



November 14, 2016

2016 NOV 14 AM 10:11  
DO-5111  
CO STATE OFFICE  
COC7999

**Via FEDERAL EXPRESS OVERNIGHT MAIL**

Ruth Welch  
State Director  
Colorado State Office  
Bureau of Land Management  
2850 Youngfield St.  
Lakewood, CO 80215

**Re: *Protest of BLM December 8<sup>th</sup> 2016 Colorado Royal Gorge-Grand Junction  
Competitive Oil and Gas Lease Sale.***

Dear Director Welch:

The Center for Biological Diversity (the “Center” or “CBD”) and the Sierra Club hereby formally protest the Bureau of Land Management’s (“BLM”) planned December 8, 2016 oil and gas lease sale, the Determination of NEPA Adequacy (“DNA”)( DOI-BLM-CO-N040-2016-0044-DNA) for the sale of 25 parcels containing 18,333.780 acres in the Grand Junction and Colorado River Valley Field Offices in Mesa and Garfield Counties, and the Environmental Assessment (“EA”)( DOI-BLM-CO-F020-2016-0013-EA) evaluating the sale of six parcels encompassing 1,801.63 acres of federal lands in the Royal Gorge Field Office in Huerfano, Las Animas, Lincoln, and Washington Counties pursuant to 40 CFR §3120.1-3.

We formally protest the inclusion of each of the 31 parcels of federal minerals for oil and gas leasing, covering 20,135.41 acres in the State of Colorado. Parcels included in this protest are listed as follows:

**Colorado River Valley Field Office**

SERIAL #: COC77998 PARCEL ID: 7588	SERIAL #: COC77999 PARCEL ID: 7917
------------------------------------	------------------------------------

**Grand Junction Field Office**

SERIAL #: COC77981 PARCEL ID: 7629	SERIAL #: COC77987 PARCEL ID: 7603	SERIAL #: COC77988 PARCEL ID: 7604	SERIAL #: COC77989 PARCEL ID: 7602	SERIAL #: COC77990 PARCEL ID: 7614	SERIAL #: COC77991 PARCEL ID: 7615	SERIAL #: COC77992 PARCEL ID: 7617
---	---	---	---	---	---	---

SERIAL #: COC77993 PARCEL ID: 7618	SERIAL #: COC77994 PARCEL ID: 7584	SERIAL #: COC77995 PARCEL ID: 7585	SERIAL #: COC77996 PARCEL ID: 7586	SERIAL #: COC77997 PARCEL ID: 7587	SERIAL #: COC78000 PARCEL ID: 7598	SERIAL #: COC78001 PARCEL ID: 7599
SERIAL #: COC78002 PARCEL ID: 7611	SERIAL #: COC78003 PARCEL ID: 7612	SERIAL #: COC78004 PARCEL ID: 7613	SERIAL #: COC78005 PARCEL ID: 7616	SERIAL #: COC78006 PARCEL ID: 7620	SERIAL #: COC78007 PARCEL ID: 7622	SERIAL #: COC78008 PARCEL ID: 7625
SERIAL #: COC78009 PARCEL ID: 7626	SERIAL #: COC78010 PARCEL ID: 7600					

**Royal Gorge Field Office**

SERIAL #: COC77980 PARCEL ID: 7607	SERIAL #: COC77982 PARCEL ID: 7591	SERIAL #: COC77983 PARCEL ID: 7592	SERIAL #: COC77984 PARCEL ID: 7593	SERIAL #: COC77985 PARCEL ID: 7590	SERIAL #: COC77986 PARCEL ID: 7583
---	---	---	---	---	---

**PROTEST**

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

This Protest is filed on behalf of the Center for Biological Diversity and the Sierra Club  
by:

Diana Dascalu-Joffe  
Senior Attorney  
Center for Biological Diversity  
1536 Wynkoop Street, Suite 421  
Denver, CO 80202  
720-925-2521  
[ddascalujoffe@biologicaldiversity.org](mailto:ddascalujoffe@biologicaldiversity.org)

Katie Schaefer  
Associate Attorney, Sierra Club  
2101 Webster St. Suite 1300  
Oakland, CA 94612  
415.977.5745  
[katie.schaefer@sierraclub.org](mailto:katie.schaefer@sierraclub.org)

2016 NOV 14 PM 10:11  
 CO STATE OFFICE  
 PAGES 2

The Center is a non-profit environmental organization with over 48,500 members, many of whom live and recreate 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 their habitats in Colorado. 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 rare, endangered and threatened species like Colorado River endangered fish species (Colorado Pikeminnow and Razorback Sucker), endangered plant species like the DeBeque phacelia and Parachute beardtongue, and big game such as mule deer and elk. The Center's board, staff, and members use the public lands in Colorado, 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.

The Sierra Club is a national nonprofit organization of approximately 625,000 members dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. The Rocky Mountain Chapter of the Sierra Club has approximately 17,000 members in the state of Colorado. The Sierra Club has members who live and recreate in the Grand Junction, Colorado River Valley, and Royal Gorge Field Office planning areas. Sierra Club members use the public lands in Colorado, including the lands and waters that would be affected by actions under the lease sale, for quiet recreation, scientific research, aesthetic pursuits, and spiritual renewal. These areas would be threatened by increased oil and gas development that could result from the proposed lease sale.

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

BLM's proposed decision to lease the parcels listed above is procedurally and substantively flawed for the reasons discussed below and in the Center for Biological Diversity, et al. comments on the Environmental Assessment (EA) for the proposed lease sale, incorporated here by reference.<sup>1</sup>

For the many reasons discussed in our EA comments, and this protest, BLM cannot rely on a Determination of NEPA adequacy for the Grand Junction and Colorado River Valley parcels. Various site-specific impacts of the proposed leasing are not addressed in the governing RMP-EISs, and the RMP-EISs do not otherwise fully disclose foreseeable environmental effects of new oil and gas development, including hydraulic fracturing or "fracking." BLM must prepare an EIS, or, at minimum, address these effects in a revised EA. Likewise, the Environmental Assessment for the Royal Gorge parcels lack adequate site-specific analysis of oil and gas leasing impacts and cannot tier to the outdated Royal Gorge and Northeastern Colorado RMPs, which have not been revised in over 20 years.

---

<sup>1</sup> The Center for Biological Diversity et al., Comments on Royal Gorge-Grand Junction-Colorado River Valley-Tres Rios Lease Sale: November 2016 Lease Parcels (submitted June 13, 2016).

DOLE  
CO STATE OFFICE  
COSTA MOUNTAIN  
7/6/16 14 AM 10:11

**A. BLM Cannot Rely on a Determination of NEPA Adequacy for the Grand Junction and Colorado River Valley Parcels.**

BLM's preparation of Determination of NEPA Adequacy for parcels within the Grand Junction and Colorado River Valley Field Offices is wholly improper and violates NEPA. The DNAs tier to the Final Environmental Impact Statement for the Resource Management Plan ("RMP-EIS" and "RMP") governing each respective field office, but BLM's reliance on the RMP-EISs is woefully misplaced. Each of the EISs fails to address site-specific impacts that could foreseeably result from new leasing, including impacts on wildlife, water resources, geological hazards, and air quality. Nor do the RMP-EISs provide a complete analysis of the cumulative impacts of new oil and gas development, including greenhouse gas emissions, to properly support a DNA. Further, new information has arisen since the RMPs were adopted, revealing significant, reasonably foreseeable effects that BLM must take into account in its leasing decision, but which the RMPs do not, and could not have, considered.

Case law and NEPA itself make clear that BLM is required to perform and disclose an analysis of environmental impacts *before* the issuance of an oil and gas lease. *N.M. ex rel. Richardson v. BLM*, 565 F.3d 683, 716 (10th Cir. 2009). In the Tenth Circuit, "assessment of all 'reasonably foreseeable' impacts must occur at the earliest practicable point, and must take place before an irretrievable commitment of resources' is made." *Id.* at 718 (citations omitted).

The issuance of a lease is an "irretrievable commitment of resources." *See id.*; *Sierra Club v. Peterson*, 717 F.2d 1409, 1414 (D.C. Cir. 1983); *Pennaco Energy, Inc. v. U.S. Dep't of Interior*, 377 F.3d 1147, 1160 (10th Cir. 2004). Under BLM's interpretation of its regulations, absent a no surface occupancy stipulation, a lessee cannot be prohibited entirely "from surface use of the leased parcel once its lease is final." *See Richardson*, 565 F.3d at 718 (citing 43 C.F.R. § 3101.1-2 ["A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to: Stipulations attached to the lease . . . [and other] reasonable measures . . ."]); *see also* BLM Handbook H-1624-1 ("By law, these impacts [from oil and gas development] must be analyzed before the agency makes an irreversible commitment. In the fluid minerals program, this commitment occurs at the point of lease issuance.").

Instead of disclosing reasonably foreseeable impacts, however, BLM improperly tiers to the EISs for the respective governing RMPs, in violation of NEPA. The RMP-EISs lack any analysis of the impacts of oil and gas development in the specific local areas at issue, and BLM unlawfully postpones disclosure of site-specific impacts when such analysis is possible now. The RMPs also contain incomplete or inadequate analysis of greenhouse gas emissions and hydraulic fracturing, hiding the full climate change impacts and public health risks of new leasing. Finally, new information arising since the RMPs' adoption concerning significant public health, water depletion, seismic, endangered fish, and cumulative effects of fracking renders the RMPs outdated and unreliable.

**1. Site-Specific Analysis Is Required But Lacking.**

2016 NOV 14 AM 10:11  
D91-6411  
CO STATE DISTRICT  
COURT

NEPA establishes action-forcing procedures that require agencies to take a “hard look” at environmental consequences of the proposed action. *Pennaco Energy, Inc.*, 377 F.3d at 1150; *see also N.M. ex rel. Richardson*, 565 F.3d at 714. In the matter at hand, BLM has not taken any look, let alone the requisite “hard look,” at the potential impacts of oil and gas development on the parcels. Instead, the agencies’ decision to proceed with the May 2016 lease sale is based solely on the analysis contained in the RMP-FEIS.

The RMP-EISs perform only broad and generalized analysis of the RMP’s effects on resources throughout the planning area. The Grand Junction RMP-EIS provides only a highly general overview of the range of possible impacts on a very broad scale – the analysis area covers nearly 1.1 million acres<sup>2</sup> of public lands in the Grand Junction planning area, which is too general to meaningfully address the foreseeable impacts to the parcels at issue. The RMP FEIS for the Colorado River Valley Field Office is similarly generalized and broad-scale, covering an analysis area of 567,000 acres administered by BLM.<sup>3</sup>

The RMP-FEIS therefore does not contain any of the required analysis of environmental impacts likely to occur from oil and gas development *in the areas to be leased*. Any and all significant environmental consequences of site-specific projects such as this one must be reviewed and disclosed. For example, the following site-specific impacts must be addressed:

#### *Impacts on Local Water Resources*

Numerous streams flow through or near the areas to be leased,<sup>4</sup> but the RMP-EISs’ discussion of water resources provides no sense of how specific streams and watersheds would be impacted by increased oil and gas development, including already impaired streams and watersheds. Both RMP-EISs simply assume that mitigation measures such as setbacks would limit impacts and “benefit” water quality.<sup>5</sup> But this approach sidesteps meaningful consideration of how runoff and spills from existing development, declining stream flows, and other sources of water pollution (e.g., grazing, agriculture, erosion), in connection with oil and gas development of the parcels to be leased could exacerbate already degraded conditions, or threaten local aquatic species with already diminished populations.<sup>6</sup>

For instance, streams cross or are near Parcels COC78002, COC78000, COC78005, COC78004, COC78003, COC78006, COC78008, COC78007, which lie within heavily developed areas.<sup>7</sup> These streams appear to be within the impaired Colorado River watershed. New development could hinder attainment of water quality standards and adversely modify

<sup>2</sup> Grand Junction RMP-FEIS (“GJFO RMP-FEIS”) at ES-1.

<sup>3</sup> Colorado River Valley RMP-FEIS (“CRVFO RMP-FEIS”) at 1-5.

<sup>4</sup> *See* BLM Competitive Oil and Gas Lease Sale Parcel Maps at pp. 2-5 (“BLM GJFO/CRVO Parcel Maps”), available at

[http://www.blm.gov/style/medialib/blm/co/programs/oil\\_and\\_gas/Lease\\_Sale/2016/november.Par.5253.File.dat/Competitive\\_Oil\\_Gas\\_Lease\\_Sale\\_Nov2016\\_05032016.pdf](http://www.blm.gov/style/medialib/blm/co/programs/oil_and_gas/Lease_Sale/2016/november.Par.5253.File.dat/Competitive_Oil_Gas_Lease_Sale_Nov2016_05032016.pdf).

<sup>5</sup> GJFO RMP-FEIS at 4-88-4-89; CRVFO RMP-FEIS at 4-101, 4-109.

<sup>6</sup> For example, Clear Creek, which is adjacent to Parcel 7600, is impaired.

<sup>7</sup> *Compare* BLM GJFO/CRVFO Parcel Maps at p. 2 *with* Rocky Mountain Wild Species Map No. 9.

critical habitat for the endangered fish.<sup>8</sup> The same goes for parcel COC77989, which partially underlies Plateau Creek, an impaired stream inhabited by sensitive species such as the bluehead sucker, flannelmouth sucker, and roundtail chub.<sup>9</sup>

Many parcels are near or underlie the Colorado River, which is a high risk flood area.<sup>10</sup> In addition, recent mudslides, which have created dams or sag ponds blocking stream flow on Grand Mesa, have the potential to cause flooding of Plateau Creek when the stopped water eventually breaks.<sup>11</sup> In the event of flooding, pits, tanks, and other storage devices could be at risk of toppling, breaching, or overflowing, risking contamination of surface and groundwater. Floods in Colorado have shown that weather events may result in uncontrolled chemical spills and leaks on a massive scale.<sup>12</sup> The Grand Junction RMP-FEIS fails to acknowledge this risk.

The RMP-FEIS also fail to acknowledge risks specific to fracking near dams, as the leasing of parcels COC77987, COC77988 and COC77981 would allow. Recently, the U.S. Army Corps of Engineers in Texas “adopted a 4,000 foot exclusion zone at Joe Pool Dam within which no drilling will be allowed, regardless of depth” to protect its structural integrity.<sup>13</sup> The Army Corps also noted that “in order to protect the [dam] from induced seismicity, [the Corps] will work to limit injection wells within five miles of the Joe Pool project.”<sup>14</sup> The agency found these measures “necessary to ensure that public safety is not reduced as a result of mineral related activities at Joe Pool.”<sup>15</sup> There is no indication that BLM (or the Bureau of Reclamation) has analyzed the effects of fracking near Vega Reservoir and whether protective measures are needed to prevent contamination or structural integrity problems with the reservoir.

### *Effects on Local Air Quality*

Increased development could worsen poor air quality in those areas that already have significant well development. The Grand Junction RMP only generally acknowledges the potential for new fluid mineral development to contribute to air quality problems, including “localized increased risk of impacts on human health.”<sup>16</sup> This statement does not supply an adequate analysis of how neighboring communities, such as DeBeque (less than a mile from

2016 NOV 14 AM 10:11  
DORVILLE  
CORPORATE OFFICE  
C2801

---

<sup>8</sup> Rocky Mountain Wild (“RMW”), Species Map No. 9. RMW’s maps are available at <http://rockymountainwild.org/rocky-mountain-oil-gas-leasing> under the heading for BLM Colorado’s November 2016 lease auction.

<sup>9</sup> GJFO RMP-FEIS at 3-108.

<sup>10</sup> Mesa County, Public Works-Floodplain Management, Local Flood Hazard, available at <http://www.mesacounty.us/publicworks/floodplain/template.aspx?id=9837>; GJFO RMP at \_\_\_.

<sup>11</sup> Lofholm, Nancy. Grand Mesa mudslide poses more danger to Collbran area residents, Denver Post (May 27, 2014), available at <http://www.denverpost.com/2014/05/27/grand-mesa-mudslide-poses-more-danger-to-collbran-area-residents/>; The Daily Sentinel, Pond Breach Gashes Slide (May 27, 2016), available at <http://www.gjsentinel.com/news/articles/pond-breach-gashes-slide>.

<sup>12</sup> 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/](http://www.cbsnews.com/8301-201_162-57603336/colorado-floods-spur-fracking-concerns/).

<sup>13</sup> U.S. Army Corps of Engineers, Memorandum for Record: Dam Safety Implications of Drilling, Hydrofracturing and Extraction, Joe Pool Dam, Grand Prairie, Texas, p. 1 (cover page) (Feb. 17, 2016), available at [http://www.swf.usace.army.mil/Portals/47/docs/pao/JoePoolDrillingStudy\\_14Mar16\\_PublicRelease\\_Secured.pdf](http://www.swf.usace.army.mil/Portals/47/docs/pao/JoePoolDrillingStudy_14Mar16_PublicRelease_Secured.pdf).

<sup>14</sup> *Id.*

<sup>15</sup> *Id.*

<sup>16</sup> GJFO RMP-FEIS at 4-33.

parcel COC77998) or popular recreational areas, such as Vega State Park (which contains or abuts parcels COC77989, COC77988, and COC77981), would be affected. A proper site-specific analysis must quantify emissions to ensure compliance with the National Ambient Air Quality Standards (NAAQS) and the Hazardous Air Pollutant (HAPs) standards in accordance with the federal Clean Air Act, 42 U.S.C. §7401. BLM must also assess increased air pollution impacts on human health and discuss mitigation measures.

### *Industrialization and Habitat Fragmentation Impacts*

In areas untouched by oil and gas development, new oil and gas leasing could significantly alter and industrialize relatively pristine or rustic landscapes and degrade prime habitat for wildlife, but the potential for such effects is not disclosed. For example, the area surrounding parcel COC78010 is relatively undeveloped, and the parcel itself is within a Potential Habitat Conservation Area ranked by Colorado State University's (CSU) Colorado Natural Heritage Program as "very high biodiversity significance" for its many imperiled plant species.<sup>17</sup> Pipelines and roads accessing the parcels could significantly degrade and fragment this important habitat. Numerous greater sage-grouse leks also surround the parcel<sup>18</sup> but the potential effects of fragmentation within this particular area is not at all addressed in any NEPA documentation.<sup>19</sup>

A number of parcels also overlap with or are upstream from several Potential Conservation Areas noted to have "Outstanding Biodiversity Significance,"<sup>20</sup> or other areas of rare plant occurrence.<sup>21</sup> See section II.C.1 below for a detailed analysis of rare and sensitive plant species in this region including DeBeque Phacelia and Parachute Beardtongue. Notwithstanding CSU stipulations to avoid development in occupied habitat, buffers do not eliminate the threat of spills, invasive weeds, dust transport, and pollinator disturbance. The cumulative impact of developing near sensitive plant populations on multiple lease parcels within the same area could weaken these strongholds and increase the chance of losing a local population. The EIS does not assess the cumulative impact to sensitive plant species within these Potential Conservation Areas.

BLM must evaluate the potential for clustering development outside areas with NSOs and resulting noise, public health, water quality, scenic, and other impacts. For example, several parcels overlap two different patches of critical habitat for the DeBeque Phacelia and one for

<sup>17</sup> Colorado State University (CSU), Level 4 Potential Conservation Area (PCA) Report for Clear Creek (Nov. 29, 2015), available at [http://www.cnhp.colostate.edu/download/documents/pca/L4\\_PCA-Clear%20Creek%20to%20Golden\\_11-29-2015.pdf](http://www.cnhp.colostate.edu/download/documents/pca/L4_PCA-Clear%20Creek%20to%20Golden_11-29-2015.pdf).

<sup>18</sup> See BLM GJFO/CRVO Parcel Maps, p. 2 (parcel 7600 is within an area with no producing leases); Rocky Mountain Wild, Species Map 7.

<sup>19</sup> The DNA does not even refer to the 2015 Colorado Greater Sage-Grouse RMP Amendments.

<sup>20</sup> CSU, Level 4 Potential Conservation Area (PCA) Reports for Colorado River, Rare Plants of the Wasatch, and Mount Callahan (Nov. 29, 2015), available at [http://www.cnhp.colostate.edu/download/documents/pca/L4\\_PCA-Colorado%20River\\_11-29-2015.pdf](http://www.cnhp.colostate.edu/download/documents/pca/L4_PCA-Colorado%20River_11-29-2015.pdf); [http://www.cnhp.colostate.edu/download/documents/pca/L4\\_PCA-Rare%20Plants%20of%20the%20Wasatch\\_11-29-2015.pdf](http://www.cnhp.colostate.edu/download/documents/pca/L4_PCA-Rare%20Plants%20of%20the%20Wasatch_11-29-2015.pdf);

[http://www.cnhp.colostate.edu/download/documents/pca/L4\\_PCA-Mount%20Callahan\\_11-29-2015.pdf](http://www.cnhp.colostate.edu/download/documents/pca/L4_PCA-Mount%20Callahan_11-29-2015.pdf).

<sup>21</sup> RMW Species Map Nos. 8, 9.

2016 NOV 14 AM 10:11  
CO STATE OFFICE  
GOLDEN

Parachute Beardtongue.<sup>22</sup> NSOs could result in clustering wellpad development along their borders, increasing surface disturbance and industrialization of these areas.

## 2. Analysis of Site-Specific Impacts Is Feasible.

The analysis of site-specific impacts must occur at the leasing stage, because leasing is highly likely to result in development of the parcels at issue and production of fluid mineral resources. A multitude of effects are readily foreseeable as discussed above and in our previous scoping comment, incorporated herein by reference.

Rather than conduct any environmental review of the parcels before proceeding with the lease sale, BLM suggests that it may postpone analysis until an Application for Permit to Drill (“APD”) is submitted for a specific well. In *Richardson*, the Tenth Circuit rejected the contention that site-specific analysis may be deferred until the APD stage in all cases. Rather, the inquiry of whether site-specific analysis is required is “necessarily contextual” and “fact-specific.” *Id.*

In the instant lease sale, BLM cannot seriously dispute that offering the parcels is likely to result in oil and gas development and the production of oil and gas. The parcels are offered for the sole purpose of promoting oil and gas development. Almost all of the parcels for lease are near or adjacent to areas with producing leases.<sup>23</sup> Numerous actively producing oil and gas wells are near the parcels for lease.<sup>24</sup> The lease parcel areas have also been identified by BLM as generally having “very high,” “high,” and “moderate” potential for both conventional oil and gas development and Mancos shale gas development.<sup>25</sup> Further, a recent USGS study notes increasing interest in the Piceance Basin’s Mancos shale play in western Colorado should be expected, as a result of its findings that the play contains technically recoverable natural gas reserves that are only second to the Marcellus shale in volume.<sup>26</sup> Total technically recoverable resources of the Mancos/Mowry Total Petroleum Systems are 66.3 trillion cubic feet of gas, 74 million barrels of oil, and 45 million barrels of natural gas liquids.<sup>27</sup> This volume is over 40

<sup>22</sup> CBD critical habitat map Exhibits A, B (Parcels COC77995, COC77997 and COC77992).

<sup>23</sup> See BLM GJFO/CRVO Parcel Maps (e.g., parcels, 7584, 7585, 7586, 7587, 7588, 7598, 7599, 7600, 7602, 7603, 7604, 7611, 7612, 7613, 7614, 7615, 7616, 7617, 7618, 7620, 7622, 7625, 7626, 7629 which corresponds to the following serial numbers in the final lease sale notice: COC77994, COC77995, COC77996, COC77996, COC77997, COC77998, COC78000, COC78001, COC78010, COC77989, COC77987, COC77988, COC78002, COC78003, COC78004, COC77990, COC77991, COC78005, COC77992, COC77993, COC78006, COC78007, COC78008, COC78009, COC77981) found at [http://www.blm.gov/style/medialib/blm/co/programs/oil\\_and\\_gas/Lease\\_Sale/2016/november.Par.16638.File.dat/BLM\\_Competitive\\_Oil\\_Gas\\_Lease\\_Sale\\_Dec2016\\_10132016\\_WL.pdf](http://www.blm.gov/style/medialib/blm/co/programs/oil_and_gas/Lease_Sale/2016/november.Par.16638.File.dat/BLM_Competitive_Oil_Gas_Lease_Sale_Dec2016_10132016_WL.pdf).

<sup>24</sup> RMW, Nearby Oil/Gas Development Maps 8-9, available at [http://rockymountainwild.org/\\_site/wp-content/uploads/16-065\\_CONov2016EA\\_OGDevelopment\\_Map8\\_v1.pdf](http://rockymountainwild.org/_site/wp-content/uploads/16-065_CONov2016EA_OGDevelopment_Map8_v1.pdf), [http://rockymountainwild.org/\\_site/wp-content/uploads/16-065\\_CONov2016EA\\_OGDevelopment\\_Map9\\_v1.pdf](http://rockymountainwild.org/_site/wp-content/uploads/16-065_CONov2016EA_OGDevelopment_Map9_v1.pdf).

<sup>25</sup> See RMW, Reasonably Foreseeable Development Oil and Gas Potential Maps (included in our CD of references but not on RMW’s website).

<sup>26</sup> USGS, Assessment of Continuous (Unconventional) Oil and Gas Resources in the Late Cretaceous Mancos Shale of the Piceance Basin, Uinta-Piceance Province, Colorado and Utah, Fact Sheet 2016-3030 (May 2016), available at <http://pubs.usgs.gov/fs/2016/3030/fs20163030.pdf>.

<sup>27</sup> *Id.*

times USGS's 2003 estimate of total natural gas reserves for this shale play.<sup>28</sup> These reserves underlie large areas of the Grand Junction, Colorado River Valley, White River, Uncompahgre, and Gunnison Field Offices.<sup>29</sup>

BLM can also project the type of development that would likely occur in the leased areas. Various maps prepared by BLM show the several formations underlying the parcels which could be developed, including areas of "high potential" coalbed methane gas development, conventional well development, and Mancos Shale play development.<sup>30</sup> And because many of the areas for lease are adjacent to or near areas that are already producing, the type of development (e.g., horizontal v. vertical well, natural gas v. oil v. coalbed methane) within these areas should give some indication of the foreseeable type of development that could occur in the areas for lease.<sup>31</sup> BLM's own studies provide readily available information that could be used to project the total footprint of leasing within these areas. The Reasonably Foreseeable Development Scenario for the Grand Junction RMP estimates potential development levels per township, average number of wells per pad, and total surface disturbance for the various types of wells that could be developed, including disturbance from well pads, pipelines, and roads.<sup>32</sup> It is also highly likely that hydraulic fracturing practices would be employed, which are necessary to recover "tighter" reserves that dominate the Piceance Basin.<sup>33</sup> The EA for the November 2016 Lease Auction for the Royal Gorge Field Office also describes how greenhouse gas emissions and other pollutants from wells may be estimated.<sup>34</sup>

For example, it is highly likely that fracking and horizontal well development would occur on many of the lease parcels. A number of parcels are only within a few miles of the Homer Deep and DeBeque Southwest Unit Master Development Plan areas, for which numerous horizontal wells have been proposed.<sup>35</sup> These proposed plans project the average number of wells per well pad, total surface disturbance, and average per well water depletion, which could inform an environmental analysis of the lease parcel areas.<sup>36</sup> The Reasonably Foreseeable

DOH  
CO STATE OFFICE  
COPENHAGEN

<sup>28</sup> Associated Press, Colorado Has 40 Times More Natural Gas Than Previously Estimated, Wall Street Journal, (June 8, 2016), available at <http://www.wsj.com/articles/colorado-has-40-times-more-natural-gas-than-previously-estimated-1465430936>.

<sup>29</sup> Center for Biological Diversity, Map of Mancos Shale relative to BLM Field Offices (2016)

<sup>30</sup> BLM, GJFO Reasonably Foreseeable Development Scenario, Figures 9-11 (June 2012); BLM, Glenwood Springs (now CRVFO) Reasonably Foreseeable Development Scenario, Maps 3-15, 17-21 (2014).

<sup>31</sup> See notes 24- 25 above; see also RMW, Nearby Oil/Gas Development Maps.

<sup>32</sup> BLM, Reasonably Foreseeable Development Scenario at 35-37.

<sup>33</sup> USGS 2016 (Mancos shale requires fracking, plus vertical drilling for shallower reserves and horizontal drilling for deeper reserves).

<sup>34</sup> See section III.A below; Royal Gorge Field Office EA at 21-24, 36, available at [http://www.blm.gov/style/medialib/blm/co/programs/oil\\_and\\_gas/Lease\\_Sale/2016/november.Par.30486.File.dat/EA\\_Draft\\_RGFO\\_Nov\\_2016.pdf](http://www.blm.gov/style/medialib/blm/co/programs/oil_and_gas/Lease_Sale/2016/november.Par.30486.File.dat/EA_Draft_RGFO_Nov_2016.pdf).

<sup>35</sup> See RMW, Maps of Homer Deep and DeBeque Southwest Master Development Plans and Nov. 2016 Lease Parcels (not found on RMW's website, but included in our CD of references).

<sup>36</sup> See BLM, Black Hills Plateau Production, LLC, Proposed Action: DeBeque Southwest Master Development Plan for Oil and Gas Exploration and Development Mesa County, Colorado, DOI-BLM-CO-N040-2015-0024-EA (May 2015) ("DeBeque Southwest MDP"), available at [https://eplanning.blm.gov/epl-front-office/projects/nepa/48239/58991/64183/DeBeque\\_Southwest\\_MDP\\_Proposed\\_Action.pdf](https://eplanning.blm.gov/epl-front-office/projects/nepa/48239/58991/64183/DeBeque_Southwest_MDP_Proposed_Action.pdf); Proposed Action: Homer Deep Master Development Plan for Oil and Gas Exploration and Development Mesa County, Colorado, DOI-BLM-CO-N040-2015-0025-EA, (March 2015) ("Homer Deep MDP"), available at

Development Scenario for the Grand Junction RMP estimates similar figures for projected horizontal well development.<sup>37</sup> BLM also tracks water depletion figures for horizontal wells in each field office and throughout the Upper Colorado River Basin, which provide a reasonable basis for per well water use estimate.<sup>38</sup>

That BLM cannot precisely determine the type and amount of development that could occur on these lease parcels is a red herring. NEPA requires “reasonable forecasting,” which includes the consideration of “reasonably foreseeable future actions...even if they are not specific proposals.” See *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1079 (9th Cir. 2011) (citation omitted). “Because speculation is . . . implicit in NEPA,” agencies may not “shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as crystal ball inquiry.” *Id.* Further, while specific development plans have not yet been proposed, such plans are not necessary to predict that development in these areas would entail significant impacts. The problem of increased surface disturbance, water pollution, degradation of air quality, greenhouse gas emissions, and wildlife impacts from new oil and gas leasing are “readily apparent,” and there are “enough specifics to permit productive analysis of [oil and gas development], including proposals for alternative ways of dealing with the problem.” *Kern v. BLM*, 284 F.3d 1062, 1073 (9th Cir. 2002).

### **3. Reliance on the RMPs Is Improper, Because They Fail to Properly Analyze Water Depletion, Greenhouse Gas, and Public Health Effects of Fracking and Horizontal Drilling**

BLM cannot rely on the RMP-FEISs for the NEPA documentation, because that analysis is incomplete or inadequate in other respects. Aside from failing to analyze site-specific impacts, the Grand Junction and Colorado River Valley RMP-EISs fail to thoroughly address the water depletion, greenhouse gas, and public health impacts of increased horizontal drilling and hydraulic fracturing, fail to discuss adequate mitigation, and set forth toothless stipulations with open-ended exceptions.

#### *Horizontal Drilling Is Not Addressed*

The Grand Junction RMP fails to quantify and address in the EIS the water depletion impacts of horizontal drilling and resulting impacts on the endangered fish. Without providing any analysis it summarily concludes: “The RFD in the RMP does not exceed the amount of water depletions consulted on in the Programmatic Biological Opinion, in reference to the biological opinion (PBO) for water depletions associated with fluid mineral development in BLM’s western Colorado Field Offices and their effects on the four Colorado River endangered fish.”<sup>39</sup>

But as described in the Center’s scoping comments on the lease auction and its protest of the Proposed Grand Junction RMP (incorporated herein by reference), the PBO does not take

---

[https://eplanning.blm.gov/epl-front-office/projects/nepa/45789/56044/60736/HDMDP\\_Proposed\\_Action\\_3-24-2015.pdf](https://eplanning.blm.gov/epl-front-office/projects/nepa/45789/56044/60736/HDMDP_Proposed_Action_3-24-2015.pdf).

<sup>37</sup> BLM, GJFO Reasonably Foreseeable Development Scenario at 35-37, 46.

<sup>38</sup> BLM, Water Depletion Logs Submitted to Fish and Wildlife Service (2010-2015) (“Water Depletion Logs”).

<sup>39</sup> GJFO RMP-FEIS at 6-195, 6-200.

into account the effects of horizontal drilling, which have much larger water depletion effects than other types of drilling.<sup>40</sup> Water depletion logs submitted by BLM to Fish and Wildlife Service show that in FY2015, 14 new horizontal wells were drilled in the Colorado River Valley and Grand Junction Field Offices and consumed an average of 45.17 acre-feet of water or a total of 632.49 acre-feet of water.<sup>41</sup> The total amount of water depleted in the Colorado River *sub-basin* by all horizontal and vertical wells was 691.09 acre-feet of water, which exceeds the 379 acre-feet annual projection for this sub-basin by 1.8 times.

Numerous other horizontal wells are proposed within the Grand Junction and Colorado River Valley planning areas, as indicated in the attached spreadsheet (Exhibit C). For example, the aforementioned DeBeque Southwest and Homer Deep Master Development plans project the addition of 80 horizontal wells over a three to five-year period that would deplete approximately 34 acre-feet per well for drilling and completion alone.<sup>42</sup> This is likely an underestimate, considering the same operator previously depleted an average of 77.60 acre-feet for eight horizontal wells in FY2015, and depleted 70.8 and 63.1 acre-feet of fresh water for two horizontal wells in FY2014.<sup>43</sup>

In any case, even assuming the project proponent's more conservative figures, depletions by these two master development plans alone would total approximately 528 acre-feet per year for five years, which still far exceeds the 379 acre-feet annual depletion threshold for the Colorado River sub-basin. And this figure only represents the depletion amount for 16 horizontal wells. The Reasonably Foreseeable Development Scenario for the Grand Junction Field Office projects a total of 2,107 horizontal wells over a 20-year period, which breaks down to an average of 105 horizontal wells per year over the life of the RMP.<sup>44</sup>

Moreover, as noted above, horizontal drilling is likely to expand throughout the Piceance Basin, including the Grand Junction, White River, and Colorado River Valley planning areas. A recent USGS study indicates vast natural gas resources in the Mancos shale play underlying the basin, as well as the occurrence of oil and natural gas liquids, which would make natural gas extraction in the Mancos shale play more profitable. Water depletions are thus very likely to exceed the original projections in the PBO.

In sum, the Grand Junction RMP-EIS's failure to quantify water depletions from new oil and gas development by itself renders the EIS inadequate to disclose the effects of new oil and

---

<sup>40</sup> This comment section focuses on the Grand Junction Field Office RMP, because most of the parcels for lease are within the GJFO, or otherwise straddle both the GJFO and CRVFO. In any case, the Colorado River Valley RMP-FEIS fails to address horizontal drilling of the Mancos shale play in any meaningful way, let alone related water depletion effects, on the grounds that "development intensity, timing, and location of development of the deep marine shale was considered too speculative for quantitative impact analysis in connection with this planning process." CRVFO RMP-FEIS at 4-576.

<sup>41</sup> Water Depletion Logs.

<sup>42</sup> DeBeque Southwest MDP at 4; Homer Deep MDP at 4. The foregoing documents actually indicate that between these two units Black Hills is proposing to develop 140 wells over a five-year period. But according to BLM staff Allen Crockett the plans have been scaled back to 60 wells in DeBeque Southwest and 20 wells in Homer Deep over a three to five-year period. (Tel. Comm. between Wendy Park and Crockett on or around May 6, 2016.)

<sup>43</sup> Water Depletion Logs.

<sup>44</sup> Grand Junction RFD at 44, 46.

gas leasing.<sup>45</sup> To the extent the EIS relies on the Programmatic Biological Opinion to provide the missing analysis, that document is not reliable, as it fails to account for water depletion effects of horizontal drilling. The EIS's statement that the Reasonably Foreseeable Development scenario for the planning area would not exceed water depletion amounts projected in the Programmatic Biological Opinion is unsupported and contradicted by ample evidence that water depletions for horizontal wells alone are likely to exceed the depletion threshold for the Colorado River sub-basin.<sup>46</sup> The Grand Junction RMP-EIS does not support a determination of NEPA adequacy as to the effects of new leasing on water depletions and the endangered fish. This is true regardless of the type and extent of development that could result from new leasing.

### *The RMP-EISs Fail to Fully Analyze Greenhouse Gas Emissions and Social Cost of Carbon*

A Determination of NEPA Adequacy is also improper because the Grand Junction RMP-FEIS fails to fully quantify greenhouse gas emissions that would result from new oil and gas development. The RMP-FEIS does not take into account the full life-cycle emissions of oil and gas extracted within the planning area. Its greenhouse gas analysis omits emissions from transportation of extracted product to market or to refineries, refining and other processing, and combustion of the extracted end-use product, failing to disclose the full scope of greenhouse gas emissions that could result from new leasing.

Additionally, as explained in the Center's Protest of the Grand Junction RMP and scoping comment, the RMP-EIS fails to analyze the social cost of carbon, a useful tool for evaluating the cumulative climate change impacts of greenhouse gas emissions. The Colorado River Valley Field Office RMP-EIS also lacks a full accounting of greenhouse gas emissions, excluding emissions from outside the study area (such as electricity generation power plants), and a social cost of carbon analysis.<sup>47</sup>

### *The RMP-EISs Lack a Full Accounting of Public Health Impacts from Fracking*

The Grand Junction RMP lacks adequate analysis of the potential public health impacts of hydraulic fracturing and oil and gas development, ignoring a number of studies that the Center presented to BLM in its protest of the Proposed Grand Junction RMP, before it was adopted. This includes studies that strongly suggest a link between oil and gas development and birth defects, low birth weight, poor infant health, cancer risk, and endocrine disruption effects. Other studies have since been published noting higher cardiology hospitalization rates linked to areas near oil and gas development and the need for minimum setbacks from oil and gas development to protect vulnerable populations. More detail is provided in the Center's scoping comment (see pp. 27-28, 52-56). BLM's conclusion that "[t]o date, no studies have documented significant cancer-based or noncancer-based public health risks from oil and gas operations using emission rates and operational practices typical of current development in the GJFO" is therefore misleading.<sup>48</sup>

---

<sup>45</sup> CBD et al. Protest of Grand Junction RMP at 21-23 (May 11, 2015).

<sup>46</sup> See also CBD Scoping Comment at 42; CBD et al. Protest of Grand Junction RMP at 4-10.

<sup>47</sup> CRVFO RMP-FEIS at 4-49.

<sup>48</sup> GJFO RMP-FEIS 4-442.

Further, the RMP-FEIS's analysis does not address the increased public health risks that could result from greater shale gas and horizontal well development. This includes increased hazardous pollutant emissions from larger rigs, more fracking chemicals transported to and stored at the well pad for fracking deeper and longer boreholes, more wells concentrated on a single well pad, and greater waste generation (including drilling cuttings and produced water). BLM's assumption that "[n]o substantial new hazardous materials uses and (or) waste generating [would] occur[] within the planning area," is erroneous, ignoring the potential for greater waste generation from more wells and longer boreholes drilled.<sup>49</sup> The GJFO Reasonably Foreseeable Development Scenario projects that over half of all wells could be horizontal wells. This assumption is also baseless because BLM lacks specific knowledge of the chemicals used for fracking throughout the planning area, and even where chemical identities are known, information about their health effects may be lacking. (See Scoping Comment at 55-56.)

The RMP-EIS also dismisses the potential for earthquakes caused by increased wastewater injection and fracking as "very rare," despite numerous studies linking earthquake activity in the central U.S. to high rates of wastewater injection. (See Scoping Comment at 49-52.)

Finally, it is unclear whether the RMP-FEIS takes into account how attainment of the new stricter federal ozone standard adopted in late 2015 would be impacted by increased oil and gas development.<sup>50</sup>

The Colorado River Valley Field Office RMP-EIS contains similar defects, dismissing felt incidences of induced seismicity to be "very rare," and failing to take into account studies on increased risks of endocrine disruption, birth defect, and cardiology hospitalization risk near oil and gas development.<sup>51</sup>

**4. The RMP-FEISs Do Not Consider New Information that Has Arisen Since Adoption of the RMPs including direct, indirect and cumulative impacts from Colorado River Withdrawals for Fracking and Other Unconventional Drilling Methods on Endangered Fish Populations and Water Supply, in Violation of NEPA and Section 7 of the ESA.**

The Grand Junction and Colorado River Valley RMP-EISs are also not adequate to assess the impacts of new leasing because new information since their adoption has arisen, which must be taken into account in analyzing the lease auction's effects, particularly on vulnerable endangered Colorado river fish populations including Colorado Pikeminnow and Razorback Sucker.

Cumulative impacts are those impacts on the environment resulting from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency . . . or person undertakes such other actions." 40 C.F.R.

---

<sup>49</sup> *Id.* at 4-441.

<sup>50</sup> 2015 National Ambient Air Quality Standards (NAAQS) for Ozone (March 14, 2016), available at <https://www.epa.gov/ozone-pollution/2015-national-ambient-air-quality-standards-naaqs-ozone> .

<sup>51</sup> CRVFO RMP-FEIS at 3-217.

§ 1508.7. By all accounts, the impacts stemming from future oil and gas leasing and development of the Royal Gorge and Grand Junction leases discussed at length in this protest are cumulative with the impacts from development of neighboring planning areas. *Thomas v. Peterson*, 753 F.2d 754, 759 (9th Cir. 1985) (reasoning that effects of proposed road and of timber sales that road was designed to facilitate were cumulative actions for which comprehensive analysis was required). Indeed, under NEPA, BLM has an obligation to consider the effects of neighboring lease sales and oil and gas development projects as cumulative impacts of any future development stemming from leasing in the neighboring vicinity of the Royal Gorge and Grand Junction parcels. 40 C.F.R. §§ 1508.7, 1508.8.

A foreseeable cumulative impact from oil and gas development occurring adjacent to the Royal Gorge and Grand Junction leasing parcels are Colorado River water withdrawals necessary for fracking and horizontal drilling techniques. Indeed, millions of gallons of water are withdrawn from the Colorado River for oil and gas extraction, potentially impacting endangered fish in the Colorado River. BLM must analyze the effects of the massive water demand resulting from relatively new horizontal drilling techniques in the Upper Colorado River Basin (the “Upper Basin”) which would impact watersheds affected by future development of the Royal Gorge and Grand junction leasing parcels, including (1) the significant cumulative impacts on local water supplies and the Colorado River endangered fish under NEPA and (2) the cumulative impacts of water depletion effects on the Colorado River endangered fish under Section 7 of the Endangered Species Act. The loss of adequate flows in the endangered fishes’ habitat within the Upper Colorado River Basin is so serious that the Fish and Wildlife Service has determined that any depletion of Upper Basin stream flows adversely affects and jeopardizes the endangered fish.<sup>52</sup> The Royal Gorge and Grand Junction lease parcels are adjacent to or on top of the critical habitat of at least two endangered fish populations, namely the Colorado Pikeminnow and the Razorback Sucker.<sup>53</sup> Therefore, any depletion is subject to Section 7 consultation and review under NEPA.

Any potential reliance in the Royal Gorge or Grand Junction RMPs, or in the December 2016 lease parcel DNA or EA on 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 (the “Fluid Mineral PBO” or “PBO”), is improper. The PBO does not take into account the enormous water depletion effects of horizontal drilling. The PBO is also unreliable in numerous other respects due to significant new information revealing that the Fluid Mineral Program may have effects on the endangered fish in a manner or to an

---

<sup>52</sup> U.S. Bureau of Land Management, Ch. 3: Affected Environment, White River FEIS at 3-71 (2015) (“The FWS has determined that any federally authorized depletion from the Upper Colorado River Basin has an adverse effect on listed Colorado River fishes.”) (Chapter 3); Biological Opinion for BLM Resource Management Plan (RMP), Price Field Office (PFO), 138 (Oct. 27, 2008), available at: [http://www.blm.gov/style/medialib/blm/ut/price\\_fo/Planning/rod\\_approved\\_rmp.Par.2742.File.dat/Price%20Biological%20Opinion.pdf](http://www.blm.gov/style/medialib/blm/ut/price_fo/Planning/rod_approved_rmp.Par.2742.File.dat/Price%20Biological%20Opinion.pdf). (“The USFWS determined that any depletion will jeopardize their continued existence and will likely contribute to the destruction or adverse modification of their critical habitat”) (citing USDI, Fish and Wildlife Service, Region 6 Memorandum, dated July 8, 1997); Biological Opinion for BLM Resource Management Plan (RMP), Vernal Field Office (VFO), 113 (Oct. 23, 2008), available at: [http://www.blm.gov/style/medialib/blm/ut/vernal\\_fo/planning/rod\\_approved\\_rmp.Par.4719.File.dat/VernalBiologicalOpinion.pdf](http://www.blm.gov/style/medialib/blm/ut/vernal_fo/planning/rod_approved_rmp.Par.4719.File.dat/VernalBiologicalOpinion.pdf). (same).

<sup>53</sup> CBD plant species critical habitat maps Exhibit A (parcels COC7795, COC77997 and COC77992).

extent not previously considered. This includes new information about (a) the potential for increased Mancos shale play development within the Piceance Basin, much of which would require horizontal drilling and therefore increased water depletions; (b) climate change effects on Upper Colorado River Basin stream flows (which is not even acknowledged in the PBO or the UFO DEIS); (c) long-term drought and increased water demand which has drastically reduced water supplies; (d) mercury and selenium pollution effects on the endangered fish; (e) declining humpback chub and Colorado pikeminnow populations and failure to meet these populations' recovery targets; (f) the Recovery Program's failure to meet recommended stream flows necessary for recovery of the endangered fish and (g) the failure of BLM to adequately monitor and track actual water use and depletions in the Upper Colorado River Basin, which could result in higher water use and greater depletions in the RMP and leasing area than anticipated in the PBO.

**a. Horizontal Wells Will Require Greater Water Depletions Than Previously Anticipated.**

While the 2008 PBO is designed to address any depletions resulting from oil and gas development within 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 Mancos/Mowry and Niobrara shale plays (collectively "Mancos shale play"). 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, Tres Rios, White River, Gunnison and Colorado River Valley Field Offices.<sup>54</sup>

For example, in the White River planning area, the PBO projects that new vertical wells would consume 2.62 acre-feet per well, while in the Grand Junction planning area, vertical wells were estimated to require 0.77 acre-feet of water per well. But BLM water depletion logs indicate that between FY2011 and FY2015, the average depletion for horizontal wells in BLM's western Colorado field offices was 26.45 acre-feet of water per well in the field offices covered by the PBO.<sup>55</sup> Indeed, in FY2015 horizontal drilling in the Grand Junction Field Office resulted in a violation of the PBO's Incidental Take Statement (ITS) water depletion limit in the Colorado River sub-basin—under the ITS, water depletions are a surrogate for take. In FY2015, an operator drilled eight horizontal wells in the Grand Junction Field Office, which consumed a total of 620.87 acre-feet of water.<sup>56</sup> The total amount of water depleted in the Colorado River sub-basin by all horizontal and vertical wells was 691.09 acre-feet of water, which exceeds the 379 acre-feet annual projection for this sub-basin by 1.8 times.<sup>57</sup>

The drastic increase in the use of this water-intensive drilling technique was not considered in the PBO, nor in BLM's consultations over the recent White River, Kremmling,

---

<sup>54</sup> BLM Instruction Memorandum CO-2011-022 (April 11, 2011) ("All of the estimates in the PBO were based on using conventional vertical drilling technology.").

<sup>55</sup> See Water Depletion Logs which are completed, pursuant to requirements within the PBO, on an annual basis by the BLM to estimate water depletion resulting from fluid minerals development on BLM lands in western Colorado.

<sup>56</sup> *Id.*

<sup>57</sup> *Id.*

2016 MAY 14 AM  
CO-STATE  
DO

Little Snake, and Grand Junction RMP amendments or revisions, which only relied on the PBO regarding the RMPs' water depletion effects. These increased water depletion impacts throughout the Upper Basin could alter the Service's analysis of the cumulative 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.

Moreover, recently, on June 8, 2016, the U.S. Geological Survey published a report re-assessing the total technically recoverable reserves in the Mancos shale play in the Piceance Basin, including the Niobrara strata of the play.<sup>58</sup> According to the report, the Mancos shale play's total technically recoverable natural gas reserves are over 40 times greater than the USGS's 2003 estimate and is the second-largest in the U.S., behind the Marcellus shale.<sup>59</sup> Specifically, 66.3 trillion cubic feet of natural gas, 74 million barrels of oil and 45 million barrels of natural gas liquids are potentially recoverable.<sup>60</sup> While tight gas in the younger, shallower Mancos shale intervals is produced primarily from vertical and directional wells in which the reservoirs have been hydraulically fractured, the tight gas and continuous oil and gas in the older and deeper intervals of the Mancos shale are produced mostly from horizontal wells that have been hydraulically fractured.<sup>61</sup> These reserves underlie large areas of the Grand Junction, White River, Royal Gorge, Colorado River Valley, Uncompahgre, and Gunnison Field Offices, all of which fall under the PBO.<sup>62</sup>

Increasing interest in the Piceance Basin's Mancos shale play should therefore be expected in the Uncompahgre field office and these other field offices, given its enormous production potential. Indeed, since the 2003 USGS assessment, more than 2,000 wells have already been drilled and completed in one or more intervals of the study area.<sup>63</sup> A review of BLM oil and gas projects in western Colorado indicates that operators are planning a number of projects involving horizontal drilling, which would most likely target the Mancos shale.<sup>64</sup>

For example, the RFDs for the Colorado River Valley and White River RMPs did not take into account Mancos shale drilling (other than exploratory wells) and thus such drilling is not considered in the PBO.<sup>65</sup> Further, a substantial portion of new wells would be horizontal

---

<sup>58</sup> Assessment of Continuous (Unconventional) Oil and Gas Resources in the Late Cretaceous Mancos Shale of the Piceance Basin, Uinta-Piceance Province, Colorado and Utah (2016) ("USGS 2016"), available at <http://pubs.usgs.gov/fs/2016/3030/fs20163030.pdf>.

<sup>59</sup> *See id.*

<sup>60</sup> *Id.*

<sup>61</sup> *Id.*

<sup>62</sup> Center for Biological Diversity, Map of Mancos Shale relative to BLM Field Offices (2016).

<sup>63</sup> *Id.*

<sup>64</sup> *See* Center for Biological Diversity, Spreadsheet of Horizontal Well Projects in Colorado (listing horizontal well projects listed in BLM's NEPA register and projected water use).

<sup>65</sup> *See* White River RMP FEIS at K-358 ("Development of the Mancos and Niobrara outside the Rangely Field in Rio Blanco County in the WRFO are not [] currently well defined and are exploratory in nature. This development is in the initial stages of the exploration phase to determine of the maturity of the reservoir and the potential viability of the Niobrara within the WRFO."); *see also* Colorado River Valley RMP FEIS at 4-576 ("To date, use of horizontal drilling in relation to the deep marine shales [i.e., Niobrara, Mancos, and Eagle Basin formations] has been limited and is considered experimental. As a result, the development intensity, timing, and location of

2016 NOV 14 AM 10:11  
CO STATE OFFICE  
COSCO M.F. OFFICE

wells, as the lower strata of the Mancos formation would likely be accessed via horizontal drilling, but again, the PBO does not take into account the extraordinarily higher water use for horizontal wells. Water depletions in the Gunnison river sub-basin and throughout the entire Upper Colorado River Basin could therefore exceed projected water use estimates in the PBO.

Additionally, the Royal Gorge and Grand Junction RMPs do not analyze cumulative impacts from oil and gas projects already moving forward in the planning and leasing area, namely the Bull Mountain Unit Master Development Plan. The Bull Mountain plan's Final Environmental Impact Statement (FEIS) anticipates the development of 146 new gas wells, half of which are assumed shale wells including horizontal drilling in the northwest portion of Gunnison County, within the Uncompahgre Field Office.<sup>66</sup> The preferred alternative's water use in the Bull Mountain FEIS would exceed levels contemplated in the PBO. The FEIS estimates that construction, drilling, dust abatement, and completion of the 146 gas wells for the preferred alternative would require 2,480.2 acre-feet of water, of which 744.1 acre-feet would be fresh water.<sup>67</sup> Per well fresh water use, then, would amount to just over five acre-feet, nearly five times greater than the PBO's projections for vertical well depletions in the Gunnison River sub-basin.<sup>68</sup> The anticipated life of the project is six years, with an average of 27 wells drilled per year.<sup>69</sup> Total fresh water depletions divided by the six year duration of the project amounts to 124 acre feet of fresh water depleted annually. As noted above, the PBO estimated total *annual* water depletions from the Gunnison sub-basin at 16 acre-feet—given the preferred alternative's proximity to tributaries of the Gunnison River, water would likely be taken from the Gunnison River sub-basin, although the Bull Mountain FEIS fails to clearly state the project's water source.<sup>70</sup> The preferred alternative, then, would likely lead to annual water depletions from the Gunnison River sub-basin of over seven times greater than projected in the PBO. Even if water were drawn from the Colorado River sub-basin, the 124 acre-feet required annually by the preferred alternative alone would amount to nearly one third of all allowable annual depletions for the Colorado River sub-basin under the 2008 PBO. None of the RMPs that this leasing DNA and EA tier to contemplate or analyze water depletions from the Bull Mountain project, nor does it address projected future water depletions, in clear violation of NEPA's cumulative impacts analysis requirements. Additionally, to the extent that approval of any leasing that tiers to RMPs that 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 for this leasing decision and the pre-leasing RMPs.

2016 NOV 14 AM 10:11  
CD STATE OFFICE  
UNCOMPAGRE FIELD

---

development of the deep marine shales was considered too speculative for quantitative impact analysis in connection with this planning process.”)

<sup>66</sup> Bull Mountain Unit Master Development Plan Final Environmental Impact Statement (FEIS) (January, 2015), DOI-BLM-CO-S050-201 3-0022-EIS, at ES-1, available at [http://www.blm.gov/style/medialib/blm/co/information/nepa/uncompahgre\\_field/13-22\\_bull\\_mountain.Par.23863.File.dat/Bull\\_Mtn\\_DEIS\\_Jan2015\\_508\\_reduced.pdf](http://www.blm.gov/style/medialib/blm/co/information/nepa/uncompahgre_field/13-22_bull_mountain.Par.23863.File.dat/Bull_Mtn_DEIS_Jan2015_508_reduced.pdf).

<sup>67</sup> Bull Mountain FEIS, at ES-8 Table ES-1, ES-10-11.

<sup>68</sup> *Id.*

<sup>69</sup> Compare *id.* at ES-7 with Exhibits 212-218 (water depletion logs).

<sup>70</sup> FEIS at 3-31, Figure 3-4.

**b. Climate Change Is Reducing Stream Flows in the Upper Colorado River Basin.**

The Royal Gorge and Grand Junction RMPs, to the extent that they rely on the PBO, entirely fail to acknowledge climate change effects on Upper Colorado River Basin stream flows, and related effects on the endangered fish.<sup>71</sup> Anthropogenic climate change is profoundly impacting the Colorado River in ways that are altering temperature, streamflow, and the hydrologic cycle. As detailed below, changes observed to date include rising temperatures, earlier snowmelt and streamflow, decreasing snowpack, and declining runoff and streamflow. Modeling studies project that these changes will only worsen, including continued declines in streamflow and intensification of drought. Climate change is likely to have significant effects on the endangered fish species in the Colorado River basin and the Colorado River ecosystem.

*Rising temperatures*

The Colorado River basin has warmed significantly during the past century, with average increases in surface temperature of 1.6°F (0.9°C) over the Southwest during 1901-2010 (Hoerling et al. 2013).<sup>72</sup> The greatest warming has occurred in spring and summer, and in daytime high temperatures and nighttime low temperatures (Bonfils et al. 2008, Hoerling et al. 2013). Surface temperatures in the Southwest are projected to increase steeply in this century by an average of 4.5 to 7.9° F depending on the emissions scenario, with an average of 2.5 to 3°F of warming projected for 2021-2050 alone (Cayan et al. 2013). In the Colorado River basin, temperatures have increased roughly by 2° F, and “additional decades of warming are ‘locked in’ regardless of any behavioral changes that may or may not be implemented by the world’s governments”—roughly an additional 5° F of warming can be expected in the basin by 2050 (CRRG 2016). As explained below, warming temperatures are having significant effects on streamflow, drought severity, and the hydrologic cycle in the Southwest (Barnett et al. 2008; Woodhouse et al. 2016).

*Earlier snowmelt and streamflow*

In much of the Colorado River basin, snowmelt, snowmelt runoff, and streamflow timing have trended earlier since the mid-1950s, in parallel with warming temperatures (Hamlet et al. 2005, Stewart et al. 2005, Barnett et al. 2008, Hoerling et al. 2013, Garfin et al. 2014). The Colorado River basin’s spring pulse from 1978-2004 shifted to two weeks earlier compared to flows before 1978 (Ray et al. 2008). Although there are both natural and human influences on these hydrologic trends, studies indicate that anthropogenic greenhouse gases began to impact

---

<sup>71</sup> In contrast, the Biological Assessment for the Bull Mountain MDP acknowledges that climate change “could impact listed fish species and their habitats by reducing suitable habitat, changing distributions, and altering food webs and water quality, including temperatures. Additional effects of climate change may include severity and frequency of droughts, floods, and wildfires, as well as changes in the timing of snowmelt and peak flows (Isaak et al. 2012; Haak et al. 2010; Rieman and Isaak 2010; Wenger et al. 2011), all of which may impact listed fish species in the analysis area.” BLM, Biological Assessment, Uncompahgre Field Office, Bull Mountain Unit Master Development Plan and EIS, 4-9 (2015)

<sup>72</sup> Some of the references in this section are provided as short cites in parentheses. Full citations for these parenthetical references are included in a bibliography at the end of the section.

NOV 14 AM 10:11  
CO STATE OFFICE  
COSCO MOUNTAIN

snow-fed streamflow timing during 1950-1999 (Barnett et al. 2008, Hidalgo et al. 2009, Hoerling et al. 2013). Modeling studies have projected that snowmelt, spring runoff, and streamflow timing will continue to shift earlier across much of the Southwest (Stewart et al. 2004, Rauscher et al. 2008, Dettinger et al. 2015).

### *Decreasing snowpack*

The Colorado River receives most of its water from winter snowpack from the Rocky Mountains, where 15% of the total basin areas generates 85% of the river flow (Dettinger et al. 2015). Across much of the Colorado River basin, the spring snowpack is decreasing and more winter precipitation is falling as rain instead of snow (Hamlet et al. 2005, Pierce et al. 2008, Das et al. 2009). Approximately half of the observed decline in snowpack in the western United States during 1950-1999 has been attributed to the effects of anthropogenic greenhouse gases, ozone and aerosols (Pierce et al. 2008). Modeling studies project a continued reduction of Southwest mountain snowpack during February through May during this century, largely due to the effects of rising temperatures (Cayan et al. 2013, Dettinger et al. 2015).

### *Declining Runoff and Streamflow*

Annual runoff in the Colorado River basin appears to be declining (USBR 2011), with significant consequences for reduced streamflow. During 2001–2010, warm temperatures and dry conditions reduced average naturalized flows in the Colorado River (measured at Lees Ferry) to the second-lowest-flow decade since 1901, to 12.6 million acre-feet per year compared to the 1901–2000 average of 15.0 million acre-feet per year (Hoerling et al. 2013).

Modeling studies project that runoff and streamflow will continue to decrease substantially in the Colorado River basin during this century (Ray et al. 2008, Das et al. 2011, USBR 2011, Cayan et al. 2013, Georgakakos et al. 2014, Dettinger et al. 2015). Barnett and Pierce (2009) concluded that anthropogenic climate change is likely to reduce runoff in the Colorado River basin by 10-30% by 2050. Projected reductions in runoff range from 6-7% (Christensen and Lettenmaier 2007) to 45% (Hoerling and Eischeid 2007) depending on the models and methods used in each study (see Barnett and Pierce 2009 at Table 2). In the short term, Hoerling and Eischeid (2007) predict streamflow to decrease by 25% during 2006-2030, and by 45% during 2035-2060.

Importantly, numerous studies show that warming temperatures alone will cause runoff and streamflow declines in the Colorado River basin. For example, in a recent review, Vano et al. (2014) estimated that future streamflow in the Colorado River basin will be reduced by 5% to 35% due to rising temperature alone. When precipitation change is considered, a 5% decrease in precipitation would further reduce streamflow by 10% to 15% (Vano et al. 2014).

Moreover, warming temperatures will play an increasingly important role in causing runoff to decline in the Colorado River basin, and must be factored into streamflow forecasts (Woodhouse et al. 2016). An empirical study of the influence of precipitation, temperature, and soil moisture on upper Colorado River basin streamflow over the past century found that warmer temperatures have already resulted in flows less than expected based on precipitation levels

(Woodhouse et al. 2016). Consistent with past research, the study found that cool season precipitation explains most of the variability in annual streamflow. However, temperature was highly influential in determining streamflow under certain conditions. The study concluded that “[s]ince 1988, a marked increase in the frequency of warm years with lower flows than expected, given precipitation, suggests continued warming temperatures will be an increasingly important influence in reducing future UCRB water supplies.” The researchers warned that “streamflow forecasts run the risk of overprediction if warming spring and early summer temperatures are not adequately considered.”

According to the study’s press release it is the “first to examine the instrumental historical record to see if a temperature effect [on stream flows] could be detected.”<sup>73</sup> The study’s lead author highlighted its significance: “If we have a warmer spring, we can anticipate that the flows will be less relative to the amount of snowpack[.]...What we’re seeing is not just the future – it’s actually now. That’s not something I say lightly.”<sup>74</sup>

### *Increasing Drought Severity*

Historically, droughts in the Colorado River basin were primarily driven by precipitation deficits. However, studies indicate that rising temperatures have begun to play a more important role in driving droughts (Hoerling et al. 2013, Vano et al. 2014). Importantly, rising temperature superimposed on natural drought variability is expected to exacerbate the impacts of droughts (Seager et al. 2012, Cook et al. 2015). Modeling studies project that droughts in Southwest will intensify due to longer periods of dry weather and more extreme heat, leading to higher evapotranspiration and moisture loss (Seager et al. 2007, Cayan et al. 2010, Trenberth et al. 2013). In the Colorado River basin, future droughts are projected to be substantially hotter, and drought is projected to become more frequent, intense, and longer lasting than in the historical record (Garfin et al. 2014). Moreover, under a business-as-usual GHG emissions scenario, the risk of mega-drought in the southwest would increase to 70-99% by the end of the century (Ault 2016). This substantial risk of mega-drought would exist regardless of how or whether precipitation changes.

### *Reduced reservoir levels and unsustainable demand for water*

Of the more than 90 reservoirs on the river and its tributaries, the two largest are Lake Mead and Lake Powell which together can store up to 85% of the total flow for the basin combined (Christensen et al. 2004). Reservoirs in the Colorado River basin are highly vulnerable to climate change, particularly because the amount of storage in reservoirs is sensitive to runoff changes (Barnett and Pierce 2008). Even small decreases in runoff have caused average reservoir levels to markedly decrease (Christensen et al. 2004). Christensen et al. (2004) predicted that climate change impacts on the hydrology of the Colorado River system would result in water demand (deliveries and evaporation) exceeding reservoir inflows (which would also be decreased), resulting in a degraded system. Likewise, Barnett and Pierce (2008) projected that a

<sup>73</sup> American Geophysical Union, Colorado River Flows Reduced by Warmer Spring Temperatures (March 9, 2016), available at <http://news.agu.org/press-release/colorado-river-flows-reduced-by-warmer-spring-temperatures/> (attached as Exhibit 236).

<sup>74</sup> *Id.*

DOE/BLM  
CO STATE OFFICE  
0050 5/11/2016 11

10% reduction in runoff would result in requested water deliveries surpassing sustainable deliveries by 2040, while a 20% reduction in runoff would cause unsustainable water demands by 2025. A greater demand than supply makes the system more prone to long-term sustained droughts, as reservoirs will not have sufficient time to be naturally replenished and more water will be extracted from a dwindling supply than is sustainable (Christensen and Lettenmaier 2007). Reservoirs would spend additional time in a depleted state, weakening the system's buffering ability in years where there is low precipitation (Barnett and Pierce 2009).

A recent Bureau of Reclamation report looks at how climate change will affect water supplies in the West and finds that warming weather will increase the likelihood of shortages, particularly for farmers.<sup>75</sup> In addition to runoff changes, increased temperatures are expected to increase the demand for irrigation water and for Reclamation's hydroelectricity, as well as for water dedicated to maintaining habitat for fish and other river species.<sup>76</sup> Collectively, the impacts of climate change to water resources give rise to difficult questions about how best to operate Reclamation facilities to address growing demands for water and hydropower now and how to upgrade and maintain infrastructure to optimize operations in the future.<sup>77</sup>

In addition to reducing the overall amount of water in the Upper Colorado River Basin, these climate change effects would worsen effects from toxic spills by increasing the concentration of pollutants and toxic contaminants. Climate change is also likely to further exacerbate mercury and selenium effects on the endangered fish. Mercury deposited into soil from coal burning, or selenium naturally found in Mancos rock outcrops or soil, will increasingly run off into streams with increased heavy rainfall events.<sup>78</sup> More frequent and severe wildfire events will result in increased charring of soil, releasing mercury and selenium that can wash off into streams.<sup>79</sup> Warmer water conditions will hasten the conversion of mercury into toxic methylmercury,<sup>80</sup> and reduced flows will increase mercury and selenium concentrations.

Ample evidence, including empirical research, demonstrates that climate change is already reducing stream flows in the Colorado River Basin and that flows will continue to dwindle as Colorado Basin temperatures rise. Accordingly, BLM must either reinitiate consultation on the PBO or initiate section 7 consultation for any western Colorado leasing or planning decision.

**c. Persistent Drought Conditions and Increasing Water Demand Have Reduced Water Supply.**

---

<sup>75</sup> U.S. Department of the Interior Bureau of Reclamation. Secure Water Act Section 9503(c) – Reclamation Climate Change and Water, at 10-13 (March 2016) (Chapter 10)

<sup>76</sup> Kahn, Debra, Climate change bodes ill for Western supplies, E&E Reporter: The Politics and Business of Climate Change (March 2016)

<sup>77</sup> U.S. Department of the Interior Bureau of Reclamation. Secure Water Act Section 9503(c) – Reclamation Climate Change and Water at 1-10 (Chapter 1)

<sup>78</sup> National Wildlife Federation, Swimming Upstream: Freshwater Fish in a Warming World, 19 (2013), available at <http://www.nwf.org/~media/PDFs/Global-Warming/Reports/NWF-Swimming%20Upstream-082813-B.ashx>.

<sup>79</sup> *Id.*

<sup>80</sup> *Id.*

DO-PLM  
CO STATE OFFICE  
COSO  
2016 NOV 14 AM 10:11

Compounding this threat to the endangered fish are persistent drought conditions that have diminished natural flows in the Colorado River Basin and reduced water storage that is needed to supplement Upper Basin flows. The period from 2000 to 2015 was the lowest 16-year period for natural flow in the last century, and one of the lowest 16-year periods for natural flow in the past 1,200 years, according to paleorecords.<sup>81</sup> As a result, water storage in the Colorado River system reservoirs have declined “from nearly full to about half of capacity,” and led to local shortages in the Upper Colorado’s sub-basins.<sup>82</sup>

Further, population growth will increase water demand for agriculture and municipal uses, making it increasingly difficult to ensure sufficient water availability for the endangered fish, which rely on the release of stored water, especially in dry years.<sup>83</sup> An ever widening gap between water supply and water demand is weakening the Colorado River water supply system’s reliability and ability to buffer the system in dry years.<sup>84</sup> According to the U.S. Geological Survey, “increased water demand and declining water availability make the restoration of endangered fish habitat extremely challenging.”<sup>85</sup> This growing gap between supply and demand in the Upper Colorado River Basin must be taken into account in a reinitiated consultation.

**d. Mercury and Selenium Are Adversely Impacting the Endangered Fish**

New scientific information regarding (a) mercury and selenium effects on fish reproduction and population viability, (b) mercury and selenium concentrations in Upper Colorado and White River fish, (c) the potential role of oil and gas development in mercury contamination levels in the White River, (d) the potential for development of the Mancos shale play to increase selenium pollution, and (e) the relationship between climate change and mercury and selenium toxicity constitutes new information revealing that the Fluid Mineral Program may have effects on the endangered fish to an extent that was not considered in the PBO, and requires reinitiation of consultation over the Fluid Mineral Program.<sup>86</sup>

*Mercury contamination is harming Colorado pikeminnow populations*

The Fluid Mineral PBO’s discussion of the environmental baseline for, and threats to, the Colorado pikeminnow and razorback sucker contains no discussion whatsoever of environmental and tissue mercury contamination or the resulting toxicity and reproductive impairment to the endangered fish. Significant new research since the 2008 PBO has demonstrated that elevated levels of mercury in Colorado pikeminnow muscle tissue, including within the Upper Colorado

<sup>81</sup> Bureau of Reclamation, Managing Water in the West: SECURE Water Act Section 9503(c) Report to Congress, Chapter 3, Colorado River Basin at 3-64 (2016) (Chapter 3)

<sup>82</sup> *Id.*

<sup>83</sup> *See id.* at 3-7, 3-8.

<sup>84</sup> *Id.* at 3-10, 3-12.

<sup>85</sup> USGS, Effects of Climate Change and Land Use on Water Resources in the Upper Colorado River Basin, 5 (2010), available at <https://pubs.usgs.gov/fs/2010/3123/pdf/FS10-3123.pdf> (attached as Exhibit 242).

<sup>86</sup> 50 C.F.R. § 402.16(b).

2016 NOV 4 AM 10:11  
CO STATE ENGINEERING  
DO: ELM

River Basin, are at concentrations likely to cause reproductive and behavioral impairment to the fish.<sup>87</sup>

Mercury is a potent neurotoxin shown to cause numerous reproductive and endocrine impairments in fish in laboratory experiments, including effects on production of sex hormones, gonadal development, egg production, spawning behavior, and spawning success.<sup>88</sup> Concentrations of mercury in Colorado pikeminnow in the Upper Basin are documented to be well in excess of the thresholds for reproductive impairment and population-level impacts.<sup>89</sup> 2008-2009 muscle tissue averages were 0.60 mg/Kg Hg for Colorado pikeminnow in the Upper Colorado basin and 0.95 mg/Kg Hg for Colorado pikeminnow in the White River – well above the 0.2 mg/kg threshold of concern.<sup>90</sup>

Mercury deposition and accumulation in critical habitat is attributable to a number of local and global factors, including air emissions from coal-fired power plants both in the immediate region and around the world.<sup>91</sup> In addition, because of discrepancies in mercury concentrations between pikeminnow in the Yampa and White Rivers, research suggests that “[i]t is possible that there is some localized sources of mercury contamination into the White River drainage connected with oil and gas exploration and development.”<sup>92</sup>

Once mercury is deposited on land or water, it is converted into a biologically available form, methylmercury (MeHg) by bacteria. Methylmercury “bioaccumulates in food chains, and particularly in aquatic food chains, meaning that organisms exposed to MeHg in their food can build up concentrations that are many times higher than ambient concentrations in the environment.”<sup>93</sup> Once it accumulates, mercury is a potent neurotoxin, affecting fish in many ways, including brain lesions, reduced gonadal secretions, reproductive timing failures, reduced ability to feed, suppressed reproductive hormones, reduced egg production, reduced reproductive

DO-FILED  
CO STATE OFFICE  
COSO  
2016 NOV 14 11:00:11

---

<sup>87</sup> USFWS, Upper Colorado River Endangered Fish Recovery Program, Colorado pikeminnow (*Ptychocheilus lucius*), 5-Year Review: Summary and Evaluation 21 (2011) (“[T]he recovery goal revision needs to consider the impacts of mercury. . . the majority (64 %) of Colorado pikeminnow may be experiencing some reproductive impairment through mercury exposure.”) (attached as Exhibit 309) (“Colorado Pikeminnow 5-year Review”); USFWS, Biological Opinion for the Four Corners Power Plant and Navajo Mine Energy Project at 76 & Table 3 (April 8, 2015) (“Four Corners Biological Opinion”)

<sup>88</sup> USFWS, Draft 2014-2015 Assessment of Sufficient Progress Under the Upper Colorado River Endangered Fish Recovery Program in the Upper Colorado River Basin, and of Implementation of Action Items in the December 20, 1999, 15-Mile Reach Programmatic Biological Opinion and December 4, 2009, Gunnison River Basin Programmatic Biological Opinion, 10 (Oct. 7, 2015) (“Sufficient Progress Assessment”)

<sup>89</sup> See Barb Osmundson and Joel Lusk, Field assessment of mercury exposure to Colorado pikeminnow within designated critical habitat (May 5, 2011) (“Osmundson & Lusk 2011”)

<sup>90</sup> See Four Corners Biological Opinion at 76 & Table 3 (attached as Exhibit 243); see generally Beckvar, N., T.M. Dillon, and L.B. Reads, Approaches for linking whole-body fish tissue residues of mercury or DDT to biological effects threshold, *Environmental Toxicology and Chemistry* 24:2094-2105 (2005)

<sup>91</sup> See Four Corners Biological Opinion at 73-74 (attached as Exhibit 243); Osmundson & Lusk 2011 at 9-10 (attached as Exhibit 245).

<sup>92</sup> *Id.* at 29.

<sup>93</sup> Four Corners Biological Opinion at 73 (attached as Exhibit 243).

success, and transfer of mercury into developing eggs.<sup>94</sup> Although the precise effects vary with relative concentrations, mercury and selenium may have synergistic toxic effects at certain ratios.<sup>95</sup>

The Service has acknowledged that its recovery planning for the Colorado pikeminnow needs updating to reflect this new information regarding mercury:

In addition, the recovery goal revision needs to consider the impacts of mercury. Beckvar et al. (2005) associated studies involving survival, growth, reproduction, and behavior and recommended that 0.2 mg/kg in whole fish be viewed as protective, while adverse biological effects are more likely at higher concentrations. Based on this threshold, the majority (64 %) of Colorado pikeminnow may be experiencing some reproductive impairment through mercury exposure. Management strategies for controlling anthropogenic mercury emissions are necessary as atmospheric pollution can indirectly affect this endangered species, its critical habitat, and its recovery by ambient air exposure, deposition into aquatic habitat and bioaccumulation in diet and in fish tissues.<sup>96</sup>

Moreover, the Service's 2015 Sufficient Progress Assessment for the Recovery Program acknowledges that population viability studies show that mercury- and selenium-related reproductive impairment is likely to influence population levels in the San Juan Basin,<sup>97</sup> but no comparable analysis has yet been done for the higher levels of contamination present in Upper Colorado River Basin fish.

The significant difference in mercury concentrations in fish found in the neighboring Yampa and White Rivers also offers significant new information potentially relevant to the effect of BLM-authorized oil and gas development. Osmundson and Lusk found very high (average 0.95 mg/Kg WW) mercury concentrations in Colorado pikeminnow and in the White River, and lower (0.49 mg/Kg) concentrations in the neighboring Yampa.<sup>98</sup> Based on this discrepancy, they noted:

The Yampa and White rivers are relatively close geographically in northwestern Colorado. Because of this proximity, it is interesting that the Yampa River had the lowest mercury concentrations in Colorado pikeminnow while the White River had the highest mercury concentrations. If most of the mercury was from aerial wet and dry deposition, the two drainages should be similar. This difference may indicate a localized source/s of mercury contamination into the White River drainage. There are currently >2,600 gas and oil wells in Rio Blanco county. It is

---

<sup>94</sup> See Lusk, Joel D., USFWS, Mercury (Hg) and Selenium (Se) in Colorado Pikeminnow and in Razorback Sucker from the San Juan River, 17 (2010), available at [https://www.fws.gov/southwest/sjrip/pdf/DOC\\_Evaluation\\_Hg\\_Se\\_SJR\\_pikeminnow%20or\\_razorback\\_SJRIP\\_BC\\_2010.pdf](https://www.fws.gov/southwest/sjrip/pdf/DOC_Evaluation_Hg_Se_SJR_pikeminnow%20or_razorback_SJRIP_BC_2010.pdf).

<sup>95</sup> Four Corners Biological Opinion at 103

<sup>96</sup> Colorado Pikeminnow 5-year Review at 21; see also Significant Progress Assessment at 10-11.

<sup>97</sup> Sufficient Progress Assessment at 10-11 (attached as Exhibit 244).

<sup>98</sup> Osmundson & Lusk 2011 at 21 & Table 2 (attached as Exhibit 245).

2016 NOV 14 AM 10:11  
DOI-BLM  
CO STATE OFFICE  
COSD/MS/STP/STP

possible that there is some localized sources of mercury contamination into the White River drainage connected with oil and gas exploration and development.<sup>99</sup>

Although site-specific information for the Upper Basin planning areas appears scarce, there is scientific as well as circumstantial evidence that oil and gas operations can contribute to mercury contamination.<sup>100</sup> The Fluid Mineral PBO does not consider the effect of oil and gas development within the White River watershed on the threat to Colorado pikeminnow and razorback sucker from mercury toxicity.

Nor does the PBO give any consideration to the multiple ways in which climate change will exacerbate mercury and selenium contamination and toxicity. Climate change can foreseeably be predicted to increase heavy rainfall events and ensuing runoff, increase pollutant concentrations due to reduced flows during low-flow periods, and contribute to increased methylmercury conversion due to higher temperatures.

#### *Selenium pollution is harming the endangered fish*

Selenium harms the endangered fish and other aquatic species through bioaccumulation in the food chain. Concentrations of 3µg/g in the food chain have been found to cause gill and organ damage in certain fish and may lead to death.<sup>101</sup> These bioaccumulative effects resulting in direct toxicity to juvenile and adults are known as “Type 1” effects. Moreover, selenium bioaccumulation can result in maternal transfer of selenium to fish egg yolks and lead to developmental abnormalities, known as “Type 2 effects.”<sup>102</sup> Waterborne concentrations of selenium in the 1-5 µg/L range can bioaccumulate and lead to Type 1 and/or Type 2 effects.<sup>103</sup>

Recent studies reveal significant exposures of the endangered fish to selenium. In one study analyzing selenium concentrations of 26 fish specimens collected from designated critical habitat in the Gunnison River, one Colorado pikeminnow specimen exhibited concentrations in muscle plugs that exceeded the 8 micrograms per gram dry weight toxicity guideline for selenium in fish muscle tissue.<sup>104</sup> Several species, including the razorback sucker and Colorado pikeminnow, exhibited selenium exposures in excess of the critical concentration at which Type 1 health effects begin to occur.<sup>105</sup>

---

<sup>99</sup> *Id.* at 29 (citations omitted).

<sup>100</sup> See U.S. EPA, National Risk Management Research Laboratory, Mercury in Petroleum and Natural Gas: Estimation of Emissions from Production, Processing, and Combustion, EPA/600/SR-01/066 (Oct. 2001); Visvanathan, C., Treatment and Disposal of Mercury Contaminated Waste from Oil and Gas Exploration Facilities (1993) available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.549.9515&rep=rep1&type=pdf>

<sup>101</sup> Lemly, A.D., Appalachian Center for the Economy & the Environment and Sierra Club, Aquatic hazard of selenium pollution from mountaintop removal coal mining, 3 (2009) (“Lemly 2009”).

<sup>102</sup> Lemly 2009 at 3 ; Hamilton, S.J., Review of residue-based selenium toxicity thresholds for freshwater fish, *Ecotox. Environ. Saf.* 56: 201-210 (2003).

<sup>103</sup> See *id.*

<sup>104</sup> May, Thomas W. and Michael J. Walther, USGS, Determination of selenium in fish from designated critical habitat in the Gunnison River, Colorado, March through October, 2012, Open-File Report 2013-1104, 2 (2013)

<sup>105</sup> *Id.*

In the Lower Gunnison River Basin, 2014 data indicated a range of dissolved selenium (chronic values) from 0.97 µg/L to 16.7 µg/L along the Uncompahgre River. Out of 18 sites in the lower Gunnison that were considered, the Colorado water-quality standard for chronic dissolved selenium of 4.6 µg/L was exceeded at two sites.<sup>106</sup> In regards to acute values, the range measured was from 1.1 µg/L for a portion of the Uncompahgre River to 125 µg/L along a portion of Loutzenhizer Arroyo, with 125 µg/L being well in excess of any criteria for instantaneous selenium measurements.<sup>107</sup> In another 2015 study, mean concentrations of selenium in various fish species in the lower Colorado River Basin exceeded the risk for maternal transfer to eggs, while selenium concentrations in various species of macroinvertebrate prey exceeded the risk value for larval fishes.<sup>108</sup> Average selenium concentrations in the studied fish species were found to be 2- to 4-fold higher than the risk threshold for piscivorous (fish-eating) wildlife, with samples exceeding this threshold in 81-100% of cases depending on the species. The risk value for larval fishes, who either absorb selenium via maternal transfer to eggs or through invertebrate diet, was exceeded in 56-100% of cases depending on the adult species (with risk posed to larvae due to maternal transfer), and 86-100% of cases among invertebrates (with risk posed to larval fishes through diet). Thus, the transfer of selenium toxicity from invertebrates to fish to piscivores is readily observable.<sup>109</sup>

DOI-FRT  
CO STATE OFFICE  
CO SO  
MAY 14 10:11

Natural erosion and runoff, as well as selenium leaching into irrigation runoff, are the primary sources of this toxic pollutant. The weathering of Cretaceous marine shales can produce high selenium soils, which are present in many areas of the western U.S.<sup>110</sup> Most notable of these Cretaceous shales is the Mancos Shale, which is found in Colorado, Utah, Wyoming, New Mexico, and Arizona. Irrigation of selenium-rich soils for crop production in arid and semi-arid regions can mobilize selenium and move it off-site in surface water runoff or via leaching into groundwater. Groundwater in contact with the Mancos Shale is known to have high levels of selenium due to leaching, and irrigation activities on Mancos Shale have led to selenium loading of nearby rivers and streams such as those in the Colorado River Basin.<sup>111</sup> As discussed previously, increased exploitation of the Mancos shale play could also put surface waters and endangered fish at risk. Selenium-laced produced water from oil and gas operations may find a pathway to surface waters via hydraulically induced fractures in Mancos shale rock, or via surface spills.

**e. Population Numbers of the Endangered Fish Are Declining.**

Colorado pikeminnow populations are in decline throughout the Green River and Colorado River Basin, indicating that the Recovery Plan for the endangered fish has not been

<sup>106</sup> Henneberg, M.F., 2014 annual summary of the lower Gunnison River Basin Selenium Management Program water-quality monitoring, Colorado: U.S. Geological Survey Open-File Report 2016-1129, 25 p. (2016), <http://dx.doi.org/10.3133/ofr20161129>

<sup>107</sup> *Id.*

<sup>108</sup> Walters, David M., et al. Mercury and selenium accumulation in the Colorado River food web, Grand Canyon, USA. *Environmental Toxicology and Chemistry*, 34(10):2385-2394, 2390 (2015).

<sup>109</sup> *Id.*

<sup>110</sup> Lemly, A.D., Guidelines for evaluating selenium data from aquatic monitoring and assessment studies. *Environ. Monitor. Assess.* 28(1):83-100 (1993)

<sup>111</sup> Environmental Sciences Laboratory, Natural Contamination from the Mancos Shale, U.S. Department of Energy, Doc. No. S07480 (2011)

effective and that the impacts of water depletions could be more severe than previously anticipated.

According to Fish and Wildlife Service, the latest 2014 Colorado River sub-basin population number of 501 is “cause for great concern,” and catch of sub-adults and adults in 2013 and 2014 “were near lowest observed in the history of the project.”<sup>112</sup> 2015 catch numbers are within the same range, which suggests that the population estimate for 2015 will be similar to the 2014 estimate.<sup>113</sup> Preliminary data show that the Green River sub-population is “in decline throughout the entire Green River Subbasin” and has fallen under 2,000, below the minimum viable population of 2,600 adults.<sup>114</sup> The Yampa River portion of the sub-basin population also “remains low and may be in further decline.”<sup>115</sup> Recent studies show that Colorado pikeminnow declines in the Yampa River are linked to “persistent high densities of nonnative predators (e.g., smallmouth bass and northern pike),” and that northern pike are outnumbering Colorado pikeminnow by three to one.<sup>116</sup>

Humpback chub numbers are also low. Fish and Wildlife Service is “concerned that wild populations of humpback chub in Black Rocks and Westwater Canyon of the Colorado River (near the Colorado-Utah state line) have not recovered from declines detected in the late 1990’s. The reason for those population declines is uncertain.”<sup>117</sup> After this steep reduction, the Black Rocks/Westwater population continued to decline.<sup>118</sup> In 2008, the population “dropped below the population size downlist criterion (MVP = 2,100 adults) for the first time.”<sup>119</sup> In 2011 and 2012, the core population estimates were 1,846 and 1,718, respectively.<sup>120</sup>

The Desolation/Gray Canyons population in the Green River has also not met the population-size downlist criterion, and was observed to be “trending downward” based on 2006-2007 population estimates.<sup>121</sup> This trend has been attributed to “increased nonnative fish abundance and habitat changes associated with dry weather and low river flows.”<sup>122</sup> The 2014 estimate is 1,863 adults, substantially below the 2,100-adults recovery criterion.<sup>123</sup>

These declining population numbers are new baseline conditions, such that the endangered fish could be more vulnerable to water depletion and other oil and gas development effects than previously assumed. These downward trends also strongly suggest that the

---

<sup>112</sup> Sufficient Progress Assessment at 23, 36 (attached as Exhibit 244).

<sup>113</sup> See USFWS, Monitoring the Colorado Pikeminnow Population in the Mainstem Colorado River via Periodic Population Estimates, 3 (Nov. 2015), available at <http://www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2015/rsch/127.pdf> (showing similar capture rates of pikeminnow in 2014 and 2015).

<sup>114</sup> Sufficient Progress Assessment at 7.

<sup>115</sup> *Id.*

<sup>116</sup> *Id.* at 8.

<sup>117</sup> *Id.* at 36.

<sup>118</sup> *Id.* at 13.

<sup>119</sup> *Id.*

<sup>120</sup> *Id.* at 13-14.

<sup>121</sup> *Id.* at 12.

<sup>122</sup> *Id.* at 23.

<sup>123</sup> *Id.* at 12.

2016 NOV 14 AM 10:11  
CO STATE OFFICE  
DOUGLAS  
COLORADO

Endangered Fish Recovery Program is not achieving recovery targets nor adequately offsetting water depletion effects as intended.

**f. The Recovery Program Is Failing to Meet Recommended Flows.**

A consistent pattern of failing to meet recommended flows in the Colorado River's 15-Mile Reach requires BLM and the Service to reinstate consultation over the Fluid Mineral Program.

The Recovery Program establishes minimum recommended flows within various segments of the Upper Colorado River Basin that should be maintained to ensure recovery of the endangered fish.<sup>124</sup> The PBO's effects analysis assumes that, at the very least, the minimum recommended flow of 810 cubic feet per second (cfs) for dry years will be maintained within the 15-Mile Reach of the Colorado River within Colorado's Grand Valley in the Grand Junction Field Office.<sup>125</sup> The 15-Mile Reach extends from the confluence of the Gunnison River in Grand Junction to Palisade, Colorado, fifteen miles upstream.<sup>126</sup> According to the Service, when flows drop below 810 cfs, "habitat becomes compromised to the point that adult pikeminnow likely vacate the 15-Mile Reach to points downstream where flows increase either due to tributary input from the Gunnison River or irrigation return flow."<sup>127</sup> The 15-Mile Reach is one of the most important habitats to the Colorado pikeminnow and razorback sucker,<sup>128</sup> providing important spawning grounds for both species and year-round habitat for the Colorado pikeminnow.<sup>129</sup>

In its discussion of the environmental baseline, the Fluid Mineral PBO notes various recommended flows for the Colorado River sub-basins, including minimum flows for wet years, wet-average years, dry-average years, and dry years.<sup>130</sup> The PBO notes that in some recent years, recommended flows have not been met in the 15-Mile Reach.<sup>131</sup> However, the PBO's effects analysis assumes that the lowest recommended flow for dry years (810 cfs) will be maintained; this minimum flow is the baseline by which the PBO determined the Fluid Mineral Program's depletion effects on the Colorado pikeminnow.<sup>132</sup>

2014-11-11 11:11:11  
DO-FLM  
CO STATE OFFICE  
COSD MGR

<sup>124</sup> See *id.* at 41; USFWS, Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River above the Confluence with the Gunnison River, 54 (Dec. 1999) ("Colorado River PBO"), available at <http://www.coloradoriverrecovery.org/documents-publications/section-7-consultation/15mile/FinalPBO.pdf>.

<sup>125</sup> PBO at 42, 48.

<sup>126</sup> PBO at 4.

<sup>127</sup> See Sufficient Progress Assessment at 34-35; Osmundson, Douglas B. & Patrick Nelson, USFWS, Relationships Between Flow and Rare Fish Habitat in the '15 Mile Reach' of the Upper Colorado River Final Report, 6 (1995), available at <http://www.coloradoriverrecovery.org/documents-publications/technical-reports/isf/OsmundsonNelson1995.pdf> ("Osmundson 1995").

<sup>128</sup> PBO at 36, 42; Colorado River PBO at 25, 32, 45; Osmundson 1995 at 6.

<sup>129</sup> PBO at 36; Colorado River PBO at 31-32.

<sup>130</sup> PBO at 41-44.

<sup>131</sup> See *id.* at 42-44 (e.g., "Since the publication of the spring flow recommendations in 1991, peak 1-day average flows through the 15-mile reach have been below 12,900 cfs approximately one-third of the years through 2006 and these targets have not been met."); *id.* at 42 ("Mean monthly flows have...dropped below 810 cfs [the minimum flow for drought years] for at least one of the summer-time months during 7 of the last 17 years (1991-2007).").

<sup>132</sup> *Id.* at 48.

The Endangered Fish Recovery Program's latest Sufficient Progress Assessment indicates that recommended flows for dry years in the 15-Mile Reach of the Colorado River were not met in 2012 and 2013.<sup>133</sup> Flows also fell short of recommended levels in 2015, despite it being a dry-average precipitation year. In April, May, August and October 2015, the 15-Mile Reach missed the recommended minimum average flows for those months for dry-average precipitation years.<sup>134</sup> This average year shortfall (following a "wet-average" year) strongly suggests that minimum recommended flows for later dry years will almost certainly not be met when water will be scarcer, and as declining stream flows overall due to climate change weaken the Recovery Program's ability to supplement natural flows in dry years.<sup>135</sup> Indeed, in the period since the PBO was adopted, between 2009 and 2015, the Recovery Program has failed to meet mean monthly recommended flows in the 15-Mile Reach in over half of all months.<sup>136</sup> This new information strongly suggests that critical habitat within the 15-Mile Reach is likely to be unsuitable for the Colorado pikeminnow and razorback sucker in dry years, and that flow depletions from oil and gas development will only exacerbate these unsuitable conditions and reduce these species' chances of recovery.

The Recovery Program's continuing pattern of failing to meet recommended flows is new information revealing that the Fluid Mineral Program may have effects on the endangered fish to an extent that was not considered in the PBO or any of the RMPs that rely on the PBO in this leasing decision.

### 5. The RMP-FEIS Does Not Describe Effective Mitigation

The Determination of NEPA Adequacy is also flawed because numerous stipulations set forth in the Grand Junction and Colorado River Valley RMP-EISs and applied to the proposed lease parcels are vague or contain broad and general exceptions without any objective criteria for how they should be applied. Significant impacts could result from the application of these extremely general stipulations. The EISs fail to acknowledge these effects, and their conclusions that stipulations would avoid or reduce significant impacts are unsupported.

For example, GJ-CSU-4 for Collbran and Mesa/Powderhorn Sourcewater Protection Areas and Jerry Creek Watershed provides:

001-BUM  
CO STATE OFFICE  
COSO M3  
016 NOV 14 AM 10:11

---

<sup>133</sup> See Sufficient Progress Assessment at 34 (noting average monthly flows significantly below 810 cfs in 15-mile reach in 2012 and 2013); *id.* at 31 (recognizing need to reduce the amount of time flows drop below 810 cfs in the 15-Mile Reach).

<sup>134</sup> Compare Colorado River PBO at 40-41 (recommended mean monthly stream flows for 15-Mile Reach) with U.S. Geological Survey, Surface Water Monthly Statistics (1991 - 2016) & Email from Tom Chart, FWS, Director, Upper Colorado River Endangered Fish Recovery Program to Wendy Park (July 15, 2016) (chart indicating dry, average, and wet precipitation years).

<sup>135</sup> See n. 415 above & accompanying text (noting ability to buffer Colorado River system will become more difficult as streamflows decrease).

<sup>136</sup> See USGS comparison of USGS monthly mean flow in Table 1 to recommended flow (spreadsheet showing 15-Mile Reach flows and months with shortfall).

**Stipulation:** All surface disturbances within sourcewater protection areas and the Jerry Creek watershed are required to avoid interference with watershed resource values.

**Purpose:** To protect watershed resource values.

This stipulation provides no objective binding criteria for avoidance of “interference with watershed resource values,” or any specific explanation of what that means.

Numerous stipulations also allow exceptions without specific criteria for their application. For example, GJ-CSU-9 for BLM Sensitive Plants Species Occupied Habitat provides:

**Stipulation:** For plant species listed as sensitive by BLM, special design, construction, and implementation measures may be required within a 100-meter (328 feet) buffer from the edge of occupied habitat. In addition, relocation of operations by more than 200 meters (656 feet) may be required.

Application of the stipulation is not only uncertain but is subject to the vague exception that:

The Authorized Officer may grant an exception to a stipulation if it is determined that the factors leading to its inclusion in the lease have changed sufficiently such that: 1) the protection provided by the stipulation is no longer justified or necessary to meet resource objectives established in the RMP; or 2) proposed operations would not cause unacceptable impacts.

But “unacceptable impacts” are not defined. Numerous other leasing stipulations contain the same sweeping exceptions.<sup>137</sup>

The Determination of NEPA Adequacy’s exclusive reliance on the RMP-EISs, which in turn rely on these extremely vague stipulations to conclude that significant effects will be reduced or avoided, is improper.

**B. The Environmental Assessment for the Royal Gorge Parcels Fails to Analyze and Mitigate Significant Environmental Effects.**

The EA for the Royal Gorge Field Office (RGFO EA) fails to adequately describe and address significant impacts on various resources within the planning area—including effects on greenhouse gas emissions and seismicity—such that a finding of no significant impact is untenable.

In addition, as described in the Center’s EA comment and protest of the Royal Gorge Field Office’s November 2015 lease auction, BLM should halt all new leasing until the 20+year old RMPs governing the Royal Gorge Field Office have been updated to consider the cumulative impacts of greenhouse gas emissions and hydraulic fracturing throughout the planning area.

---

<sup>137</sup> See, e.g., stipulations for DeBeque Phacelia NSO, wildlife CSU, visual resources CSU.

2016 NOV 14 AM 10:11  
D01-BLM  
CO STATE OFFICE  
00000000000000000000

Tiering to these RMPs is inappropriate when the RMPs have never considered the impacts of fracking and other unconventional oil and gas techniques at the scale they are likely to be used for shale-area drilling within the planning area today. *See Ctr. for Biological Diversity v. Bureau of Land Mgmt.*, 937 F. Supp. 2d 1140, 1156-57 (N.D. Cal. 2013) (holding tiering to outdated RMP that did not address fracking was improper). Further, allowing new leasing while this update is pending would prejudice the consideration of the Center’s proposed no leasing-no fracking alternative for the Eastern Colorado planning area.

**1. The EA Fails to Quantify Greenhouse Gas Emissions.**

The EA fails to quantify the specific emissions that could potentially result from the RGFO lease auction, including emissions from transport of the extracted product to market or refineries, refining or processing, and end-use combustion of the extracted product. This is despite the EA’s implicit acknowledgement that such analysis is possible.

The EA notes that the RGFO has projected the potential number of wells per township that could be developed within the areas to be leased in the Reasonably Foreseeable Development Scenario for the RGFO.<sup>138</sup> It also provides a per well estimate of greenhouse gas emissions from well development and production activities.<sup>139</sup> In addition, the EA notes that emissions from combustion could be assessed “by using per-well annual production values” (based on “production data for each county and ranges of [reasonably foreseeable development] ranges for each Lease Parcel”).<sup>140</sup> These figures could be “converted to energy equivalent and ranges of [reasonably foreseeable development] with the following CO<sub>2</sub>e emissions factors: ~ 52 mmMT CO<sub>2</sub>e per QBtu consumption of natural gas and ~ 61 mmMT of CO<sub>2</sub>e per QBtu consumption of petroleum, derived using the Annual Energy Outlook (AEO) 2014 Report.”<sup>141</sup> Despite acknowledging that ample information is available to forecast combustion emissions, the EA stops short of performing this analysis. Existing production information could also be used to estimate the potential emissions from transportation and processing.

Meaningful consideration of greenhouse gas emissions (GHGs) is clearly within the scope of required NEPA review. *Ctr. for Biological Diversity v. Nat’l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9<sup>th</sup> Cir. 2008). As the Ninth Circuit has held, in the context of fuel economy standard rules:

The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct. Any given rule setting a CAFE standard might have an “individually minor” effect on the environment, but these rules are “collectively significant actions taking place over a period of time” *Ctr. for Biological Diversity v. Nat’l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1216 (9<sup>th</sup> Cir. 2008)(quoting 40 C.F.R. § 1508.7).

---

<sup>138</sup> EA at 23-24.

<sup>139</sup> *Id.* at 21-22.

<sup>140</sup> *Id.* at 36.

<sup>141</sup> *Id.*

2016 NOV 14 AM 10:11  
DO-EBM  
CO STATE OFFICE  
COSO N.S. 1508.7

The courts have ruled that federal agencies consider indirect GHG emissions resulting from agency policy, regulatory, and leasing decisions. For example, agencies cannot ignore the indirect air quality and climate change impact of decisions that would open up access to coal reserves. *See Mid States Coal. For Progress v. Surface Transp. Bd.*, 345 F.3d 520, 532, 550 (8th Cir. 2003); *High Country Conservation Advocates v. U.S. Forest Serv.*, 52 F.Supp. 3d 1174, 1197-98 (D.Colo. 2014).

NEPA requires “reasonable forecasting,” which includes the consideration of “reasonably foreseeable future actions...even if they are not specific proposals” *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1079 (9th Cir. 2011) (citation omitted). Full development of the areas for lease is entirely foreseeable in light of the Reasonably Foreseeable Development Scenarios for each of the field offices and existing development patterns. That BLM cannot “accurately” calculate the total emissions expected from full development is not a rational basis for cutting off its analysis. “Because speculation is . . . implicit in NEPA,” agencies may not “shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as crystal ball inquiry.” *Id.* Indeed, the EA for a recent lease sale in Utah undercuts BLM’s assertion here that GHGs cannot be quantified at the leasing stage<sup>142</sup>. *See High Country Conservation Advocates v. United States Forest Serv.*, 52 F. Supp. 3d 1174, 1196 (D. Colo. 2014) (decision to forgo calculating mine’s reasonably foreseeable GHG emissions was arbitrary “in light of the agencies’ apparent ability to perform such calculations”).

The final CEQ *Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA review* is dispositive on the issue of federal agency review of greenhouse gas emissions as foreseeable direct and indirect effects of the proposed action. 81 Fed. Reg. 51,866 (Aug. 5, 2016). The CEQ guidance provides clear direction for BLM to conduct a lifecycle greenhouse gas analysis because the modeling and tools to conduct this type of analysis are readily available to the agency:

If the direct and indirect GHG emissions can be quantified based on available information, including reasonable projections and assumptions, agencies should consider and disclose the reasonably foreseeable direct and indirect emissions when analyzing the direct and indirect effects of the proposed action. Agencies should disclose the information and any assumptions used in the analysis and explain any uncertainties. To compare a project’s estimated direct and indirect emissions with GHG emissions from the no-action alternative, agencies should draw on existing, timely, objective, and authoritative analyses, such as those by the Energy Information Administration, the Federal Energy Management Program, or Office of Fossil Energy of the Department of Energy. In the absence of such analyses, agencies should use other available information. 81 Fed. Reg. 51,866 at 16 (Aug. 5, 2016)(citations omitted).

CEQ’s guidance even provides an example of where a lifecycle analysis is appropriate in a leasing context at footnote 42:

---

<sup>142</sup> U.S. Bureau of Land Management, Environmental Assessment for West Desert District, Fillmore Field Office, August 2015 Oil and Gas Lease Sale, pp. 57-58 (Dec. 2015); U.S. Bureau of Land Management, Greenhouse Gases Estimate (West Desert District Nov 2015 Lease Sale), [http://www.blm.gov/style/medialib/blm/ut/natural\\_resources/airQuality.Par.38](http://www.blm.gov/style/medialib/blm/ut/natural_resources/airQuality.Par.38)

2016 HDY  
NOV 10 11  
DOI-BLM  
CO STATE OFFICE  
COSO MONTICELLO

The indirect effects of such an action that are reasonably foreseeable at the time would vary with the circumstances of the proposed action. For actions such as a Federal lease sale of coal for energy production, the impacts associated with the end-use of the fossil fuel being extracted would be the reasonably foreseeable combustion of that coal. *Id.*

The number of future wells and volume of potential oil and gas from these lease parcels are knowable and calculating the direct emissions impact from these lease parcels are also quantifiable. Utilizing BLM's own potential volume data for the December 2016 Royal Gorge and Grand Junction lease sale, the estimated oil volume of 1.340718 MMbbl represents lifecycle greenhouse gas emissions of up to 469,767.71 tons of CO<sub>2</sub> and the estimated gas volume of 35.6761Bcf represents lifecycle greenhouse gas emissions of up to 2,682,293.75 tons of CO<sub>2</sub>e. Potential lifecycle greenhouse gas emissions for resultant oil and gas volumes were generated using a peer-reviewed carbon calculator and lifecycle greenhouse gas emissions model developed by EcoShift consulting.<sup>143</sup> This model is not novel in its development or methodology. Numerous greenhouse gas calculation tools exist to develop lifecycle analyses, particularly for fossil fuel extraction, operations, transport and end-user emissions.<sup>144</sup> Indeed, the Department of Energy has historically utilized these types of lifecycle emissions analyses in NEPA review of oil and gas infrastructure projects.<sup>145</sup> Other federal agencies have begun to employ upstream, downstream and lifecycle greenhouse gas emissions analyses for NEPA review of energy-related projects.<sup>146</sup> Courts have upheld the viability and usefulness of lifecycle analyses, and adoption of

<sup>143</sup> See Ecoshift Consulting, The potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels, Center for Biological Diversity and Friends of the Earth (2015), <http://www.ecoshiftconsulting.com/wp-content/uploads/Potential-Greenhouse-Gas-Emissions-U-S-Federal-Fossil-Fuels.pdf>.

<sup>144</sup> See Council on Environmental Quality, Revised draft guidance for greenhouse gas emissions and climate change impacts (2014), [https://ceq.doe.gov/current\\_developments/GHG-accounting-tools.html](https://ceq.doe.gov/current_developments/GHG-accounting-tools.html).

<sup>145</sup> U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States, DOE/NETL-2014/1649 (May 29, 2014) available at <http://energy.gov/sites/prod/files/2014/05/f16/Life%20Cycle%20GHG%20Perspective%20Report.pdf>. See also, U.S. Department of Energy National Renewable Energy Laboratory, Life Cycle Greenhouse Gas Emissions from Electricity Generation Fact Sheet, Pub No. NREL/FS-6A20-57817 (2013) available at <http://www.nrel.gov/docs/fy13osti/57187.pdf>; U.S. Department of Energy National Energy Technology Laboratory Role of Alternative Energy Sources: Natural Gas Technology Assessment, Pub No. DOE/NETL-2012/1539 (NETL, 2012) available at <https://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/Life%20Cycle%20Analysis/LCA-2012-1539.pdf>; U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Greenhouse Gas Inventory of Natural Gas Extraction, Delivery and Electricity Production, Pub No. DOE/NETL-2011/1522 (NETL, 2011) available at [http://www.fossil.energy.gov/programs/gasregulation/authorizations/2013\\_applications/sierra\\_club\\_13-69\\_venture/exhibits\\_44\\_45.pdf](http://www.fossil.energy.gov/programs/gasregulation/authorizations/2013_applications/sierra_club_13-69_venture/exhibits_44_45.pdf); U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Analysis: Natural Gas Combined Cycle (NGCC) Power Plant, Pub No DOE/NETL-403-110509 (Sep 10, 2012) (NETL, 2010) available at [https://www.netl.doe.gov/energy-analyses/temp/FY13\\_LifeCycleAnalysisNaturalGasCombinedCycle\(NGCC\)PowerPlantFinal\\_060113.pdf](https://www.netl.doe.gov/energy-analyses/temp/FY13_LifeCycleAnalysisNaturalGasCombinedCycle(NGCC)PowerPlantFinal_060113.pdf).

<sup>146</sup> U.S. Bureau of Land Management, Final Supplemental Environmental Impact Statement for the Leasing and Underground Mining of the Greens Hollow Federal Coal Lease Tract, UTU-84102, 287 (Feb 2015) (BLM expressly acknowledged that "the burning of the coal is an indirect impact that is a reasonable progression of the mining activity" and quantified emissions from combustion without any disclaimer about other sources of coal. *Id.* at 286. In that same EIS, BLM also acknowledged that truck traffic to haul coal would be extended as a result of the proposed lease approval, and this would generate additional emissions.) See also, U.S. Forest Service, Record of Decision and Final Environmental Impact Statement, Oil and Gas Leasing Analysis, Fishlake National Forest, 169 (Aug 2013) (Table 3.12-7: shows GHG emissions from transportation, offsite refining and end use; and total direct and indirect emissions. See also *id.*, Appendix E/SIR-2 (more detailed calculations of direct and indirect emissions.)) U.S. Army

2015-09-14  
CO STATE OFFICE  
CO SO. DISTRICT  
DOI-BLM

this trend is clearly reflected in the CEQ Guidance on Climate Change . 81 Fed. Reg. 51, 866 at 11 (Aug. 5, 2016) (“This guidance recommends that agencies quantify a proposed agency action’s projected direct and indirect GHG emissions. Agencies should be guided by the principle that the extent of the analysis should be commensurate with the quantity of projected GHG emissions and take into account available data and GHG quantification tools that are suitable for and commensurate with the proposed agency action”).<sup>147</sup>

It is reasonably foreseeable, as opposed to speculative, that this lease sale will induce oil and natural gas production, transmission and ultimate end-user climate change impacts. The effects of this induced production must be considered in the EA, and in fact, necessitate a more robust review under an EIS. *See, e.g., N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1081-82 (9th Cir. 2011) (finding that NEPA review must consider induced coal production at mines, which was a reasonably foreseeable effect of a project to expand a railway line that would carry coal, especially where company proposing the railway line anticipated induced coal production in justifying its proposal); *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549-50 (8th Cir. 2003) (environmental effects of increased coal consumption due to construction of a new rail line to reach coal mines was reasonably foreseeable and required evaluation under NEPA). The development of an area for lease and subsequent oil and gas production would certainly result in combustion of the extracted product, which the EA implicitly acknowledges. As courts have held in similar contexts, combustion emissions resulting from opening up a new area to development are “reasonably foreseeable,” and therefore a “proximate cause” of the leasing. *See Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir. 2003) (holding that agency violated NEPA when it failed to disclose and analyze the future coal combustion impacts associated with the agency’s approval of a railroad line that allowed access to coal deposits); *High Country Conserv’n*

---

Corps of Engineers, Final Environmental Impact Statement: Alaska Stand Alone Gas Pipeline, Volume 2 Sec. 5.20-70-71 (Oct. 2012) The Corps, in a 2012 EIS for an intrastate natural gas pipeline in Alaska, estimated downstream emissions from combustion of the natural gas that would be transported, and also discussed the potential for natural gas to displace other, dirtier fuel sources such as coal and oil.) U.S. Department of State, Final Supplemental Environmental Impact Statement for the Keystone XL Project, § 4.14.3, Appendix U (Jan. 2014)(The Department of State, as lead agency on the Keystone XL Pipeline Review conducted a relatively comprehensive life-cycle greenhouse gas analysis for the proposed pipeline, alternatives, and baseline scenarios that could occur if the pipeline was not constructed.) U.S. Environmental Protection Agency Region X, Letter from Dennis McLerran, Regional Administrator, to Randel Perry, U.S. Army Corps of Engineers Seattle District, re Gateway Pacific Projects (Jan 22, 2013) available at [http://www.eisgatewaypacificwa.gov/sites/default/files/content/files/EPA\\_Reg10\\_McLerran.pdf#overlay-context=resources/project-library](http://www.eisgatewaypacificwa.gov/sites/default/files/content/files/EPA_Reg10_McLerran.pdf#overlay-context=resources/project-library). (EPA submitted comments on the scope of impacts that should be evaluated in the coal terminal EIS that the Corps is preparing, in which it urged the Corps to conduct a lifecycle emissions analysis of GHG emissions from the coal that would be transported via the terminal.)

<sup>147</sup> *High Country Conservation Advocates v. United States Forest Serv.*, 52 F. Supp. 3d 1174 (D. Colo. 2014) (Court held that the agencies’ failure to quantify the effect of greenhouse gas (GHG) emissions from the mining lease modifications was arbitrary in violation of NEPA because the social cost of carbon protocol tool existed for such analysis under 40 C.F.R. § 1502.23 but the agencies did not provide reasons in the final EIS for not using the tool, and that the agencies’ decision to forgo calculating the foreseeable GHG emissions was arbitrary in light of their ability to perform such calculations and their decision to include a detailed economic analysis of the benefits.) *See also, Dine Citizens Against Ruining Our Env’t v. United States Office of Surface Mining Reclamation & Enfr’t*, 82 F. Supp. 3d 1201, 1213-1218 (D. Colo. 2015) (Court held that the agency failed to adequately consider the reasonably foreseeable combustion-related downstream effects of the proposed action. Also held that that combustion emissions associated with a mine that fed a single power plant were reasonably foreseeable because the agency knew where the coal would be consumed).

2015-08-14 AM 10:12  
DOI-BLM  
CO STATE OFFICE  
GOSN/K/STP/STP

*Advocates v. United States Forest Serv.*, 52 F. Supp. 3d 1174, 1197 (D. Colo. 2014) (same with respect to GHG emissions resulting from approval of coal mining exploration project); *cf. S. Fork Band Council of W. Shoshone v. United States Dep't of the Interior*, 588 F.3d 718, 725 (in reviewing authorization of gold mining project, “[t]he air quality impacts associated with transport and off-site processing of the five million tons of refractory ore are prime examples of indirect effects that NEPA requires be considered.”).

In both *Mid States Coalition* and *High Country*, the courts rejected the government’s rationale that increased emissions from combustion of coal was not reasonably foreseeable because the same amount of coal would be burned without opening up the areas at issue to new coal mining. Both courts found this argument “illogical at best” and noted that “increased availability of inexpensive coal will at the very least make coal a more attractive option to future entrants into the utilities market when compared with other potential fuel sources, such as nuclear power, solar power, or natural gas.” See *High Country*, 52 F. Supp. 3d at 1197 (quoting *Mid States Coalition*, 345 F.3d at 549). On similar grounds, the development of new wells over the proposed areas for lease will increase the supply of [oil and natural gas]. At some point this additional supply will impact the demand for [oil and gas] relative to other fuel sources, and [these minerals] that otherwise would have been left in the ground will be burned. This reasonably foreseeable effect must be analyzed, even if the precise extent of the effect is less certain.” *Id.* See also *WildEarth Guardians v. United States Office of Surface Mining, Reclamation & Enft*, 104 F. Supp. 3d 1208, 1229-30 (D. Colo. 2015) (coal combustion was indirect effect of agency’s approval of mining plan modifications that “increased the area of federal land on which mining has occurred” and “led to an increase in the amount of federal coal available for combustion.”)<sup>148</sup>

Even if it were true that potential emissions cannot reasonably be estimated, it is possible for BLM to identify significant sources of greenhouse gas emissions, which would enable the identification of specific measures to reduce emissions and an understanding of the extent to which certain emissions are avoidable. The extreme urgency of the climate crisis requires BLM to pursue all means available to limit the climate change effects of its actions. Any emissions source, no matter how small, is potentially significant, such that BLM should fully explore mitigation and avoidance options for all sources.

BLM suggests that quantification of GHGs would occur when actual drilling is proposed. But by delaying quantification until after a lease is issued, BLM may prejudice the consideration of alternatives or leasing stipulations that would avoid or reduce greenhouse gas emissions to an extent not otherwise available after leasing. BLM has long (but incorrectly) maintained that leasing stipulations can only be imposed with the issuance of the lease.

---

<sup>148</sup> See also, Council on Environmental Quality, Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 81 Fed. Reg. 51,866 at 14 (Aug. 5, 2016) (For example, NEPA reviews for proposed resource extraction and development projects typically include the reasonably foreseeable effects of various phases in the process, such as clearing land for the project, building access roads, extraction, transport, refining, processing, using the resource, disassembly, disposal, and reclamation. Depending on the relationship between any of the phases, as well as the authority under which they may be carried out, agencies should use the analytical scope that best informs their decision making.)

DOI-BLM  
CO STATE OFFICE  
COSO MOUNTAIN

2016 NOV 14 PM 10:12

Thereafter, purportedly, its authority to condition drilling is limited to “reasonable measures” or “conditions of approval” that may not be “[in]consistent with lease rights granted.” 43 C.F.R. § 3101.1-2. Cost-prohibitive measures could therefore potentially be barred. Further, measures to “minimize” impacts may be imposed, but those may not necessarily avoid impacts altogether. *Id.* Waiting until the drilling stage could also be too little too late, as various other actions may occur between leasing and drilling, such as the execution of unit agreements, or construction of roads or pipelines, all of which may narrow mitigation options available at the drilling stage. *See William P. Maycock et al.*, 177 I.B.L.A. 1, 20-21 (Dec. Int. 2008) (holding that unit agreements limit drilling-stage alternatives).

Natural gas emissions are generally about 84 percent methane.<sup>149</sup> Methane is a potent greenhouse gas that contributes substantially to global climate change. Its global warming potential is approximately 33 times that of carbon dioxide over a 100 year time frame and 105 times that of carbon dioxide over a 20 year time frame.<sup>150</sup>

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 or 3.8 percent of the total greenhouse gas emissions in the United States.”<sup>151</sup> 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.<sup>152</sup> 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.<sup>153</sup> 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.<sup>154</sup>

For the oil industry, emissions result “primarily from field production operations . . . , oil storage tanks, and production-related equipment.”<sup>155</sup> Emissions are released as planned, during

---

<sup>149</sup> Howarth, Robert, et al., “Methane and the greenhouse-gas footprint of natural gas from shale formations,” *Climatic Change* (Mar. 31, 2011) (“Howarth 2011”); Shindell, Drew, “Improved Attribution of Climate Forcing to Emissions,” 326 *Science* 716 (2009).

<sup>150</sup> *Id.*

<sup>151</sup> 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).

<sup>152</sup> USEPA, Basic Information.

<sup>153</sup> 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, 2 *Nature Climate Change* 385, 386 (2012)

<sup>154</sup> Tollefson, Jeff, “Methane leaks erode green credentials of natural gas,” *Nature News* (Jan. 2, 2013).

<sup>155</sup> Williams, Megan & Cindy Copeland, Earthjustice, Methane Controls for the Oil and Gas Production Sector (2010).

2014-11-14  
CO STATE OFFICE  
09:50 AM  
NOV 14 AM 10:12

normal operations and unexpectedly due to leaks and system upsets.<sup>156</sup> Significant sources of emissions include well venting and flaring, pneumatic devices, dehydrators and pumps, and compressors.<sup>157</sup>

Contrary to CEQ’s guidance, the EA improperly declines to analyze the contribution to climate change of additional Colorado federal oil and gas leasing, instead dismissing those impacts by asserting the site-specific tools to quantify the emissions and impacts from this leasing decision are in a “formative phase” of development.<sup>158</sup> The very purpose of oil and gas leasing is the production, and subsequent combustion, of hydrocarbon fossil fuels. It is simply not credible to assert in 2016 that BLM has no way of estimating a range of possible production levels for leases within established industry plays and currently producing geological formations. Although there are certainly geological, technological, and economic uncertainties that could affect the production from the leases in question, these uncertainties do not relieve BLM of the obligation to analyze and disclose, at the very least, a range of possible production scenarios and their resulting emissions. In its recent NEPA guidance, CEQ directs agencies, at a minimum, to “use projected GHG emissions as a proxy for assessing potential climate change effects when preparing a NEPA analysis for a proposed agency action.” 81 Fed. Reg. 51,866, 51,866 (Aug. 5, 2016). BLM has failed to meet even this low bar in its climate analysis.

The Leasing EA’s failure to quantify reasonably foreseeable GHG emissions that could result from new leasing within the Royal Gorge region—including emissions from construction, operating fossil-fuel powered equipment during production, reclamation, transportation, processing and refining, and combustion of the extracted product—is unlawful and unsupported by evidence or reasoned analysis.

Finally, like the Grand Junction, Colorado River Valley, the Royal Gorge EA fails to perform any social cost of carbon analysis.

## 2. The EA Fails to Address Induced Seismicity.

The EA contains no analysis whatsoever of the potential for wastewater injections or fracking near and around the parcels at issue to induce earthquakes. (See Scoping Comment at 49-52.) Parcel 7583 in Huerfano County in southern Colorado appears to be within or very close to an area that is susceptible to earthquakes induced by human activity. A recent USGS study assessing wastewater injection-induced earthquake risk in the central U.S. concluded that “[t]he potential damage probabilities from an earthquake in 2016 are particularly high in parts of north-central Oklahoma, northern Texas, southern Colorado/northern New Mexico, and north-central Arkansas.”<sup>159</sup> These earthquakes could threaten the physical safety, homes, and other property of

---

<sup>156</sup> *Id.*

<sup>157</sup> U.S. Environmental Protection Agency, National Gas STAR Program, Basic Information, Major Methane Emission Sources and Opportunities to Reduce Methane Emissions, <http://www.epa.gov/gasstar/basic-information/index.html#sources> (last updated May 24, 2012).

<sup>158</sup> EA at 36.

<sup>159</sup> USGS, 2016 One-Year Seismic Hazard Forecast for the Central and Eastern United States From Induced and Natural Earthquakes, Open-File Report 2016–1035 (March 2016), available at <https://pubs.er.usgs.gov/publication/ofr20161035>.

CO STATE OFFICE  
NOV 14 AM 10:12

residents in surrounding communities. The EA must disclose this risk and describe effective mitigation to reduce the threat of induced seismicity.

**C. BLM Has Violated the Endangered Species Act by Failed to Consult with the Fish and Wildlife Service Regarding Effects to Listed Species.**

Further, BLM’s failure to consult with the Fish and Wildlife Service regarding impacts to listed species is unsupported and violates Section 7 of the Endangered Species Act. Specifically, the BLM’s failure to conduct site-specific consultation with the Fish and Wildlife Service regarding the proposed parcels violates both ESA § 7 and the terms of the Fish and Wildlife Service’s consultation in the RMPs tied to in this leasing decision.

The EA reveals the presence of numerous threatened, endangered, and sensitive species and their critical habitat within the areas proposed for leasing, but fails to provide any meaningful information regarding potential effects. BLM must not only evaluate the indirect and cumulative effects on special status species under NEPA, it must also (a) consult (and/or confer in the case of black-footed ferrets) with the Fish and Wildlife Service under Section 7 regarding the effects of oil and gas development and water use on listed species and critical habitat, and (b) evaluate the effects on sensitive species under its own sensitive species policy.

Congress enacted the Endangered Species Act (ESA) in 1973 to provide for the conservation of endangered and threatened fish, wildlife, plants and their natural habitats. 16 U.S.C § 1531, 1532. The ESA imposes substantive and procedural obligations on all federal agencies with regard to listed and proposed species and their critical habitats. *See id.* §§ 1536(a)(1), (a)(2) and (a)(4) and § 1538(a); 50 C.F.R. § 402. Under section 7 of the ESA, federal agencies must “insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined ... to be critical.”16 U.S.C. § 1536(a)(2).

The definition of agency “action” is broad and includes “all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies,” including programmatic actions. 50 C.F.R. § 402.02. Likewise, the “action area” includes “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” *Id.*

The duties in ESA section 7 are only fulfilled by an agency’s satisfaction of the consultation requirements that are set forth in the implementing regulations for section 7 of the ESA, and only after the agency lawfully complies with these requirements may an action that “may affect” a protected species go forward. *Pac. Rivers Council v. Thomas*, 30 F.3d 1050, 1055-57 (9th Cir. 1994). The action agency must initially prepare a biological assessment (BA) to “evaluate the potential effects of the proposed action” on listed species. 50 C.F.R. § 402.12. If the action agency concludes that the proposed action is “not likely to adversely affect” a listed species that occurs in the action area, the Service must concur in writing with this determination. *Id.* §§ 402.13(a) and 402.14(b). If the Service concurs in this determination, then formal consultation is not required. *Id.* § 402.13(a). If the Service’s concurrence in a “not likely to

2016 MAY 11 10:12  
DRI-BLM  
CO STATE OFFICE  
C050 MAIL ROOM

adversely affect” finding is inconsistent with the best available data, however, any such concurrence must be set aside. *See id.* § 402.14(g)(8); 5 U.S.C. § 706(2). If the action agency concludes that an action is “likely to adversely affect” listed species or critical habitat, it must enter into “formal consultation” with the Service. 50 C.F.R. §§ 402.12(k), 402.14(a). The threshold for triggering the formal consultation requirement is “very low”; indeed, “any possible effect ... triggers formal consultation requirements.”<sup>160</sup>

Formal consultation commences with the action agency’s written request for consultation and concludes with the Service’s issuance of a “biological opinion.” 50 C.F.R. § 402.02. The biological opinion states the Service’s opinion as to whether the effects of the action are “likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.” *Id.* § 402.14(g)(4).<sup>161</sup> When conducting formal consultation, the Service and the action agency must evaluate the “effects of the action,” including all direct and indirect effects of the proposed action, plus the effects of actions that are interrelated or interdependent, added to all existing environmental conditions – that is, the “environmental baseline.” *Id.* §§ 402.14 and 402.02. The environmental baseline includes the past and present impacts of all Federal, state, and private actions and other human activities in the action area...*Id.* The effects of the action must be considered together with “cumulative effects,” which are “those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.” *Id.*

If the Service concludes in a biological opinion that jeopardy is likely to occur, it must prescribe “reasonable and prudent alternatives” to avoid jeopardy. *Id.* § 402.14(h)(3). If the Service concludes that a project is not likely to jeopardize listed species, it must nevertheless provide an incidental take statement (ITS) with the biological opinion, specifying the amount or extent of take that is incidental to the action (but which would otherwise be prohibited under Section 9 of the ESA), “reasonable and prudent measures” (RPMs) necessary or appropriate to minimize such take, and the “terms and conditions” that must be complied with by the action agency to implement any reasonable and prudent measures. 16 U.S.C. § 1536(b)(4); 50 C.F.R. § 402.14(i).

The ESA requires federal agencies to use the best scientific and commercial data available when consulting about whether federal actions will jeopardize listed species. *See* 16 U.S.C. § 1536(a)(2). Accordingly, an action agency must “provide the Service with the best scientific and commercial data available or which can be obtained during the consultation for an adequate review of the effects that an action may have upon listed species of critical habitat.” 50 C.F.R. § 402.14(d). Likewise, “[i]n formulating its biological opinion...the Service will use the best scientific and commercial data available.” *Id.* § 402.14(g)(8). However, if the action agency failed “to discuss information that would undercut the opinion’s conclusions,” the biological

<sup>160</sup> *See* USFWS and NOAA, Interagency Cooperation Under the Endangered Species Act, 51 Fed. Reg. 19,926 (Dec 16, 2008).

<sup>161</sup> To “jeopardize the continued existence of” means “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.” *Id.* § 402.02.

DOI-BLM  
CO STATE OFFICE  
COSCO MARIPOSA  
NOV 14 AM 10:30

opinion is legally flawed, and the ITS will not insulate the agency from ESA Section 9 liability. See *Ctr. for Biological Diversity v. BLM*, 698 F.3d 1101, 1127-28 (9th Cir. 2012).

Section 7(d) of the ESA provides that once a federal agency initiates consultation on an action under the ESA, the agency, as well as any applicant for a federal permit, “shall not make any irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures which would not violate subsection (a)(2) of this section.” 16 U.S.C. § 1536(d). The purpose of section 7(d) is to maintain the environmental status quo pending the completion of consultation. Section 7(d) prohibitions remain in effect throughout the consultation period and until the federal agency has satisfied its obligations under section 7(a)(2) that the action will not result in jeopardy to listed species or adverse modification of critical habitat.

In addition, BLM must consult with the Service regarding the impacts of the lease sale on affected listed species, in compliance with its section 7 obligations under the ESA. To the extent that BLM relies on its section 7 programmatic consultations for the several management plans governing the lease sale, that reliance is not proper for any of the listed species affected by BLM’s action. The potential for fracking and horizontal drilling and its associated impacts within the planning area constitutes “new information reveal[ing] effects of the [RMPs] that may affect listed species or critical habitat in a manner or to an extent not previously considered [in the prior section 7 programmatic consultations].” 50 CFR § 402.16(b). BLM must therefore reinitiate consultation on all of the planning documents for these areas. In any case, it must formally consult over the lease sale’s potential adverse effects on listed species and consider the full scope of fracking and other drilling activities that could affect these species.

The law is clear that, in the context of oil and gas leasing, “agency action” under the ESA includes not just the legal transaction of lease issuance, but also all resulting post-leasing activities from exploration, through production, to abandonment:

we hold that agency action in this case entails not only leasing but leasing and all post-leasing activities through production and abandonment. Thus, section 7 of the ESA on its face requires the FWS in this case to consider all phases of the agency action, which includes postleasing activities, in its biological opinion. Therefore the FWS was required to prepare, at the leasing stage, a comprehensive biological opinion assessing whether or not the agency action was likely to jeopardize the continued existence of protected species, based on “the best scientific and commercial data available.” 16 U.S.C. § 1536(a)(2).<sup>162</sup>

The Ninth Circuit’s decision in *Conner v. Burford* is similarly clear that the consultation requirement is not obviated by uncertainty about the precise location and extent of future drilling: “Although we recognize that the precise location and extent of future oil and gas activities were unknown at the time, extensive information about the

---

<sup>162</sup> *Conner*, 848 F.2d at 1453.

2016 NOV 14 AM 10:12  
DOI-BLM  
CO STATE OFFICE  
COSCO HANCOCK

behavior and habitat of the species in the areas covered by the leases was available.”<sup>163</sup> Similarly, the inclusion of a general Threatened and Endangered Species stipulation in the standard lease terms cannot substitute for the ESA Section 7 obligation to prepare a comprehensive biological opinion at the initial leasing stage:

Appellants ask us, in essence, to carve out a judicial exception to ESA's clear mandate that a comprehensive biological opinion -- in this case one addressing the effects of leasing and all post-leasing activities -- be completed before initiation of the agency action. They would have us read into the ESA language to the effect that a federal agency may be excused from this requirement if, in its judgment, there is insufficient information available to complete a comprehensive opinion and it take upon itself incremental step consultation such as that embodied in the T & E stipulations. We reject this invitation to amend the ESA. That it is the role of Congress, not the courts.<sup>164</sup>

The BLM's refusal to consult at the lease stage, and proposal to defer consultation to the APD stage, is precisely the sort of incremental step consultation decisively rejected as inconsistent with the ESA in *Conner v. Burford*. Under *Conner*, the individual activity in question is clearly the issuance of a (non-NSO) lease, and consultation must occur prior to lease issuance if the resulting activities may affect listed species or critical habitat. Based on the information in the EA and the maps we have provided based on BLM GIS data, there is substantial basis to conclude that leasing and post-leasing activities may affect, at a minimum, listed plants, and big game habitat and migration corridors. Therefore, under ESA § 7, BLM must consult with FWS prior to leasing.

**1. Listed Plants – DeBeque phacelia (Parcels COC77995, COC77997) and Parachute Beardtongue (Parcel COC77992).**

BLM must consult with the Fish and Wildlife Service over the effects of leasing on the listed DeBeque phacelia and Parachute beardtongue. According to a map prepared by the Center, critical habitat of DeBeque phacelia and the Parachute beardtongue lies adjacent to and on top of leasing parcels.<sup>165</sup> New development of those lease parcels would result in increased transportation, spill risks (including toxic frack fluid spills), and air pollution along these access routes, impacting the species and critical habitat.

New development would also increase pipeline transport of produced water and natural gas, and heighten the risk of pipeline spills. These threats must be addressed in the Section 7 consultation for the leasing decision.

A Section 7 consultation should also consider climate change effects on the DeBeque phacelia and Parachute beardtongue, and how increased drought and reduced stream flows would

2016 NOV 14 11:02 AM  
DO-FLM  
CO STATE OFFICE  
COSCO MARIETTA

<sup>163</sup> *Id.* at 1453.

<sup>164</sup> *Id.* at 1455.

<sup>165</sup> CBD plant species critical habitat maps Exhibit A (parcels COC7795, COC77997 and COC77992).

impact the species' survival and recovery.<sup>166</sup> According to the Service's biological opinion for the Winter Flats oil and gas project:

DeBeque phacelia only germinates and is identifiable during years with suitable moisture and climate conditions. Germination appears to be highly dependent on winter snows and spring rainfall immediately prior to and during the blooming period. Seasons with less than average moisture, or moisture that may come after normal germination periods, can result in low rates of germination.<sup>167</sup>

In the Colorado River basin, temperatures have increased roughly by 2° F, and “additional decades of warming are ‘locked in’ regardless of any behavioral changes that may or may not be implemented by the world’s governments”—roughly an additional 5° F of warming can be expected in the basin by 2050.<sup>168</sup> This temperature rise is likely to result in significant runoff declines.<sup>169</sup> Moreover, under a business-as-usual GHG emissions scenario, the risk of mega-drought in the southwest would increase to 70-99% by the end of the century.<sup>170</sup> This substantial risk of mega-drought would exist regardless of how or whether precipitation changes. Increasingly warm and drier than normal conditions could therefore result in lower rates of germination for DeBeque phacelia, and reduce its chances of survival and recovery.

BLM inadequately attempts to mitigate impacts to listed plants by imposing the controlled surface use lease stipulation GJ-CSU-9, BLM Sensitive Plants Species Occupied Habitat.<sup>171</sup> The stipulation vaguely attempts to provide protection for sensitive plant species by creating special design, construction, and implementation measures within a 100-meter (328 feet) buffer from the edge of occupied habitat, and in some cases, a 200 meter (656 feet) buffer may be required.<sup>172</sup> According to the species listing decision for these particular plants, Fish and Wildlife Service “recommends buffers of at least 656 ft (200 m) for pipeline ROWs between the edge of disturbance and suitable plant habitat to protect the plants from destruction by vehicles that stray outside of the project area, runoff, erosion, dust deposition, or other indirect effects such as destruction of pollinators as well as...[T]he ongoing threats to habitat that are associated with oil and gas development include well pad and road construction; installation of pipelines; and construction of associated buildings, holding tanks, and other facilities. All of these actions would destroy the seed bank of *Phacelia submutica* and modify its habitat so that the plants could no longer grow in these areas.”<sup>173</sup> As noted by the agency itself, a MINIMUM of a 200 meter buffer should be established for these listed plants and therefore, BLM did not adequately

<sup>166</sup> See NOI at 26-27 and Exhibit A attached thereto.

<sup>167</sup> Winter Flats project BO at 6.

<sup>168</sup> Colorado River Research Group, *Climate Change and the Colorado River: What We Already Know*, 1-2 (Oct. 2016), available at [http://www.coloradoriverresearchgroup.org/uploads/4/2/3/6/42362959/crrg\\_climate\\_change.pdf](http://www.coloradoriverresearchgroup.org/uploads/4/2/3/6/42362959/crrg_climate_change.pdf).

<sup>169</sup> *Id.* at 2-3.

<sup>170</sup> Ault, Toby R. et al., *Relative Impacts of mitigation, temperature, and precipitation on 21st-century megadrought risk in the American Southwest*, 2 *Science Advances*, e1600873 (2016).

<sup>171</sup> U.S. Department of Interior, Bureau of Land Management, *Final Notice of Competitive Oil and Gas Internet-Based Lease Sale October 2016 at 106*, found at [http://www.blm.gov/style/medialib/blm/co/programs/oil\\_and\\_gas/Lease\\_Sale/2016/november.Par.63919.File.dat/Dec\\_2016\\_Final\\_SN\\_v2.pdf](http://www.blm.gov/style/medialib/blm/co/programs/oil_and_gas/Lease_Sale/2016/november.Par.63919.File.dat/Dec_2016_Final_SN_v2.pdf).

<sup>172</sup> *Id.*

<sup>173</sup> DOI, *Fish and Wildlife Service Listing Decision* at page 45,071 , 45,072.

mitigate or consult with Fish and Wildlife Service on impacts of leasing and subsequent development on DeBeque phacelia and Parachute Beardtongue.

**2. Stipulations for Protection of Big Game and Big Game Migration Routes Are Inadequate – Parcels COC78008, COC78009 and COC77990.**

The above-listed parcels overlap with well-documented mule deer and elk migration routes.<sup>174</sup> As a recent Wyoming Game and Fish Department study has emphasized, recent research conclusively shows that oil and gas development can be interfering with these important migration corridors and reduce overall habitat available to these species. For example, recent tracking collar research on a mule deer herd utilizing the Dad Winter Range in southern Wyoming found that, “[i]n migration routes exposed to a larger, more concentrated oil and gas development, mule deer use declined by 53% and movement rates nearly doubled.”<sup>175</sup> Thus, as highlighted by the Sawyer et al. (2013) study, this population has already experienced impacts from development in migration corridors and winter range.

BLM’s finding of no significant impact is also flawed in that it fails to take into account mule deer habitat losses that could result from oil and gas production within winter habitat. A recent study shows that oil and gas development causes significant habitat loss 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.<sup>176</sup>

DOI-BLM  
CO STATE OFFICE  
COSC MONTROSE  
2016 NOV 14 AM 10:12

The EA recognizes these habitat loss effects on mule deer and elk.<sup>177</sup> However, the only protections provided for big game habitat are timing limitation stipulations (CO-09, RG-08, RG-14), which prohibit surface use during the winter or calving months, but this measure does nothing to avoid or offset the impacts of the substantial habitat loss resulting from big game avoidance of oil and gas infrastructure. This is especially problematic, because extensive winter big game habitat and elk calving areas are found within the lease sale areas.<sup>178</sup> The EA’s failure to adopt any mitigation measures to offset these losses render BLM’s FONSI invalid.

<sup>174</sup> See Exhibits C and D for Big Game migration routes and habitats. (Exhibit C, Elk migration route and habitat for parcel COC77990; Exhibit D, Mule Deer migration route and habitat for parcels COC78008 and COC78009).

<sup>175</sup> Sawyer, Hall et al., A Framework for Understanding Semi-Permeable Barrier Effects on Migratory Ungulates, 50 J. Applied Ecol. 74 (2013), doi: 10.1111/1365-2664.12013.

<sup>176</sup> 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>.

<sup>177</sup> EA at 54.

<sup>178</sup> See RMW ABI Screen; RMW Big Game Maps 2, 5 (parcels 7583, 7591, 7592, 7593), available at [http://rockymountainwild.org/\\_site/wp-content/uploads/16-065\\_CONov2016EA\\_Game\\_Map2\\_v1.pdf](http://rockymountainwild.org/_site/wp-content/uploads/16-065_CONov2016EA_Game_Map2_v1.pdf), [http://rockymountainwild.org/\\_site/wp-content/uploads/16-065\\_CONov2016EA\\_Game\\_Map5\\_v1.pdf](http://rockymountainwild.org/_site/wp-content/uploads/16-065_CONov2016EA_Game_Map5_v1.pdf); EA at 53-54.

**III. Conclusion**

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, surface and ground water resources, seismic potential, or human, animal, and plant health and safety concerns present in the area to be leased. Unconventional oil and gas development not only fuel the climate crisis but entail significant public health risks and harms to the environment. Should BLM proceed with the proposed oil and gas leasing, 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 this protest. The proposed leasing’s significant environmental impacts should compel BLM to withdraw the leasing proposal.

Sincerely,

Diana Dascalu-Joffe  
Senior Attorney  
The Center for Biological Diversity

Katie Schaefer  
Associate Attorney  
Sierra Club

DOI-BLM  
CO STATE OFFICE  
CO SO MAIL ROOM  
2016 NOV 14 AM 10:12

## List of References

- 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)
- American Geophysical Union, Colorado River Flows Reduced by Warmer Spring Temperatures (March 9, 2016), <http://news.agu.org/press-release/colorado-river-flows-reduced-by-warmer-spring-temperatures/>
- Associated Press, CO Colorado Has 40 Times More Natural Gas Than Previously Estimated, (June 8th 2016)
- Ault, Toby R. et al., Relative Impacts of mitigation, temperature, and precipitation on 21st-century megadrought risk in the American Southwest, 2 Science Advances e1600873 (2016)
- Barnett, T. P., et al., Human-induced changes in the hydrology of the western United States, 319 Science 1080 (2008)
- Barnett, T.P. & D.W. Pierce, Sustainable water deliveries from the Colorado River in a Changing Climate, 106 PNAS 18 (2009)
- Barnett, T.P. & D.W. Pierce, When will Lake Mead go dry? 44 Water Resources Research W03201 (2008)
- Beckvar, N., T.M. Dillon, and L.B. Reads, Approaches for linking whole-body fish tissue residues of mercury or DDT to biological effects threshold, Environmental Toxicology and Chemistry 24:2094-2105 (2005)
- Bonfils, C., et al., Detection and attribution of temperature changes in the mountainous western United States, 21 Journal of Climate 6404 (2008)
- Brune, Michael, Statement of Sierra Club Executive Director Michael Brune Before the Committee on Oversight & Government Reform (May 31, 2012)
- Center for Biological Diversity et al., Comments on Royal Gorge-Grand Junction-Colorado River Valley-Tres Rios Lease Sale: November 2016 Lease Parcels (submitted June 13, 2016).
- Center for Biological Diversity, Grand Junction Protest Letter (May 11, 2015)
- Center for Biological Diversity, Map of critical habitat for parcels COC77995, COC77997, COC77992) (2016)

DO-ELM  
CO STATE OFFICE  
COSO MAPS SECTION  
2016 NOV 14 AM 10:12

Center for Biological Diversity, Map of Mancos Shale relative to BLM Field Offices (2016)

Center for Biological Diversity, Map of Oil and Gas Lease Sales November 2016 relative to Critical Habitat (2016)

Center for Biological Diversity, Spreadsheet of Western Colorado Horizontal Drilling Projects (2016)

Christensen, N.S. and D.P. Lettenmaier, A multimodel ensemble approach to assessment of climate change impacts on the hydrology and water resources of the Colorado River basin, 11 Hydrology and Earth System Sciences 417 (2007)

Colorado River Research Group, Climate Change and the Colorado River: What We Already Know (Oct. 2016).

Colorado State University, Level 4 PCA Rare Plants of the Wasatch (Nov. 2015)

Colorado State University, Level 4 PCA Report Clear Creek (Nov. 2015)

Colorado State University, Level 4 PCA Report Mount Callahan (Nov. 2015)

Council on Environmental Quality, Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 81 Fed. Reg. 51,866 (Aug. 5, 2016)

Council on Environmental Quality, Revised draft guidance for greenhouse gas emissions and climate change impacts (2014)

Das, T., et al., Structure and detectability of trends in hydrological measures over the western United State, 10 Journal of Climate 871 (2009)

Dettinger, M. et al., Western water and climate change, 25 Ecological Applications 2069 (2015)

Ecoshift Consulting, The potential Greenhouse Gas Emissions of U.S. Federal Fossil Fuels, Center for Biological Diversity and Friends of the Earth (2015)

Environmental Sciences Laboratory, Natural Contamination from the Mancos Shale, U.S. Department of Energy, Doc. No. S07480 (2011)

2016 NOV 14 AM 10:12  
DOI-BLM  
CO STATE OFFICE  
COSO MOUNTAIN VIEW

- Garfin, G., et al., Ch. 20: Southwest. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program (2014).
- Georgakakos, A., et al., Ch 3: Water resources, Climate change impacts in the United States: the third National Climate Assessment, J. M. Melillo, T. C. Richmond, and G. W. Yohe, eds., U.S. Global Change Research Program, Washington, D.C., USA (2014)
- Hamilton, S.J., Review of residue-based selenium toxicity thresholds for freshwater fish, *Ecotox. Environ. Saf.* 56: 201-210 (2003)
- Hamlet, A., et al., Effects of temperature and precipitation variability on snowpack trends in the western United State, 18 *Journal of Climate* 4545 (2005)
- Henneberg, M.F., 2014 annual summary of the lower Gunnison River Basin Selenium Management Program water-quality monitoring, Colorado: U.S. Geological Survey Open-File Report 2016-1129, 25 p. (2016), <http://dx.doi.org/10.3133/ofr20161129>
- Hidalgo, H. G., et al., Detection and attribution of streamflow timing changes to climate change in the western United States, 22 *Journal of Climate* 3838 (2009)
- Hoerling, M. P. and Jon Eischeid, *Past Peak Water in the Southwest*, University of Colorado - CIRES (2007)
- Hoerling, M. P., et al., Present Weather and Climate: Evolving Conditions. Pages 74-100 in G. Garfin, A. Jardine, M. Black, R. Merideth, J. Overpeck, and A. Ray, editors. *Assessment of climate change in the Southwest United States: a report prepared for the National Climate Assessment*. Island Press, Washington, D.C., USA (2013)
- Hou, Deyi, et al., Shale gas can be a double-edged sword for climate change, 2 *Nature Climate Change* 385 (2012)
- Howarth, Robert, et al., Methane and the greenhouse-gas footprint of natural gas from shale formations, *Climatic Change* (Mar. 31, 2011)
- Howarth, Robert, et al., Venting and Leaking of Methane from Shale Gas Development: Response to Cathles et al. (2012)
- Interagency Cooperation Under the Endangered Species Act, 51 Fed. Reg. 19,926 (June 3 1996)

2016 NOV 14 AM 10:12  
 DOI-BLM  
 CO STATE OFFICE  
 COSC MARIETTA



- Rauscher, S. A., et al., Future changes in snowmelt-driven runoff timing over the western US, 35 Geophysical Research Letters L16703, doi:10.1029/2008GL034424 (2008)
- Ray, A.J., Barsugli et al., Climate change in Colorado: a synthesis to support water resources management and adaptation, Report for the Colorado Water Conservation Board, University of Colorado, Boulder (2008)
- Sawyer, Hall et al., A Framework for Understanding Semi-Permeable Barrier Effects on Migratory Ungulates, 50 J. Applied Ecol. 74 (2013), doi: 10.1111/1365-2664.12013.
- Shindell, Drew, Improved Attribution of Climate Forcing to Emissions, 326 Science 716 (2009)
- Stewart, I. T., et al., Changes in snowmelt runoff timing in western North America under a 'Business as Usual' climate change scenario, 62 Climatic Change 217 (2004)
- The Daily Sentinel, Pond Breach Gashes Slide (May 27, 2016), <http://www.gjsentinel.com/news/articles/pond-breach-gashes-slide>.
- Tollefson, Jeff, "Methane leaks erode green credentials of natural gas," Nature News (Jan. 2, 2013).
- Trowbridge, A., Colorado Floods Spur Fracking Concerns, CBS News (Sept. 17, 2013), [http://www.cbsnews.com/8301-201\\_162-57603336/colorado-floods-spur-fracking-concerns/](http://www.cbsnews.com/8301-201_162-57603336/colorado-floods-spur-fracking-concerns/)
- U.S. Army Corps of Engineers, Engineerings Services for Dam Safety Implications of Drilling, Hydrofracturing and Extraction, Joe Pool Damn, TX (Feb. 2015)
- U.S. Army Corps of Engineers, Final Environmental Impact Statement: Alaska Stand Alone Gas Pipeline, Volume 2 Sec. 5.20-70-71 (Oct. 2012)
- U.S. Bureau of Land Management Colorado State Office, Final Notice of Competitive Oil and Gas Internet-Based Lease Sale (October 2016)
- U.S. Bureau of Land Management Map: DeBeque Southwest Master Development Plan for Oil and Gas Exploration and Development (May 3, 2016)
- U.S. Bureau of Land Management, Biological Assessment, Uncompahgre Field Office Bull Mt. Field Unit (August, 2015)

2016 NOV 14 AM 10:12  
 001-BLM  
 CO STATE OFFICE  
 COSM MOUNTAIN

- U.S. Bureau of Land Management, Biological Assessment, Uncompahgre Field Office, Bull Mountain Unit Master Development Plan and EIS (2015)
- U.S. Bureau of Land Management, Ch. 3: Affected Environment, White River Final Environmental Impact Statement (2015)
- U.S. Bureau of Land Management, Environmental Assessment for the RGFO November 2016 Competitive Oil & Gas Lease Sale (Nov 2016)
- U.S. Bureau of Land Management, Environmental Assessment for West Desert District, Fillmore Field Office, August 2015 Oil and Gas Lease Sale, pp. 57-58 (Dec. 2015)
- U.S. Bureau of Land Management, Executive Summary: Resource Management Plan and Final EIS for Bull Mt. Field Office, DOI-BLM-CO-S050-2013-0022-EIS (January, 2015)
- U.S. Bureau of Land Management, Executive Summary: Resource Management Plan and Final EIS for Grand Junction Field Office
- U.S. Bureau of Land Management, Final Supplemental Environmental Impact Statement for the Leasing and Underground Mining of the Greens Hollow Federal Coal Lease Tract, UTU-84102 (Feb 2015)
- U.S. Bureau of Land Management, Greenhouse Gases Estimate (West Desert District Nov 2015 Lease Sale),  
[http://www.blm.gov/style/medialib/blm/ut/natural\\_resources/airQuality.Par.38](http://www.blm.gov/style/medialib/blm/ut/natural_resources/airQuality.Par.38)
- U.S. Bureau of Land Management, Homer Deep Master Development Plan for Oil and Gas Exploration and Development Mesa County, Colorado, DOI-BLM-CO-N040-2015-0025-EA (March 2015)
- U.S. Bureau of Land Management, Instruction Memorandum CO-2011-022 (April 11, 2011)
- U.S. Bureau of Land Management, Reasonably Foreseeable Development Scenario for Oil and Gas Glenwood Springs (2014)
- U.S. Bureau of Land Management, Reasonably Foreseeable Development Scenario for Oil and Gas Grand Junction Field Office, Colorado (June 18, 2012)
- U.S. Bureau of Land Management, Resource Management Plan and Final EIS for Colorado River Valley Field Office, chapter 3 (2015)

2016 NOV 14 AM 10:12  
 DOI-BLM  
 CO STATE OFFICE  
 COSO

- U.S. Bureau of Reclamation and Colorado River Basin Water Supply and Demand Study Team, Colorado River basin Water Supply and Demand Study: Technical Report B – Water Supply Assessment. Interim Report No. 1 (2011)
- U.S. Bureau of Reclamation, SECURE Water Act Section 9503©- Reclamation climate Change and Water (2016)
- U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Analysis: Natural Gas Combined Cycle (NGCC) Power Plant, Pub No DOE/NETL-403-110509 (Sep 10, 2012)
- U.S. Department of Energy National Energy Technology Laboratory, Life Cycle Greenhouse Gas Inventory of Natural Gas Extraction, Delivery and Electricity Production, Pub No. DOE/NETL-2011/1522 (Oct 24, 2011)
- U.S. Department of Energy National Energy Technology Laboratory, Role of Alternative Energy Sources: Natural Gas Technology Assessment Pub No. DOE/NETL- 2012/1539 (2012)
- U.S. Department of State, Final Supplemental Environmental Impact Statement for the Keystone XL Project, Appendix U (Jan. 2014)
- U.S. Environmental Protection Agency Region X, Letter from Dennis McLerran, Regional Administrator, to Randel Perry, U.S. Army Corps of Engineers Seattle District, re Gateway Pacific Projects (Jan 22, 2013)
- U.S. Environmental Protection Agency, National Ambient Air Quality Standards for Ozone (2015)
- U.S. Environmental Protection Agency, National Gas STAR Program, Basic Information, Major Methane Emission Sources and Opportunities to Reduce Methane Emissions, <http://www.epa.gov/gasstar/basic-information/index.html#sources> (last update May 24, 2012)
- U.S. Environmental Protection Agency, National Risk Management Research Laboratory, Mercury in Petroleum and Natural Gas: Estimation of Emissions from Production, Processing, and Combustion, EPA/600/SR-01/066 (Oct. 2001)
- U.S. Fish and Wildlife Service, Assessment of Sufficient Progress Under the Upper Colorado River Endangered Fish Recovery Program (Oct. 2015)
- U.S. Fish and Wildlife Service, Biological Opinion for BLM Resource Management Plan (RMP), Price Field Office (Oct. 27, 2008)

2016 NOV 14 AM 10:12  
 DOI-BLM  
 CO STATE OFFICE  
 COSCO MOUNTAIN

- U.S. Fish and Wildlife Service, Biological Opinion for BLM Resource Management Plan (RMP), Vernal Field Office (Oct. 23, 2008)
- U.S. Fish and Wildlife Service, Biological Opinion for the Four Corners Power Plant and Navajo Mine Energy Project (April 8, 2015)
- U.S. Fish and Wildlife Service, Colorado Pikeminnow (*Ptychocheilus lucius*) 5 year review: Summary and Evaluation (2011)
- U.S. Fish and Wildlife Service, Email from Tom Chart, FWS, Director, Upper Colorado River Endangered Fish Recovery Program to Wendy Park, Center for Biological Diversity re questions about 2015 Sufficient Progress Memo (July 15, 2016 1:55:23)
- U.S. Fish and Wildlife Service, Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River above the Confluence with the Gunnison River (Dec. 1999)
- U.S. Fish and Wildlife Service, Monitoring the Colorado Pikeminnow Population in the Mainstream Colorado River via Periodic Population Estimates (Sept. 2015)
- U.S. Fish and Wildlife Service, PBO for Water Depletions Associated with BLM's Fluid Mineral Program within the Upper Colorado River Basin in Colorado (Dec. 2008)
- U.S. Forest Service, Record of Decision and Final Environmental Impact Statement, Oil and Gas Leasing Analysis, Fishlake National Forest (Aug 2013)
- U.S. Geological Survey, 2016 One-Year Seismic Hazard Forecast for the Central and Eastern United States From Induced and Natural Earthquakes, Open-File Report 2016-1035 (March 2016),
- U.S. Geological Survey, Assessment of Continuous Oil and Gas Resources in the Late Cretaceous Mancos Shale of the Piceance Basin, Uinta-Piceane Province, Colorado and Utah (2016)
- U.S. Geological Survey, Comparison of USGS monthly mean flow in Table 1 to recommended flow
- U.S. Geological Survey, Effects of Climate Change and Land Use on Water Resources in the Upper Colorado River Basin, 5 (2010)
- U.S. Geological Survey, Surface Water Monthly Statistics (1991 - 2016)

2016 NOV 14 AM 10:12

DOI-BLM  
CO STATE OFFICE  
COSCO MOUNTAIN

- Vano, J. A. et al., Understanding uncertainties in future Colorado River streamflow, 95 Bulletin of the American Meteorological Society 59 (2014)
- Visvanathan, C., Treatment and Disposal of Mercury Contaminated Waste from Oil and Gas Exploration Facilities (1993)
- Walters, David M., et al. Mercury and selenium accumulation in the Colorado River food web, Grand Canyon, USA. 34 Environmental Toxicology and Chemistry 10:2385 (2015).
- Wang, Jinsheng, et al., Reducing the Greenhouse Gas Footprint of Shale (2011)
- Williams, Megan & Cindy Copeland, Earthjustice, Methane Controls for the Oil and Gas Production Sector (2010).
- Woodhouse, C. A., et al., Increasing influence of air temperature on upper Colorado River streamflow, 43 Geophys. Res. Lett. doi:10.1002/2015GL067613 (2016)

**ADDITIONAL MATERIAL PROVIDED**

- U.S. Bureau of Land Management, 2010-2015 Water Depletion Logs
- Center for Biological Diversity Maps of Mancos Shale / BLM overlay, critical habitat, and parcels
- Rocky Mountain Big Game Maps
- U.S. Bureau of Land Management, Horizontal Well Projects
- Rocky Mountain Wild Nearby Oil Development maps
- Rocky Mountain Wild Reasonably Foreseeable Development maps
- Rocky Mountain Wild Species maps
- Exhibits A, B, C, D

2016 NOV 14 AM 10:12  
 001-ELM  
 CO STATE OFFICE  
 COSO MEETING