion /Well (AF) | Total Depletion (AF) |
|---|---|---|---|---|
| Glenwood Springs | Colorado | 117 | 0.77 | 90.1 |
| Kremmling | Colorado | 0 | 0.77 | 0 |
| Grand Jct. | Colorado | 0 | 0.77 | 0 |
| Grand Jct. | Gunnison | 0 | 0.77 | 0 |
| Gunnison | Gunnison | 0 | 1.11 | 0 |
| Uncompahgre | Gunnison | 2 | 1.11 | 2.2 |
| Uncompahgre | Dolores | 0 | 1.11 | 0 |
| Tres Rios | Dolores | 2 | 1.11 | 2.2 |
| Little Snake | Yampa | 0 | 2.62 | 0 |
| White River | White | 32 | 2.62 | 83.8 |
| **Totals** | | **153** | | **178.3** |

# Horizontal Wells Drilled by BLM Field Office
# FY2014

| Field Office | River Basin | Well Location (T, R, Section) | Operator | Net Fresh Water Used (AF) |
|---|---|---|---|---|
| KFO | North Platte | Section 06-6N-80W | EE3 LLC | 9.0 acre feet |
| KFO | North Platte | Section 20-8N-80W | EE3 LLC | 9.6 acre feet |
| KFO | North Platte | Section 32-7N-80W | EE3 LLC | 9.6 acre feet |
| GJFO | Colorado (Roan Creek) | 9S, R98W, 17<br>Well 3C-19 D17 998 | Black Hills | Total 63.1 AF<br><br>Drilling (8125 bbls)<br>Dust Control (3600 bbls)<br>Completion (477,750 bbls) |
| GJFO | Colorado (Roan Creek) | 9S, R98W, 17<br>Well 3C-20 D17 998 | Black Hills | Total 70.8 AF<br><br>Drilling (8125 bbls)<br>Dust Control (3600 bbls)<br>Completion (537,917 bbls) |
| **Total** | | | | **162.1 AF** |

CENTER for BIOLOGICAL DIVERSITY
Because life is good.
*working through science, law and creative media to secure a future for all species, great or small, hovering on the brink of extinction.*

May 11, 2015

**Via U.S. Mail & E-mail**
Director (210)
Attention: Protest Coordinator, WO-210
P.O. Box 71383
Washington, D.C. 20024-1383
Email: protest@blm.gov

Dear Director Kornze:

This Proposed Resource Management Plan Protest is submitted on behalf of the Center for Biological Diversity ("Center"), Living Rivers, and Utah Rivers Council, regarding the Bureau of Land Management's (BLM) Proposed Resource Management Plan (PRMP) and Final Environmental Impact Statement (FEIS) for the Grand Junction Field Office (GJFO). The Notice of Availability of the PRMP and FEIS was published by the Environmental Protection Agency (EPA) in the Federal Register on April 10, 2015 (80 FR 19344); therefore this Protest is being timely filed in accordance with 43 C.F.R § 1601.5-2. Pursuant to the instructions contained in BLM's "Dear Reader" letter accompanying the PRMP, this protest is being provided via email with a timely postmarked copy sent via U.S. Mail to the address above.

## PROTEST

**1. Protesting Parties: Contact Information and Interests:**

This Protest is filed on behalf of the Center for Biological Diversity, Living Rivers, and Utah Rivers Council their boards and members by:

Wendy Park
Staff Attorney
Center for Biological Diversity
351 California St. #600
San Francisco, CA 94104
wpark@biologicaldiversity.org

John Weisheit, Conservation Director
Living Rivers
PO Box 466
Moab, UT 84532

(435) 259-1063
john@livingrivers.org

Zach Frankel, Executive Director
Utah Rivers Council
1055 East 2100 South, Suite 204
Salt Lake City, UT 84106
(801) 486-4776
zach@utahrivers.org

The Center is a non-profit environmental organization with 50,400 member activists, including members who live and recreate in the areas in and affected by actions taken within the areas governed by the Grand Junction Field Office planning area in Colorado. The Center uses science, policy and law to advocate for the conservation and recovery of species on the brink of extinction and the habitats they need to survive. The Center has and continues to actively advocate for increased protections for species and habitats in the planning area on lands managed by the BLM. The lands and waters that will be affected by the decision include habitat for many listed, rare, and imperiled species that the Center has worked to protect including the Colorado pikeminnow, humpback chub, bonytail, razorback sucker, Colorado cutthroat trout, and Greater Sage-Grouse, and many other species which will be affected by actions authorized or allowed under the PRMP. The Center's board, staff, and members use the lands and waters within the planning area, including the lands and waters that would be affected by actions under the PRMP, for quiet recreation (including hiking and camping), scientific research, aesthetic pursuits, and spiritual renewal.

Living Rivers is a nonprofit organization based in Moab, Utah that promotes river restoration through mobilization. By articulating conservation and alternative management strategies to the public, Living Rivers seeks to revive the natural habitat and spirit of rivers by undoing the extensive damage done by dams, and water-intensive energy development on the Colorado Plateau. Living Rivers has approximately 1,200 members in Utah, Colorado and other states.

Utah Rivers Council is a grassroots organization dedicated to the conservation and stewardship of Utah's rivers and sustainable clean water sources for Utah's people and wildlife. Founded in 1995, Utah Rivers Council works to protect Utah's rivers and clean water sources for today's citizens, future generations and healthy, sustainable natural ecosystems. It implements its mission through grassroots organizing, direct advocacy, research, education, community leadership, and litigation.

The Center participated in the planning process to the degree required by law. Michael Saul submitted comments on the Draft Environmental Impact Statement (DEIS) and the draft PRMP on behalf of National Wildlife Federation. These comments are included in Attachment A and are incorporated by reference herein. Mr. Saul is now a member and employee of the Center, and the Center now submits this protest on behalf of its members, including Mr. Saul. Thus, the Center properly has associational administrative standing to file this protest based on Mr. Saul's standing to file this protest. Mr. Saul has administrative standing, because he previously

participated in the planning process and has an interest in the area affected by the PRMP. Mr. Saul has hiked and viewed wildlife on BLM lands within the planning area, and will visit the area again to view wildlife, including Greater Sage-Grouse.

As detailed in those comment and others, and as explained below, the Center, Living Rivers, and Utah Rivers Council, believe that the PRMP and accompanying FEIS are inadequate to ensure compliance with the procedural and substantive mandates of the Federal Land Policy and Management Act (FLPMA), the National Environmental Policy Act (NEPA), and the Endangered Species Act (ESA) and other federal and state laws and policies.

If the Director finds that none of the parties to this letter has administrative standing to file this protest, we request that BLM still consider these comments on the FEIS and PRMP and include them in the administrative record, as required by the Council on Environmental Quality (CEQ) regulations. *See* 40 CFR § 1503.1(b) ("An agency may request comments on a final environmental impact statement before the decision is finally made. In any case other agencies or persons may make comments before the final decision....")

**2. Issues and Parts of the PRMP Protested:**

The Center, Living Rivers, and Utah Rivers Council, protest the proposed adoption of the BLM's preferred alternative, which, absent modification, provides for continued and expanded oil leasing and development on BLM lands and mineral estate without adequate analysis of, or mitigation for, the direct, indirect and cumulative impacts of such activities on air and water quality, public health, wildlife, and climate. As outlined below, by adopting the preferred alternative, BLM would find itself in violation of the ESA, NEPA, and FLPMA. BLM should therefore withdraw the PRMP and FEIS, prepare a Supplemental Environmental Impact Statement (SEIS) that addresses the deficiencies in the FEIS, and issue a new PRMP that complies with applicable statutory mandates and better protects the resources BLM is entrusted to manage.

**3. Statement of Reasons as to Why the Proposed Decision to Adopt the PRMP Is Unlawful:**

As noted above, BLM's proposed decision to adopt the PRMP is substantively and procedurally flawed. A concise statement of those reasons is provided below.

**I. BLM and Fish and Wildlife Service Must Formally Consult Regarding the Impacts of Water Depletion, Spills and Leaks, and Selenium Pollution Resulting from Oil and Gas Development.**

BLM does not plan to release its Biological Assessment or Fish and Wildlife Service's (Service) Biological Opinion regarding the PRMP's effects on listed species until publication of the Record of Decision. FEIS 5-3. Nonetheless, in its current form, the PRMP falls far short of ensuring that ESA-listed Colorado pikeminnow, humpback chub, bonytail, and razorback sucker (collectively "endangered fish") are protected from water depletions, chemical spills and leaks, and selenium pollution resulting from fluid mineral development.

The FEIS suggests that BLM and the Service plan to rely on the 2008 "Programmatic Biological Opinion for Water Depletions Associated with Bureau of Land Management's Fluid Mineral Program within the Upper Colorado River" (PBO) instead of completing a formal consultation regarding the effects of the PRMP's water depletion effects on the endangered fish.[1] FEIS 6-195 ("The [Reasonably Foreseeable development scenario] in the RMP does not exceed the amount of water depletions consulted on in the Programmatic Biological Opinion."). The Service and BLM cannot reasonably rely on the PBO, because it did not anticipate the full scope of water use required by the PRMP and other fluid mineral development activities in the Upper Colorado River Basin. In addition, the PRMP lacks adequate measures to reduce the increased risk of spills and leaks that the PRMP poses to endangered fish and their habitat in the Upper Colorado Basin, as well as effective measures that will reduce the risk of selenium contamination from increased surface disturbance. Before approving the PRMP, the Service and BLM must (1) formally consult or reinitiate formal consultation regarding the PRMP's water depletion effects on the endangered fish; (2) complete formal consultation regarding the increased risk of spills and leaks from oil and gas development on the endangered fish; and (3) formally consult over the PRMP's selenium contamination impacts on the endangered fish.

### A. The Service Must Complete Formal Consultation Regarding Water Depletion Effects on the Endangered Fish.

The Service cannot reasonably rely on the PBO regarding the PRMP's water depletion effects on the endangered fish. That prior section 7 consultation did not fully take into account water depletion of hydraulic fracturing; nor did it anticipate the potential for horizontal drilling and its enormous water depletion effects.

In 2008, the Service issued the PBO regarding the water depletion effects of fluid mineral development in the GJFO and other Upper Colorado Basin planning areas. The PBO determined that BLM's water depletions from the Colorado River Basin are likely to adversely affect the endangered fish and their designated critical habitats. PBO, p. 1. However, the PBO concluded that the water depletions are not likely to jeopardize the continued existence of the endangered fish and not likely to destroy or adversely modify the endangered fishes' designated critical habitat. *Id.*, p. 50.

The PBO's water depletion projections for the GJFO is based in part on development projections estimated in the 2008 Programmatic Biological Assessment ("PBA") prepared by BLM.[2] The PBA projected that within the GJFO planning area, new development would total 1,000 federal wells (including split estate) and 1,200 non-federal wells over the next 15 years. PBA, p. 5. Because a Reasonably Foreseeable Development scenario had not been prepared, these estimates were "based on discussions with office petroleum engineers and other

[1] *See* Fish and Wildlife Service, "Programmatic Biological Opinion for Water Depletions Associated with Bureau of Land Management's Fluid Mineral Program within the Upper Colorado River," Dec. 19, 2008. All references cited herein are provided in the attached CD.

[2] BLM, Programmatic Biological Assessment for BLM's Fluid Minerals Program in Western Colorado re: Water Depletions and effects on the Four Endangered Big River Fishes: Colorado pikeminnow (Ptychocheilus lucius), humpback chub (Gila cypha), bonytail chub (Gila elegans), and razorback sucker (Xyrauchen texanus), November 3, 2008.

professional staff, and for non-federal wells[,] professional opinion, the [Colorado Oil and Gas Conservation Commission ("COGCC")] website, and discussions with industry personnel." *Id.*

In 2012, BLM prepared a Reasonably Foreseeable Development scenario (RFD) that made more detailed and robust projections regarding the total oil and gas development that could occur in the GJFO.[3] The RFD predicted that between 2009 and 2028, maximum total development (federal and non-federal) would be 9,116 wells. RFD, pp. 44, 46. 5,502 wells would be "conventional wells" (including coalbed methane) and 3,614 wells would be horizontal wells. *Id.* The RFD also noted that conventional drilling would occur throughout the GJFO planning area, while horizontal drilling "will be used to develop the Mancos- Niobrara shale plays." *See* RFD, p. 19, 35; *see also* RFD, p. 16 ("In the Piceance basin portion of the Study Area, the Mancos/Mowry Total Petroleum System assessment units are the most likely to be developed for shale gas resource plays... Occasionally these plays are explored using vertical wellbores with multiple fracking and perforation zones but full development generally occurs using horizontal wellbores and large fracturing operations."). Approximately 4000 wells would be managed by BLM - 2,107 of which would be horizontal wells, and 1,831 of which would be conventional. RFD, pp. 44, 46; FEIS 4-3; *see also* FEIS 4-455 (noting receipt of applications for horizontal wells in GJFO); FEIS 4-448 ("Future drilling will include a mix of conventional/directional and horizontal wells.")

The EIS's preferred alternative assumes significantly less drilling – only 780 BLM-managed wells for the planning period, which is extrapolated from the historical maximum rate of 39 wells per year. FEIS 4-3. The EIS does not indicate what portion will be horizontal wells, but based on the RFD's projections, over half - 54% or 417 wells – could be horizontal wells. Over a 20 year period, this amounts to approximately 21 horizontal wells per year.

The PBO, however, does not take into account the potential for *any* wells to use horizontal drilling. The PBO's and PBA's water depletion projections make no mention of horizontal drilling or its freshwater requirements. But water depletion logs submitted by BLM to Fish and Wildlife Service report on the water use of horizontal drilling separately from the water depletion of vertical wells, and show far higher water use for horizontal wells. While vertical and non-horizontal directional wells in the GJFO are assumed to require 0.77 acre-feet of water (as estimated in the PBO) and BLM reports total number of vertical wells multiplied by this standard depletion factor, BLM's logs report actual water use for horizontal drilling.[4] Those logs show that horizontal drilling typically entails fresh water depletion many times greater than 0.77 acre-feet per well. The average water use of horizontal drilling projects from 2011-2014 in the Field Offices covered by the PBO (White River, Grand Junction, Kremmling, Colorado River Valley, Gunnison, Uncompahgre, San Juan Public Lands, and Little Snake) was 11.6 acre-feet of water or fifteen times that projected for vertical wells in the GJFO.[5] Recent horizontal drilling projects in the Grand Junction Field Office in 2014 depleted 68.3 and 70.8 acre-feet of freshwater, for a total of 139.1 acre-feet, or the equivalent of 180 vertical wells (assuming a 0.77 acre-feet

[3] BLM, Reasonably Foreseeable Development Scenario for Oil and Gas, Grand Junction Field Office, Colorado, June 18, 2012.
[4] BLM, Water Depletion Logs Reported to Fish and Wildlife Service, 2009-2014.
[5] Table Summarizing Average Water Depletions for Horizontal Drilling Projects, 2009-2014.

depletion factor).[6] This amount of water depleted in one year comprises over 2.5 times the amount of water that the PBA projected would be consumed within the Grand Junction planning area (52 acre-feet).[7] Clearly, in failing to account for horizontal drilling, the PBO severely underestimates the potential water depletion effects of fluid mineral development in the GJFO.

High-volume fracking or "massive fracs" requiring millions of gallons of water may also be performed on vertical wells and directional non-horizontal wells in the GJFO.[8] ("Although many horizontal wells are given massive fracs, many vertical wells and directional non-horizontal wells, such as those in the Williams Fork formation of western Colorado, are also given massive fracs."). But it is unclear to what extent the PBO took into account water depletion effects of hydraulic fracturing for such wells. The PBO relied on the PBA's water depletion estimates, which noted: "[t]he average depletion amount per well is calculated as follows: [(drilling and completion)=0.56 af] + [(dust abatement)=0.10 af] + [(hydrostatic pipeline testing)=0.11 af] = 0.77 af/well. PBA, p. 8. The PBA states that its projections for "drilling and completion" water use account for "fracing," PBA p. 5, pp. 6-7; on the other hand, the PBA states that these projections apply to water use required for "*Primarily Conventional* Natural Gas Development." PBA, p. 8. "Primarily conventional natural gas development" is undefined, and has no precise meaning, but in recent years "*unconventional* natural gas development" has typically been used to denote the development of unconventional, "tight" gas reserves that require fracking, like those in the planning area covered by the PRMP.[9] It is thus entirely unclear to what extent the PBA took into account the freshwater needs of hydraulic fracturing for unconventional natural gas reserves.

This is especially troubling, because hydraulic fracturing requires water volumes that far exceed the amounts used in conventional natural gas development.[10] According to EPA's analysis of data reported to FracFocus, extraordinarily high volumes of water were used for hydraulic fracking in the GJFO planning area, as shown by the table below.[11] In Garfield County, the median water volume per disclosure was 1,707,024 gallons per disclosure or 5.23 acre-feet, based on a total of 1,355 disclosures during this period; the 95th percentile volume was 8,093,060 million gallons (24.83 acre-feet). Cumulative water volume during this period was 3.62 billion gallons (over 11,100 acre-feet).

---

[6] BLM, Water Depletion Logs.

[7] PBA, p. 9 (estimating 52 acre-feet water depletion per year, assuming 1000 wells drilled over a 15-year period).

[8] Getches-Wilkinson Center for Natural Resources, Energy, and the Environment, Intermountain Oil and Gas BMP Project: Hydraulic Fracturing, available at http://www.oilandgasbmps.org/resources/fracing.php.

[9] NaturalGas.org, Unconventional Oil and Gas, available at "http://naturalgas.org/overview/unconventional-ng-resources/; Alberta Energy Regulator, "What is Unconventional Oil and Gas?," available at, https://www.aer.ca/about-aer/spotlight-on/unconventional-regulatory-framework/what-is-unconventional-oil-and-gas; RFD, pp. 7-8 (noting that many of the GJFO reserves are "low-permeability (tight) and unconventional gas reservoirs, which are defined as shales, tight gas, and coalbed methane reservoirs that may not produce economic volumes of gas without assistance from massive stimulation treatments or special recovery processes and technologies").

[10] *See* Clark, Corrie E. et al., Life Cycle Water Consumption for Shale Gas and Conventional Natural Gas, Environ. Sci. Technol., 2013, 47 (20), pp 1182–11836, available at http://pubs.acs.org/doi/abs/10.1021/es4013855.

[11] EPA, State-level Summaries of FracFocus 1.0 Hydraulic Fracturing Data, March 2015, pp. 1-2, 4, 14, available at http://www2.epa.gov/sites/production/files/2015-03/documents/ff_statesummarysheets_final_508.pdf.

In Mesa County, the median water volume per fracked well was 14,452,836 gallons, or 44.35 acre-feet per well, based on a total of 19 disclosures with valid volumes; the 95th percentile water volume was 22,609,230 gallons (69.39 acre feet). Cumulative water volume in fracking fluids during this period exceeded 244 million gallons (over 748 acre-feet).

**Reported Water Volume by County**

| County | Number of disclosures with valid volumes | Number of oil disclosures | Number of gas disclosures | Cumulative water volume (gallons) | Water volume per disclosure (gallons) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Median | 5th percentile | 95th percentile |
| Weld | 3,011 | 558 | 2,453 | 2,335,000,000 | 407,442 | 128,100 | 2,977,508 |
| Garfield | 1,355 | 7 | 1,348 | 3,624,000,000 | 1,707,024 | 695,047 | 8,093,060 |
| Las Animas | 146 | 4 | 142 | 15,770,000 | 96,974 | 20,424 | 260,255 |
| Rio Blanco | 143 | 10 | 133 | 294,700,000 | 2,248,291 | 96,911 | 3,232,073 |
| Larimer | 40 | 12 | 28 | 10,630,000 | 224,906 | 71,698 | 470,367 |
| La Plata | 39 | 1 | 38 | 6,967,000 | 196,744 | 36,136 | 227,067 |
| Broomfield | 24 | 0 | 24 | 9,046,000 | 397,066 | 295,096 | 421,458 |
| Yuma | 24 | 1 | 23 | 733,500 | 29,673 | 26,626 | 36,582 |
| Boulder | 23 | 0 | 23 | 6,259,000 | 410,424 | 129,738 | 422,881 |
| Mesa | 19 | 0 | 19 | 244,100,000 | 14,642,836 | 444,333 | 22,609,230 |

The FracFocus figures only represents the volume of water used in fracking fluids, and does not include the amount of water needed to drill and complete the well.[12] But those figures (5.23 acre-feet in Garfield County and 44.35 acre-feet in Mesa County) are over nine and 79 times the PBA's estimate of the amount of water needed for "drilling and completion," plus fracking (0.56 acre-feet).

The PBA attributes its low water use estimates to significant levels of water reuse and recycling in the planning area: "the primary gas fields located within the... GJFO are mature and have been in place for many years. As such, sophisticated water treatment, holding, reuse, and associated transmission facilities are in place. A significant amount of water reuse for well completion is occurring in this area which accounts for the relatively low estimated water use per well." PBO, p. 8. However, the extremely high levels of actual freshwater use for horizontal wells within the planning area (as shown by BLM's water depletion logs) suggests that water reuse and recycling is not so widespread or feasible throughout the planning area. One 2013 report notes that in Colorado only 2% of water used for oil and gas production is reused or

[12] "Drilling and completion" are separate steps from "hydraulic fracturing" of a well. "Drilling" refers to drilling the borehole into the earth; "fracking" refers to the process of injecting fracking fluids into the well to create high pressure that fractures underground formations and forces trapped hydrocarbons to the surface once the pressure is released; and "well completion" refers to isolating the well from the surrounding environment and turning it into an actively producing well. *See* Jiang, Mohan, et al. Life Cycle Water Consumption and Wastewater Generation Impacts of a Marcellus Shale Gas Well. Environ Sci Technol. 2014 Feb 4; 48(3): 1911–1920, p. 1912, available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3915742/ (describing steps of drilling, fracking, and completing a well); Kargbo, David M., et al. Natural Gas Plays in the Marcellus Shale: Challenges and Potential Opportunities, Environ. Sci. Technol. 2010, 44, 5679–5684, pp. 5680-81, available at http://pubs.acs.org/doi/pdf/10.1021/es903811p (same); "How Does Well Completion Work?" Rigzone.com, available at http://www.rigzone.com/training/insight.asp?i_id=326 (describing well completion process).

recycled.[13] This is because readily available underground wastewater disposal sites and cheap sources of freshwater have reduced incentives to recycle.[14]

Moreover, in the Marcellus Shale, only 20-40% of fracking fluids are recovered as flowback,[15] suggesting that the majority of fracking fluids are irretrievably lost and thus cannot be reused. Even if half of the 1.7 million gallons used to frack one well in Garfield County (median water use based on the FracFocus data) was reused or recycled, the other half - 853,512 gallons or 2.62 acre-feet per well– would still be lost with every well stimulation. This depletion amount is nearly five times the amount that the PBO projects would be depleted per well for "drilling and completion" (0.54 acre-feet), despite that the PBO figure covers more than just fracking. In Mesa County, 7.27 million gallons or 22.32 acre-feet would still be depleted per well, which is over 41 times the PBO's projection for drilling, completion, and fracking.

The PBO's projection that only 1,000 wells will be drilled in the GJFO planning area over 15 years is also unreliable. As earlier noted, the RFD projects that a maximum of nearly 4,000 wells could be drilled over 20 years. While the EIS's analysis is largely based on the assumption that the preferred alternative will result in drilling a fraction of that amount – 780 wells – elsewhere it indicates that the preferred alternative could allow nearly 4,000 new wells, as projected in the RFD. FEIS 4-448. The EIS's socio-economic impacts analysis looks at three different scenarios for each of the alternatives, including the preferred alternative (Alternative B), each with a different development rate – 11 wells per year, 39 wells per year, and 197 wells per year. *Id.* The justification for analyzing the economic impacts of each of these development scenarios across all alternatives is that "differences between the management alternatives would have a limited effect on production because they would affect only a small portion of the land available for production." FEIS 4-456. This is because nearly 80% of the GJFO planning area with development potential is already leased, and "changes in acreages available for leasing and in NSO stipulations would affect only land not already leased." *Id*; *see also* FEIS 4-457 ("The effect of changing NSO stipulations [on production] is negligible.") The EIS also notes that "the price of natural gas… is the most important factor in the decision to produce or not to produce." FEIS 4-455.

Accordingly, BLM's analysis notes various economic benefits of the preferred alternative assuming a 197-well per year development rate, including over $2 billion in spending attributable to natural gas development. FEIS 4-450, 4-455-65. Indeed, BLM's press release on the PRMP touts that the PRMP "could create nearly 7,500 jobs by 2029 in livestock grazing, recreation and energy development."[16] This figure is necessarily based on the most optimistic natural gas production scenario for the PRMP. *See* FEIS 4-450-51 (6,907.3 gas drilling jobs

[13] Lynn, Steve. "Frack-water recycling lacking in Northern Colorado," BizWest.com, Oct. 16, 2013, available at http://bizwest.com/frack-water-recycling-lacking-in-northern-colorado-2/.
[14] *Id.*
[15] Schramm, E. 2011. What is flowback, and how does it differ from produced water? Institute for Energy and Environmental Research of Northeastern Pennsylvania Clearinghouse website, available at http://energy.wilkes.edu/pages/205.asp.
[16] BLM, "BLM releases Grand Junction Resource Management Plan: Includes 700,900-acre Shale Ridges and Canyons Master Leasing Plan," April 10, 2015, available at http://www.blm.gov/co/st/en/BLM_Information/newsroom/2015/blm_releases_grand.html.

CENTER for BIOLOGICAL DIVERSITY

Because life is good

*working through science, law and creative media to secure a future for all species, great or small, hovering on the brink of extinction.*

April 27, 2015

**Via U.S. Mail & E-mail**

Director (210)
Attention: Protest Coordinator, WO-210
P.O. Box 71383
Washington, D.C. 20024-1383
Email: protest@blm.gov

Dear Director Kornze:

This Resource Management Plan Amendment Protest is submitted on behalf of the Center for Biological Diversity ("Center") regarding the Bureau of Land Management's (BLM) Proposed Resource Management Plan Amendment (RMPA) and Final Environmental Impact Statement (FEIS) for the White River Field Office (WRFO). The Notice of Availability of the RMPA and FEIS was published by the Environmental Protection Agency (EPA) in the Federal Register on March 27, 2015 (80 FR 16424); therefore this Protest is being timely filed in accordance with 43 C.F.R § 1601.5-2. Pursuant to the instructions contained in BLM's "Dear Reader" letter accompanying the RMPA, this protest is being provided via email with a timely postmarked copy sent via U.S. Mail to the address above.

## PROTEST

**1. Protesting Parties: Contact Information and Interests:**

This Protest is filed on behalf of the Center for Biological Diversity, Rocky Mountain Wild, and their boards and members by:

Wendy Park
Staff Attorney
Center for Biological Diversity
351 California St. #600
San Francisco, CA 94104
wpark@biologicaldiversity.org

Megan Mueller
Senior Conservation Biologist

Rocky Mountain Wild
1536 Wynkoop St., Ste. 900
Denver, CO 80202
(303) 704-9760
megan@rockymountainwild.org

John Weisheit, Conservation Director
Living Rivers
PO Box 466
Moab, UT 84532
(435) 259-1063
john@livingrivers.org

Zach Frankel, Executive Director
Utah Rivers Council
1055 East 2100 South, Suite 204
Salt Lake City, UT 84106
(801) 486-4776
zach@utahrivers.org

The Center is a non-profit environmental organization with 50,400 member activists, including members who live and recreate in the areas in and affected by actions taken within the areas governed by the White River Field Office planning area in Colorado. The Center uses science, policy and law to advocate for the conservation and recovery of species on the brink of extinction and the habitats they need to survive. The Center has and continues to actively advocate for increased protections for species and habitats in the planning area on lands managed by the BLM. The lands and waters that will be affected by the decision include habitat for many listed, rare, and imperiled species that the Center has worked to protect including the Colorado pikeminnow, humpback chub, bonytail, razorback sucker, Colorado cutthroat trout, and greater sage-grouse, and many other species which will be affected by actions authorized or allowed under the RMPA. The Center's board, staff, and members use the lands and waters within the planning area, including the lands and waters that would be affected by actions under the RMPA, for quiet recreation (including hiking and camping), scientific research, aesthetic pursuits, and spiritual renewal.

Rocky Mountain Wild (formerly Center for Native Ecosystems) has a longstanding interest in the management of BLM lands in Colorado and engages frequently in the decision-making processes for land use planning and project proposals that could adversely affect biodiversity, wildlife populations, rare and imperiled species, and natural areas. Rocky Mountain Wild's staff and members enjoy a wide variety of recreational activities on BLM-managed public lands, including viewing wildlife and plants (including rare and imperiled species), wildlife and nature photography, hiking, biking, rafting, and enjoying solitude. The planning area includes key habitat for a wide variety of animal and plant species that Rocky Mountain Wild has worked to protect, including elk, mule deer, pronghorn, greater sage-grouse, black footed ferret, white tailed prairie dog, graham's penstemon, white river penstemon, narrowleaf evening

TRANSACTION REPORT

P. 01

DEC-14-2015 MON 03:41 PM

FOR: 303 239 3799

RECEIVE

| DATE | START | SENDER | RX TIME | PAGES | TYPE | NOTE | M# | DP |
|---|---|---|---|---|---|---|---|---|
| DEC-14 | 03:32 PM | | 9′06″ | 50 | FAX RX | COM. E-21 | | |

(finding that BLM's authority to prevent degradation is not limited to the RMP planning process). Greenhouse gas pollution for example causes "undue" degradation. Even if the activity causing the degradation may be "necessary," where greenhouse gas pollution is avoidable, it is still "unnecessary" degradation. 43 U.S.C. § 1732(b).

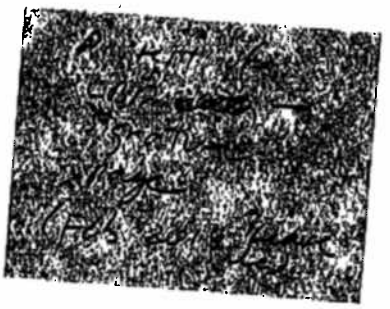
In addition to being harmful to human health and the environment, the emissions from oil and gas operations are also an undue and unnecessary waste and degredation of public lands. Consequently, BLM's proposed gas and oil lease sale violates FLPMA. *See* 43 U.S.C. § 1732(b).

**Conclusion**

Unconventional oil and gas development not only fuel the climate crisis but entail significant public health risks and harms to the environment. Accordingly, BLM should end all new leasing on BLM lands. Should BLM proceed with the lease sale it must thoroughly analyze the alternatives of no new leasing (or no action), and no fracking or other unconventional well stimulation methods in an EIS. Thank you for your consideration of these comments. The Center looks forward to reviewing a legally adequate EIS for this proposed oil and gas leasing action.

Sincerely,

Wendy Park
Staff Attorney
Center for Biological Diversity



Rocky Mountain Wild
1536 Wynkoop St., Ste. 900
Denver, CO 80202
(303) 704-9760
megan@rockymountainwild.org

John Weisheit, Conservation Director
Living Rivers
PO Box 466
Moab, UT 84532
(435) 259-1063
john@livingrivers.org

Zach Frankel, Executive Director
Utah Rivers Council
1055 East 2100 South, Suite 204
Salt Lake City, UT 84106
(801) 486-4776
zach@utahrivers.org

The Center is a non-profit environmental organization with 50,400 member activists, including members who live and recreate in the areas in and affected by actions taken within the areas governed by the White River Field Office planning area in Colorado. The Center uses science, policy and law to advocate for the conservation and recovery of species on the brink of extinction and the habitats they need to survive. The Center has and continues to actively advocate for increased protections for species and habitats in the planning area on lands managed by the BLM. The lands and waters that will be affected by the decision include habitat for many listed, rare, and imperiled species that the Center has worked to protect including the Colorado pikeminnow, humpback chub, bonytail, razorback sucker, Colorado cutthroat trout, and greater sage-grouse, and many other species which will be affected by actions authorized or allowed under the RMPA. The Center's board, staff, and members use the lands and waters within the planning area, including the lands and waters that would be affected by actions under the RMPA, for quiet recreation (including hiking and camping), scientific research, aesthetic pursuits, and spiritual renewal.

Rocky Mountain Wild (formerly Center for Native Ecosystems) has a longstanding interest in the management of BLM lands in Colorado and engages frequently in the decision-making processes for land use planning and project proposals that could adversely affect biodiversity, wildlife populations, rare and imperiled species, and natural areas. Rocky Mountain Wild's staff and members enjoy a wide variety of recreational activities on BLM-managed public lands, including viewing wildlife and plants (including rare and imperiled species), wildlife and nature photography, hiking, biking, rafting, and enjoying solitude. The planning area includes key habitat for a wide variety of animal and plant species that Rocky Mountain Wild has worked to protect, including elk, mule deer, pronghorn, greater sage-grouse, black footed ferret, white tailed prairie dog, graham's penstemon, white river penstemon, narrowleaf evening

primrose, and many other species that will be adversely affected by actions authorized or allowed under the RMPA.

Living Rivers is a nonprofit organization based in Moab, Utah that promotes river restoration through mobilization. By articulating conservation and alternative management strategies to the public, Living Rivers seeks to revive the natural habitat and spirit of rivers by undoing the extensive damage done by dams, and water-intensive energy development on the Colorado Plateau. Living Rivers has approximately 1,200 members in Utah, Colorado and other states.

Utah Rivers Council is a grassroots organization dedicated to the conservation and stewardship of Utah's rivers and sustainable clean water sources for Utah's people and wildlife. Founded in 1995, Utah Rivers Council works to protect Utah's rivers and clean water sources for today's citizens, future generations and healthy, sustainable natural ecosystems. It implements its mission through grassroots organizing, direct advocacy, research, education, community leadership, and litigation.

The Center and Rocky Mountain Wild participated in the planning process to the degree required by law. On January 28, 2013 Michael Saul submitted comments on the Draft Environmental Impact Statement (DEIS) and the draft proposed RMPA on behalf of the Colorado and National Wildlife Federations. This comment is included in Attachment A and is incorporated by reference herein. Mr. Saul is now a member and employee of the Center, and the Center now submits this protest on behalf of its members, including Mr. Saul. Thus, the Center properly has associational administrative standing to file this protest based on Mr. Saul's standing to file this protest. Mr. Saul has administrative standing, because he previously participated in the planning process and has an interest in the area affected by the RMPA. Mr. Saul has hiked and viewed wildlife on BLM lands within the planning area, and will visit the area again to view wildlife, including greater sage-grouse.

Rocky Mountain Wild participated in all stages of the planning process through the submission of scoping comments, comments on the DEIS, and various letters submitted to BLM regarding the impacts of plan activities on threatened and endangered species and other resources of the plan area. Its comments addressing numerous issues with the RMPA are attached as Attachment A and incorporated by reference herein. Rocky Mountain Wild submitted scoping comments on September 29, 2006, and March 9, 2007, including nominations for several Areas of Critical Environmental Concern (ACECs). It also submitted comments on the Draft Plan Amendment on January 28, 2013, including a Master Leasing Plan Proposal for the Dinosaur Lowlands Area. Rocky Mountain Wild will continue to participate in the RMPA process and other opportunities to ensure protection of key habitat and natural areas within the White River Field Office.

As detailed in those comment and others, and as explained below, the Center, Rocky Mountain Wild, Living Rivers, and Utah Rivers Council, believe that the RMPA and accompanying FEIS are inadequate to ensure compliance with the procedural and substantive mandates of the Federal Land Policy and Management Act (FLPMA), the National

Environmental Policy Act (NEPA), and the Endangered Species Act (ESA) and other federal and state laws and policies.

If the Director finds that none of the parties to this letter has administrative standing to file this protest, we request that BLM still consider these comments on the FEIS and RMPA and include them in the administrative record, as required by the Council on Environmental Quality (CEQ) regulations. *See* 40 CFR § 1503.1(b) ("An agency may request comments on a final environmental impact statement before the decision is finally made. In any case other agencies or persons may make comments before the final decision....")

**2. Issues and Parts of the RMPA Protested:**

The Center protests the proposed adoption of the BLM's preferred alternative which, absent modification, provides for continued and expanded oil leasing and development on BLM lands and mineral estate without adequate analysis of, or mitigation for, the direct, indirect and cumulative impacts of such activities on air and water quality, wildlife and climate. As outlined below, by adopting the preferred alternative, BLM would find itself in violation of the ESA, NEPA, and FLPMA. BLM should therefore withdraw the RMPA and FEIS, prepare a Supplemental Environmental Impact Statement (SEIS) that addresses the deficiencies in the FEIS, and issue a new RMPA that complies with applicable statutory mandates and better protects the resources BLM is entrusted to manage.

**3. Statement of Reasons as to Why the Proposed Decision to Adopt the RMPA Is Unlawful:**

As noted above, BLM's proposed decision to adopt the RMPA is substantively and procedurally flawed. A concise statement of those reasons is provided below.

**I. <u>BLM and Fish and Wildlife Service Must Formally Consult Regarding the Impacts of Water Depletion and Spills and Leaks Resulting from Oil and Gas Development.</u>**

The Service's failure to complete formal consultation regarding the effects of the RMPA on the ESA-listed Colorado pikeminnow, humpback chub, bonytail, and razorback sucker (collectively "endangered fish") violates the ESA. BLM determined that "implementation of the WRFO RMPA may affect, but is not likely to adversely affect any of the endangered fish or their critical habitats beyond the effects of water depletions, which have undergone separate section 7 consultation." The Service's determination and BLM's reliance on it are improper because the Service and BLM cannot reasonably rely on the "separate section 7 consultation," i.e., the 2008 Programmatic Biological Opinion for Water Depletions Associated with Bureau of Land Management's Fluid Mineral Program within the Upper Colorado River."[1] This is because the Programmatic Biological Opinion ("PBO") did not anticipate the full scope of water use required by the RMPA. The Service also erroneously failed to complete formal consultation regarding the heightened risk of spills and leaks that the RMPA poses to endangered fish and their habitat in

[1] *See* Fish and Wildlife Service, "Programmatic Biological Opinion for Water Depletions Associated with Bureau of Land Management's Fluid Mineral Program within the Upper Colorado River," Dec. 19, 2008 (Ex. A).

the Upper Colorado Basin. Before approving the RMPA, the Service and BLM must (1) formally consult or reinitiate formal consultation regarding the RMPA's water depletion effects on the endangered fish; and (2) complete formal consultation regarding the increased risk of spills and leaks from oil and gas development on the endangered fish.

No public comments previously commented on the adequacy of the Biological Assessment for the RMPA and the Service's concurrence, because these documents were not available at the time the draft EIS was published.

**A. The Service's Determination Regarding the RMPA's Water Depletion Effects on Endangered Fish Is Flawed.**

The Service cannot reasonably rely on the PBO regarding the RMPA's water depletion effects on the endangered fish. In its concurrence letter to BLM regarding the RMPA, the Service concluded that "implementation of the WRFO RMPA may affect, but is not likely to adversely affect any of the endangered fish or their critical habitats beyond the effects of water depletions, which have undergone separate section 7 consultation."[2] But that prior section 7 consultation – the PBO – did not fully take into account water depletion of hydraulic fracturing; nor did it anticipate the potential for horizontal drilling and its enormous water depletion effects.

In 2008, the Service issued the PBO regarding the water depletion effects of fluid mineral development in the WRFO and other Upper Colorado Basin planning areas. The PBO determined that BLM's water depletions from the Colorado River Basin are likely to adversely affect the endangered fish and their designated critical habitats. PBO, p. 1. However, the PBO concluded that the water depletions are not likely to jeopardize the continued existence of the endangered fish and not likely to destroy or adversely modify the endangered fishes' designated critical habitat. *Id.*, p. 50.

The PBO's water depletion projections for the WRFO is based on BLM's 2007 Reasonably Foreseeable Future Development ("RFD") report for the WRFO planning area ("RFD," available at FEIS, Appendix R). While the RFD predicts that new technologies in hydraulic fracturing will allow operators to tap into unconventional reserves that were not previously accessible,[3] the PBO does not appear to account for the water depletion required by such technologies.

Based on the development scenario contemplated in the RFD, the PBO finds that the average water depletion amount per well in the WRFO would be 2.62 acre-feet per well. PBO, p.

---

[2] Letter from Fish & Wildlife Service to White River Field Office, BLM re Section 7 Consultation on the Oil and Gas Amendment to the Resource Management Plan (RMP), March 11, 2015 ("FWS Concurrence Letter"), p. 4 (Ex. B).

[3] *See* RFD, p. 22 ("The emerging interest in the Mesaverde basin-centered play in the central part of the WRFO is principally related to the development of new completion technology (i.e. modern hydraulic fracturing techniques) coupled with the sustained elevation in gas prices (>$5.00/thousand cubic feet of gas) over the past few years."); RFD, p. 1 (noting "past conventional drilling and extraction technologies have not been successful in producing the unique geologic traps containing the gas" in the area covering much of the WRFO, but that "new technology" recently developed allow them to be tapped).

5. This figure includes water use required for drilling and completion (2.41 acre-feet), dust abatement (0.10 acre-feet), and hydrostatic pipeline testing (0.11 acre-feet). *Id.* It is unclear, however, whether this figure accounts at all for water use required for hydraulic fracturing. The PBO relied on the 2008 Programmatic Biological Assessment ("PBA") prepared by BLM for its water use estimate.[4] The PBA states that its projections for "drilling and completion" water use account for "fracing," PBA p. 5, pp. 6-7; on the other hand, the PBA states that these projections apply to water use required for "*Primarily Conventional* Natural Gas Development with some Limited Coalbed Methane Activity." (PBA, p. 8). "Primarily conventional natural gas development" is undefined, and has no precise meaning, but in recent years "*unconventional* natural gas development" has typically been used to denote the development of unconventional, "tight" gas reserves that require fracking, like those in the Mesaverde Play Area covered by the RMPA.[5] It is thus entirely unclear to what extent the PBA took into account the freshwater needs of hydraulic fracturing for unconventional natural gas reserves other than coalbed methane development.

This is especially troubling, because hydraulic fracturing requires water volumes that far exceed the amounts used in conventional natural gas development.[6] Indeed, considering that these estimates did not account for the potential for water reuse and recycling, *see* PBA, p. 9, these estimates are remarkably low. According to FracFocus, a database reporting fracking fluid composition for individual wells, from January 2011 through February 2013, the median "total volume of water" use to frack an individual well in Rio Blanco County (which covers most of the WRFO area) was 2,248,291 gallons of water or 6.9 acre feet.[7] The FracFocus figure only represents the volume of water used in fracking fluids, and thus does not include the amount of water needed to also drill and complete the well.[8] But that figure (6.9 acre feet) is almost three

---

[4] Programmatic Biological Assessment for BLM's Fluid Minerals Program in Western Colorado re: Water Depletions and effects on the Four Endangered Big River Fishes: Colorado pikeminnow (Ptychocheilus lucius), humpback chub (Gila cypha), bonytail chub (Gila elegans), and razorback sucker (Xyrauchen texanus), November 3, 2008 (Ex. C).

[5] NaturalGas.org, Unconventional Oil and Gas, available at "http://naturalgas.org/overview/unconventional-ng-resources/ (Ex. E); Alberta Energy Regulator, "What is Unconventional Oil and Gas?," available at, https://www.aer.ca/about-aer/spotlight-on/unconventional-regulatory-framework/what-is-unconventional-oil-and-gas (Ex. F); RFD, p. 15, 17 ("Mesaverde continuous, basin-centered, tight sand gas accumulation... contains the bulk of the technically recoverable reserve in the Basin").

[6] *See* Clark, Corrie E. et al., Life Cycle Water Consumption for Shale Gas and Conventional Natural Gas, Environ. Sci. Technol., 2013, 47 (20), pp 11829–11836, abstract available at http://pubs.acs.org/doi/abs/10.1021/es4013855 (Ex. G).

[7] EPA, State-level Summaries of FracFocus 1.0 Hydraulic Fracturing Data, March 2015, pp. 1-2, 4, 14, available at http://www2.epa.gov/sites/production/files/2015-03/documents/ff_statesummarysheets_final_508.pdf (Ex. H).

[8] "Drilling and completion" are separate steps from "hydraulic fracturing" of a well. "Drilling" refers to drilling the borehole into the earth; "fracking" refers to the process of injecting fracking fluids into the well to create high pressure that fractures underground formations and forces trapped hydrocarbons to the surface once the pressure is released; and "well completion" refers to isolating the well from the surrounding environment and turning it into an actively producing well. *See* Jiang, Mohan, et al. Life Cycle Water Consumption and Wastewater Generation Impacts of a Marcellus Shale Gas Well. Environ Sci Technol. 2014 Feb 4; 48(3): 1911–1920, p. 1912, available at

times the PBO's and EIS's estimate of the amount of water needed for "drilling and completion," plus fracking (2.41 acre feet).

While the Biological Assessment for the RMPA notes that water depletion per well "is expected to decline over time as BMPs involving water recycling and treatment are more fully integrated into standard drilling and completions operations," the integration of those technologies is entirely speculative and not required by any provision of the PBO or RMPA.[9] RMPA Biological Assessment (or "BA"), PDF 67.

The EIS similarly brushes aside the potential for higher levels of water use, noting "typically fresh water is only needed for surface drilling operations and for cementing requirements for all casing strings that are run. For hydraulic fracturing, recycled produced water and/or flow back water can be used which helps cumulatively by reducing the overall amounts of water used for oil and gas operations." FEIS, Appendix K, PDF 20; *see also id.*, PDF 92 (noting "majority of water and chemicals are recovered after stimulation" without citing any reference or data). No data, however, reveals what proportion of water use is "recycled produced water and/or flow back water" and what proportion is non-recycled fresh water. In the Marcellus Shale, only 20-40% of fracking fluids are recovered as flowback,[10] suggesting that the majority of fracking fluids are *not* recoverable. Further, no data reveals the extent to which operators recycle, or that recycling is technically feasible in the WRFO, or how soon operators will be relying on such technology. Indeed, the PBA's water use projections previously noted that "sophisticated water treatment, holding, reuse, and associated transmission facilities are not in place. Thus *limited water reuse* is occurring in this region...." PBA, p. 9 [emphasis added]; *see also* FEIS Chapter 4, pdf 140, 160 (noting "freshwater use volume of 2.62 acre-feet per well with limited reuse and recycling of freshwater"). One 2013 report notes that in Colorado only 2% of water used for oil and gas production is reused or recycled.[11] This is because readily available underground wastewater disposal sites and cheap sources of freshwater have reduced incentives to recycle.[12]

Nor does the PBO take into account the much higher fresh water requirements of horizontal drilling. The PBO's and PBA's water depletion projections make no mention of this technique or its freshwater requirements. Indeed, water depletion logs submitted by BLM to Fish and Wildlife Service report on the water use of horizontal drilling separately from the water

---

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3915742/ (describing steps of drilling, fracking, and completing a well) (Ex. I); Kargbo, David M., et al. Natural Gas Plays in the Marcellus Shale: Challenges and Potential Opportunities, Environ. Sci. Technol. 2010, 44, 5679–5684, pp. 5680-81, available at http://pubs.acs.org/doi/pdf/10.1021/es903811p (same) (Ex. J); "How Does Well Completion Work?" Rigzone.com, available at http://www.rigzone.com/training/insight.asp?i_id=326 (describing well completion process) (Ex. K).

[9] U.S. BLM, White River Field Office Oil and Gas Development Proposed RMP Amendment and Final EIS Revised Biological Assessment, February 2015 (Ex. D).

[10] Schramm, E. 2011. What is flowback, and how does it differ from produced water? Institute for Energy and Environmental Research of Northeastern Pennsylvania Clearinghouse website, available at http://energy.wilkes.edu/pages/205.asp (Ex. L).

[11] Lynn, Steve. "Frack-water recycling lacking in Northern Colorado," BizWest.com, Oct. 16, 2013, available at http://bizwest.com/frack-water-recycling-lacking-in-northern-colorado-2/. (Ex. M.)

[12] *Id.*

depletion of vertical wells. While vertical wells are assumed to require 2.62 acre feet of water (as estimated in the PBO) and BLM reports total number of vertical wells multiplied by this standard depletion factor, BLM's logs report actual water use for horizontal drilling.[13] Those logs show that horizontal drilling typically entails fresh water depletion much greater than 2.62 acre feet per well. The average water use of horizontal drilling projects from 2011-2014 in the Field Offices covered by the PBO (White River, Grand Junction, Kremmling, Colorado River Valley, Gunnison, Uncompahgre, San Juan Public Lands, and Little Snake) was 11.6 acre feet of water.[14] Recent horizontal drilling projects in the Grand Junction Field Office in 2014 depleted 68.3 and 70.8 acre feet of freshwater.[15] The use of this technique is likely to increase. FEIS, Appendix K, PDF 367, 374, 380 (energy companies noting EIS's failure to consider advancements in this "widespread" technique).

The EIS itself seems to admit that the water depletion of horizontal drilling was not accounted for in the PBO, noting that additional consultation may be needed for projects that exceed an unspecified water depletion estimate – likely that provided in the PBO:

> The water depletion process also requires an annual estimate of freshwater use. Exploratory wells outside the [Mesaverde Play Area], particularly horizontal completions, may result in water use *significantly above the estimate*. Each drilling proposal is considered and impacts of freshwater use analyzed in environmental assessments during the consideration of APDs. If freshwater use increases dramatically, additional consultation with FWS would most likely be required.

FEIS, Ch. 4, PDF 134 (emphasis added). But this piecemeal approach masks the collective impact of horizontal drilling projects in the WRFO area in connection with other projects, and its overall impact on sensitive species including the endangered fish. Moreover, the trigger for additional consultation is unclear. The EIS does not specify what counts as a "dramatic[]" increase and relative to what standard – possibly, an increase above the "annual estimate of freshwater use" made in the 2008 PBO (3,227 acre feet in the White River Basin), or above some other annual estimate made by BLM would trigger consultation, but the reader is left guessing.

High-volume fracking or "massive fracs" requiring millions of gallons of water may even be performed on vertical wells and directional non-horizontal wells in the WRFO.[16] ("Although many horizontal wells are given massive fracs, many vertical wells and directional non-horizontal wells, such as those in the Williams Fork formation of western Colorado, are also given massive fracs."); RFD, p. 30 (geology, drilling depth, and drilling practices can "vary significantly from wellbore to wellbore" in the Mesaverde/Williams Fork formation). Again, the

[13] BLM Water Depletion Logs Reported to Fish and Wildlife Service, 2009-2014 (Ex. N).
[14] Table Summarizing Average Water Depletions for Horizontal Drilling Projects, 2009-2014. (Ex. O.)
[15] BLM, 2014 Water Depletion Log.
[16] Getches-Wilkinson Center for Natural Resources, Energy, and the Environment, Intermountain Oil and Gas BMP Project: Hydraulic Fracturing, available at http://www.oilandgasbmps.org/resources/fracing.php. (Ex. P.)

PBO erroneously assumes an average of 2.62 acre feet of water per well, although water use could far exceed this amount.

In addition, the water depletion logs disclose other oil and gas activities that have occurred over the past several years that are likely to continue and significantly impact water use in the Colorado River Basin. These activities were not accounted for in the PBO, although they are reasonably foreseeable as part of the RMPA. Infrastructure development projects, including pipeline and road improvement projects require high amounts of water (up to 29.1 and 9 acre feet of water in 2011, respectively),[17] but the PBO only accounts for water use associated with well production. Because new pipelines and roads are expected to be constructed under the RMPA, *see* EIS, Ch. 4, PDF 74, 84, the PBO must take into account the water depletion of these projects as well.

In sum, because the PBO does not assess the full scope of anticipated fluid mineral development activities on endangered fish in the Upper Colorado Basin, the Service cannot reasonably rely on the PBO to assess the RMPA's impacts on the endangered fish and its critical habitat. Further, because the Service has determined that any water depletion in the Upper Colorado River Basin may adversely affect the endangered fish, PBA, p. 1, the Service must complete formal consultation regarding the RMPA's water depletions.

In the alternative, the Service and BLM must reinitiate formal consultation regarding the RMPA's water depletion impacts on the endangered fish. "Reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and...[i]f new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered." 50 CFR § 402.16(b). New information reveals that horizontal drilling, hydraulic fracturing, and other related infrastructure projects in the WRFO planning area will require water depletions "to an extent not previously considered." *Id.*

In a reinitiated consultation, BLM and the Service must reevaluate not just the water depletion effects of fluid mineral development under the RMPA, but it must do so with respect to *all* fluid mineral development projected to occur throughout the entire western Colorado planning area. The PBO's water use projections for these other planning areas neither take into account increased water use due to hydraulic fracturing, horizontal drilling, and infrastructure projects, although these activities are also occurring in these areas and are expected to increase.[18]

Finally, BLM is not complying with the terms of the PBO, because it has failed to report to the Service actual water depletions of vertical and directional non-horizontal wells in the WRFO and other field offices covered by the PBO. *See* pp. 7-8 above; *see also* FWS Concurrence Letter, p. 4 ("All water depletions from the Colorado River Basin involved with

[17] BLM, 2011 Water Depletion Log.

[18] *See* 2011-2014 Water Depletion Logs (water depletion logs showing water use due to horizontal drilling in other field offices); PBA, p. 5 (projecting thousands of new drilling projects throughout Upper Colorado Basin).

fluid mineral extraction from BLM administered lands must be reported to the BLM state office annually so that they can be included in the annual water depletion report submitted to our Ecological Services Office in Grand Junction."). Instead it is reporting the number of vertical and directional wells drilled annually multiplied by a standard depletion factor that does not accurately reflect actual water use. This is despite the PBO's clear intent that actual water use should be monitored. *See* PBO, p. 5 ("The BLM State Office will track all projects that result in water depletions from the upper Colorado River Basin. The BLM will complete and submit a log of all water depleting projects by river sub-basin to the Service by October 31 of each year. *The logs showing depletion amounts resulting from wells drilled will be used to track compliance with the threshold depletion amount.*" [emphasis added].) Reporting of actual water use would ensure that water depletions are not exceeding the annual water depletion threshold. In a reinitiated consultation, the Service should require BLM to collect such data from operators and report actual water depletions (or the RMPA should include these measures), given the inherent uncertainties in predicting future water use.

### B. The Service Must Initiate Formal Consultation Regarding the Impacts of Spills on Endangered Fish.

The Service erroneously declined to initiate formal consultation regarding the effects of the RMPA on endangered fish, when it determined that implementation of the RMPA other than water depletion activities "may affect but is not likely to adversely affect" the endangered fish. "Formal" consultation is required when a proposed action is "likely to adversely affect" a species or its critical habitat. *See* 50 C.F.R. §§ 402.13(a), 402.14(b)(1). The Service's determination that RMPA implementation "is not likely to adversely affect" the endangered fish fails to take into account the increased risk of leaks and spills that will occur with increased fluid mineral development. These leaks and spills will pollute nearby streams, rivers, and stream-connected groundwater, exposing endangered fish to toxic pollutants and degrading their habitat.

#### 1. Accidental Spills and Leaks Are Foreseeable and Likely to Increase Under the RMPA.

As earlier comments pointed out, fluid mineral development activities within the Upper Colorado River Basin have resulted in nearly 500 spills in Rio Blanco County between 2000 and 2012, including a 90% increase in spills since 2000. FEIS, Appendix K, PDF 234. An analysis of spills reports within the Basin between January 1, 2008 and July 31, 2014 revealed 12 self-reported spills in the WRFO planning area that resulted in contamination of surface waters or groundwater, or an average of two spills per year.[19] The number could actually be higher, as spills commonly go unreported.[20] Currently, the number of actively producing wells in the

[19] *See* Upper Colorado River Basin Spills (Ex. Q, hereinafter "Spills Data"). This document consists of data reporting spills in the Upper Colorado River Basin that we compiled from the following sources: Colorado: Colorado Oil and Gas Conservation Commission, http://cogcc.state.co.us ("inspection/incident" database for "spill/release"); Utah: Utah Department of Environmental Quality, http://eqspillsps.deq.utah.gov/Search_Public.aspx; New Mexico: State of New Mexico Oil Conservation Division, https://wwwapps.emnrd.state.nm.us/ocd/ocdpermitting//Data/Incidents/Spills.aspx. The analysis does not include data from Wyoming or Arizona.

[20] Souther, Sara, et al. Biotic Impacts of Energy Development from Shale: Research Priorities and

assuming 197 wells/year and higher NSO costs + 61.2 grazing jobs + 328.8 employment jobs = 7,297.3 jobs). By BLM's own admission, this higher rate of development is plainly foreseeable. The PBA and PBO's forecast of 1,000 wells over a 15-year period (66 wells per year) is thus a gross underestimate of potential development in the GJFO planning area.

BLM's water depletion logs disclose other oil and gas activities that have occurred over the past several years that are likely to continue and significantly impact water use in the Colorado River Basin. These activities were not accounted for in the PBO, although they are reasonably foreseeable as part of the PRMP. Infrastructure development projects, including pipeline and road improvement projects require high amounts of water (up to 29.1 and 9 acre-feet of water in 2011, respectively),[17] but the PBO only accounts for water use associated with well construction and stimulation. Because new pipelines and roads are expected to be constructed under the PRMP, *see* FEIS 4-3, 4-23, the PBO must take into account the water depletion of these projects as well. Contrary to the PBO, such projects are no more "impossible" to predict than the number of wells drilled per year. *Cf.* PBO, p. 7. The RFD projects that maximum well construction in the GJFO would result in 2.9 miles of pipeline and 6.5 acres of road disturbance per section in "medium" to "very high" potential development areas, plus 0.7 miles of pipeline and 2 acres of road disturbance per section within "low to very low" potential areas. RFD, pp. 36-37; *see also* FEIS 4-23, 4-32 (road and pipeline construction accounted for in air quality analysis).

In sum, because the PBO does not assess the full scope of anticipated fluid mineral development activities in the Upper Colorado Basin, the Service cannot reasonably rely on the PBO to assess the PRMP's impacts on the endangered fish and its critical habitat. Because the Service has previously determined that any water depletion in the Upper Colorado River Basin may adversely affect the endangered fish, PBA, p. 1, the Service must complete formal consultation regarding the PRMP's water depletions.

In the alternative, the Service and BLM must reinitiate formal consultation regarding the water depletion impacts of all Upper Colorado Basin fluid mineral development on the endangered fish. "Reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and...[i]f new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered." 50 CFR § 402.16(b). New information reveals that horizontal drilling, hydraulic fracturing, and other related infrastructure projects in the GJFO planning area will require water depletions "to an extent not previously considered." *Id.*

In a reinitiated consultation, BLM and the Service must reevaluate not just the water depletion effects of fluid mineral development under the PRMP, but it must do so with respect to *all* fluid mineral development projected to occur throughout the entire western Colorado planning area. The PBO's water use projections for these other planning areas neither take into account increased water use due to hydraulic fracturing, horizontal drilling, and infrastructure

[17] BLM, 2011 Water Depletion Log.

projects, although these activities are also occurring in these areas and are expected to increase.[18] For example, for similar reasons discussed above, the PBO underestimates water use in the White River Field Office planning area.[19] Nor are these activities considered with respect to non-federal wells in the Basin, including the 1,200 non-federal wells that the PBA projects will be developed just within the GJFO planning area over a 15-year period. Already, 1,066 well permits were issued in 2014 alone in Garfield County – a large portion of which may be within the GJFO planning area.[20] Further, state data show that horizontal drilling is on the rise throughout Colorado, and is making up a larger portion of all new wells drilled. New horizontal wells increased from 95 wells in 2008 to 2,457 wells in 2014.[21] These wells also make up a larger proportion of total new wells, increasing from 0.01% of new wells in 2008 to 58% of all new wells in 2014.[22] In 2015, so far, 62% of new wells are horizontally drilled.[23]

Finally, BLM is not complying with the terms of the PBO, because it has failed to report to the Service actual water depletions of vertical and directional non-horizontal wells in the GJFO and other field offices covered by the PBO. *See* p. 5 above. Instead it is reporting the number of vertical and directional wells drilled annually multiplied by a standard depletion factor that does not accurately reflect actual water use. This is despite the PBO's clear intent that actual water use should be monitored. *See* PBO, p. 5 ("The BLM State Office will track all projects that result in water depletions from the upper Colorado River Basin. The BLM will complete and submit a log of all water depleting projects by river sub-basin to the Service by October 31 of each year. *The logs showing depletion amounts resulting from wells drilled will be used to track compliance with the threshold depletion amount.*" [emphasis added].) Reporting of actual water use would ensure that water depletions are not exceeding the annual water depletion threshold. In a reinitiated consultation, the Service should require BLM to collect such data from operators and report actual water depletions (or the PRMP should include these measures), given the inherent uncertainties in predicting future water use.

### B. The Service Must Initiate Formal Consultation Regarding the Impacts of Spills on Endangered Fish.

An increased risk of leaks and spills resulting from increased fluid mineral development is likely to adversely affect the endangered fish - all of which have critical habitat within the GJFO planning area. FEIS 3-108-109 (discussing critical habitat locations). These leaks and spills will pollute nearby streams, rivers, and stream-connected groundwater, exposing the endangered fish to toxic pollutants and degrading their habitat. The PRMP, however, does not incorporate adequate measures to ensure that the endangered fish are adequately protected from

---

[18] *See* BLM, 2011-2014 Water Depletion Logs (water depletion logs showing water use due to horizontal drilling in other field offices); PBA, p. 5 (projecting thousands of new drilling projects throughout Upper Colorado Basin).
[19] Center for Biological Diversity, Rocky Mountain Wild, Living Rivers, & Utah Rivers Council, Protest Letter Regarding the White River Resource Management Plan Amendment & accompanying references, April 27, 2015, pp. 5-10 (describing underestimates of water use in hydraulic fracturing and horizontal drilling).
[20] COGCC, Colorado Weekly & Monthly Oil & Gas Statistics, May 4, 2015, p. 2, available at https://cogcc.state.co.us/documents/data/downloads/statistics/CoWklyMnthlyOGStats.pdf.
[21] *Id.*, p. 16.
[22] *Id.*, p. 2.
[23] *Id.*

# *Gutierrezia elegans*
**Author: A. Schneider & P. Lyon**

**Lone Mesa snakeweed**

**Asteraceae (sunflower family)**

Close up of *Gutierrezia elegans* by Peggy Lyon

## Ranks and Status

**Global rank:** G1
**State rank:** S1
**Federal protection status:** USFS Sensitive, BLM Sensitive
**State protection status:** None

Close up of *Gutierrezia elegans*. Photo ©Al Schneider, www.swcoloradowildflowers.com.

## Description and Phenology

**General description:** A low, compact subshrub with woody caudex branches and decumbent-ascending leafy stems, yellow flowers in short-pedunculate heads in congested corymboid clusters, and short 3-nerved leaves (Schneider et al. 2008).

**Look Alikes:** Differs from other species of *Gutierrezia* in having larger flowers and shorter, broader leaves (CNHP 2012).

**Phenology:** Flowers July through early September; fruits are produced in August and September (Colorado Natural Heritage Program 2012).

*Gutierrezia elegans:* by Dorothy DePaulo

## Habitat

This species is found on outcrops of grayish, argillaceous, bare Mancos shale outcrops with thin soil over the shale. *Gutierrezia elegans* is scattered to abundant in the barrens and also occurs with *Artemisia nova* and other species in sites with deeper soil over the shale. Associated species inlcude *Helianthella microcephala*, *Tetraneuris acaulis*, *Eriogonum lonchophyllum*, *Petradoria*

*pumila, Astragalus missouriensis* var. *amphibolus,* and *Heterotheca villosa Pinus ponderosa* and pinyon-juniper characterize the surrounding slopes (Schneider et al. 2008, CNHP 2012).

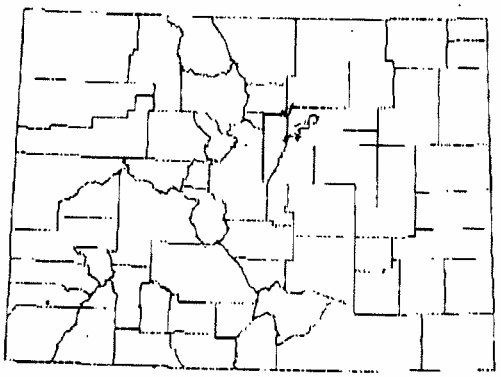
**Elevation Range:** 7,526 - 7,808 feet (2,294 - 2,380 meters)

Habitat of *Gutierrezia elegans* by Peggy Lyon

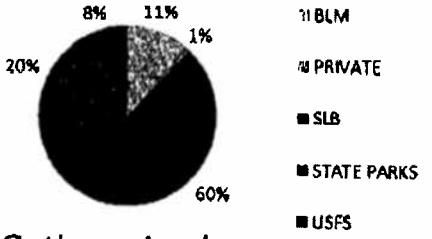
## Distribution

**Colorado endemic:** Yes

**Global range:** This species is known only from Dolores County, Colorado.



Distribution of *Gutierrezia elegans* in Colorado




*Gutierrezia elegans*

Distribution of *Gutierrezia elegans* in Colorado according to mapped land ownership/management boundaries (CNHP 2012, COMaP v9 ).

## Threats and Management Issues

The species may be threatened by oil and gas development, seismic testing, excessive or repeated erosion, motorized recreation, over-grazing, water development, and climate change (Panjabi et al. 2011).

## References

Ackerfield, J. 2012. The Flora of Colorado. Colorado State University Herbarium. 433 pp.

Colorado Natural Heritage Program. 2005. The Second Annual Colorado Rare Plant Symposium: G1 Plants of Colorado. Symposium Minutes. Available on-line http://www.cnhp.colostate.edu/teams/botany.asp#symposia.

Colorado Natural Heritage Program. 2010. The Seventh Annual Colorado Rare Plant Symposium: G1 Plants of Colorado. Symposium Minutes. Available on-line http://www.cnhp.colostate.edu/teams/botany.asp#symposia.

Colorado Natural Heritage Program. 2012. Biodiversity Tracking and Conservation System. Colorado State University, Fort Collins, CO.

Lavender, A.E., M.M. Fink, S.E. Linn, D.M. Theobald. 2011. Colorado Ownership, Management, and Protection v9 Database. Colorado Natural Heritage Program and Geospatial Centroid, Colorado State University, Fort Collins, CO. (30 September).

Neely, B., S. Panjabi, E. Lane, P. Lewis, C. Dawson, A. Kratz, B. Kurzel, T. Hogan, J. Handwerk, S. Krishnan, J. Neale, and N. Ripley. 2009. Colorado Rare Plant Conservation Strategy, Developed by the Colorado Rare Plant conservation Initiative. The Nature Conservancy, Boulder, Colorado, 117 pp.

Panjabi, S., B. Neely and P. Lyon. 2011. Preliminary Conservation Action Plan for Rare Plants in the Plateau Creek and Miramonte Reservoir West Priority Action Areas. Prepared by The Nature

Conservancy and the Colorado Natural Heritage Program. Unpublished report prepared for the National Fish and Wildlife Foundation. 28 pp.

Schneider, A. 2013. Wildflowers, Ferns, and Trees of the Four Corners Regions of Colorado, New Mexico, Arizona, and Utah. Accessed on-line at http://www.swcoloradowildflowers.com.

Schneider, A., P. Lyon, and G. Nesom. 2008. Gutierrezia elegans sp. nov. (Asteraceae: Astereae), a shale barren endemic of southwestern Colorado. J. Bot. Res. Inst. Texas 2(2): 771-774.

USDA, NRCS. 2013. The PLANTS Database. National Plant Data Team, Greensboro, NC 27401-4901 USA.

Weber, W. A. and R. C. Wittmann. 2012. Colorado Flora, Western Slope, A Field Guide to the Vascular Plants, Fourth Edition. Boulder, Colorado. 532 pp.

## Last Updated

2013-02-26

# *Physaria pulvinata*
## Author: O'Kane & Reveal

**Cushion bladderpod**

**Brassicaceae (mustard family)**

Close up of *Physaria pulvinata*. Photo ©Al Schneider, www.swcoloradowildflowers.com.

Close up of *Physaria pulvinata* fruit. Photo ©Al Schneider, www.swcoloradowildflowers.com.

Close up of *Physaria pulvinata* flowers. Photo ©Al Schneider, www.swcoloradowildflowers.com.

## Taxonomic Comments

Recently described species by O'Kane and Reveal (2006).

## Ranks and Status

**Global rank:** G1
**State rank:** S1
**Federal protection status:** USFS Sensitive, BLM Sensitive
**State protection status:** None

## Description and Phenology

**General description:** Plants are low and compact, densely matted and densely hairy. A long-lived perennial, less that 3 dm across with reddish stems and gray-green foliage arising from a deep-seated taproot terminated by a buried, densely branched caudex system of up to several hundred branches each ending in a tufted cluster of leaves. Flowers are yellow with four narrowly spatulate petals 4-7 mm long. Fruits are ellipsoid, compressed, 4-6 mm long and densely

*Physaria pulvinata*: artwork in progress

pubescent (O'Kane and Reveal 2006).

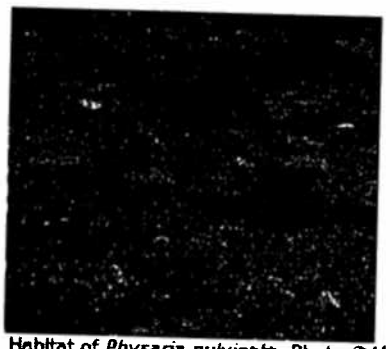
**Look Alikes:** Not likely to be confused with other species in this habitat in this part of Colorado.

**Phenology:** Plants flower in June-July and produce fruit in August (Colorado Natural Heritage Program 2012).

## Habitat

This species is known from widely scattered outcrops of grayish, argillaceous (Mancos) shale. It grows in openings between low shrubs *Artemisia nova, Chrysopsis,* and *Tetraneuris*, and forbs *Sphaeralcea* and *Cryptantha* (O'Kane and Reveal 2006).

**Elevation Range:** 7,543 - 8,487 feet (2,299 - 2,587 meters)



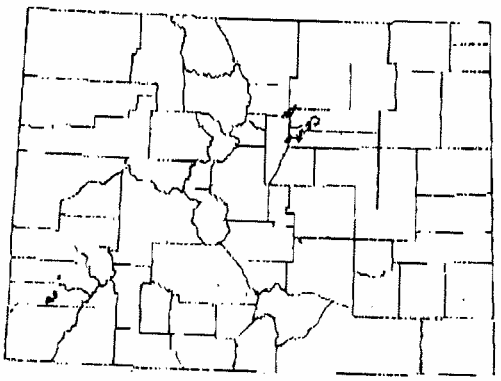
Habitat of *Physaria pulvinata*. Photo ©Al Schneider, www.swcoloradowildflowers.com.

Habitat of *Physaria pulvinata* by Bernadette Kuhn

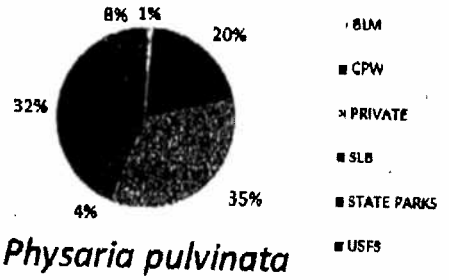
## Distribution

**Colorado endemic:** Yes

**Global range:** Endemic to Colorado; known from San Miguel and Dolores counties. Estimated range is 55 square kilometers (21 square miles), calculated in GIS by drawing a minimum convex polygon around the known occurrences (calculated by the Colorado Natural Heritage Program in 2008).



Distribution of *Physaria pulvinata* in Colorado

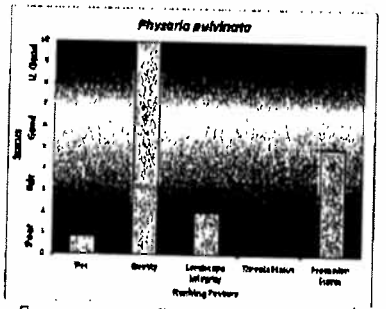



*Physaria pulvinata*

Distribution of *Physaria pulvinata* in Colorado according to mapped land ownership/management boundaries (CNHP 2012, COMaP v9 ).

## Threats and Management Issues

The primary threat is considered to be recreation, both motorized and non-motorized. This species also is threatened by over-grazing, and removal of shale for road work (Colorado Natural Heritage Program 2012, O'Kane and and Reveal 2006).




Summary results of an analysis of the status of *Physaria pulvinata* based on several ranking factors. This species was concluded to be "Weakly Conserved". From Rondeau et al. 2011.

## References

Ackerfield, J. 2012. The Flora of Colorado. Colorado State University Herbarium. 433 pp.

Colorado Natural Heritage Program. 2005. The Second Annual Colorado Rare Plant Symposium: G1 Plants of Colorado. Symposium Minutes. Available on-line http://www.cnhp.colostate.edu/teams/botany.asp#symposia.

Colorado Natural Heritage Program. 2010. The Seventh Annual Colorado Rare Plant Symposium: G1 Plants of Colorado. Symposium Minutes. Available on-line http://www.cnhp.colostate.edu/teams/botany.asp#symposia.

Colorado Natural Heritage Program. 2012. Biodiversity Tracking and Conservation System. Colorado State University, Fort Collins, CO.

Flora of North America Editorial Committee, ed. (FNA). 1993+. Flora of North America North of Mexico. Oxford Univ. Press, New York, Oxford.

Lavender, A.E., M.M. Fink, S.E. Linn, D.M. Theobald. 2011. Colorado Ownership, Management, and Protection v9 Database. Colorado Natural Heritage Program and Geospatial Centroid, Colorado State University, Fort Collins, CO. (30 September).

Neely, B., S. Panjabi, E. Lane, P. Lewis, C. Dawson, A. Kratz, B. Kurzel, T. Hogan, J. Handwerk, S. Krishnan, J. Neale, and N. Ripley. 2009. Colorado Rare Plant Conservation Strategy, Developed by the Colorado Rare Plant conservation Initiative. The Nature Conservancy, Boulder, Colorado, 117 pp.

O'Kane, S. L. and J. L. Reveal. 2006. Physaria pulvinata (Brassicaceae), a new species from southwestern Colorado. Brittonia 58(1): 74-77.

Panjabi, S., B. Neely and P. Lyon. 2011. Preliminary Conservation Action Plan for Rare Plants in the Plateau Creek and Miramonte Reservoir West Priority Action Areas. Prepared by The Nature Conservancy and the Colorado Natural Heritage Program. Unpublished report prepared for the National Fish and Wildlife Foundation. 28 pp.

Reveal, J.L. 2005. University Of Maryland: An Array of Botanical Images, Physaria pulvinata. URL: http://www.life.umd.edu/emeritus/reveal

Rondeau, R., K. Decker, J. Handwerk, J. Siemers, L. Grunau, and C. Pague. 2011. The state of Colorado's biodiversity 2011. Prepared for The Nature Conservancy. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado.

Schneider, A. 2013. Wildflowers, Ferns, and Trees of the Four Corners Regions of Colorado, New Mexico, Arizona, and Utah. Accessed on-line at http://www.swcoloradowildflowers.com.

Weber, W. A. and R. C. Wittmann. 2012. Colorado Flora, Western Slope, A Field Guide to the Vascular Plants, Fourth Edition. Boulder, Colorado. 532 pp.

## Last Updated

2013-02-04

# Level 4 Potential Conservation Area (PCA) Report

**Name** Plateau Creek **Site Code** S.USCOHP*26172

## IDENTIFIERS

**Site ID** 2340 **Site Class** PCA

**Site Alias** None

**Network of Conservation Areas (NCA)**

| NCA Site ID | NCA Site Code | NCA Site Name |
|---|---|---|
| - | | No Data |

**Site Relations** No Data

## SITE DESCRIPTION

| | | | | |
|---|---|---|---|---|
| **Minimum Elevation** | 7,400.00 | **Feet** | 2,255.52 | **Meters** |
| **Maximum Elevation** | 7,900.00 | **Feet** | 2,407.92 | **Meters** |

**Site Description**

The site includes sparsely vegetated areas of light gray Mancos Shale, and sagebrush flats with Gambel oak (*Quercus gambelii*) woodland on upper slopes. The shale areas support a number of unusual plant species, including the recently described cushion bladderpod (*Physaria pulvinata*) and Lone Mesa snakeweed (*Gutierrezia elegans*). another species yet to be described (an un-named *Packera*) is known from this site. Other species that occur on the shale are mat penstemon (*Penstemon caespitosus*), *Tetraneuris* sp., common Townsend daisy (*Townsendia leptotes*), buckwheat (*Eriogonum lonchophyllum*), and Missouri milkvetch (*Astragalus missouriensis* ssp. *amphibolus*). Black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) occur together in the sagebrush areas.

**Key Environmental Factors**

No Data

**Climate Description**

No Data

**Land Use History**

The area has primarily been used for cattle grazing and big game hunting. Lone Mesa State Park has not yet been opened to the public.

**Cultural Features**

No Data

## SITE DESIGN

**Site Map** Y - Yes **Mapped Date** 06/06/2009

**Designer** Lyon, M.J.

**Boundary Justification**

The boundary includes all known locations of cushion bladderpod (*Physaria pulvinata*) and Lone Mesa snakeweed (*Gutierrezia elegans*), as well as a population of *Physaria cinerea*. An un-named *Packera* species is included within the *Physaria pulvinata* occurrences. Some additional habitat that appears suitable for these species, but is not known to be occupied, is included. With additional surveys, this boundary may be adjusted in the future.

**Primary Area** 11,983.94 **Acres** 4,849.75 **Hectares**

## SITE SIGNIFICANCE

**Biodiversity Significance Rank** B1: Outstanding Biodiversity Significance

**Biodiversity Significance Comments**

The site supports excellent (A-ranked) and good (B-ranked) occurrences of two plants that are globally critically imperiled (G1/S1), cushion bladderpod (*Physaria pulvinata*) and Lone Mesa snakeweed (*Gutierrezia elegans*). There is also a good (B-ranked) occurrence of the state imperiled (G5/S1) King's clover (*Trifolium kingii*).

**Other Values Rank** No Data

**Other Values Comments**

No Data

# Level 4 Potential Conservation Area (PCA) Report

**Name** Plateau Creek **Site Code** S.USCOHP*26172

## ASSOCIATED ELEMENTS OF BIODIVERSITY

| Element State ID | State Scientific Name | State Common Name | Global Rank | State Rank | Driving Site Rank |
|---|---|---|---|---|---|
| 40393 | *Physaria pulvinata* | Cushion bladderpod | G1 | S1 | Y |
| 40393 | *Physaria pulvinata* | Cushion bladderpod | G1 | S1 | N |
| 40393 | *Physaria pulvinata* | Cushion bladderpod | G1 | S1 | Y |
| 44159 | *Gutierrezia elegans* | Lone Mesa snakeweed | G1 | S1 | Y |
| 23550 | *Trifolium kingii* | King's clover | G5 | S1 | N |

## LAND MANAGMENT ISSUES

**Land Use Comments**
No Data

**Natural Hazard Comments**
No Data

**Exotics Comments**
Although not competing directly with the rare plants, there are several exotics, including musk thistle ( *Carduus nutans*), mountain tarweed (*Madia glomerata*) and a number of pasture grasses.

**Offsite**
No Data

**Information Needs**
Further surveys are warranted for *Gutierrezia elegans* and *Physaria pulvinata*. Confirmation of taxonomic status and publication of *Physaria cnema* and the *Packera* species (if they are determined to be good species) is needed.

## REFERENCES


| Reference ID | Full Citation |
|---|---|
| 198365 | Lyon, M.J. 2009. Final Report: Rare Plant Survey of Lone Mesa State Park. Dolores County, Colorado. Colorado Natural Heritage Program, Fort Collins, CO. |
| 194256 | Lyon, P. and J. Hanson. 2006. Final Report: 2005 Rare Plant Survey of San Juan Public Lands, Colorado. Colorado Natural Heritage Program, Fort Collins, CO. |


## ADDITIONAL TOPICS

**Additional Topics**
Original site design by Lyon, M.J. 2005-10-16.

## LOCATORS

**Nation** United States
**State** Colorado
**Latitude** 374138N
**Longitude** 1082722W

| Quad Code | Quad Name |
|---|---|
| 37108-F4 | Willow Spring |

**County**
Dolores (CO)

| Watershed Code | Watershed Name |
|---|---|
| 14030002 | Upper Dolores |

## VERSION

**Version Date** 06/06/2009
**Version Author** Lyon, M.J.

## DISCLAIMER



Print Date 11/29/2015

# Level 4 Potential Conservation Area (PCA) Report

**Name** Plateau Creek

**Site Code** S.USCOHP*26172

These data are a product and property of Colorado State University, Colorado Natural Heritage Program (CNHP). These data are strictly "on loan" and should be considered "works in progress". Data maintained in the Colorado Natural Heritage Program database are an integral part of ongoing research at CSU and reflect the observations of many scientists, institutions and our current state of knowledge. These data are acquired from various sources, with varying levels of accuracy, and are continually being updated and revised. Many areas have never been surveyed and the absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. These data should not be regarded as a substitute for on-site surveys required for environmental assessments. Absence of evidence is NOT evidence of absence. Absence of any data does not mean that other resources of special concern do not occur, but rather CNHP files do not currently contain information to document this presence. CNHP is not responsible for whether other, non-CNHP data providers have secured landowner permission for data collected.

These data are provided for non-commercial purposes only. Under no circumstances are data to be distributed in any fashion to outside parties. To ensure accurate application of data, tabular and narrative components must be evaluated in conjunction with spatial components. Failure to do so constitutes a misuse of the data. The Colorado Natural Heritage Program shall have no liability or responsibility to the data users, or any other person or entity with respect to liability, loss, or damage caused or alleged to be caused directly or indirectly by the data, including but not limited to any interruption of service, loss of business, anticipatory profits or indirect, special, or consequential damages resulting from the use of operation of the data. Data users hereby agree to hold CNHP, Colorado State University, and the State of Colorado harmless from any claim, demand, cause of action, loss, damage or expense from or related to data users use of or reliance on the data, regardless of the cause or nature thereof, and even in the event that such cause is attributable to the negligence or misconduct of CNHP.

These data are provided on an as-is basis, as-available basis without warranties of any kind, expressed or implied, INCLUDING (BUT NOT LIMITED TO) WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT. Although CNHP maintains high standards of data quality control, CNHP, Colorado State University, and the State of Colorado further expressly disclaim any warranty that the data are error-free or current as of the date supplied



Print Date 11/29/2015

**UNITED STATES DEPARTMENT OF THE INTERIOR**
**BUREAU OF LAND MANAGEMENT**
**COLORADO STATE OFFICE**
**2850 YOUNGFIELD STREET**
**LAKEWOOD, COLORADO 80215-7093**

In Reply Refer To:
6840 (CO-932) I

April 1, 2011

EMS TRANSMISSION 04/01/2011
Instruction Memorandum No. CO-2011-022
Expires: 09/30/2012

To: District Managers and Field Office Managers

From: State Director

Subject: Revised Process for Tracking and Reporting Water Depletions Associated with Fluid Minerals Development on Bureau of Land Management (BLM) Lands

**Program Area:** Fisheries/Threatened and Endangered Species

**Purpose:** The BLM Colorado is operating under the terms and conditions of a Programmatic Biological Opinion (PBO), signed on December 19, 2008 (ES/GJ-6-CO-08-F-0006). The purpose of the PBO is to streamline the consultation process for both the BLM and the U.S. Fish and Wildlife Service (FWS), by allowing field offices to track water depletions associated with fluid minerals actions over the course of the fiscal year and then report all depletions in a standardized log to the Colorado State Office. The PBO addresses water depletions associated with fluid minerals development on BLM lands for a period of approximately 15-20 years. The estimates were based on the best information available in 2008. The PBO estimated that each gas well would deplete (on average): 0.77 acre-feet (in the Colorado and Gunnison River Basins), 1.11 acre-feet (in the Dolores River Basin), and 2.62 acre-feet (in the Yampa and White River Basins). The variation in depletion amounts between different river basins was due to different drilling depths to the gas reservoir (deeper drilling requires more water) and differing degrees of water re-use (operators in the Colorado River Basin re-use a lot of their drilling water resulting in less water depleted). All of the estimates in the PBO were based on using conventional vertical drilling technology.

**Policy/Action:** The current PBO allows for up to 4,046 acre-feet of water depletion associated with fluid minerals development activities on BLM lands per year across all basins in western Colorado. Based on completed depletion logs for 2009 and 2010, the depletion amounts are far below the 4,046 acre-foot threshold (975 acre-feet depleted by 514 wells in Fiscal Year (FY) 2009, and 513 acre-feet depleted by 360 wells in FY 2010).

Even though the total water depletion estimates are still accurate for conventional vertical and directional wells and the depletion logs clearly show that we are still far below the 4,046 acre-foot threshold, changes in drilling and completion technology such as horizontal drilling and multi-stage fracking require that we gather additional data.

According to some estimates, a horizontally-drilled well results in a water depletion between 7 and 20+ acre-feet per well, depending on the individual characteristics of the well. On a per well basis, new horizontal drilling and completion techniques appear to use considerably more water; however, depending on the thickness of the target formation, a typical horizontal well can replace between 5 and 20 conventional vertical wells. Another factor to consider is that in many areas water is being recycled and used in subsequent wells. Because of the potential reduction in the total number of wells and the increased use of recycled water, additional data is needed in order to determine if more or less total water is being used when horizontal wells and multi-stage fracking are factored into our calculations.

In an effort to determine if the advent of horizontal drilling will result in the BLM exceeding the 4,046 acre-foot threshold in the PBO, each BLM Field Office in western Colorado will be required to track the number of wells drilled in two ways (Note: this Instruction Memorandum (IM) supersedes the guidance for tracking and reporting of water depletions associated with fluid minerals development given in CO-IM-2010-023):

1. **Conventional vertical wells drilled:** Each field office will sum the number of vertical wells drilled and apply the depletion amounts (0.77 af, 1.11 af, or 2.62 af) per well given in the PBO for that field office (i.e.; White River Field Office, 32 wells drilled @ 2.62 af/well = 83.8 af depleted). This is the exact same log that each office completed in 2009 and 2010.

2. **Horizontal wells drilled:** Each field office will track each horizontal well drilled and request a net water use report for each well from the operator. The water use report should provide the total amount of fresh water used to drill the well – if recovered water is reused to drill multiple wells, the operator should report only the new fresh water used at a given well. The water use reports will allow the BLM to calculate the total depletion amount for horizontal wells by river basin **and** provide information on how much water is depleted by an "average" horizontal well (it will likely take more than one year's worth of data to determine an average depletion amount for a horizontal well). This log will include a depletion amount and location for each horizontal well drilled.

In October 2011, the BLM will look at the depletion amounts for the 2011 fiscal year and determine if the 4,046 acre-foot threshold has been exceeded; if so, the BLM will re-initiate consultation with the FWS. If not, the BLM will submit our depletion log(s) as required in the PBO. With the 2011 data in hand, and with estimates of drilling activity for 2012, the BLM will decide by 01/01/2012 if a new PBO for depletions associated with fluid minerals activities on BLM lands is needed.

**Timeframe:** This IM is effective immediately.

**Budget Impact:** None.

**Background:** Several documents pertaining to water depletions and the BLM's fluid minerals program are posted on the BLM server at:
\\Ilmcoso3ds2\co\pub\Fluid Minerals\WaterDepletion_RecoveryAgreements

Files of interest on the server include:
--Wells drilled and water depletion amount logs for 2009 and 2010
--CO-IM-2010-023
--Programmatic Biological Assessment (PBA) for the BLM's Fluid Minerals Program in Western Colorado Regarding Water Depletions and Effects on the Four Endangered Big River Fishes: Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*). The PBA includes detailed background information as well as a description of how the depletion amounts for fluid minerals activities were calculated.

**Directives Affected:** This IM affects the BLM Manual 6840, Special Status Species Management.

**Coordination:** This IM was prepared with input from Jerry Strahan, Fluid Minerals Branch Chief, at the BLM Colorado State Office.

**Contact:** If you have any questions about the above guidance, please contact Jay Thompson, Fisheries & Riparian Program Lead, at (303) 239-3724.

Signed by:
Lynn E. Rust
Acting State Director

Authenticated by:
Cathy Cooney
Branch of IRM & Access