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13 January 2023

Doug Vilsack, State Director
Bureau of Land Management, Colorado State Office
Thompson Divide Withdrawal Project
2850 Youngfield Street, Lakewood, Colorado 80215
Via email at: BLM_ CO_Thompson_Divide@blm.gov

Chad Stewart, Forest Supervisor
GMUG National Forest
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Re: Support for the Thompson Divide and Mt. Emmons Mineral Withdrawal

Dear State Director Vilsack:

Please accept these comments on behalf of High Country Conservation Advocates, The Wilderness Society, Colorado Mountain Club, Rocky Mountain Wild, EcoFlight, Rocky Mountain Recreation and Wildlife Initiative, American Whitewater, Great Old Broads for Wilderness, INFORM, Center for Biological Diversity, and Rocky Smith, in response to the *Notice of Proposed Withdrawal and Public Meeting, Thompson Divide Area, Colorado* published in the Federal Register in October. 87 Fed. Reg. 62878 (Oct. 17, 2022). On behalf of our collective membership, and for reasons detailed below, the undersigned organizations strongly support the Department's proposed mineral withdrawal of approximately 224,793.73 acres of land near the Thompson Divide area.

We hereby request to receive all future notices and analyses concerning this proposal. We also reserve the right to submit additional comments in the future as the administrative process progresses. Finally, all previous comments and materials submitted by HCCA to the United States Forest Service (USFS) encouraging a mineral withdrawal are hereby incorporated into the administrative record. This includes HCCA's comments submitted on October 14, 2022, on the Mt. Emmons Land Exchange proposal.[1] A copy of these comments, and other supporting documents noted herein, are included as attachments.

[1] *See* Attachment A: HCCA LEX Comments

High Country Conservation Advocates (HCCA) was established in 1977 with a mission to eliminate the threat of mining on Mt. Emmons to protect our municipal watershed. Over the past four and a half decades our mission has expanded more broadly to protect the water resources and public lands of the Upper Gunnison basin; nonetheless, protecting our watershed from the threat of mining on Mt. Emmons has remained integral to our mission.

I. Introduction

The Department's Bureau of Land Management and the Department of Agriculture are proposing a withdrawal of approximately 224,793.73 acres from all forms of entry, appropriation, and disposal under the public land laws; location, entry, and patent under the mining laws; and operation of the mineral leasing, mineral materials, and geothermal leasing laws, subject to valid existing rights.[2] The proposed withdrawal would be for a period of 20 years "to protect agricultural, ranching, wildlife, air quality, recreational, ecological, and scenic values in the Thompson Divide Area of Colorado."[3] The proposed withdrawal is the culmination of decades worth of community engagement and input on the effort to protect the Thompson Divide area and Mt. Emmons area from mineral development.

HCCA is based out of the Gunnison Valley in Crested Butte, Colorado. As noted above, our organization was formed to oppose the development of a large-scale molybdenum mine on Mt. Emmons. Due to our history of engagement on this issue, our comments focus on providing support for the withdrawal, specifically for the area located on and adjacent to Mt. Emmons and south of Kebler Pass. Similarly, we focus on how the proposed withdrawal would be a benefit for our watershed and the greater Gunnison Basin.

II. Benefits from Proposed Action

Mining activities can seriously impair a region's ecosystems, wreaking havoc on the landscape, drying up critical seeps and springs, disturbing fish and wildlife, and releasing heavy metals into waterways. The proposed withdrawal would protect and enhance critical water resources, wildlife, recreation, our economy, public health, and air quality. Each of these categories is addressed below.

a. Water Resources

The proposed withdrawal would help to protect water resources. A primary concern attending mining development in the proposed withdrawal area involves the contamination and depletion of surface waters that ultimately discharge into the Colorado River. Mining will likely contaminate high quality waters of this headwaters area, including a number of streams that have been designated as outstanding waters or identified as eligible for wild and scenic status by the Bureau of Land Management (BLM) and/or the USFS.

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[2] Federal Register (2022). Notice of Proposed Withdrawal and Public Meeting, Thompson Divide Area, Colorado. Federal Register Vol. 87 No.199, 62878 [pdf] Washington D.C.: Department of the Interior.
[3] *Id.*

Within the proposed withdrawal area are a number of streams that have been designated as outstanding waters.[4] These high-quality streams contribute to the many water uses downstream and should be afforded the highest level of protection. These streams include:

- Ruby and Anthracite Creeks and their tributaries (just north of Kebler Pass)
- Oh-Be-Joyful Creek and Peeler Basin (north of the Town of Crested Butte).

Farther north in the segregated area are a number of additional streams with outstanding waters designations. For a complete list of outstanding waters within the proposed withdrawal area please see the State of Colorado's website describing designated outstanding waters.[5]

At least two streams within the proposed withdrawal area have been identified as eligible for wild and scenic protections. Oh-Be-Joyful Creek has been identified in the Draft Forest Plan by the GMUG National Forest as having four segments that are eligible for wild and scenic status.[6] Additionally, in the Gunnison Public Lands Initiative Report the Oh Be Joyful basin was one of the areas identified by local stakeholders as appropriate for designation as a special management area for recreation and wildlife. Anthracite Creek was also identified as eligible for wild and scenic status due to its outstanding recreation, scenery and geological values in the draft GMUG Forest Plan revision.[7]

In the proposed withdrawal area, the primary types of mining would be hardrock mining in the area south of Kebler Pass and a combination of oil and gas development and hardrock mining north of the pass. Hardrock mining and oil and gas exploration and development impact water resources. Mining activities can cause the "long-term disruption of terrestrial and aquatic habitats and hydrologic systems often with extensive "off-site" impacts, e.g., stream pollution."[8] These impacts are accrued directly from mineral extraction, but also due to secondary mining impacts ranging from "urban development to support mining to the creation of road networks for exploration activities."[9]

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[4] Colorado Department of Public Health and the Environment. *Colorado Outstanding Waters 2022*. December 1, 2022. Accessed at https://cdphe.maps.arcgis.com/apps/Viewer/index.html?appid=03b24116b8fd43cfa83999365ce56ab3.

[5] *Id*.

[6] Table 58. Eligible wild and scenic river segments. Draft Revised Land Management Plan. Grand Mesa, Uncompahgre, and Gunnison National Forests. Rocky Mountain Region. United States Forest Service. Department of the Interior. August 2021. Similarly, the BLM has identified Oh-Be-Joyful as eligible for wild and scenic status in the BLM's *2009 Wild and Scenic River Eligibility Report*. See *2009 Wild and Scenic River Eligibility Report*, Bureau of Land Management, Grand Junction Field Office. 2009. Prepared by Catherine Robertson.

[7] *Id.*

[8] Lynn B. Starnes and Don C. Gasper, Effects of Surface Mining on Aquatic Resources in North America (Revised). American Fisheries Society (AFS) Policy Statement #13. Accessible at https://fisheries.org/policy-media/policy-statements/afs-policy-statement-13/#:~:text=However%2C%20even%20with%20current%20regulations,and%20aquifers%20with%20toxic%20chemicals.

[9] *Id.*

Hardrock mining can lead to disturbances from the extraction of ore as well as processing procedures where heavy metals are milled nearby the mining location. Mining operations can have the following impacts on water resources:

- Significant consumption of water resources, reducing water available for the natural environment and other uses.
- Altered soil and subsurface geologic structure, causing disruption to subsurface hydrologic regimes (subsurface subsidence from mining activities can dewater surface waters)
- Degradation of water quality in streams, requiring perpetual water treatment to reduce mining-related impacts. Surface disturbance from mining and exploration activities can significantly impact water quality, leading to erosion and sedimentation, destruction and dewatering of wetlands, and contaminating waters by exposing water to minerals. Impacted streams are often unable to attain the same level of water quality from pre-mining baselines.[10]

Historic mining activities in the Gunnison Valley have caused significant impacts to our stream ecosystems, costing millions of dollars to address acid mine drainage. While opposing the development of a new mine on Mt. Emmons, our community has continued to partner with state, federal and local governments and organizations to address the impacts of past mining activities in the Upper Gunnison basin. There are a number of other historic mines that impact water quality already in the Town of Crested Butte's municipal watershed. Located to the west of Mt. Emmons and approximately five miles upstream of the Town of Crested Butte is the Standard Mine Superfund site.[11] On Mt. Emmons lands presently managed by the USFS is the Keystone Mine, a historic mine on lands managed by MEMC that requires year-round water treatment and significant on-site reclamation.

The proposed mineral withdrawal would protect the area's watersheds and groundwater from mining within the segregated area as described below.

i. Water Quality

Several different mining companies have attempted in the past to develop a significant deposit of molybdenum located within Mt. Emmons. Concerns about the potential for mining in the headwaters of the Upper Gunnison basin includes concern over potential impacts to water quality from the contamination of water supplies from molybdenum as well as from other heavy metals.

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[10] Earthworks, Hardrock Mining: Acid Mine Drainage Fact Sheet (Sept. 2021) available at https://earthworks.org/wp-content/uploads/2021/09/FS_AMD.pdf. *See* Attachment B.

[11] Standard Mine Gunnison National Forest, CO. Available at https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Stayup&id=0801669#Announce. The site includes approximately ten acres of both USFS lands and private mining claims and extends downstream to include the smaller Elk Lodge Mine.

1. Molybdenum and Cattle Health

Molybdenum development has the potential to impact cattle health. This concern has in the past motivated Gunnison valley stakeholders to weigh in during the Regulation 31 rulemaking process to raise concerns about statewide molybdenum standards. In 2017, the Gunnison Stockgrowers Association and Upper Gunnison River Water Conservancy District submitted comments to Colorado's Water Quality Control Commission that raised concerns over the potential impact of molybdenum on grazing in the Gunnison basin.[12]

The Gunnison Valley Stakeholders continued to argue for more stringent standards to better protect the health of cattle raised under current ranching practices on the West Slope, citing research that:

> "[H]as demonstrated a number of adverse effects in cattle as a result of molybdenum exposure, including reproductive effect… adverse effects on cattle have been documented in other studies with regards to metabolic functions, reproduction, blood chemistry, nursing, embryos, and growth from molybdenum ingestion."[13]

Cattle health is particularly vulnerable to molybdenum in the water supply on the Western Slope due to public grazing practices on the West Slope.[14] The proposed withdrawal will reduce the possibility of molybdenum mining in the headwaters of the Gunnison Valley, protecting the various life and reproductive stages of cattle raised under circumstances and practices employed on the West Slope.[15]

2. Other Heavy Metals

Acid mine drainage can have significant impacts on public health and on the health of stream ecosystems. After entering aquatic ecosystems, heavy metals accumulate in aquatic tissues and then move up the food chain. Effects of heavy metals in the environment can include "a decrease in aquatic reproductive capacity, respiratory and neurological problems, etc., and also due to its accumulation in the body (bioaccumulation) and their transmission to subsequent consumers, including humans, can have side effects."[16]

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[12] Kugel, Frank. Upper Gunnison River Water Conservancy District and Gunnison Stockgrowers Association. "Regulation 31 Molybdenum Standard Rulemaking Comment Letter." Received by Trisha Oeth, 27 November 2017.

[13] *Id.*

[14] *Id.* "Cattle raised in Gunnison County are not fed a commercial diet. On the West Slope, most cattle graze on public rangelands. Natural forage is of varying nutritional quality and less nutritional than the diet fed to Kistner's steers. Cattle require more caloric intake under range conditions and would be consuming a larger quantity of fodder. Furthermore, natural forage exposed to higher molybdenum concentrations would likely cause additional intake of the metal as cattle consume range plants."

[15] The Center for Biological Diversity does not to endorse livestock grazing in areas where it may degrade habitat for wildlife, including the endangered Gunnison sage grouse, or harm other environmental values.

[16] Vajargah MF. A review on the effects of heavy metals on aquatic animals. J Fish Res 2021;5(5):22-26.

In the Upper Gunnison Basin, historic mining has impaired water quality in a number of sub-basins. For instance, Coal Creek, the Town of Crested Butte's water supply, is impaired from heavy metals discharged from the historic Keystone Mine. While MEMC has made significant progress in cleaning up the site in recent years, this discharge still causes the mainstem of Coal Creek to be listed on the 303(d) list as impaired for total dissolved Cadmium.[17]

ii. Consumptive Use of Water Resources

The Thompson Divide and Kebler Pass areas provide a significant amount of water from snowpack accumulation. Mining activities require a significant amount of water for the extraction and processing of ore during operations. For instance, MEMC holds a conditional water right for the development of the Mt. Emmons mine. If this right had been developed for mining it would have used thirty cfs of direct flow from the Slate River, ten cfs from Carbon Creek, and involved the development of three 1,000 acre-feet reservoirs in three different basins.[18] The original proposal reflects the intensity of water use associated with large-scale hardrock mines. Furthermore, consumptive use can continue long after active mining operations have ceased, persisting through reclamation periods.

As the headwaters, the water quantity and quality that originate at the top of the Gunnison basin have implications for numerous downstream communities. Withdrawing the proposed area from appropriation for mining activities would protect the critical water resources at the headwaters of the Gunnison River and greater Colorado River Basin.

b. Wildlife

The Thompson Divide Withdrawal Area, including the lands surrounding Mount Emmons, contains outstanding and critically important wildlife habitat. Some of the wildest, undeveloped, mid-elevation terrain left in Colorado is within the withdrawal area, providing refuge to a diversity of species. In the face of climate change and increased human pressure, this landscape provides a large, diverse, and healthy stronghold for wildlife, connecting ecologically varied habitats across the greater Southern Rockies. The diversity of habitats within the withdrawal area – from wetlands and fens to aspen and conifer forests to alpine tundra – is its greatest strength. Because this valuable resource is threatened by new mining and fossil fuel development, protection of these public lands through the proposed administrative mineral withdrawal would ensure that their wildlife and ecosystems thrive into the future.

The Thompson Divide Withdrawal Area truly is a wildlife paradise, albeit one increasingly threatened by expanded hardrock mining, coal mining, oil and gas development, and related

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[17] Colorado Public Health and the Environment. Regulation 93 Dashboard. Accessed at https://cdphe.colorado.gov/regulation-93-dashboard.

[18] Concerning the Application for Water Rights of U.S.Energy Corp., Case No. 08CW81 (96CW311). District Court, Water Division No. 4, State of Colorado.

pressures. Robust populations of elk[19], mule deer[20], black bear[21], and turkey attract hunters, while streams teeming with trout attract anglers. Endangered, threatened, and other potentially imperiled species also call the area home, including Canada lynx[22] and Colorado River cutthroat trout. In addition to mapped lynx and cutthroat trout habitat, the withdrawal area likely hosts several Forest Service sensitive species[23], including boreal toad, northern leopard frog, bald eagle, flammulated owl, northern goshawk, purple martin, and American marten.[24]

The withdrawal area in Gunnison County is particularly important for migratory wildlife, and the proposed withdrawal area encompasses a number of important wildlife corridors. The Mt. Emmons area and the public lands of the Upper North Fork are the central hub for landscape-level connections that unite the Gunnison Basin and San Juan Mountains to the south, the Grand Mesa to the west, the Elk and Sawatch Mountains to the east, and the Colorado River to the north. This topography facilitates movement by elk, mule deer, and other big game, supporting herd vitality.[25]

On November 18th, 2022, the BLM released a new policy "designed to protect connections between habitats for fish, wildlife, and native plants, preserving the ability of wildlife to migrate between and across seasonal habitat, a concept known as habitat connectivity."[26] This policy instructs "BLM state offices to assess areas of habitat connectivity and conduct planning, on-the-ground management actions, and conservation and restoration efforts to ensure those areas remain intact and healthy, and able to support diverse wildlife and plant populations."[27] Approving the proposed mineral withdrawal would help advance this policy by protecting migration corridors. A mineral withdrawal that includes the entire segregation area will afford the greatest protection for wildlife.

The economic benefits of protecting this area would be significant. Hunting and angling are important economic drivers in Gunnison County. Total hunting economic contributions in Gunnison County are amongst the highest in the state, and the second highest in Colorado's eleven-county Southwest Region.[28] Numerous guides and outfitters depend on the vitality of the public lands within the withdrawal area as they lead clients in pursuit of elk, mule deer, and

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[19] *See* Attachment C Elk Habitat Map, showing elk winter range, winter concentration areas, and migration corridors.
[20] *See* Attachment D Mule Deer Habitat Map, showing mule deer winter range, winter concentration areas, and migration corridors.
[21] *See* Attachment E Black Bear Habitat Map, showing black bear fall concentration areas.
[22] *See* Attachment F Canada Lynx Habitat Map. [Map will be provided separately]
[23] Sensitive species are "Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by: a. Significant current or predicted downward trends in population numbers or density. b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." Forest Service Manual (FSM) 2670.5.
[24] Sensitive Species List. United States Forest Service. December 1, 2022. Accessed at https://www.fs.usda.gov/detail/r2/landmanagement/?cid=stelprdb5390116.
[25] Please see Attachments C and D for maps demonstrating Elk and Mule Deer habitat.
[26] *See* Attachment G BLM Habitat Connectivity on Public Lands Policy.
[27] *Id.*
[28] See Attachment H The 2017 Economic Contributions of Outdoor Recreation in Colorado.

trout. This economic driver would be severely compromised if forced to compete with industrial mining and mineral development.

Mineral exploration and development have the potential to significantly alter the character of wildlife habitat in and around the withdrawal area. A number of impacts to wildlife would be avoided by prohibiting the development of these lands. Adverse impacts that would be avoided include:

- An increase in road construction and traffic necessary to conduct exploration activities within the withdrawal area
- Mortality to species through road construction activities and vehicle collision
- The introduction and spread of exotic plants such as cheatgrass
- The fragmentation of wildlife habitat and populations
- Visual and noise disturbance activities from exploration and mining activities
- Environmental impacts affecting wildlife from the unplanned discharge of mining or exploration wastes into surface waters feeding into the Gunnison basin.

Mining and fossil fuel development are not appropriate within the proposed withdrawal area. Gunnison County is already home to the largest coal mine in Colorado (the West Elk mine) and significant oil and gas operations. Thus, it is appropriate that public lands uses are balanced, and wildlife and wild places be prioritized in some areas. The Thompson Divide withdrawal would accomplish that.

c. Recreation

The proposed mineral withdrawal will benefit recreational uses and values within the segregated area. On the southern portion of the proposed withdrawal area, the Gunnison Valley includes several municipalities that primarily rely on tourism as their economic driver, including Mt. Crested Butte, the Town of Crested Butte and the City of Gunnison.

The segregated area supports a broad range of recreational activities which provide significant revenue to this region. The stunning natural beauty of the Thompson Divide area attracts “leaf peepers” every year from all over the state and beyond who enjoy the brilliant early fall colors of aspen trees. Recreational activities offered by the Thompson Divide area include hiking, horseback riding, backpacking, backcountry skiing and snowmobiling, kayaking and mushrooming. It provides excellent hunting opportunities that attract people from all over the country. Recreationalists looking to access the Thompson Divide often travel through Gunnison and Crested Butte to do so, contributing to our municipal economies.

The Town of Mt. Crested Butte was incorporated in 1973 to provide for the community growing up around the Mt. Crested Butte ski resort. To this day, the primary economic driver of the Town is the ski resort and the service industries that accommodate resort visitors. Numerous businesses have grown up to support the ski area, including a robust lodging and real estate market.

Although the Town of Crested Butte was originally established as a mining town in the 1800s, in the 1970s the Town made a deliberate shift towards becoming a ski-town economy. Over the

past several decades, the economy has continued to rely on recreation. Now visitors come to the valley for numerous outdoor activities, including downhill skiing, Nordic skiing, mountain biking, kayaking, hunting, backpacking, trail running, and angling. The Town hosts a broad range of events based on the natural environment, including outdoor concerts, week-long and single day sporting events, painting and writing retreats, and a Wildflower Festival. All these activities rely on a healthy environment and are enhanced- if not dependent-on our gorgeous landscapes. The real estate, lodging and restaurant industries here rely heavily on these outdoor activities to attract their customers.

The City of Gunnison attracts a large number of visitors for angling. It has a number of outfitters that supply the larger Gunnison Valley with supplies for hunting, backpacking, and other outdoor activities. It is the gateway for the West Elk Scenic Byway, one of Colorado's notable scenic roadway loops. A significant portion of the loop created by the West Elk Scenic Byway is within the proposed withdrawal area.[29] This loop is traveled by hundreds of leaf peepers every year. An increase in mining activities at the headwaters would lead to a decrease in tourists traveling through Gunnison to access the activities described above.

Mining industrialization—roads, ore trucks, drill rigs, other associated machinery and vehicle traffic—would fundamentally change the character of public lands surrounding the Gunnison Valley, diminishing (if not eliminating) the opportunity for human-powered recreation on Mt. Emmons and in the surrounding backcountry area. Similarly, mining activities on Mt. Emmons and along the Kebler Pass area would impact recreational access in the surrounding West Elk and Raggeds Wilderness areas. Potential impacts to wildlife and our fisheries could shut down hunting, fishing and photography in the area. This diminished natural beauty would foreclose significant artistic opportunities for activities such as painting or photography that depends on views of Mt. Emmons and the Thompson Divide.

The withdrawal will protect these economic activities.

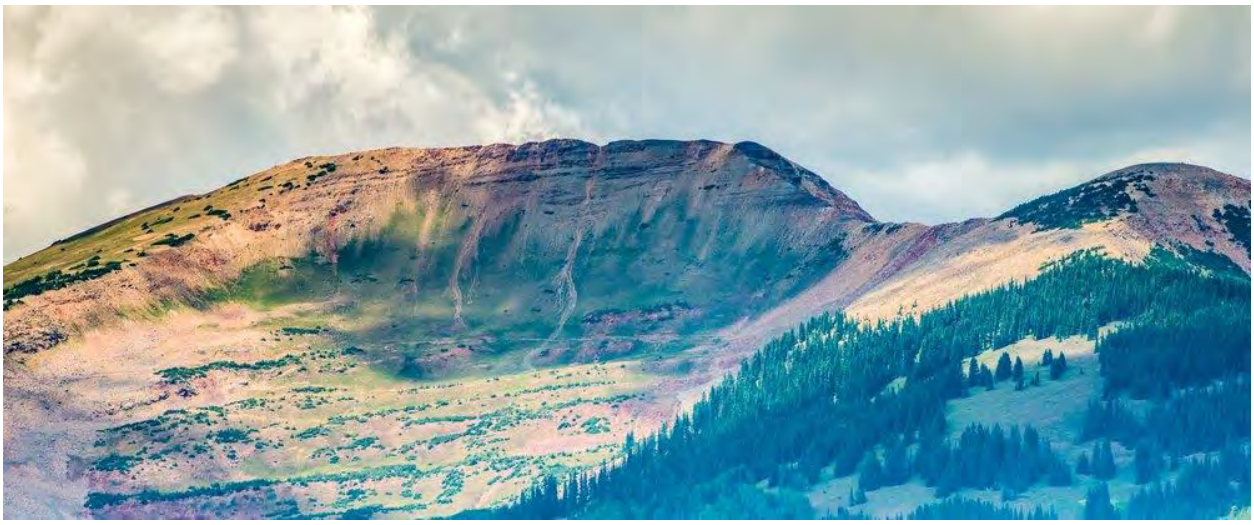
d. Scenic Values

Mining can be a highly visible land use change, eliminating vegetation, reshaping mountain topography and requiring significant infrastructure. A large part of what makes our valley attractive to visitors and locals alike is our picturesque landscapes. Mines in the segregated area would potentially be visible from the Town of Crested Butte and surrounding wilderness areas. Past mining plans of operations for Mt. Emmons have depicted large-scale disturbances, including the removal of a substantial portion of the mountain, which would have been visible from the main street in Crested Butte. The past proposal also included three 1,000 acre-feet reservoirs behind 100-foot-tall dams that would have impounded three sub basins in our headwaters.[30] All of these impacts were for one single mining proposal; mining activities can seriously impact the scenic qualities of an area. This unique landscape is treasured by local

[29] Colorado Department of Transportation. Colorado Scenic Byways, Southwest. West Elk Loop. November 12, 2022. Accessed at https://www.codot.gov/travel/colorado-byways/southwest/west-elk-loop.

[30] Concerning the Application for Water Rights of U.S.Energy Corp., Case No. 08CW81 (96CW311). District Court, Water Division No. 4, State of Colorado.

communities and is our economic driver as well- we want to see it protected for our future prosperity and to preserve our way of life.



Mt. Emmons, known locally as Red Lady

e. Economic

The withdrawal would enhance the regional tourism economy connected to the area surrounding the proposed mineral withdrawal area. As noted above, the natural environment of the proposed withdrawal area attracts a broad range of recreationalists. The environmental, recreational and scenic values discussed above together form a significant portion of the Gunnison Valley economy. In 2021, the outdoor recreation economy in Colorado reached $11.6 billion dollars.[31]

The withdrawal will enhance the long-term and more sustainable jobs associated with the tourism sectors versus the short-term and limited nature of those associated with hardrock mining activities.

f. Public Health and Safety

The withdrawal will protect the public health and safety from impacts that would accompany the increased traffic volume and impaired water quality from headwaters mineral development. Residents of the Town of Crested Butte and Mt. Crested Butte use Kebler Pass to travel to Grand Junction and Delta Colorado. Tourists use the pass to access the Gunnison Valley for recreational pursuits. Hunters come from both sides of the divide to access this important habitat area. Most roads within the segregated area are accessed by tourists.

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[31] Outdoor Recreation in Colorado Accounted for $11.6B last year". Chris Woodward. Summit Daily News Nov 18, 2022. Accessed at https://www.summitdaily.com/news/outdoor-recreation-in-colorado-accounted-for-11-6b-last-year/.

Mining operations would increase the amount of traffic on Kebler Pass, Ohio Pass, and on the Coal Creek Road (Hwy 12). The withdrawal would reduce the potential for increased traffic accidents given the coincidence of mining and exploration related vehicles with civilian traffic, particularly on the narrow dirt roads within the withdrawal area. The withdrawal will also prevent the potential for tailings spills that could impact water quality.

g. Air Quality

Activities associated with mineral exploration, mining, hauling, and milling contribute to a decline in local air quality. Hydrocarbon emissions from vehicles, drill rigs, diesel generators, pumps, and other machinery reduce visibility, increase ozone, and stress ecosystems. The withdrawal will prevent these impacts.

h. Human Health Impacts

The withdrawal will protect against human health impacts from the avoidance of the accumulation of additional heavy metal contaminants in the waters of the Gunnison Valley. There is a very real potential for mining activities to contaminate surface and groundwater sources. When exposed to air, the hazardous minerals native to the rock are oxidized and released to the environment through runoff. The largest possible withdrawal area will afford the greatest protection of the Gunnison River and the drinking water for thousands of people.

III. Recommendations

HCCA fully supports the proposed mineral withdrawal. However, we have a few recommendations to accomplish management objectives in the segregated and adjacent area and better protect the desired resources as articulated by the Secretary and BLM in their notice of the proposed action.

1. Lands Included in the Proposed Mt. Emmons Land Exchange should be Excluded from the Withdrawal Area

HCCA recommends that the BLM remove portions of the proposed withdrawal that overlap with the USFS proposed Mt. Emmons Land Exchange parcels.[32] These areas of overlap include a portion of Parcel 2 and a portion of Parcel 3 as identified in the land exchange documents. The lands proposed for the federal exchange should be excluded to execute the successful completion of the Mt. Emmons Land Exchange.

Recommendation: Approximately 85 acres of lands currently proposed as part of the Mt. Emmons Land Exchange should be excluded from the proposed mineral withdrawal.

[32] Mt. Emmons LEX Data used in creation of this map are on file with the USDA Forest Service, GMUG NFs, T:\FS\NFS\GMUG\Program \1900NatlResourcePlng\GIS\prking\MEMC_LEX Vicinity Map (North). *See* Attachment I: Mt. Emmons LEX Vicinity Map (North).

2. The Proposed Withdrawal Area should be Modified to Include the Mt. Emmons Iron Fen and entire Standard Mine Superfund Site

When the proposed withdrawal area is represented on a map, it appears that there is a gap between the boundary of the segregated area and the proposed exchange land boundary and MEMC's currently private lands on Mt. Emmons (the "gap"). The Mt. Emmons Iron Fen and a portion of the Standard Mine Superfund site appear to fall within this gap. HCCA suggests that- if possible in the noticed acreage- the footprint of the proposed mineral withdrawal should be adjusted to encompass the Mt. Emmons Iron Fen and the entire Standard Mine Superfund site. This could be accomplished by extending the proposed withdrawal area up to the boundary of the proposed Mt. Emmons Land Exchange area (which includes both federal parcels identified for the exchange and patented lands held by Mt. Emmons Mining Company). Doing so would a) protect the Mt. Emmons Iron Fen, b) protect the Standard Superfund Site from additional mining impacts, and c) consolidate federal land management by prohibiting mining in the gap between the current withdrawal proposal and the Mt. Emmons exchange lands. These objectives are discussed below.

a. The Mt. Emmons Iron fen should be included within the proposed exchange area

In the gap area is a unique fen, the Mt. Emmons Iron Fen (also referred to as the Mt. Emmons Iron Bog). Fens are an incredibly unique type of wetland. They are groundwater-dependent and many formed between 8,000 to 12,000 years BCE in Colorado's high-elevation basins, hillsides, toe slopes, and depressions connected to consistent, complex local groundwater flows. The Mt. Emmons Iron Fen is noted as "an example of the complexity of groundwater in fens... [where] upward flows of groundwater from a lateral moraine through peat have a basic pH, whereas acidic water at the surface originates from water flowing through pyrite in bedrock."[33] Fens are important ecologically both for their high biodiversity and ability to sequester carbon. They are considered irreplaceable – they take one thousand or more years to form and cannot be created by humans.[34]

The Mt. Emmons Iron Fen has been identified in the past by the USFS as meriting special management and protection. In 2010, the Gunnison Ranger completed an Environmental Assessment for the Mt. Emmons Iron Bog Proposed Mineral Withdrawal (hereafter, "the EA").[35] As explained in the EA introduction, this document "was prepared in response to the Grand Mesa, Uncompahgre, and Gunnison National Forests' (GMUG) Forest Land and Resource Management Plan (FLRMP) direction towards mineral withdrawal for the Mt. Emmons Iron Bog Special Interest Area".[36] The Iron Bog (Iron Fen) contains 75.6 acres administered by the Forest Service in T. 14S., R.86W., 6thP.M., Section 6, Gunnison County,

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[33] Attachment J. USDA Forest Service, 2010, *Environmental Assessment Mt. Emmons Iron Bog Proposed Mineral Withdrawal (Colorado 61627)*. Gunnison Ranger District. Grand Mesa, Uncompahgre, Gunnison National Forests. USDA Forest Service.

[34] *See* Forest Service Region 2 Fen Policy.

[35] *See* Attachment J.

[36] *Id.* at 1.

approximately 3.5 miles west of Crested Butte, Colorado."[37] The articulated purpose and need for the proposal is to "follow FLRMP direction and to protect this unique wetland from the effects of future (not from claims that are already present in the Iron Bog) mine claim location, mining, mineral development, and mine claim speculation, a withdrawal of these National Forest System lands from future mineral entry has been proposed."[38]

EA explains that "The Forest Service seeks a withdrawal for the Iron Bog to follow the United States Department of the Interior, Fish and Wildlife Service (FWS) fen regulation."[39] The Mt. Emmons iron fen depends on a particular quantity and quality of water. Mining activities have the potential to impact, or even destroy, this unique ecosystem. As noted in the magazine of the Colorado Native Plant Society, "Fens are threatened by recent changes to the Clean Water Act, population growth demanding water, mining, development, ski-area expansion, timber harvest, sedimentation, and increasing motorized and off-road use in National Forests".[40] Fens are especially sensitive to loss of groundwater regimes and complex groundwater chemistry from hydrologic alterations.[41] After noting the importance of the fen to reducing heavy metals loading to the Town of Crested Butte water supply, the EA notes that the water supply to the fen had been reduced by approximately 33% by past mining, and that "historic mining may have drained parts of the fen."[42] As a result of the analysis completed in the EA, the USFS proposed "to further protect the Iron Bog with the implementation of a mineral withdrawal request with the Department of the Interior. Under this alternative… existing claims will continue but future claims will not be allowed."[43]

HCCA encourages the BLM to consider this additional information and to include the Mt. Emmons Iron Fen within the mineral withdrawal area to protect an important ecological area that is vulnerable to potential impacts of mineral exploration and development. We urge the BLM to review Attachments J and K for the initial assessment documents prepared by the USFS on this critical natural resource.

Recommendation: Approximately 75.6 acres of the Mt. Emmons Iron Fen should be included in the proposed mineral withdrawal.

b. Encompass the entire Standard Mine Superfund site within the proposed withdrawal area

A portion of the Standard Mine site appears to fall within the proposed withdrawal area, while another portion appears to be in the gap area outside of the proposed withdrawal. As discussed

[37] *Id.* at 2. The EA explains that while this wetland has been referred to in the past to as the Mt. Emmons Iron Bog, it is more accurately categorized as an iron fen.
[38] *Id.*
[39] *Id.*
[40] *Id.*, citing Marshall S and Lemly J. Colorado Wetland Program Plan: 2020-2024. Unpublished document. Colorado Natural Heritage Program, Colorado State University, Fort Collins, CO.
[41] *Id.*
[42] EA at 3. After introducing the importance of protecting the Mt. Emmons fen from additional mining, the EA proceeds to describe the unique biota of the fen, the importance of the fen to scientific research, and the importance of the fen as a palaeoecological site in detail. *Id.*
[43] *Id.* at 4.

above, there has been significant effort and expense invested by taxpayers to remediate the Standard Superfund site. The objective of this work was to better protect the watershed that provides the Town of Crested Butte's drinking water supply. If not already included, the BLM should consider adding the entire Standard Superfund site to the withdrawal to more fully protect the reclaimed site, for consistent federal land management, and to best protect Crested Butte's source of drinking water. A map demonstrating the location of the Standard Mine Superfund site is included as Attachment L.

Recommendation: The entire Standard Mine Site should be included in the proposed mineral withdrawal.

c. Consolidate management areas for consistency

The segregated lands overlap a portion of the proposed Mt. Emmons Land Exchange area and exclude other lands adjacent to the exchange area. The BLM should consider revising the boundary of the withdrawal area to extend the withdrawal to the boundary of the federal lands that will exist after the exchange, for consistent management.

Recommendation: The mineral withdrawal boundary should be expanded to share a boundary with the proposed exchange parcels and MEMC's currently private lands.

d. Support for the Local and Regional Agencies Working on the Withdrawal Analysis

HCCA understands that the review and analysis of a mineral withdrawal requires a significant commitment of resources for the local and regional agencies reviewing the proposal. We recommend that the USFS and BLM offices working on this project are provided with sufficient staff and resources necessary to evaluate this proposal in a timely manner.

V. Historic and Present Public Support for the Mineral Withdrawal

Protecting the Thompson Divide area and the area surrounding Mt. Emmons from mining and development has enjoyed broad public support for decades. This support has been expressed at all levels of government, by local and regional elected officials as well as Congress. It has also been broadly supported in collaborative local land use planning efforts by a broad number of local interest groups. Residents of the Gunnison Valley have also weighed in with broad enthusiasm to request that the withdrawal proposal moves forward. This support is summarized below.

1. Legislation

A significant portion of the proposed mineral withdrawal area has been included in past legislative attempts. These efforts demonstrate the broad support that these lands should be managed to prohibit additional mineral development.

The Gunnison Public Lands Initiative (GPLI) was formed in 2014 as a broad coalition of diverse interests that would work together to develop a consensus-based proposal for public lands

management in the Gunnison Valley. This coalition of stakeholders included ten community groups with interests in ranching, water resources, motorized recreation, conservation, mountain biking, hunting, and angling.[44] After years of consensus building, GPLI released its community proposal that provides a carefully vetted, deliberative vision for the future of local public lands in and around Gunnison County. Senator Bennet's office created legislation from this proposal that became the draft Gunnison Outdoor Resource Protection Act.[45] The draft legislation included provisions that would have withdrawn from mineral exploration hundreds of thousands of acres of public lands.

The Colorado Outdoor Recreation and Economy (CORE) Act was introduced in the U.S. Senate and House in January 2019 by Senators Michael Bennet and John Hickenlooper and Representatives Joe Neguse, Diane DeGette, Ed Perlmutter, and Jason Crow, and was reintroduced in the 117th Congress. During the 116th and 117th Congresses, the CORE Act passed in the House with bipartisan support five times and was marked up and voted on by the Senate Energy and Natural Resources Committee in the 117th Congress. Importantly, the CORE Act included a proposed withdrawal of the Thompson Divide and Mt. Emmons area.[46]

B. Governmental Support

The withdrawal process itself was initiated with the support of Colorado Representatives, including Joe Neguse and Senator Bennet, in collaboration with the Secretary of Agriculture and Secretary of Interior and President Biden. During the remarks designating Camp Hale as a National Monument, President Joe Biden voiced support for the withdrawal, as did Secretary of Agriculture Tom Vilsack.

Local governments in the Gunnison Basin that have weighed-in to support the proposed withdrawal include:

- Gunnison County
- The City of Gunnison[47]
- The Town of Crested Butte[48]
- The Town of Mt. Crested Butte[49]

C. Local Organizations and Residents Support the Proposed Mineral Withdrawal

The Gunnison County Sustainable Tourism and Outdoor Recreation (STOR) Committee represents a broad range of organizations and interests in the Gunnison Valley. As described on

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[44] The Gunnison Public Lands Initiative and Gunnison Outdoor Resources Protection Act. January 2, 2023. Accessed at https://www.gorpact.org/.
[45] Gunnison Public Lands Proposal. Michael Bennet Senator for Colorado. January 4, 2023. Accessed at https://www.bennet.senate.gov/public/index.cfm?p=gunnison-public-lands-proposal.
[46] CORE Act. January 4, 2023. Accessed at https://coreact.org/2021intro/.
[47] Attachment M.
[48] Attachment N.
[49] Attachment O.

the STOR Committee website, "[t]he Gunnison County Sustainable Tourism and Outdoor Recreation [ ] committee was formed in 2018 to facilitate idea sharing between entities that might not otherwise communicate with one another. Members of the STOR committee include land managers, trails organizations, tourism industry professionals, businesses, and city and county officials."[50]

STOR Committee members at large include representatives from the Crested Butte Mountain Biking Association, Gunnison Trails, Crested Butte Land Trust, Gunnison Chamber of Commerce, amongst others. Agency and municipality appointees include representatives from, the National Park Service, the Tourism and Prosperity Partnership Board, the Gunnison County Stockgrowers's Association, Crested Butte Mountain Resort, Western Colorado University, the Upper Gunnison River Water Conservancy District, and the Gunnison County Metropolitan Recreation District. A copy of the STOR Committee letter of support can be found as Attachment P. Other individual organizations, such as the Crested Butte Mountain Biking Association, have also submitted formal levels of support.[51]

Residents have voiced robust support for the 20-year mineral withdrawal in individual comments submitted directly to the BLM as well as by signing petitions in support of the proposed mineral withdrawal. HCCA has collected a number of signatures in person (see Attachment R) and electronically (see Attachment S) in support of the proposed mineral withdrawal.

D. Mining Company Agreement with the Proposed Mineral Withdrawal

MEMC, a subsidiary of Freeport McMoRan, has agreed to support a mineral withdrawal of lands surrounding Mt. Emmons as part of a multi-faceted solution to end mining on Mt. Emmons while facilitating efficiencies in MEMC's reclamation efforts on and surrounding the historic Keystone Mine site. Encompassed within the proposed mineral withdrawal area is an area where the MEMC holds a large number of claims surrounding the Mt. Emmons molybdenum deposit. Past owners of these claims have submitted plans of operations to develop a large-scale mine here. In contrast, MEMC is working with the community and local governments to eliminate the potential of mining on Mt. Emmons. The framework for this plan has been outlined in key agreements between the mining company and governmental entities, including the 2021 MOU between MEMC, the Town of Crested Butte, and Gunnison County, collectively referred to as the "MOU Parties". The MOU parties have agreed to the following:

> "MEMC agrees to support the Government Parties' efforts in securing the eventual permanent withdrawal of mineral location and entry to those USFS lands

[50] STOR Committee website. Available at https://gunnisoncrestedbutte.com/stewardship/gunnison-valley-stewardship-organizations/sustainable-tourism-and-outdoor-recreation-committee/#:~:text=What%20is%20the%20STOR%20committee%3F%20The%20Gunnison%20County,that%20might%20not%20otherwise%20communicate%20with%20one%20another.

[51] *See* Attachment Q.

containing the unpatented mining claims held by MEMC, with the EXCEPTION of those claims within the footprint of the proposed exchange."[52]

A copy of the MOU is included as Attachment T.

As demonstrated above, every level of government has expressed support for the withdrawal of the Thompson Divide and the lands at and around Mt. Emmons in some regard. This support has been represented in a number of diverse ways, from letters of support, memorandums of understanding/intent, and in petitions representing community support for the mineral withdrawal.

VI. Conclusion

We believe that mining in the headwaters poses an unacceptable risk to our water resources, recreation, wildlife, the economy, and human health, in the Roaring Fork and Upper Gunnison watersheds. This withdrawal would prevent these potential impacts through the duration of the withdrawal.

Additionally, while we offer our full support of the proposal as is, HCCA recommends that the BLM and USFS remove lands from the proposed land exchange from the withdrawal and consider including the additional lands described above.

Your protection of approximately 224,000 acres of land around the Thompson Divide area, especially the lands at and around Mt. Emmons, for two years is a good first step to protect our drinking water, fish and wildlife, agricultural producers, and recreational economy. We applaud this action, and we urge the Secretary to now protect this area by selecting the longest permissible withdrawal period: 20 years. We appreciate your time and consideration evaluating these comments; please do not hesitate to contact us should you wish to discuss them more.

Respectfully,

/s/
Julie Nania
Water Director
High Country Conservation Advocates,
PO Box 1066
Crested Butte, CO 81224

[52] Gunnison County Colorado, Mt. Emmons Mining Company, Town of Crested Butte. 2021. *Memorandum of Understanding for Mt. Emmons. Mt. Emmons Project.* Paragraph 4.

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Attachment A: HCCA LEX Comments

Attachment B: Acid Mine Drainage

Attachment C: Elk Habitat Map

Attachment D: Mule Deer Habitat Map

Attachment E: Black Bear Habitat Map

Attachment F: Canada Lynx Habitat Map

Attachment G: BLM Habitat Connectivity Policy

Attachment H: The 2017 Economic Contributions of Outdoor Recreation in Colorado

Attachment I: MEMC Vicinity LEX Map

Attachment J: Iron Fen Mineral Withdrawal EA

Attachment K: Iron Fen Mineral Withdrawal Plant EA

Attachment L: Standard Mine Superfund Site

Attachment M: City of Gunnison LOS

Attachment N: Town of Crested Butte LOS

Attachment O: Mt. Crested Butte LOS

Attachment P: STOR Committee LOS

Attachment Q: CBMBA LOS

Attachment R: HCCA Petition in Support of Mineral Withdrawal

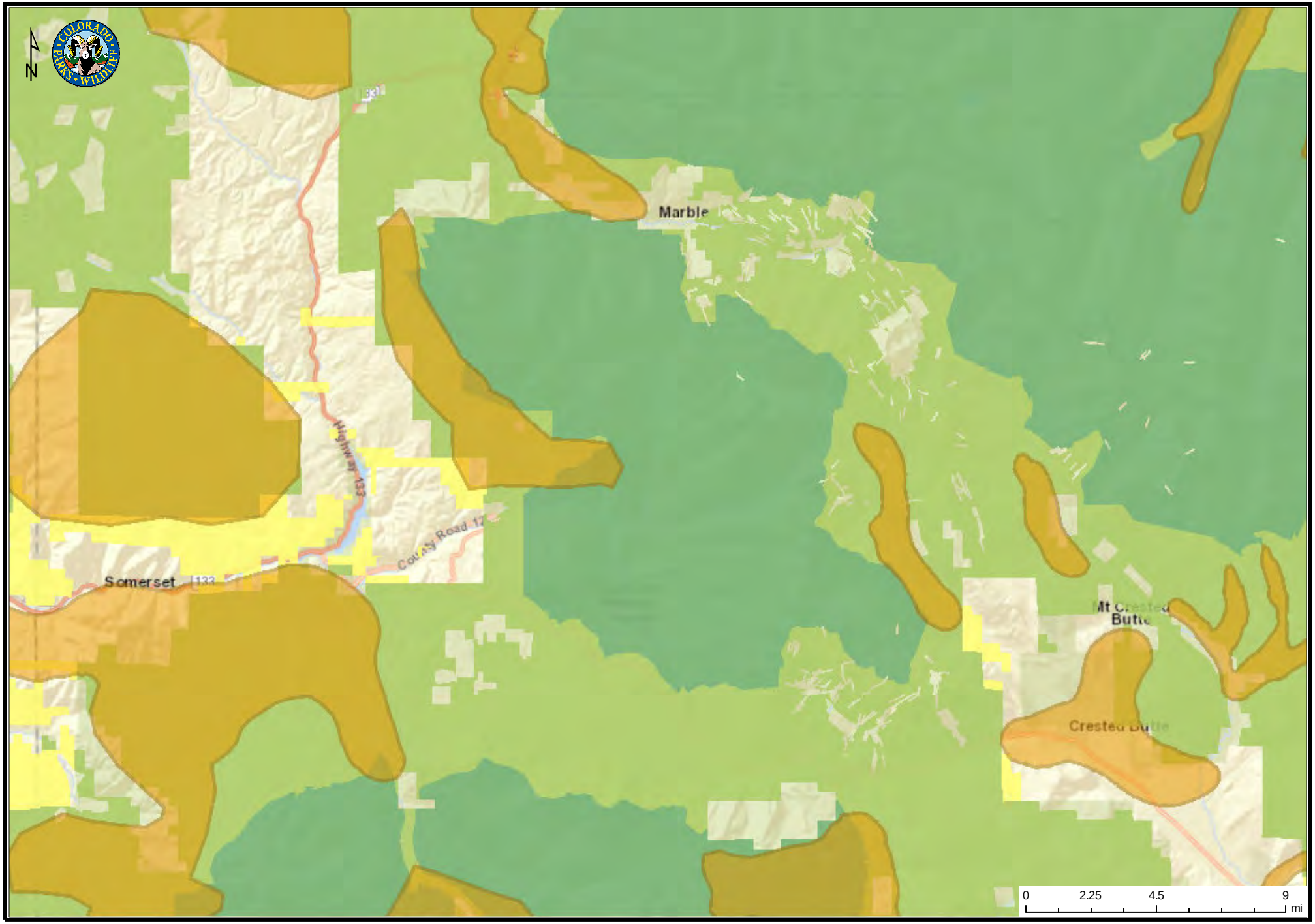
Attachment S: Electronic Petition in Support of Mineral Withdrawal

Attachment T: MOU

Black Bear Habitat

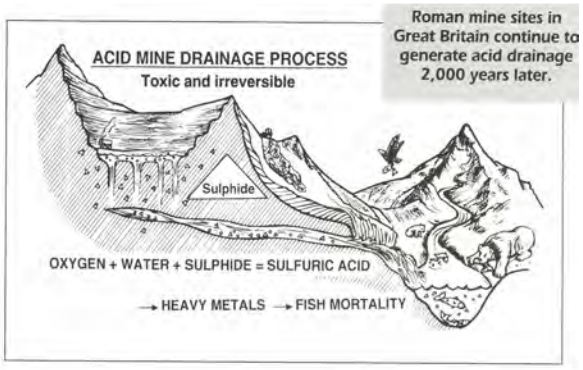
1:274,294

Colorado Hunting Atlas
Map created: January 5, 2023



HARDROCK MINING: ACID MINE DRAINAGE

Acid mine drainage is considered one of mining's most serious threats to water resources.[1] A mine with acid mine drainage has the potential for long-term devastating impacts on rivers, streams and aquatic life.



HOW DOES IT FORM?

Acid mine drainage is a concern at many metal mines, because metals such as gold, copper, silver and molybdenum, are often found in rock with sulfide minerals. When the sulfides in the rock are excavated and exposed to water and air during mining, they form sulfuric acid. This acidic water can dissolve other harmful metals in the surrounding rock. If uncontrolled, the acid mine drainage may runoff into streams or rivers or leach into groundwater. Acid mine drainage may be released from any part of the mine where sulfides are exposed to air and water, including waste rock piles, tailings, open pits, underground tunnels, and leach pads.

HARM TO FISH & OTHER AQUATIC LIFE

If mine waste is acid-generating, the impacts to fish, animals and plants can be severe. Many streams impacted by acid mine drainage have a pH value of 4 or lower – similar to battery acid.[2] Plants, animals, and fish are unlikely to survive in streams such as this. For example, acid and metals runoff from the Questa molybdenum mine in New Mexico has harmed biological life in eight miles of the Red River.[3]

TOXIC METALS

Acid mine drainage also dissolves toxic metals, such as copper, aluminum, cadmium, arsenic, lead and mercury, from the surrounding rock. These metals, particularly the iron, may coat the stream bottom with an orange-red colored slime called *yellowboy*. Even in very small amounts, metals can be toxic to humans and wildlife. Carried in water, the metals can travel far, contaminating streams and groundwater for great distances. The impacts to aquatic life may range from immediate fish kills to sub-lethal, impacts affecting growth, behavior or the ability to reproduce.

Metals are particularly problematic because they do not break down in the environment. They settle to the bottom and persist in the stream for long periods of time, providing a long-term source of contamination to the aquatic insects that live there, and the fish that feed on them. Over 100 miles of the Clark Fork River in Montana, the Coeur d'Alene River in Idaho, and the Columbia River in Washington are contaminated by metals pollution from historic mining activities upstream.

PERPETUAL POLLUTION

Acid mine drainage is particularly harmful because it can continue indefinitely --

causing damage long after mining has ended.[4] Due to the severity of water quality impacts from acid mine drainage, many hardrock mines across the west require water treatment in perpetuity. For example, government officials have determined that acid drainage at the Golden Sunlight mine will continue for thousands of years.[5] Water treatment can be a significant economic burden if the company files for bankruptcy or refuses to cover water treatment costs. For example, acid runoff from the Summitville Mine in Colorado killed all biological life in a 17-mile stretch of the Alamosa River. The site was designated a federal Superfund site, and the EPA is spending $30,000 a day to capture and treat acid runoff.[6] In South Dakota, Dakota Mining Co. abandoned the Brohm mine in 1998, leaving South Dakota with $40 million in reclamation costs – largely due to acid mine drainage.[7] And, at the Zortman Landusky Mine in Montana, the State of Montana was left with millions in water treatment costs when Pegasus Gold Corp. filed for bankruptcy in 1998.[8]

Even with existing technology, acid mine drainage is virtually impossible to stop once the reactions begin. To permit an acid generating mine, means that future generations will take responsibility for a mine that must be managed for possibly hundreds of years. Predictions about the success of managing this waste in the long term are, at best, speculative.[9]

SOURCES:

[1]USDA Forest Service 1993, Acid Mine Drainage from Impact of Hardrock Mining on the National Forests: A Management Challenge. Program Aid 1505. p. 12.

[2]Mineral Policy Center, Golden Dreams, Poisoned Streams, 1995.

[3]Atencio, Earnest, High Country News, "The mine that turned the Red River Blue," August 2000.

[4]Placer Dome 2002, Available: **http://www.placerdome.com/sustainability/environment/reports/ard.html**

[5]Montana Department of Environmental Quality, Draft Environmental Impact Statement, Golden Sunlight Mine, November 1997.

[6]U.S. Environmental Protection Agency, Liquid Assets, 2000.

[7]McClure, Robert. "The Mining of the West: Profit and Pollution on Public Lands". Seattle Post-Intelligencer, June 13, 2001.

[8]Ibid.

[9]Environmental Mining Council of B.C., Acid Mine Drainage: Mining and Water Pollution Issues in B.C., Brochure.

CASE STUDY: ZORTMAN LANDUSKY

- Zortman Landusky is a large open pit gold mine located in Montana adjacent to the Fort Belknap Reservation.
- In 1993, the Fort Belknap Council, State of Montana and the EPA filed suit against the company charging that the mine's discharges "present human health risks" and that "the acidity of the discharges would kill fish and aquatic life."
- In 1998, the company abandoned the site and filed for bankruptcy, leaving significant reclamation and water treatment costs from acid mine drainage and metals pollution.
- State and federal authorities have determined that acid runoff from the mine will have to be collected and treated in perpetuity.

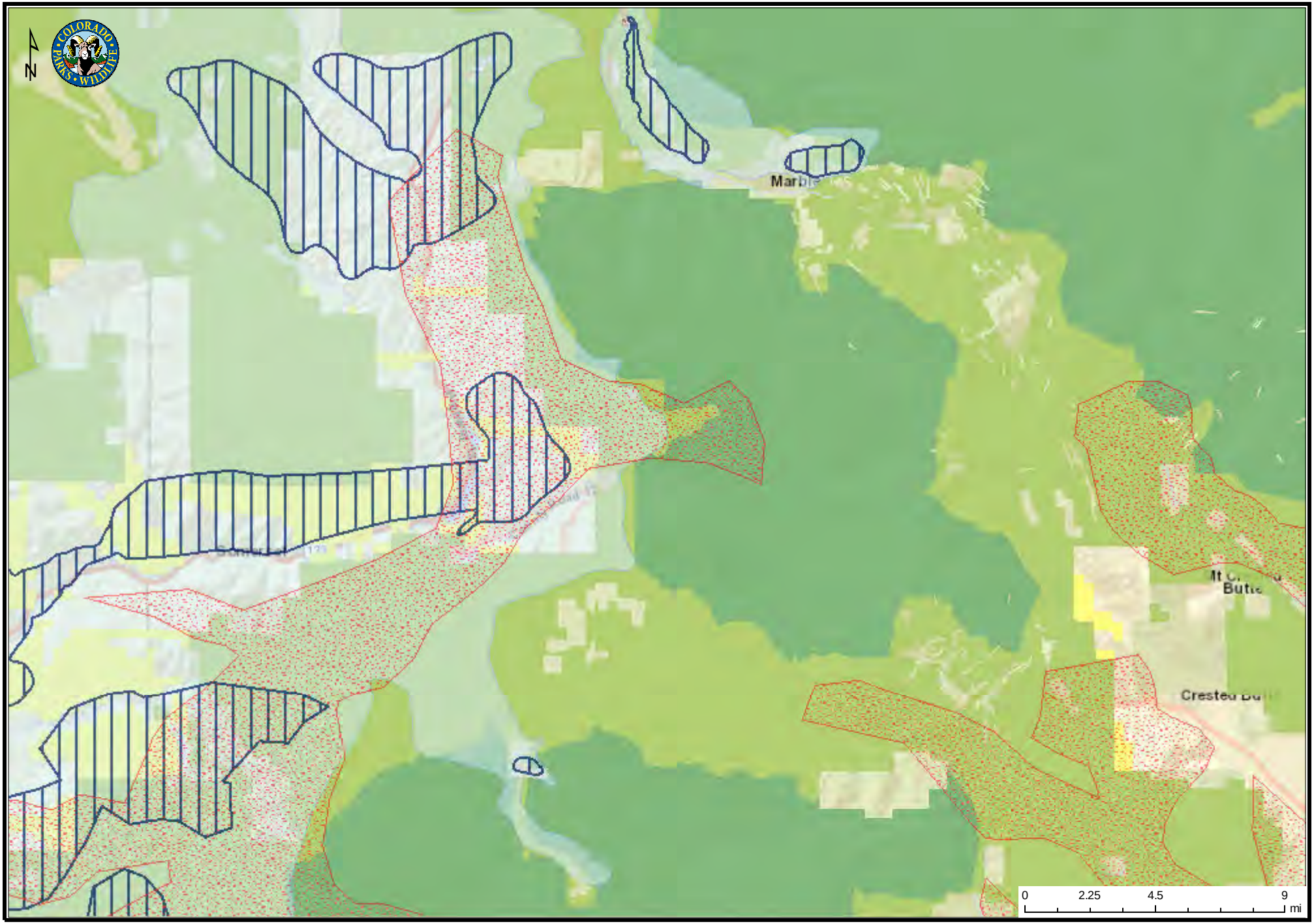
"Water treatment will have to go on for hundreds of years, possibly forever."

Wayne Jepson, Montana State Regulator, Helena Independent Record, 2002.

Elk Habitat

1:274,294

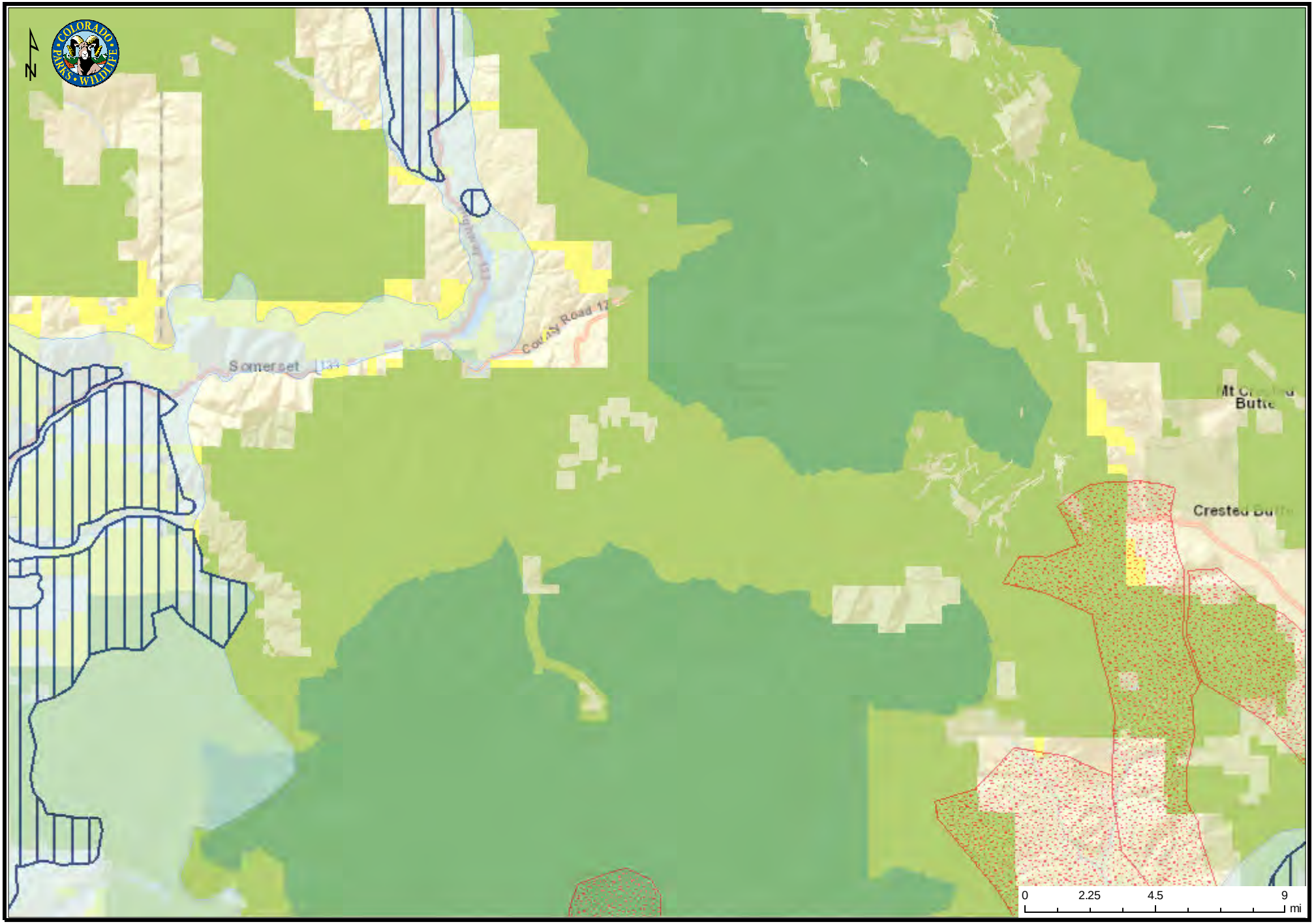
Colorado Hunting Atlas
Map created: January 5, 2023



Mule Deer Habitat

1:274,294

Colorado Hunting Atlas
Map created: January 5, 2023



HABITAT CONNECTIVITY ON PUBLIC LANDS

IM 2023-005, Change 1
Instruction Memorandum

November 18, 2022

IN REPLY REFER TO:

6500/6840 (230) P

Post Date/EMS Transmission:
11/18/2022
Expires:

09/30/2026

To:

All Field Officials

From:

Assistant Director, Resources and Planning

Subject:

Habitat Connectivity on Public Lands

Program Area:

All

Purpose:

This Instruction Memorandum (IM) helps the Bureau of Land Management (BLM) fulfill aspects of its multiple use and sustained yield mandate by ensuring habitats for native fish, wildlife, and plant populations are sufficiently inter- connected. As part of that work, this policy directs the BLM state offices to consult with state fish and wildlife agencies and Tribes to assess habitat connectivity in order to manage as best as possible for intact, connected habitat.

Administrative or Mission Related:

Mission

Policy/Action:

The Federal Land Policy and Management Act of 1976 (FLPMA), as amended, includes a congressional declaration of policy that "the public lands be managed in a manner that will …provide food and habitat for fish and wildlife…" (Section 102(a)(8)). FLPMA also identifies "fish and wildlife development and utilization" as one of the six "principal or major uses" of the public lands (Section 103(l)), and "wildlife and fish" as one of the resources expressly included in the definition of "multiple use" (Section 103(c)). Existing BLM policy directs the BLM "to manage habitat with emphasis on ecosystems to ensure self-sustaining populations and a natural abundance and diversity of wildlife, fish, and plant resources on the public lands" (BLM Manual Section (MS) 6500, rel. 6-114 (Wildlife and Fisheries Management) Section .06 Policy). This IM builds on that policy by directing BLM state offices to explicitly consider habitat connectivity, permeability, and resilience as a means to ensuring those self-sustaining populations.

Management of habitats for wildlife, fish, and plant species, in consultation and collaboration with states and Tribes, is a core part of the BLM's long- standing agency practice. However, the management of the connections between and within priority habitats (for both migratory and non-migratory species) has, in some cases, received less attention and, with increasing habitat fragmentation and degradation, maintaining habitat integrity and connectivity has become a significant need.

BLM recognizes the state and Tribal authority and expertise over fish and wildlife management, seeking here to do its part to by ensuring that fish and wildlife have intact, connected habitat on our public lands.

The overarching policy intent of this IM is to ensure habitat connectivity, permeability and resilience is restored, maintained, improved, and/or conserved on public lands. To accomplish this outcome, BLM state offices will work with state and Tribal wildlife managers as well as other stakeholders to assess data regarding connectivity, permeability, and resilience and, based on that assessment, identify where to focus management that best supports priority species.

Priority Habitat refers to habitat conditions, areas, or types that have been identified in Resource Management Plans or special studies as having special significance for focused management or conservation actions. Habitat connectivity refers to how and to what degree distinct sources of food, water, and shelter for fish, wildlife, and plant populations are distributed and inter-connected, both spatially and temporally, across terrestrial and aquatic ecosystems.

BLM Manual Section 6500 (Wildlife and Fisheries Management) and MS 6840, rel. 6-125 (Special Status Species Management Manual) are under revision. Even as those revisions are ongoing, to help guide where best to focus management of connectivity, the BLM will inventory public lands to assess habitat connectivity in order to determine how best to manage for it, by directing restoration activities or by identifying areas of habitat connectivity, which are habitats on BLM administered public lands that support or facilitate priority species movements and other ecological processes, such as seed dispersal, migrations, and stopover sites. Just as land management agencies have long inventoried riparian areas in order to manage for their value, this IM directs the Bureau to inventory areas of habitat connectivity in order to manage for intact habitat.

The following text adds to the existing manuals to clarify the BLM's responsibilities for management of habitat connectivity on public lands.

The following is added at the end of Section MS 6500.06 Policy:

> Will manage existing fish and wildlife habitat with the goal of maintaining, improving, and/or conserving habitat connectivity and restoring degraded fish and wildlife habitat to provide for increased habitat connectivity.

The following is added at the end of Section MS 6840.06 Policy, subsection 2 (Administration of Bureau Sensitive Species), subsection C. (Implementation):

> Managing existing special status species habitat with the goal of maintaining, improving, and/or conserving habitat connectivity and restoring degraded special status species habitat to provide for increased habitat connectivity.

The subsequent sections of this IM provide guidance to implement these manual-level policy objectives in land use planning and in implementation-level decisions that include habitat conservation and restoration.

Nothing in this IM should imply federal management of wildlife species, unless as directed under the Endangered Species Act or the Alaska National Interest Land Conservation Act.

Nothing in this IM shall be construed as direction to enact a new category of federal designations for wildlife migration corridors.

The Bureau recognizes that the work of habitat connectivity is, by its nature, collaborative and in some cases warrants co-stewardship. To succeed, we must share our resources, our science, and our various tools with the states, Tribes, and private landowners that we manage lands alongside.

Assessment of Public Lands for Habitat Connectivity

Consistent with BLM's inventory obligations and authority for important resource values (as provided for in Section 201(a) of FLPMA)[1], and to help guide where best to focus management of connectivity, the BLM will assess public lands for habitat connectivity and identify areas of habitat connectivity, which are habitats on BLM administered public lands that support or facilitate priority species movements and other ecological processes, such as seed dispersal, migrations, and stopover sites.

The initial assessment will assess existing priority habitat and the connectivity between them. BLM state offices will complete these assessments within one calendar year from the issuance of this IM. The initial assessment will be based on existing data according to the methodology

found in Attachment 2, and will rely on collaboration, coordination and consultation with Tribal and state wildlife managers, and other federal agencies

State Directors will determine which priority species and which priority habitats to prioritize for initial assessment in consultation with states and Tribes. State, local and Tribal expertise is critical to the assessment, as informed by traditional ecological knowledge and scientifically defensible local, regional, and national data, including climate modeling products and delineations of priority and seasonal habitats. Offices are also encouraged to work with a diverse scientific field of experts to expand research on habitat connectivity on public lands to best inform the assessment of habitat connectivity.

From this assessment, HQ230 and the National Operations Center will develop an initial geospatial layer to support identification of areas of habitat connectivity on BLM-managed lands and data standards to provide a consistent framework. The assessment and resulting geospatial layer will be updated periodically and kept current as new information is gained about resource conditions and as ecological transformation occurs due to climate change.

Because not all habitat is considered equal in importance for maintaining the overall integrity of the habitat, State Directors will determine where to best focus management of habitat connectivity. To support that process, BLM offices will use the assessment and geospatial layer to identify which lands/waters priority species need to move between habitat types. Offices will include consideration of both linear connectivity needs and habitat permeability and resilience needs and will seek to factor in reasonably foreseeable shifts in species ranges and movement/migration needs. In consultation and collaboration with state and Tribal wildlife managers, State Directors will select habitat conservation areas that best support priority species, and connection between priority habitats.

Land Use Planning

Once the BLM assesses habitat connectivity and identifies areas important to habitat connectivity, the BLM should consider each area as a habitat feature for the relevant species in land use planning efforts.

Specifically, areas of habitat connectivity should be addressed and appropriately analyzed in new land use plans and revisions, if appropriate, after considering the results of the plan evaluation, state director's planning guidance, and the purpose and need of the plan or amendment.

BLM offices must incorporate evaluation of areas of habitat connectivity, and management and analysis of them (consistent with the land use planning effort's purpose and need), in the land use planning cycle, as follows:

1. *Plan Evaluations:* During scheduled land use plan evaluations, and as appropriate to the scope of unscheduled land use plan evaluations, evaluate if existing land use plan decisions are (or are not) restoring, maintaining, improving, and /or conserving areas of habitat connectivity. See Case Study #1 in Attachment 1 for an example of how to incorporate areas of habitat connectivity into a plan evaluation.

2. *State Director Planning Guidance*: Provide the focus and framework for the planning effort as it relates to areas of habitat connectivity, including consideration of any resource conflicts identified by the plan evaluation or opportunities provided by the planning area.
    a. State Directors will, consistent with this policy and in consultation with state and Tribal fish and wildlife agencies, provide direction to state, district, and field offices to seek to restore, maintain, improve, and/or conserve areas of habitat connectivity in the planning area[2].
    b. Where resource conflicts exist, state directors will provide appropriate direction to state, district, and field offices for balanced land management, taking into consideration the significance of the habitat, the nature of the conflicts, state and/or Tribal priorities, and other uses of the public lands.
3. *Preparation Plans:* Identify issues and necessary data sources for analyzing impacts to areas of habitat connectivity. Discuss in the preparation plan whether data are available and if time and/or funding are needed to secure necessary data.
4. *Formulation of Alternatives and Analysis of Issues:* The following information will be included, as appropriate, in the planning criteria/analysis of the management situation document, National Environmental Policy Act (NEPA) documents, and decision documents:
    a. Disclose all areas of habitat connectivity within the planning area, including the location, habitat components, and species for which each was assessed.
    b. Describe how management of areas of habitat connectivity would occur under each alternative. The decisions for habitat connectivity will generally vary across alternatives to allow for analysis of different approaches to meet the purpose and need. In identifying decisions in the planning effort, the BLM may:
        i. Identify specific objectives and management direction for habitat connectivity, including appropriate allocations to support the objectives. (See Case Study #2 in Attachment 1 for an example of how to identify objectives and management direction for habitat connectivity);
        ii. Identify management areas (e.g., wildlife habitat management areas, riparian management areas) to establish objectives and management direction for a habitat connectivity, including appropriate allocations to support the management of habitat connectivity; or
        iii. Apply an administrative designation, such as an area of critical environmental concern or a backcountry conservation area, to support management of the habitat connectivity area (where the habitat connectivity area and associated management meet the criteria to allow those designations to be applied).

1.

c. As appropriate, incorporate adaptive management (i.e., monitoring requirements, trigger thresholds, and management responses) into management direction and allocation decisions to provide for future management of habitat connectivity if disturbances alter habitats, species' needs or distributions change, future climate projections are refined, etc.
d. Identify any analysis issues, analytical frameworks for analysis, and the approach for analyzing the effects of BLM decisions on the management of areas of habitat connectivity across alternatives, including trade-offs associated with impacts to habitat connectivity across the alternatives.

Implementation-Level Decisions

During the implementation-level decision-making process, authorized officers shall adhere to the following protocol for areas of habitat connectivity, unless it would be inconsistent with the governing land use plan.

1. When conducting appropriate NEPA analysis in an area with areas of habitat connectivity that the BLM determines warrants detailed analysis consistent with the H-1790-1, rel. 1-1710, BLM NEPA Handbook (Section 6.4 Issues):
    a. Consider an alternative for analysis that seeks to avoid, as much as practicable, adverse impacts to the habitat connectivity area (e.g., by siting an incompatible resource use outside of the area, by co-locating the incompatible resource use in previously degraded areas, by identifying appropriate design features that de- conflict the resource uses and the habitat connectivity area function, etc.). This avoidance strategy is particularly important in areas where restoration is unlikely to be successful.
    b. Where possible, incorporate adaptive management processes into alternatives to facilitate the agency's ability to change its management actions should monitoring data indicate unexpected impacts to areas of habitat connectivity are occurring (e.g., if a fence is necessary for in a right-of-way grant, but there are concerns that the fence may impact wildlife migration, the BLM may want to analyze in an alternative a stipulation that if the fence is found to be limiting the ability of migrating wildlife to move through a habitat connectivity area effectively, the BLM can require the operator to remove, re-design, or replace the fence).
    c. For adverse impacts to areas of habitat connectivity identified in the analysis (which may be indirect effects on public lands outside of the project area), develop and analyze appropriate mitigation measures to help support the continued function of areas of habitat connectivity.
    d. Identify habitat improvement actions in areas of habitat connectivity where habitat assessments indicated the quality and health of the habitat is degraded.

2. In implementation-level decision documents for projects in areas of habitat connectivity, include standardized monitoring to ensure the effects of the project

on areas of habitat connectivity are consistent with the desired conditions as referenced in the governing resource management plan, and to determine if adaptive management thresholds have been triggered (as applicable), and to inform other resource data needs.

3. The authorized officer should address how the selected alternative results in adverse impacts to habitat connectivity when discussing the rationale for the decision, considering FLPMA's policy statement and the BLM policy (including this IM) favoring fish and wildlife habitat management.

Authorized officers should, in accordance with the governing land use plan, and to the extent practicable, take appropriate actions to restore, maintain, improve, and/or conserve areas of habitat connectivity. Refer to the following section for example actions.

Proactive Habitat Conservation and Restoration

BLM offices shall work with states, Tribes and other partners willing to develop and implement shared and collaborative ecosystem-based conservation strategies for areas of habitat connectivity and the habitats they serve to connect, especially in areas of mixed ownership. These strategies must be consistent with the governing land use plan(s). The types of strategies and projects that benefit habitat connectivity are diverse and will vary depending on a variety of ecological and social factors. Such actions may include, but are not limited to:

- Removing physical and disturbance barriers to fish and wildlife movements (e.g., removal of hazardous fencing, installation of wildlife-friendly fencing, improvements to fish passages, building wildlife crossings, etc.);
- Installation of signage to mitigate vehicle-wildlife collisions;
- Treatments that promote resilient species composition and structure of native plant communities;
- Strategic development and location of water sources and other features to encourage wildlife utilization of suitable habitat across landscapes;
- Travel management implementation;
- Projects that address impacts from fire, drought, and invasive species; and
- Land and Water Conservation Fund and/or Federal Land Transaction Facilitation Act acquisitions that support habitat connectivity.

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[1] FLPMA (Savings Provisions at 43 USC 1701) directs that in the event of conflict with or inconsistency between FLPMA and the 1937 Oregon and California Lands Act, 43 U.S.C. 2601 et seq. (O&C Act), relating to the management of timber resources and the disposition of revenue, the O&C Act takes precedence. This direction must be considered when implementing this policy on lands managed pursuant to the O&C Act.

[2] Various resources are available to the BLM to help make a determination about the potential for restoration success. One tool set that is an appropriate starting point is to consider an area's "resistance and resilience," as described by the U.S. Forest Service's Rocky Mountain Research Station.

Budget Impact:

This policy will increase financial costs for BLM offices in order to assess habitat connectivity. The BLM will continue to consider several criteria when prioritizing undertaking the assessment of habitat connectivity and identification of areas of habitat connectivity. Monitoring requirements and workloads may increase to ensure the effects of projects, including design features and mitigation measures, are as expected and can inform other resource data needs. To support the implementation of this policy, state offices are encouraged to submit funding requests to the Headquarters' Division of Wildlife Conservation, Aquatics, and Environmental Protection or to include the funding need in the preparation plan for the development, revision, or amendment of a land use plan.

Background:

This IM is in response to Secretary Haaland's direction in April 2022, for agencies to update polices, to identify and prioritize conservation and restoration of wildlife corridors as well as other lands and waters that advance habitat connectivity, permeability and resilience in partnership with state and Tribal wildlife managers and other stakeholders. It builds upon the BLM's on-going efforts to implement Secretary's Order 3362 (Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors) and BLM IM 2018-062 (Addressing Hunting, Fishing, Shooting Sports, and Big Game Habitats, and Incorporating Fish and Wildlife Conservation Plans and Information from Tribes, State Fish and Wildlife Agencies, and Other Federal Agencies in Bureau of Land Management (BLM) National Environmental Policy Act (NEPA) Processes). This IM is also intended to be supportive of state- level and Tribal efforts to manage lands for the benefit of wildlife habitat and wildlife movement, including, for example, the implementation of Governor-level Executive Orders in Colorado, Nevada, Wyoming, and the Native American Fish and Wildlife Society Wildlife Corridors Initiative.

Manual/Handbook Sections Affected:

This policy updates Manual Section 6500 (Wildlife and Fisheries Management) and Manual Section 6840 (Special Status Species Management). The policies in the IM will be formally incorporated into these two manual sections during their on- going revisions and into a new wildlife habitat management handbook, currently in development.

Contact:

If there are any questions concerning this IM, please contact Stephanie Miller, Deputy Division Chief (Acting), Division of Wildlife Conservation, Aquatics, and Environmental Protection at 202-317-0086 or smiller@blm.gov.

Coordination:

The policy was coordinated within the HQ200 (Resources and Planning), HQ300 (Energy, Minerals, and Realty Management), HQ400 (National Conservation Lands and Community Partnerships), state offices, and the Office of the Solicitor.

Signed By
David Jenkins
Assistant Director

Resources and Planning
Authenticated By
Ambyr Fowler
Division of Regulatory Affairs and Directives (HQ-630)

October 14, 2022
Chad Stewart, Forest Supervisor
GMUG National Forest
2250 Highway 50
Delta, CO 81416
Submitted via email

Re: Mt. Emmons Land Exchange #61798

Dear Forest Supervisor Stewart:

High Country Conservation Advocates (HCCA) was established in 1977 with a mission to eliminate the threat of mining on Mt. Emmons. Over the past four and a half decades our mission has expanded to protect the water resources and public lands of the Upper Gunnison basin. Protecting our watershed from the threat of mining on Mt. Emmons remains integral to our mission. The proposed Mt. Emmons Land Exchange, when tied to the conservation easements and mineral extinguishment agreements, will help our community accomplish this objective. As such, we support this land exchange proposal, and provide the comments below to assure that the exchange is implemented in a manner that is in the best interest of the public, protects environmental and public lands resources, and meets applicable federal regulations. HCCA incorporates its previous comments to the U.S. Forest Service on the exchange and related matters.

To that end, we offer comments on five primary areas of the proposed exchange:

I. Evaluating public gains and concessions
II. The segregation and proposed withdrawal of lands surrounding Mt. Emmons
III. Segregation of lands taken into the public domain
IV. Need for additional information
V. Request for additional public engagement opportunities

I. Evaluating potential public gains and concessions from the proposed land exchange

Under the Federal Land Policy and Management Act (FLPMA), the Secretary of Agriculture must demonstrate that the exchange will serve the public interest, specifically the "local people" or local community, in order to execute a land exchange agreement.[1] In this proposal the U.S. Forest Service ("USFS") will deed 551 acres of federal lands to Mt. Emmons Mining Company (MEMC) in exchange for 625 acres of land from four separate parcels held by MEMC.[2] Overall, there are significant public benefits from the lands that will be received in the exchange. A number of these benefits are derived from the associated conservation easements and mineral extinguishment agreement. Potential gains and concessions for the public interest from this exchange may include:

1) **Potential Gain: The elimination of future mining on Mt. Emmons and protection of the water resources of the Gunnison Valley**. Upon executing the conservation easements and mineral extinguishment agreement tied to the proposed land exchange, mining and development would be prohibited on Mt. Emmons. The USFS repeatedly notes that this exchange is being evaluated in anticipation that conservation easements will be implemented on the federal parcels received in the land exchange as well as on private lands currently held by MEMC surrounding the Keystone Mine water treatment plant. Reference to the expected execution of these easements and the mineral extinguishment agreement can be found throughout the Feasibility Analysis ("FA") and supporting documents.[3] HCCA supports the agency's position that linking the exchange to the enactment of the conservation easements makes the exchange in the public interest.

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[1] See FLPMA §206 §1716 (a): "A tract of public land or interests therein may be disposed of by exchange by the Secretary under this Act and a tract of land or interests therein within the National Forest System… *where the Secretary concerned determines that the public interest will be well served by making that exchange*... Provided, That when considering public interest the Secretary concerned shall give full consideration to … the needs of State and local people, including needs for lands for the economy, community expansion, recreation areas, food, fiber, minerals, and fish and wildlife.."

[2] Page 5, Feasibility Analysis. Mt. Emmons Land Exchange Proposal. Grand Mesa, Uncompahgre, and Gunnison National Forests and Rio Grande National Forest. Gunnison and Saguache Counties, Colorado. 2022. Retrieved fromhttps://www.fs.usda.gov/sopa/components/reports/sopa-110204-2022-10.pdf on 10/4/2022. Hereinafter referred to as "FA".

[3] FA Exhibit E 1. Signed Proposed Voluntary Conservation Easement and Mineral Extinguishment.Letter from Forest Supervisor Chad Stewart to Francis McAllister, Vice President of Freeport McMoRan. August 30th, 2022.

For example, in an August 30, 2022 letter to Freeport McMoRan, GMUG Forest Supervisor Chad Stewart summarizes the role that the conservation easements play in the USFS analysis, noting that:

> The Non-Federal Party has agreed to voluntarily place a conservation easement on the Federal Parcels upon their acquisition by the Non-Federal Party. The Non-Federal Party has indicated that this conservation easement will be executed by the Non-Federal Party and the Crested Butte Land Trust and placed into escrow with instructions to be recorded with the Gunnison County Clerk and Recorder upon closing of the land exchange. Because it is a foreseeable future condition, the Forest Service authorized officer may consider the conditions resulting from the proposed conservation easement to support the use of 36 CFR 220.6(d)(7) in analyzing the land exchange.[4]

The USFS also correctly notes that support for this land exchange from local stakeholders is dependent on the successful execution of the conservation easements and mineral extinguishment agreement prohibiting mining. It is critical to note that this exchange would not be in the public interest without these protections.[5] Without these protections the exchange could facilitate the development of a large-scale mining operation and allow for new uses of the exchanged lands, including for residential development and the FA would be fundamentally different. Without the integration of both of these protections the exchange would not be supported by HCCA.

The USFS should further tie the execution of the conservation easements and mineral extinguishment agreement to the land exchange because they are integral to the analysis of the public interest and because these protections are necessary to assure similar resource management objectives and practices on the exchanged federal parcels, as required to satisfy the use of the categorical exclusion § 220.6 (d) (7)(ii).[6] Notably, the mineral extinguishment agreement is not consistently referenced alongside the conservation easements when the USFS discusses protections provided against

[4] *Id*.
[5] The USFS correctly recognizes this in the FA on page 46: "Land protections that would be provided by the conservation easement after the land exchange would fulfill key public needs."
[6] § 220.6 (d) (7)(ii). Sale or exchange of land or interest in land and resources where resulting land uses remain essentially the same. Examples include but are not limited to...Exchanging NFS lands or interests with a State agency, local government, or other non-Federal party (individual or organization) with similar resource management objectives and practices.

mining and development. The USFS should incorporate additional references to the mineral extinguishment agreement. While directly related to the conservation easements, this is a separate but critical document.

The USFS has the authority to accomplish this in a range of ways. As noted in 36 C.F.R. 254.3(h), the agency may place restrictions on the uses of federal lands that are exchanged into private ownership to "protect the public interest." At a minimum the agency can include the conservation easements and mineral extinguishment agreement as part of their rationale in a Decision Memorandum or Record of Decision.

Recommendation (a): The USFS should explicitly incorporate the conservation easements and mineral extinguishment agreement into the rationale in the Decision Memo or Record of Decision and require execution of the conservation easements as a condition of approval.

Recommendation (b): The USFS should refrain from referring to the conservation easements as a "related effort".[7] A proper exchange analysis should address this as a required condition as it relies on these easements to evaluate the future use of the parcels exchanged.

Recommendation (c): The USFS should incorporate additional references to the mineral extinguishment agreement where appropriate.

2) **Potential Gain: Net gain of wetland acreage**. Completion of the exchange would result in a net acquisition of 42.5 acres of wetlands to the public domain.[8] Wetlands are critical to the health of our ecosystems and communities and HCCA recognizes this as a significant public benefit.

3) **Potential Gain: Recreational benefits from conservation easements.** Recreational benefits would include gaining legal access to the top of Mt. Emmons (via the conservation easements) and the acquisition of a small portion of the Continental Divide National Scenic Trail.

[7] FA at 51.
[8] *Id.* at 45.

The Monchego Creek Ranch parcel contains a small portion of the Continental Divide National Scenic Trail.[9] As noted in the FA, the USFS currently does not have a written easement for the portion of the trail going through this parcel.[10] The acquisition of this private parcel would secure that access.

Additional recreational benefits will be received via the conservation easements. These benefits include legal access for backcountry skiing to the top of Mt. Emmons via the customary skin track and summer access to the summit of Mt. Emmons from the customary summer trail.[11] While we are supportive of this substantive gain, much like the benefits from eliminating mining and development addressed above, these recreational benefits will only be actualized if the easements are successfully tied to the exchange.

Recommendation: See recommendations in I(1)(a) & I(1)(b) above.

On page 52 of the FA the USFS explains that "the conservation easement would include a surface recreation stipulation granting the public the right to use certain hiking and ski trails that start at the Kebler Pass Road and proceed to Mount Emmons". It may be helpful to further clarify where on Kebler Pass Road this access will start from (i.e., from the customary winter trailhead parking).

Recommendation: The USFS should further describe this access as originating from the winter trailhead.

4) **Potential Gain: General wildlife habitat acquisition.** Integration of the Three Peaks Ranch parcel into the public lands domain will provide numerous benefits to the public, including the further protection of important big game habitat as mapped by Colorado Parks & Wildlife.[12] In addition, HCCA supports the statement from the Forest Service that "the District Ranger made the determination to manage the parcel to be consistent with the surrounding Whetstone CRA, which included requesting the non-Federal Party to remove most of the improvements including the road within the parcel."[13]

[9] *Id*. at 11.
[10] *Id*.
[11] *Id.* at 8.
[12] *See* Attachments A and B.
[13] FA at 11.

This area should be managed explicitly to conserve roadless values for eventual inclusion within the Whetstone CRA. Furthermore, to maintain these habitat values lands acquired by the USFS should be precluded from future route construction (while existing trails, including the Continental Divide Trail segment could be maintained).

Recommendation: Post-acquisition, the USFS should manage the Three Peaks parcel to be consistent with the surrounding Whetstone CRA and the newly-segregated designation of surrounding lands.

Recommendation: Lands acquired by the USFS should be precluded from future route construction. There should be an exception for existing trails, including the portion of the Continental Divide Trail in Saguache County.

5) **Potential Gain: Gunnison Sage-grouse habitat.** Acquisition of the Monchego Ranch parcel in Saguache County will add 143 acres of Gunnison Sage-grouse habitat to the Gunnison National Forest. This gain should also be evaluated to demonstrate the net habitat acquisition for threatened and endangered species. There would also be an exchange of more lower quality Canada Lynx habitat for a lesser quantity of higher quality habitat.

Recommendation: Once complete, the USFS should share on the SOPA website the analysis evaluating the gain of threatened and endangered species habitat and exchange of Canada Lynx habitat,

II. The Conservation Easements, Mineral Extinguishment Agreement and Proposed Withdrawal are Integral to Protecting Public Values

In Section XXIII "Other Related Efforts" the USFS discusses "Three concurrent efforts underway related to the land exchange."[14] These three efforts include:

- Conservation easement
- Mineral withdrawal
- Colorado water court case

[14] *Id.* at 51.

For the reasons discussed above in I(1), we agree that the conservation easement and mineral segregation/withdrawal are appropriately incorporated into the Feasibility Analysis and exchange approval documents as they necessarily ensure that that the public interest is served by the exchange, as it is integral to the substance of the exchange being in favor of the public interest as well as integral to satisfying the use of § 220.6 (d) (7)(ii). While the water court case is related, it occurs outside of the proposed exchange footprint and will not necessarily be executed in tangent with the land exchange. To that end, we urge the USFS to analyze the water case outside of consideration of the exchange and FA.

Recommendation: The USFS should not rely on the outcomes of the elements discussed in "Other Related Efforts" to assess the exchange proposal, with the exception of the conservation easements and mineral extinguishment agreement that would be directly tied to the exchanged lands, as well as the mineral segregation/withdrawal.

Regarding these elements, HCCA would like to provide additional clarifications and recommendations.

1) Clarifications on the Mineral Withdrawal and Relinquishment Effort

In Section XXIII "Other Related Efforts", the USFS touches upon the importance of the conservation easements and eliminating the potential use of surrounding lands for mining purposes. The USFS states:

> "The conservation easement, *coupled with other strategies including but not limited to a strategic relinquishment of unpatented mining claims from surrounding NFS land* and assignment of strategically-held unpatented mining claims to a third party (e.g., Town of Crested Butte), would also permanently eliminate commercially extractive mining and commercial and residential development on MEMC's private land and the Federal Parcels" (emphasis added).[15]

[15] FA at 52.

We offer the following comments on the relinquishment concept and federal mineral withdrawal.

a) The Relinquishment of Claims Surrounding the Mt. Emmons Lands

The USFS is correct that MEMC has committed to disposing of their mining and milling claims on lands surrounding Mt. Emmons. MEMC has proposed accomplishing this through a concept that they have identified as "strategic relinquishment".[16] The USFS appears to present this option as an effective strategy to eliminate the use of these claimed areas for mining purposes. Yet the potential for a strategic relinquishment of MEMC's claims has not yet been fully evaluated and protection of the lands may likely be effectuated by the segregation/proposed withdrawal of these lands.

b) Administrative Mineral Withdrawal

On pages 52-53 of the FA MEMC asserts that potential future actions regarding a withdrawal are related to the exchange process and notes that the withdrawal is another element that will secure the intent of the land exchange for all parties. However, later on page 53 of the FA the USFS appears to contradict this analysis and provides conclusory statements about the necessity of a mineral withdrawal as well as about the willingness of the agencies to pursue a withdrawal.[17]

In light of President Biden's announcement and accompanying support for the segregation and proposed withdrawal of these lands by the Department of Agriculture and Interior Department, mention of agency opposition to segregation/withdrawal is no longer accurate. The decisions approving the exchange should recognize the segregation and likely withdrawal of lands surrounding Mt. Emmons.

[16] *Id*. at 53.
[17] *Id*.

The USFS also mischaracterizes support for this approach. Due in part to the importance of a withdrawal to end mining on Mt. Emmons, the segregation/proposed withdrawal has broad support from local governments, local stakeholders, and a number of Colorado representatives. Recently, a number of Colorado representatives reached out to President Biden to request an executive withdrawal of the lands surrounding Mt. Emmons as part of the Thompson Divide Mineral Withdrawal. These representatives included Colorado Senator Bennet, U.S. Senator John Hickenlooper, Colorado Governor Jared Polis, and Colorado U.S. Representative Joe Neguse.[18]

Recommendation: The decisions approving the exchange should recognize the segregation and likely withdrawal of lands surrounding Mt. Emmons.

Recommendation: HCCA supports the segregation and proposed withdrawal of the lands as designated by the agencies.

2) Conditional water rights

The USFS summary of MEMC's conditional water rights is incomplete. If the USFS intends to keep this analysis in the FA, HCCA recommends adding additional context, including the following:

- On page 53 of the FA there is no mention of the water rights in the Slate River that are part of the conditional water rights decree. In their most recent diligence filing MEMC proposed maintaining rights to 20 cfs of direct flow water rights to the Slate River (in addition to the rights described in the draft FA).[19]

- Coal Creek Watershed Coalition and Western Resource Advocates are also Opposers in the above-noted diligence case that share concerns about the final amount of water necessary for reclamation and restricted only to those uses.

[18] *See* LaConte, John. Letter to Biden from Bennet, Hickenlooper, Polis and Neguse urges 'Camp Hale-Continental Divide National Monument' creation. Vail Daily. August 26, 2022. Retrieved from https://www.steamboatpilot.com/news/letter-to-biden-from-bennet-hickenlooper-polis-and-neguse-urges-camp-hale-continental-divide-national-monument-creation.
[19] Attachment C.

- The water rights are decreed for the mining and milling of molybdenum at the Mt. Emmons mine site. The Opposers are seeking a narrower definition of how those rights can be used as well as a significant reduction in the total water amount to restrict that amount to reclamation and remediation purposes. MEMC and the Opposers are currently engaging in settlement negotiations to resolve these issues.

III. Lands Accepted into the Federal Lands Should be Immediately Segregated

Under FLPMA, lands accepted into the public domain are automatically segregated from mineral exploration for a period of 90 days.[20] Yet after that, these lands are open to claiming under the 1872 Mining Law. We encourage the USFS to request that the Interior Department segregate the federally-acquired lands, and propose a longer withdrawal under FLPMA – to match what the agencies have done this week on the other federal lands in the area.

This is particularly important for the Three Peaks Ranch. Due to the recent segregation/ proposed withdrawal, the Three Peaks Ranch lands, if not segregated/withdrawn beyond the initial 90 days, would be a "donut hole" of lands open for claiming under the Mining Law. This would defeat the goals of the exchange and the recent segregation and unnecessarily complicate agency management of the area.

IV. Additional Information is Necessary to Evaluate the Exchange Proposal

HCCA has additional comments and recommendations to assure that the land exchange is executed with adequate process and a full evaluation of assets removed from the public domain.

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[20] §1716. FLPMA §206 (i)(2) Addresses the segregation of lands taken into the public sphere from appropriation under mining and public land laws and states:

"All non-Federal lands which are acquired by the United States through exchange pursuant to this Act or pursuant to other law applicable to lands managed by the Secretary of Agriculture shall be automatically segregated from appropriation under the public land law, including the mining laws, for ninety days after acceptance of title by the United States. Such segregation shall be subject to valid existing rights as of the date of such acceptance of title. At the end of such ninety day period, such segregation shall end and such lands shall be open to operation of the public land laws and to entry, location, and patent under the mining laws except to the extent otherwise provided by this Act or other applicable law, or appropriate actions pursuant thereto." (Pub. L. 94-579, title II, §206, Oct. 21, 1976, 90 Stat. 2756; Pub. L. 100-409, §3, 9, Aug. 20, 1988, 102 Stat. 1087, 1092.)

A. Potential loss of recreational access on federal parcels

While it appears that this exchange will result in substantial recreational benefit overall (dependent on the execution of the conservation easements), there is still a small loss of access on the federal parcels that MEMC would be receiving. The restricted access areas have been carefully designed to protect public health by preventing access in areas that have tailings infrastructure and where heavy equipment (including plows) operate. However, this does result in a small loss of some backcountry skiing terrain near the upper part of the parcel (the conservation easements would provide continued use of the uphill skin track and provide legal access to Red Lady Bowl).

The FA describes the conservation easement as allowing "backcountry skiing access and other non-motorized activities via the proposed conservation easement".[21] As explained above, permissible recreational access will actually be more nuanced than this and will not extend to all of the areas to be exchanged. The USFS should identify the areas where recreational access will be eliminated to allow the public to more fully evaluate the tradeoff. Additionally, the USFS must condition the exchange on the completion of the conservation easements to accomplish the conditions for recreational access described in the FA.

Recommendation: To protect recreational access discussed in the FA we refer the USFS to recommendations in I(1)(a) & I(1)(b).

B. Valuation of Exchange Lands

Under FLPMA the lands exchanged must be of equal value.[22] The value of lands to be exchanged is determined through an appraisal process.[23] In order to make this determination, the USFS must rely on unbiased appraisals evaluating the value of the lands received as well as the value of the lands exchanged away. The appraisal here is anticipated to be completed by November of 2022.[24] Once this assessment is completed, we encourage the USFS to provide transparency of the values of the exchanged lands.

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[21] FA at 46.
[22] §1716. FLPMA §206 (h): "The values of the lands exchanged by the Secretary under this Act and by the Secretary of Agriculture under applicable law relating to lands within the National Forest System either shall be equal, or if they are not equal, the values shall be equalized by the payment of money to the grantor or to the Secretary concerned as the circumstances require so long as payment does not exceed 25 per centum of the total value of the lands or interests transferred out of Federal ownership." Federal Land Policy and Management Act 43 U.S.C. § 1716 (b).
[23] §1716 (d)
[24] ATI at 14.

Recommendation: The USFS should provide the public with an opportunity to review the appraisal valuation numbers prior to the issuance of the Record of Decision or Decision Memo.

C. Water Rights Analysis of Exchange Parcels

In the Implementation Schedule (Exhibit C), completion of the Water Rights Analysis was targeted for 8/2021. However, it appears that the water rights may require additional analysis.

In the FA and in the associated Water Rights Analysis Report the USFS has provided additional information on the water rights associated with the non-federal parcels.[25] Generally, this analysis adequately addresses the presence of water rights associated with these properties. However, the explanation of the Three Peaks Ranch water rights merits additional discussion.

There are two irrigation ditches with water rights associated with the Three Peaks Ranch. These rights amount to 5.5 cfs total and are decreed for irrigation purposes on that parcel. As described in the FA, the USFS is not currently seeking to acquire these rights.[26] The Water Rights Analysis associated with the Three Peaks Ranch parcel appears cursory and does not fully evaluate a potential change in the use of those rights if not acquired by the USFS. To that end, HCCA has the following questions:

- How has the USFS evaluated whether or not to acquire the Three Peaks Ranch water rights? Please provide an explanation of the evaluation of whether these rights could be acquired and used for the public benefit.
- If the USFS does not accept those water rights, what use will they be applied to?

Recommendation: The USFS should provide additional discussion of what will happen with the Three Peaks Ranch water rights once the exchange process is complete.

[25] FA at 43; FA Exhibit 7.
[26] *Id*. at 43.

D. Water Quality Protections: Discharge & Stormwater Permits

In the FA the USFS discusses the means of oversight that the state of Colorado will maintain over the mine water treatment plant operated by MEMC.[27] The Colorado Discharge Permit System Permit No. CO-0035394 is correctly described as an administrative renewal. This permit has not been updated since 2008 and was placed on administrative renewal in 2013.[28] Similarly, MEMC's Stormwater Permit is on administrative renewal.[29] The Colorado Department of Health and the Environment (CDPHE) is Colorado's agency in charge of the renewal of both of these permits. It is important to note that both of these permits are substantially dated.

Recommendation: The USFS should encourage CDPHE to update permits.

V. The United States Forest Service Should Provide an Opportunity for Public Engagement Once Additional Information is Available

Typically, a federal land exchange process is evaluated over a number of years. The USFS is currently evaluating whether to pursue the Mt. Emmons Land Exchange via a categorical exclusion. Here, the incorporation of the conservation easements and mineral extinguishment agreement as a requirement of the land exchange may render this particular exchange as an appropriate use of § 220.6 (d) (7)(ii) as these instruments would ensure that these lands maintain similar resource management objectives and practices.

To date, the USFS has provided significant opportunities for public engagement and has been forthcoming with sharing information publicly about the proposed exchange. We encourage the USFS to continue this transparency as additional analysis is completed. Specifically, as additional analysis is completed the USFS should provide these documents for public review on the SOPA website and the public should be notified. These documents should include things such as the draft biological assessment and USFWS consultation documents, the draft cultural resources assessment (subject to redaction of sensitive cultural information), and documentation of the final assessment values and how those values were arrived at.

[27] *Id.* at 16.
[28] *Id*.
[29] CDPHE Water Quality Control Division Stormwater Permit Certification No. COR-040284 is also on administrative renewal. *See Id.* at 16.

We also encourage an additional opportunity for public engagement once additional analysis is available and prior to any final Decision Memorandum or Record of Decision. As recognized in the ATI, "all documents pertaining to both Federal and non-Federal lands necessary for the evaluation, processing and consummation of a land adjustment transaction… are subject to public availability pursuant to the Freedom of Information Act (5 U.S.C. 522)".[30] Often, the USFS requires that the public submit FOIA requests to obtain the documents necessary to evaluate these proposals, which can be a lengthy process.

The USFS has started off on the right foot by providing initial FA documents and the ATI on the SOPA website prior to initiation of the scoping period. Throughout the scoping period the USFS has provided additional documents helpful to analyze the exchange proposal. Providing access on the SOPA website for public review will provide a more transparent exchange process. The USFS should post these documents on the SOPA website as they are made available.

By offering an informal opportunity for public engagement prior to a final Record of Decision or Decision Memo the USFS would provide an opportunity for feedback on any new analysis. This could be an informal process or listening session where stakeholders weigh-in on the substance of additional assessment.

Recommendation:The USFS should provide additional assessment documents on the SOPA website for public review.

Recommendation: The USFS should provide a meaningful opportunity for public engagement once additional assessment documents have been developed and before the Decision Memo is finalized.

VI. Support for the Acquisition of all Non-Federal Parcels

In the ATI the parties agree that, in the instance that the value of the listed Non-Federal parcels exceeds the value of the Federal parcels, the USFS will make a cash equalization payment to execute the agreement.[31] These parcels have important attributes that render them valuable acquisitions for the public lands. HCCA supports the acquisition of all four parcels even if additional payment is necessary.

[30] ATI at 3.
[31] *Id.* at 19.

VII. Conclusion

HCCA supports this proposal on the condition that the conservation easements and mineral extinguishment agreements are executed in tangent with the exchange. The proposal as a whole provides numerous public benefits and, when executed with the associated prohibitions against mining activities, it will provide a net benefit to the public. Critically, without the prohibitions against mining our analysis would be dramatically different, as this exchange could open up the exchanged lands to mining and development without USFS oversight.

To fully execute the desired land management regime on the exchanged parcels we support the recent segregation/proposed withdrawal and urge the USFS to request an additional administrative mineral withdrawal of the lands to be acquired, in particular the Three Peaks Ranch parcel. This concept has broad support from the local community, government entities, the mining company that holds the claims within the proposed withdrawal area, as well as from Colorado's elected representatives.

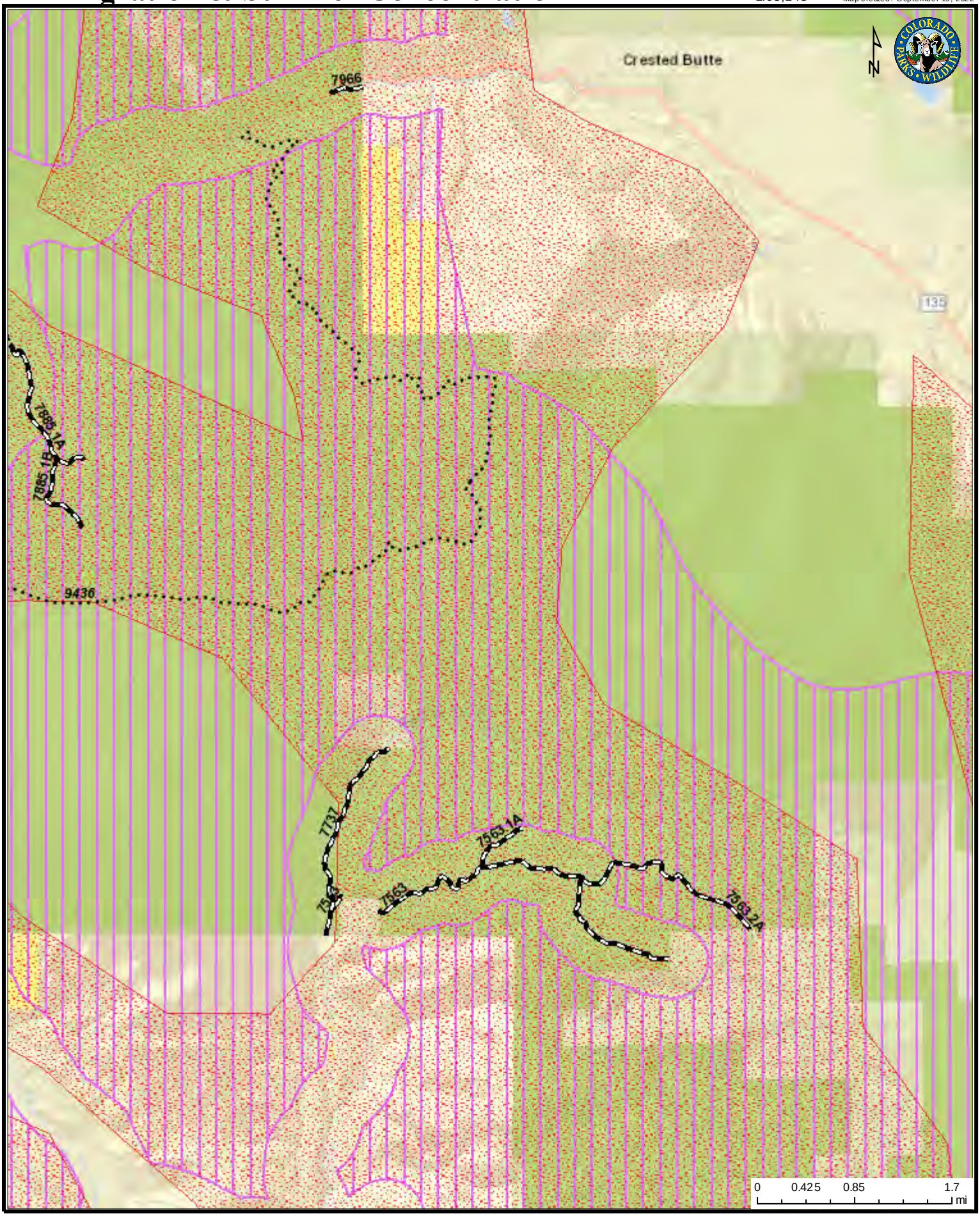
Thank you for your consideration,

Julie Nania
High Country Conservation Advocates
Red Lady and Water Program Director

Elk Migration & Summer Concentration

1:68,148

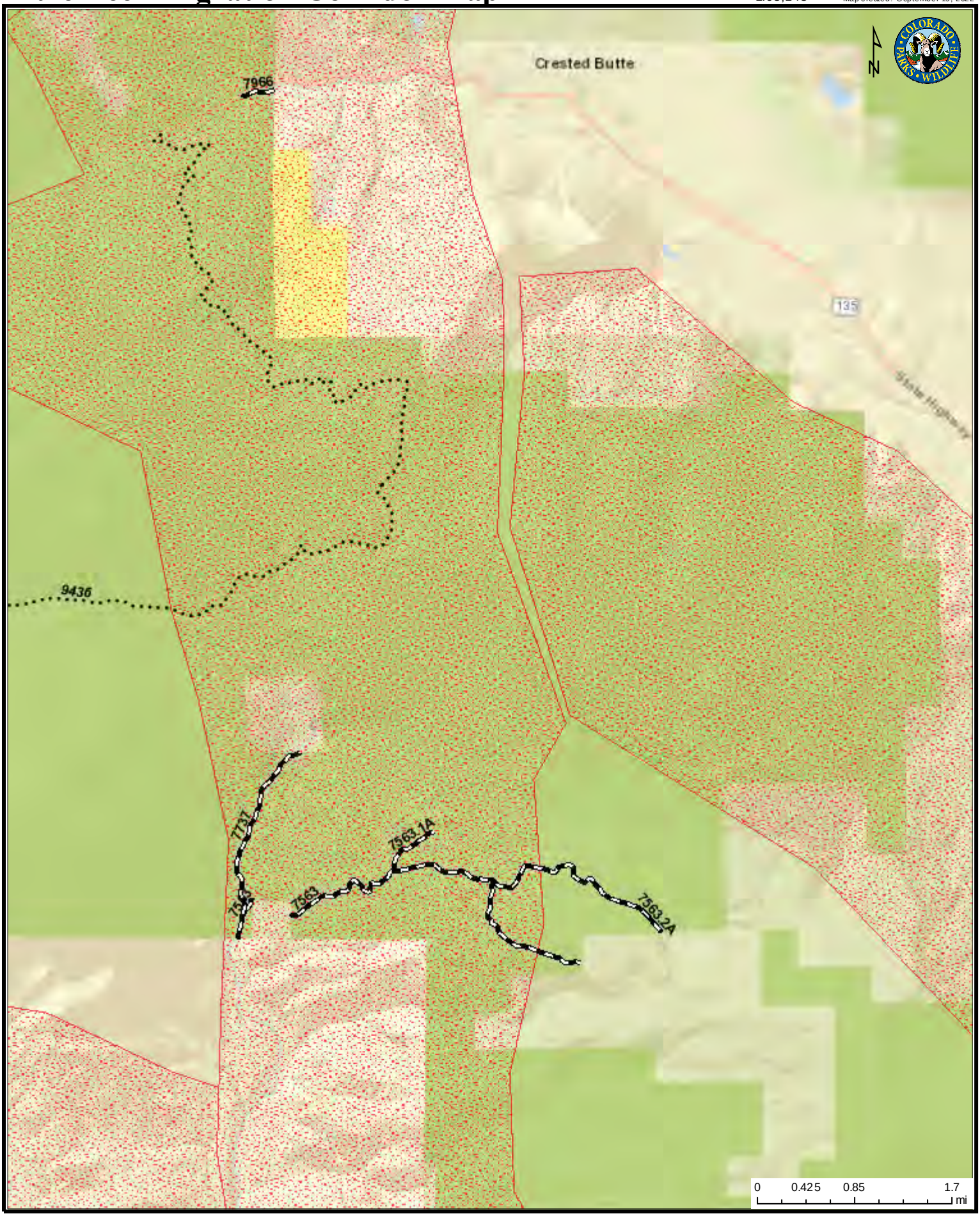
Colorado Hunting Atlas
Map created: September 19, 2022



Mule Deer Migration Corridor Map

1:68,148

Colorado Hunting Atlas
Map created: September 19, 2022



DISTRICT COURT, WATER DIVISION 4, STATE OF COLORADO Montrose County Justice Center 1200 N. Grande Ave., Bin A Montrose, Colorado 81401-3146 Telephone: (970) 252-4336	
CONCERNING THE APPLICATION FOR MT. EMMONS MINING COMPANY, a Delaware corporation and a subsidiary of Freeport McMoRan, Inc. IN GUNNISON COUNTY	**▲COURT USE ONLY▲**
Attorneys for Applicant: Brian M. Nazarenus, #16984 Sheela S. Stack, #32768 NAZARENUS STACK & WOMBACHER LLC 5299 DTC Blvd., Suite 610 Greenwood Village, Colorado 80111 Telephone: (720) 647-5661 E-mail: bnazarenus@nswlaw.com sstack@nswlaw.com	**Case No. 21CW_____** **(08CW81, 96CW311)**
APPLICATION FOR FINDING OF REASONABLE DILIGENCE	

1. Name, Address, and Telephone Number of Applicant

Mt. Emmons Mining Company
c/o Francis McAllister, V.P. Liability Management and Land & Water
Freeport McMoRan
333 North Central Avenue
Phoenix, AZ 85004
Telephone: (602) 366-8100

Please direct all correspondence or inquiries regarding this matter to counsel for Applicant:

Brian M. Nazarenus, Esq.
Sheela S. Stack, Esq.
NAZARENUS STACK & WOMBACHER
8301 E. Prentice Avenue, Suite 110
Greenwood Village, Colorado 80111
Telephone: (720) 647-5661

2. Description of Decreed Conditional Water Rights

2.1. Slate River Direct Flow Right

2.1.1. Name of Structure: Slate River Intake

2.1.2. Original and Subsequent Decrees:

2.1.2.1. The Slate River Direct Flow Right was originally decreed in Case No. 96CW311 on July 25, 2002 in the District Court in and for Water Division No. 4 ("96CW311 Decree").

2.1.2.2. The Slate River Direct Flow Right was continued as conditional in Case No. 08CW81 on April 16, 2015 in the District Court in and for Water Division No. 4 ("08CW81 Decree").

2.1.3. Legal Description of Structure: The Slate River Intake will divert at a point on the south bank of the Slate River from which the West quarter corner of Section 20, Township 13 South, Range 86 West of the 6th P.M., bears South 88° 54' 52" West, distance of 2,666.55 feet, in Gunnison County, Colorado.

2.1.4. Source of Water: Slate River, a tributary of the East River

2.1.5. Appropriation Date: November 11, 1996

2.1.6. Amount: The 96CW311 and 08CW81 Decrees granted and continued as conditional the Slate River Direct Flow Right in the amount of 30 cfs. By this application and in accordance with paragraph 6.2.6 of the 96CW311 Decree, Applicant has re-evaluated the flow rate decreed for the Slate River Direct Flow Right, and has determined that only 20 cfs of the water right is necessary for Applicant's beneficial use. Therefore, this application seeks to abandon 10 cfs of the Slate River Direct Flow Right and continue, as conditional, 20 cfs for the beneficial uses described in paragraph 3.6., below.

2.1.7. Use of Water: Use and reuse for all industrial purposes associated with mining and milling molybdenum at the Mount Emmons molybdenum property, including without limitation: mining, grinding, and processing of ore; transportation of tailings; evaporation replacement; cooling and dust suppression; fire suppression; and domestic use and lawn and park irrigation at mine and mill facilities.

2.2. Carbon Creek Direct Flow Right

2.2.1. Name of Structure: Carbon Creek Intake

2.2.2. Original and Subsequent Decrees:

2.2.2.1. The Carbon Creek Direct Flow Right was originally decreed in Case No. 96CW311 on July 25, 2002 in the District Court in and for Water Division No. 4.

2.2.2.2. The Carbon Creek Direct Flow Right was continued as conditional in Case No. 08CW81 on April 16, 2015 in the District Court in and for Water Division No. 4.

2.2.3. Legal Description of Structure: The Carbon Creek Intake will divert at a point on Carbon Creek from which the Southwest corner of Section 28, Township 14 South, Range 86 West of the 6th P.M., bears South 51° 56' 38" West, a distance of 3,617.89 feet, in Gunnison County, Colorado.

2.2.4. Source of Water: Carbon Creek, a tributary of Ohio River

2.2.5. Appropriation Date: November 11, 1996

2.2.6. Amount: 10 cfs, conditional

2.2.7. Use of Water: Use and reuse for all industrial purposes associated with mining and milling molybdenum at the Mount Emmons molybdenum property, including without limitation: mining, grinding, and processing of ore; transportation of tailings; evaporation replacement; cooling and dust suppression; fire suppression; and domestic use and lawn and park irrigation at mine and mill facilities.

2.3. Carbon Creek Reservoir Storage Right

2.3.1. Name of Structure: Carbon Creek Reservoir

2.3.2. Original and Subsequent Decrees:

2.3.2.1. The Carbon Creek Reservoir Storage Right was originally decreed in Case No. 96CW311 on July 25, 2002 in the District Court in and for Water Division No. 4.

2.3.2.2. The Carbon Creek Reservoir Storage Right was continued as conditional in Case No. 08CW81 on April 16, 2015 in the District Court in and for Water Division No. 4.

2.3.3. Legal Description of Structure: Carbon Creek Reservoir will be an on-stream reservoir located on Carbon Creek. The location of the dam will be a point on the south abutment of the dam axis from which the Southwest corner of Section 28, Township 14 South, Range 86 West of the 6th P.M., bears South 54° West, a distance of 3,300 feet, in Gunnison County, Colorado. Total capacity of Carbon Creek Reservoir will be 1,000 acre-feet. The dam will be approximately 115 feet high. The anticipated length of the dam will be 990 feet.

2.3.4. Source of Water: Carbon Creek, a tributary of the Ohio River; and the Slate River, a tributary of the East River.

2.3.5. Appropriation Date: November 11, 1996

2.3.6. Amount: 1,000 acre-feet, conditional

2.3.7. Use of Water: Use and reuse for all industrial purposes associated with mining and milling molybdenum at the Mount Emmons molybdenum property, including without limitation: mining, grinding, and processing of ore; transportation of tailings; evaporation replacement; cooling and dust suppression; fire suppression; and domestic use and lawn and park irrigation at mine and mill facilities.

2.4. Mill Water Reservoir Storage Right

2.4.1. Name of Structure: Mill Water Reservoir

2.4.2. Original and Subsequent Decrees:

2.4.2.1. The Mill Water Reservoir Storage Right was originally decreed in Case No. 96CW311 on July 25, 2002 in the District Court in and for Water Division No. 4.

2.4.2.2. The Mill Water Reservoir Storage Right was continued as conditional in Case No. 08CW81 on April 16, 2015 in the District Court in and for Water Division No. 4.

2.4.3. Legal Description of Structure: Mill Water Reservoir will be an on-stream reservoir located on an unnamed tributary of Ohio Creek. The location of the dam will be a point

on the south abutment of the dam axis from which the Southwest corner of Section 19, Township 14 South, Range 86 West of the 6th P.M., bears South 81° East, a distance of 3,856 feet, in Gunnison County, Colorado. The total capacity of Mill Water Reservoir will be 1,000 acre-feet. The dam will be approximately 185 feet high. The anticipated length of the dam will be 710 feet.

2.4.4. Source of Water: An unnamed tributary of Ohio Creek, and the Slate River, a tributary of the East River.

2.4.5. Appropriation Date: November 11, 1996

2.4.6. Amount: 1,000 acre-feet, conditional

2.4.7. Alternate Point of Storage: Elk Creek Reservoir is an alternate place of storage for 600 acre-feet of the Mill Water Storage Right; provided, however, that the source of any Mill Water Reservoir water stored in Elk Creek Reservoir shall be limited to diversions from the Slate River Intake.

2.4.8. Use of Water: Use and reuse for all industrial purposes associated with mining and milling molybdenum at the Mount Emmons molybdenum property, including without limitation: mining, grinding, and processing of ore; transportation of tailings; evaporation replacement; cooling and dust suppression; fire suppression; and domestic use and lawn and park irrigation at mine and mill facilities.

2.5. Elk Creek Reservoir Storage Right

2.5.1. Name of Structure: Elk Creek Reservoir

2.5.2. Original and Subsequent Decrees:

2.5.2.1. The Elk Creek Reservoir Storage Right was originally decreed in Case No. 96CW311 on July 25, 2002 in the District Court in and for Water Division No. 4.

2.5.2.2. The Elk Creek Reservoir Storage Right was continued as conditional in Case No. 08CW81 on April 16, 2015 in the District Court in and for Water Division No. 4.

2.5.3. Legal Description of Structure: Elk Creek Reservoir will be an on-stream reservoir located on Elk Creek. The location of the dam will be a point on the north abutment of the dam axis from which the Southwest corner of Section 6, Township 14 South, Range 86 West of the 6th P.M., bears South 77° East, a distance of 2,720 feet, in Gunnison County, Colorado. The total capacity of Elk Creek Reservoir will be 1,600 acre-feet; provided, however, that the volume of water diverted into storage in Elk Creek Reservoir from the natural flow of Elk Creek shall be

limited to a maximum of 1,000 acre-feet. The dam will be approximately 220 feet high. The anticipated length of the dam will be 960 feet.

2.5.4. Source of Water: Elk Creek, a tributary of Coal Creek; Carbon Creek, a tributary of Ohio Creek; and the Slate River, a tributary of the East River

2.5.5. Appropriation Date: November 11, 1996

2.5.6. Amount: 1,000 acre-feet, conditional

2.5.7. Use of Water: Use and reuse for all industrial purposes associated with mining and milling molybdenum at the Mount Emmons molybdenum property, including without limitation: the mining, grinding, and processing of ore; the transportation of tailings; evaporation replacement; cooling and dust suppression; fire suppression; and domestic use and lawn and park irrigation at mine and mill facilities.

3. Provide a detailed outline of what has been done toward completion or for completion of the appropriation and application of water to a beneficial use as conditionally decreed, including expenditures, during the previous diligence period:

3.1. On February 12, 2016, Applicant acquired from the previous owner, U.S. Energy ("USE"), all of USE's properties and interests related to the Mt. Emmons mine site, including the mine, water rights, and water treatment plant.

3.2. The Applicant spent the rest of 2016 analyzing the mine site to determine what is necessary to keep the water quality in good condition and make the operation run more efficiently.

3.3. In 2018, the Applicant established various levels of drainage systems on the property to better mitigate the water, and retained Trout Unlimited and the Colorado Division of Reclamation Mining and Safety to design and oversee implementation of onsite reclamation work, including reclamation of two waste rock areas.

3.4. The majority of 2019 was spent evaluating how to overall best improve the wastewater treatment plant for the long term, while Applicant also finished ditch and road improvements along with some slope improvements and additional waste rock reclamation. Applicant also, conducted repairs to the re-vegetation work done in 2018, and projects to improve stormwater management.

3.5. In 2020 and 2021, the Applicant continued with road, slope, and channel improvements, waste rock reclamation, as well as recontouring tailing dams to improve stormwater management. Applicant also re-evaluated the volume of water necessary for various reclamation scenarios on the property and determined that only 20 cfs of Slate River Direct Flow Right would be necessary for the uses described in paragraph 3.6., below.

3.6. Applicant continues to rely upon and develop the conditional water rights described herein and has no intent to abandon them for industrial purposes associated with water management; water treatment; site operation, maintenance and restoration; and reclamation purposes, including, but not limited to, evaporation replacement; fire suppression; and domestic use and lawn and park irrigation at the former mine and mill location(s).

4. Names and addresses of owners of the land on which the structures are or will be located, upon which water is or will be stored, or upon which water is or will be placed to beneficial use. All water diversion structures, reservoir, and related facilities will be constructed on land owned by the Applicant, as well as on land owned by:

4.1. United States Bureau of Land Management, Colorado State Office, 2850 Youngfield Street, Lakewood, Colorado 80215.

4.2. United States Forest Service, Gunnison National Forest, 2250 Highway 50, Delta, Colorado 81416.

WHEREFORE, Applicant respectfully requests that this Court enter an order finding that reasonable diligence has been exercised in the development of the conditional water rights and that such water rights be continued as conditional in the amounts described in paragraphs 2.1.6, 2.2.6, 2.3.6, 2.4.6, and 2.5.6., above for industrial purposes associated with water management; water treatment; site operation, maintenance and restoration; and reclamation purposes, including, but not limited to, evaporation replacement; fire suppression; and domestic use and lawn and park irrigation at the former mine and mill location(s).

Respectfully submitted this 30th day of April, 2021.

NAZARENUS STACK & WOMBACHER

_____

By: Brian M. Nazarenus, #16984
Sheela S. Stack, #32768

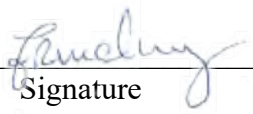
Attorneys for Applicant Mt. Emmons Mining Company

VERIFICATION

I declare under penalty of perjury under the law of Colorado that the foregoing is true and correct.

Executed on the 30th day of April, 2021, at Phoenix, Arizona.

Francis McAllister
Printed Name


Signature

The person signing this verification is the Vice President of Liability Management and Land & Water of Freeport-McMoRan, Inc., the parent company of the Mt. Emmons Mining Company.

July 23, 2018

The 2017 Economic Contributions of Outdoor Recreation in Colorado

A regional and county-level analysis

Colorado Parks & Wildlife
Denver, CO

SOUTHWICK
ASSOCIATES

PO Box 6435 ■ Fernandina Beach, FL 32035 ■ Office (904) 277-9765

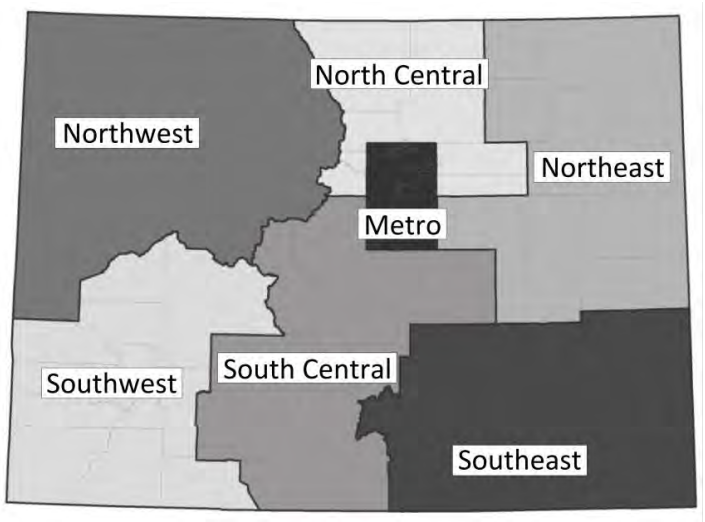
Executive Summary

This study, conducted by Southwick Associates for Colorado Parks and Wildlife, estimates the economic contributions of outdoor recreational activity in Colorado during 2017. The results are provided at the state-level as well as for 7 regions within the state.[1] Focusing on the state-level results below, the total economic output associated with outdoor recreation amounts to $62.5 billion dollars, contributing $35.0 billion dollars to the Gross Domestic Product of the state. This economic activity supports over 511,000 jobs in the state, which represents 18.7% of the entire labor force in Colorado and produces $21.4 billion dollars in salaries and wages. In addition, this output contributes $9.4 billion dollars in local, state and federal tax revenue. Similar interpretations can be applied to the regional results. Outdoor recreation constitutes a substantial part of the Colorado economy.

Total Economic Contribution of Outdoor Recreation in Colorado, by Region ($ values in millions)

	Northwest	North Central	Metro	Northeast	Southeast	South Central	Southwest	**State**
Output	$14,879	$13,846	$10,648	$505	$1,648	$6,384	$5,009	**$62,540**
Salaries & Wages	$5,088	$4,384	$3,862	$166	$494	$1,845	$1,673	**$21,372**
GDP Contribution	$8,276	$7,487	$6,167	$254	$808	$3,201	$2,657	**$34,997**
State/Local Taxes	$1,231	$1,002	$743	$51	$184	$615	$490	**$4,369**
Federal Taxes	$1,195	$1,074	$934	$39	$121	$439	$380	**$5,125**
Jobs	133,658	119,958	86,976	5,709	20,209	68,321	53,090	**511,059**

SCORP Regions



[1] Part of the analysis for this study was based on work performed or supported by the Outdoor Industry Association (OIA, 2017). This study uses a broader definition of outdoor recreation, and for this reason the results of these two studies should not be directly compared. Rather, these two studies should be used together to gain a better understanding of the economic contributions of outdoor recreation to the Colorado economy.

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1. Introduction

This study, conducted by Southwick Associates for Colorado Parks and Wildlife (CPW), was undertaken to quantify the economic contributions of outdoor recreation in Colorado for 2017. This investigation updates a similar study completed in 2014 (CPW, 2014). Both the current and original study are part of a broader CPW effort to characterize outdoor recreation both statewide and regionally for the Colorado Statewide Comprehensive Outdoor Recreation Plan (SCORP). Recreation contributions of multiple recreational activities were estimated. Fishing, hunting, and wildlife watching were of particular interest, and the specific contributions of these three activities were also examined. Additionally, the county-level contributions of hunting were estimated for a more detailed view of the economic contributions of hunting in Colorado.

Part of the analysis for this study was based on work performed or supported by the Outdoor Industry Association (OIA). In particular, the statewide economic contributions relied on data from a 2017 OIA study (OIA, 2017).[2] Although components of the analysis presented here relied on OIA data, the results of this study differ somewhat from the state-level results of the OIA study for two reasons. First, this study incorporates a wider range of outdoor recreation activities, which leads to larger economic estimates of outdoor recreation. Second, this study relies principally on the SCORP survey data to characterize participation, and these numbers differ from the OIA-based participation numbers as a consequence of using different data sources. For this reason, the results of these two studies should not be directly compared, but rather should be used together to gain a broader understanding of the economic contributions of outdoor recreation to the Colorado economy.

2. Data Sources & Methods

Outdoor recreation in this study includes a set of activities corresponding to questions in a CPW survey sent to 7,000 Colorado residents in early 2018 as part of the Colorado Statewide Comprehensive Outdoor Recreation Plan (SCORP, 2018)[3]. Spending in Colorado was estimated by applying spending profiles to participation numbers for the SCORP activities. Statewide spending was estimated using appropriate data sources for each activity group (Appendix D). In constructing spending profiles for each activity, this study largely relied on spending data from an OIA survey, administered for the purpose of quantifying the economic contributions of outdoor recreation with the U.S. and each of the 50 states (OIA, 2017). Because this study incorporated a wider range of activities than the OIA study, additional data sources were incorporated in characterizing spending profiles for certain activities. The estimation of

[2] The Outdoor Recreation Economy (OIA, 2017). https://outdoorindustry.org/advocacy/
[3] Additional details about the SCORP survey are included in Appendix G.

spending varied by activity as a result. Detailed descriptions of these procedures are included in Appendix E.

The spending estimates were analyzed using standard economic models to quantify economic contributions[4]. The definitions of key economic terms are presented in Appendix A. The IMPLAN economic modeling software was used to estimate economic contributions. Details of the economic contribution methodology are presented in Appendix B.

3. Outdoor Recreation Participation

The 2018 SCORP survey of Outdoor Recreation was used to characterize participation in Colorado regionally and statewide for residents of the state (SCORP, 2018). The survey included a set of 30 activities that were grouped into 5 larger categories (Table 1). The survey results suggest that outdoor recreation is very popular among Colorado residents, with an estimated 3.8 million adults (90% of adult residents) having engaged in at least one of the 30 activities in 2017. Trail activities were the most popular, with nearly 83% of adults participating. The Northwest and North Central regions were the two areas where the largest proportions of participants recreated, with 49% and 46% of Colorado adults talking part in outdoor recreation in those regions, respectively.

Table 1. SCORP Survey Activity Groups (SCORP, 2018)

Activity Group	Activities in Group
Trail/Road	Walking, Jogging/Running (outdoors), Hiking/Backpacking, Horseback riding, Road biking, Mountain biking, Off-highway vehicle (OHV) or 4-wheeling/motorcycling
Water-based	Swimming (outdoors), Power boating, Water/Jet skiing, Sailing, Canoeing/Kayaking, Whitewater rafting, Stand up paddle-boarding
Winter	Skiing (alpine/tele)/snowboarding, Sledding/tubing, Snowmobiling, Snowshoeing or cross-country skiing
Wildlife-related	Hunting, Fishing, Ice fishing, Bird Watching, Wildlife viewing (excluding bird watching)
Other Outdoor	Developed/RV camping, Tent camping, Picnicking, Target or skeet shooting, Rock climbing, Team or individual sports (outdoors), Playground activities

[4] All monetary values are reported in 2017 dollars. For example, spending profiles based on 2016 data were scaled up by 2.1% to account for inflation (U.S. Bureau of Labor Statistics).

Table 2. SCORP Survey Participants (thousands) for Activity Groups by Region (SCORP, 2018)

Activity	Northwest	North Central	Metro	Northeast	Southeast	South Central	Southwest	**State**
Trail/Road	1,603	1,706	1,469	273	356	1,250	710	**3,628**
Water-based	506	676	378	54	141	325	273	**1,758**
Winter	983	481	226	16	43	275	231	**1,747**
Wildlife-related	860	759	504	161	244	773	443	**2,201**
Other Outdoor	1,117	1,238	1,003	206	309	950	598	**3,070**
Any Outdoor Activity	2,049	1,942	1,628	452	569	1,579	972	**3,796**

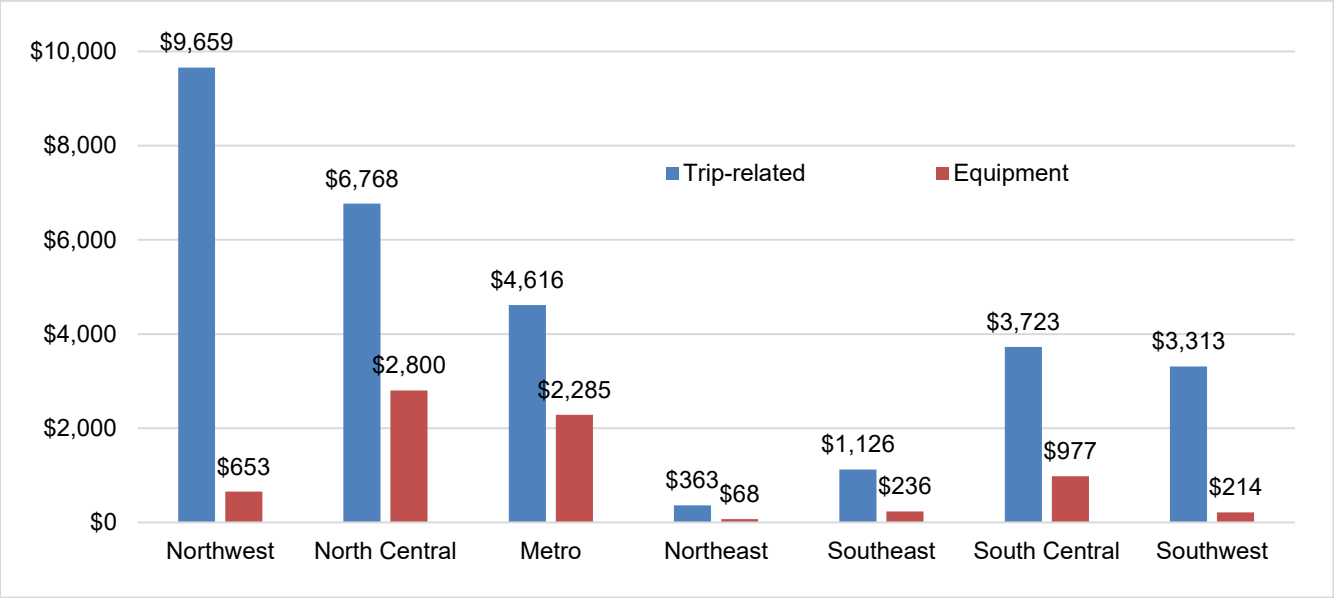
4. Outdoor Recreation Expenditures

The popularity of outdoor recreation by both Colorado residents and nonresidents leads to significant consumer spending in the Colorado economy. Outdoor recreationists in Colorado spent over $36.8 billion dollars on trips and equipment in 2017 (Table 3). The Northwest region included the largest amount of outdoor recreation spending at $10.3 billion, followed by the North Central region at $9.6 billion. Combined, these two regions accounted for over half of all the outdoor recreation spending within Colorado. Because retail sales are concentrated in more populous regions, the ratio of equipment to trip-related sales varies widely from one region to the next (Table 3). Figure one shows trip and equipment spending separately as well as the differences in magnitude between those two spending categories by county. Partly as a result of these differences, the nature of economic contributions (e.g., industries impacted, types of jobs supported) varies regionally.

Table 3. Spending by Region (millions) for Trip-Related versus Equipment Spending

	Northwest	North Central	Metro	Northeast	Southeast	South Central	Southwest	**State**
Total Spending								
Trip-related	$9,659	$6,768	$4,616	$363	$1,126	$3,723	$3,313	$29,569
Equipment	$653	$2,800	$2,285	$68	$236	$977	$214	$7,233
Total	$10,312	$9,568	$6,901	$431	$1,363	$4,700	$3,527	$36,802
Percent Spending by Type								
Trip-related	93.7%	70.7%	66.9%	84.3%	82.7%	79.2%	93.9%	80.3%
Equipment	6.3%	29.3%	33.1%	15.7%	17.3%	20.8%	6.1%	19.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 1. Total Outdoor Recreation Spending by Region (in $millions)



5. Economic Contributions of Outdoor Recreation

As a result of the economic multiplier effect, the $36.8 billion dollars of outdoor recreation spending produces additional rounds of economic activity throughout the state's economy. These include indirect contributions, arising from additional spending within industries, and induced contributions, which result from spending of salaries and wages by employees of these industries. These indirect/induced effects total $29.0 billion, and when combined with direct expenditures, account for $62.5 billion dollars of output in the Colorado economy (Table 4). This total output includes $35.0 billion to the state's Gross Domestic Product (GDP), which is equal to 10.2% of the state's total GDP (BEA, 2018).[5]

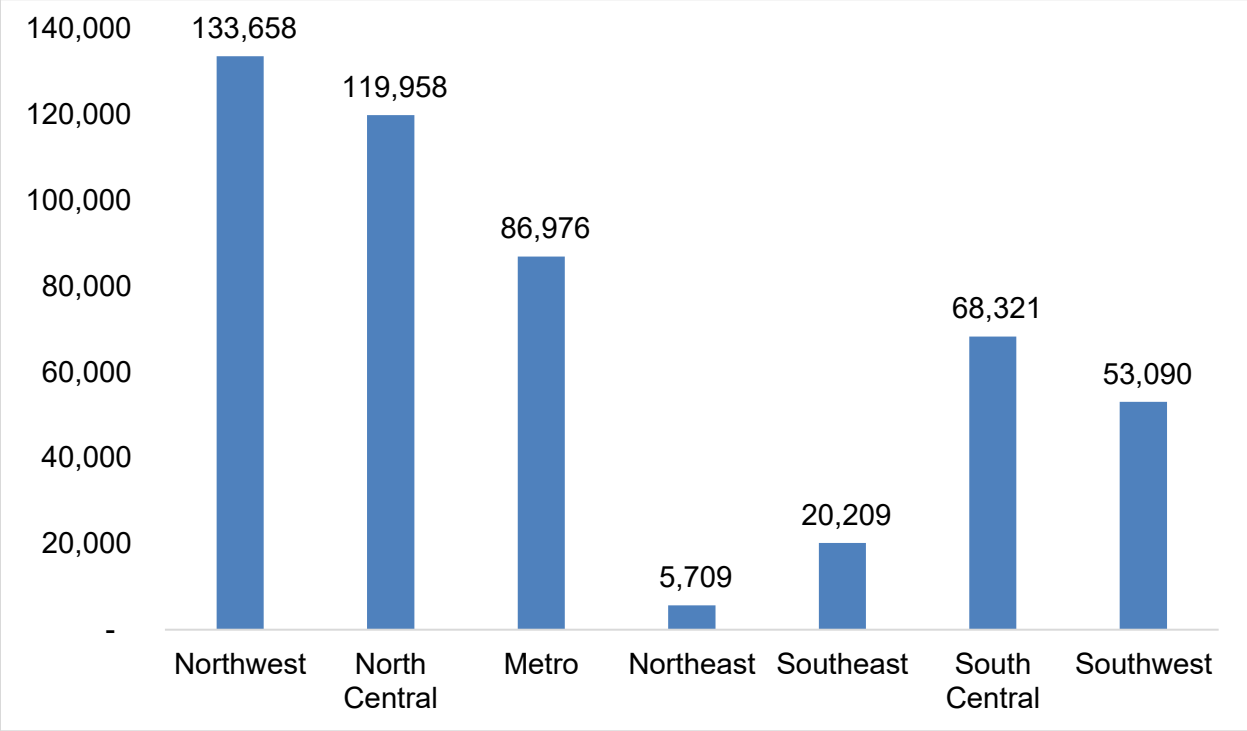
Table 4. Economic Contributions by Region (dollar values in $millions)

	Northwest	North Central	Metro	Northeast	Southeast	South Central	Southwest	**State**
Direct								
Output	$10,312	$9,568	$6,901	$431	$1,363	$4,700	$3,527	$36,802
Salaries & Wages	$3,288	$2,699	$2,242	$128	$339	$1,180	$1,119	$11,206
GDP Contribution	$5,206	$4,569	$3,479	$188	$558	$2,068	$1,713	$18,354
State/Local Taxes	$902	$760	$537	$43	$157	$507	$393	$2,977
Federal Taxes	$773	$667	$543	$30	$85	$289	$256	$2,749
Jobs	92,805	85,833	60,144	4,703	16,064	51,647	38,080	328,632
Indirect/Induced								
Output	$5,567	$5,096	$4,377	$133	$498	$2,131	$1,857	$29,039
Salaries & Wages	$1,800	$1,685	$1,620	$38	$155	$665	$554	$10,166
GDP Contribution	$3,070	$2,918	$2,688	$66	$250	$1,134	$943	$16,643
State/Local Taxes	$329	$242	$206	$8	$27	$108	$97	$1,392
Federal Taxes	$422	$407	$390	$9	$36	$150	$124	$2,376
Jobs	40,853	34,125	26,831	1,006	4,145	16,675	15,010	182,427
Total								
Output	$14,879	$13,846	$10,648	$505	$1,648	$6,384	$5,009	$62,540
Salaries & Wages	$5,088	$4,384	$3,862	$166	$494	$1,845	$1,673	$21,372
GDP Contribution	$8,276	$7,487	$6,167	$254	$808	$3,201	$2,657	$34,997
State/Local Taxes	$1,231	$1,002	$743	$51	$184	$615	$490	$4,369
Federal Taxes	$1,195	$1,074	$934	$39	$121	$439	$380	$5,125
Jobs	133,658	119,958	86,976	5,709	20,209	68,321	53,090	511,059

[5] GDP contribution is smaller than total output because GDP measures only the value-added production of goods and services (i.e., any intermediate inputs are excluded). While total output is a broader measure of economic activity, GDP contribution is included for comparison to the other GDP-based measures.

An important result of outdoor recreation spending is the number of jobs supported in the state. An estimated 511,000 jobs in Colorado are supported by outdoor recreation expenditures, which accounts for 18.7% of all jobs in Colorado, larger than the combined construction and manufacturing labor force in the state (BLS, 2018). These jobs are especially important to the economies of specific locales in the state. In the Northwest region alone nearly 134,000 jobs are supported by the total economic contribution of outdoor recreation (Figure 2).

Figure 2. Jobs Supported by Outdoor Recreation in Colorado Regions



6. Economic Contributions of Fishing, Hunting, and Wildlife Watching

Outdoor recreation includes a diverse set of activities that participants pursue in Colorado. Of particular interest for this study are the contributions of fishing, hunting, and wildlife watching. These three activities together produce over $5 billion dollars of economic output, which supports nearly 40,000 jobs within the state. Fishing alone contributes $2.4 billion dollars in economic output per year, supporting over 17,000 jobs in Colorado (Table 5).

Table 5. Total Economic Contributions of Fishing, Hunting, and Wildlife Watching by Region

	Northwest	North Central	Metro	Northeast	Southeast	South Central	Southwest	**State**
Economic Output ($millions)								
Fishing	$239	$691	$512	$29	$109	$353	$120	$2,445
Hunting	$136	$221	$166	$20	$24	$93	$55	$843
Wildlife Watching	$161	$762	$682	$23	$55	$277	$86	$2,436
Salaries & Wages ($millions)								
Fishing	$74	$194	$165	$9	$33	$97	$39	$757
Hunting	$50	$65	$53	$8	$8	$28	$22	$280
Wildlife Watching	$49	$184	$191	$7	$17	$72	$28	$637
GDP Contribution ($millions)								
Fishing	$122	$321	$261	$13	$53	$162	$61	$1,227
Hunting	$77	$113	$90	$11	$12	$46	$31	$457
Wildlife Watching	$88	$310	$320	$10	$28	$121	$45	$1,071
State & Local Taxes ($millions)								
Fishing	$17	$40	$28	$2	$12	$29	$11	$143
Hunting	$9	$11	$8	$2	$2	$6	$5	$44
Wildlife Watching	$11	$33	$31	$2	$5	$14	$7	$111
Federal Taxes ($millions)								
Fishing	$18	$47	$40	$2	$8	$22	$9	$180
Hunting	$12	$16	$13	$2	$2	$6	$5	$66
Wildlife Watching	$12	$44	$47	$2	$4	$16	$6	$154
Jobs								
Fishing	1,930	4,919	3,355	284	1,298	3,368	1,185	17,114
Hunting	1,488	1,885	1,238	368	443	1,213	869	7,937
Wildlife Watching	1,283	3,936	4,313	191	569	1,916	825	13,243

Pursuing big game is the most popular form of hunting in Colorado among both residents of the state and those traveling from other locations. Residents make up a majority of days spent hunting in the state at 69.8% (CPW, 2013a). The average non-resident big game hunter spends more money per day, and the economic output contributed by non-resident big game hunters makes up nearly 40 percent of the total (Table 6).

Table 6. Total Economic Contributions of Big Game Hunting in Colorado

	Output ($millions)	Labor Income ($millions)	GDP Contribution ($millions)	State/Local Taxes ($millions)	Federal Taxes ($millions)	Jobs
Resident	$374.3	$124.5	$197.4	$21.3	$29.1	2,999
Non-resident	$228.2	$95.1	$138.6	$13.0	$21.3	3,305
Total	$602.4	$219.6	$336.0	$34.4	$50.4	6,304

7. Hunting Economic Contributions by Destination County

Hunting is a popular form of outdoor recreation in Colorado, with participants that are typically active over many years. The type of hunting that Colorado residents and visitors engage in varies greatly by location. Through extensive surveys of hunters, CPW has been able to characterize hunting effort by destination county within the state over a range of species pursued (CPW, 2013). Using these survey results allowed us to estimate hunter effort by county of activity for three species groups; big game, small game, and waterfowl. Pursuing big game is the most popular hunting activity in Colorado, and the Northwest region includes the largest contribution of hunting effort by a fairly large margin (Table 7).

Table 7. Hunting Effort by Region in 2017[6]

	Northwest	North Central	Metro	Northeast	Southeast	South Central	Southwest	**State**
Hunter Days per Year								
Big Game	760,237	110,277	28,392	43,840	85,998	237,109	342,758	**1,608,611**
Small Game	113,185	69,838	4,500	123,235	39,273	47,007	40,378	**437,417**
Waterfowl	16,701	76,185	958	32,842	15,826	8,028	6,704	**157,244**

(CPW, 2012 Big Game, Small Game & Waterfowl Hunter Days by County, 2013)
(CPW, 2017 Big Game Hunter days by County, 2018)

[6] Note that small game and waterfowl days estimates were not available in 2017. We increased the 2012 days by 7.9% to produce a corresponding 2017 estimate. This percentage equals the observed change in Colorado big game hunter days over that time period.

The detailed hunting effort data also allowed economic contributions of hunting effort to be examined at the county level. The economic contributions of the top ten counties by total output from hunting are included in Table 8. Detailed contributions for all counties are displayed in Table 9.

Table 8. Top 10 Counties for Total Hunting Economic Contributions by Output

County	Output ($thousands)	Labor Income ($thousands)	GDP Contribution ($thousands)	State/Local Taxes ($thousands)	Federal Taxes ($thousands)	Jobs
El Paso	$61,819	$16,451	$28,871	$3,097	$3,774	577
Denver	$55,018	$18,123	$31,082	$2,430	$4,081	362
Jefferson	$50,820	$14,811	$24,828	$2,663	$3,604	467
Arapahoe	$50,793	$16,103	$28,776	$2,646	$3,945	398
Larimer	$46,843	$13,725	$23,341	$2,950	$3,314	549
Adams	$32,169	$9,368	$16,592	$1,886	$2,310	344
Weld	$30,724	$9,225	$14,734	$2,020	$2,185	402
Boulder	$29,753	$8,367	$14,579	$1,599	$1,890	262
Douglas	$29,437	$9,213	$16,291	$1,764	$2,330	316
Mesa	$26,868	$8,380	$13,483	$1,712	$2,035	392

Table 9. Total Hunting Economic Contributions by County

County	Output ($thousands)	Labor Income ($thousands)	GDP Contribution ($thousands)	State/Local Taxes ($thousands)	Federal Taxes ($thousands)	Jobs
Northwest Region						
Eagle	$14,109	$5,786	$8,917	$986	$1,334	144
Garfield	$15,249	$6,700	$8,961	$1,369	$1,457	217
Grand	$11,220	$4,120	$6,518	$1,174	$936	251
Jackson	$4,533	$1,416	$2,222	$607	$333	51
Mesa	$26,868	$8,380	$13,483	$1,712	$2,035	392
Moffat	$11,942	$4,271	$6,293	$807	$1,037	312
Pitkin	$3,839	$1,685	$2,536	$282	$333	40
Rio Blanco	$9,433	$4,741	$5,086	$1,229	$708	172
Routt	$13,264	$5,540	$8,222	$1,157	$1,306	219
Summit	$6,243	$2,143	$3,696	$505	$537	74
North Central Region						
Adams	$32,169	$9,368	$16,592	$1,886	$2,310	344
Arapahoe	$50,793	$16,103	$28,776	$2,646	$3,945	398
Boulder	$29,753	$8,367	$14,579	$1,599	$1,890	262
Clear Creek	$984	$443	$620	$96	$90	24
Gilpin	$462	$232	$311	$35	$51	14
Larimer	$46,843	$13,725	$23,341	$2,950	$3,314	549
Weld	$30,724	$9,225	$14,734	$2,020	$2,185	402
Metro Region						
Broomfield	$3,687	$1,203	$2,190	$233	$295	34
Denver	$55,018	$18,123	$31,082	$2,430	$4,081	362
Douglas	$29,437	$9,213	$16,291	$1,764	$2,330	316
Jefferson	$50,820	$14,811	$24,828	$2,663	$3,604	467
Northeast Region						
Cheyenne	$265	$72	$102	$48	$18	3
Elbert	$874	$348	$506	$95	$88	24
Kit Carson	$1,071	$413	$600	$103	$91	48
Lincoln	$1,117	$400	$619	$122	$83	25
Logan	$3,392	$1,518	$2,077	$292	$343	53
Morgan	$5,835	$1,948	$3,039	$608	$488	129
Phillips	$524	$257	$329	$44	$51	10
Sedgwick	$996	$236	$436	$132	$52	11
Washington	$800	$391	$434	$91	$81	28
Yuma	$2,272	$989	$1,284	$226	$214	41

(Continued) Total Hunting Economic Contributions by County

County	Output ($thousands)	Salaries & Wages ($thousands)	GDP Contribution ($thousands)	State/Local Taxes ($thousands)	Federal Taxes ($thousands)	Jobs
Southeast Region						
Baca	$570	$145	$271	$81	$33	7
Bent	$1,079	$382	$586	$130	$79	28
Crowley	$301	$103	$162	$39	$22	8
Huerfano	$2,100	$669	$1,054	$246	$180	48
Kiowa	$367	$89	$165	$56	$20	5
Las Animas	$3,395	$1,613	$1,922	$344	$342	85
Otero	$1,594	$495	$793	$173	$127	39
Prowers	$868	$294	$453	$93	$69	20
Pueblo	$10,846	$3,404	$5,802	$893	$827	165
South Central Region						
Alamosa	$1,480	$501	$801	$147	$117	35
Chaffee	$2,971	$1,074	$1,642	$279	$245	72
Conejos	$2,418	$915	$1,320	$269	$218	83
Costilla	$756	$285	$419	$87	$60	24
Custer	$1,558	$589	$841	$162	$154	51
El Paso	$61,819	$16,451	$28,871	$3,097	$3,774	577
Fremont	$2,593	$915	$1,412	$257	$206	81
Lake	$924	$343	$519	$106	$70	23
Mineral	$940	$355	$532	$104	$98	18
Park	$3,364	$1,138	$1,774	$403	$279	76
Rio Grande	$2,440	$839	$1,287	$257	$211	61
Saguache	$3,963	$1,548	$2,253	$432	$302	131
Teller	$1,566	$575	$876	$150	$142	32
Southwest Region						
Archuleta	$4,683	$1,723	$2,597	$471	$389	85
Delta	$6,225	$1,944	$3,085	$641	$455	129
Dolores	$2,328	$909	$1,306	$309	$150	71
Gunnison	$8,442	$3,096	$4,804	$825	$730	155
Hinsdale	$1,067	$221	$464	$161	$56	13
La Plata	$8,877	$3,332	$4,971	$627	$748	121
Montezuma	$2,855	$1,185	$1,600	$263	$253	70
Montrose	$8,299	$2,682	$4,288	$771	$646	175
Ouray	$1,686	$780	$979	$144	$151	27
San Juan	$713	$205	$341	$88	$50	8
San Miguel	$2,832	$1,170	$1,735	$273	$254	35

8. Comparison to Previous Studies

Previous studies have been undertaken to estimate the economic impacts of fishing, hunting, and wildlife watching in Colorado. CPW supported studies in 2004, 2008, and 2013 to estimate these economic contributions (CPW, 2004; CPW, 2008; CPW, 2013). Additionally, USFWS estimates expenditures for fishing, hunting, and wildlife watching by state every five years based on a National Survey (USFWS, 2011)[7]. The direct expenditure estimates of these studies are comparable in scope; retail trip and equipment expenditures made by fishing, hunting, and wildlife watchers in a given year. The spending estimates from each of these studies are summarized in Table 10 and compared to spending estimates utilized for this current study.

Table 10. Estimates of Annual Fishing, Hunting, and Wildlife Watching Expenditures from Comparable Data Sources

Data Source	Fishing and Hunting Expenditures	Wildlife Watching Expenditures
CPW (2004)	$845,300,000	$526,000,000
CPW (2008)	$1,017,800,000	$703,200,000
USFWS (2011)	$1,551,577,000	$1,432,579,000
CPW (2013)	$1,604,218,256	$1,322,968,136
Current Study	$1,875,008,881	$1,495,180,053

Different studies incorporate different data sources to characterize participation and spending habits of outdoor recreationists, the resulting expenditure estimates vary as a result. The current study relies largely on the USFWS National Survey to characterize average spending for fishers, hunters, and wildlife watchers. Because the participation numbers used in this study are similar to those estimated by USFWS, the overall statewide expenditures estimates are also similar.

[7] The most recent (2016) National Survey did not include estimates at the state level at the time of the writing of this report.

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Appendix A Definitions for Economic Contribution

Economic benefits can be estimated by two types of economic measures: economic contributions and economic values. An **economic contribution** addresses the business and financial activity resulting from the use of a resource. **Economic value**, on the other hand, is a non-business measure that estimates the value people receive from an activity after subtracting for their costs and expenditures. This concept is also known as consumer surplus.

There are three types of economic contribution: direct, indirect and induced. A **direct contribution** is defined as the economic contribution of the initial purchase made by the consumer (the original retail sale). **Indirect contributions** are the secondary effects generated from a direct contribution, such as the retailer buying additional inventory, and the wholesaler and manufacturers buying additional materials. Indirect contributions affect not only the industry being studied, but also the industries that supply the first industry. An **induced contribution** results from the salaries and wages paid by the directly and indirectly effected industries. The employees of these industries spend their income on various goods and services. These expenditures are induced contributions, which, in turn, create a continual cycle of indirect and induced effects.

The direct, indirect and induced contribution effects sum together to provide the overall economic contribution of the activity under study. As the original retail purchase (direct contribution) goes through round after round of indirect and induced effects, the economic contribution of the original purchase is multiplied, benefiting many industries and individuals. Likewise, the reverse is true. If a particular item or industry is removed from the economy, the economic loss is greater than the original lost retail sale. Once the original retail purchase is made, each successive round of spending is smaller than the previous round. When the economic benefits are no longer measurable, the economic examination ends.

This study presents several important measures:

Retail Sales – these include expenditures made by outdoor recreationists for equipment, travel expenses and services related to their outdoor activities over the course of the year. These combined initial retail sales represent the “direct output”.

Total Economic Effect – also known as “total output” or “total multiplier effect,” this measure reports the sum of the direct, indirect and induced contributions resulting from the original retail sale. This figure explains the total activity in the economy generated by a retail sale. Another way to look at this figure is, if the activity in question were to disappear and participants did not spend their money elsewhere, the economy would contract by this amount.

Salaries & Wages – this figure reports the total salaries and wages paid in all sectors of the economy as a result of the activity under study. These are not just the paychecks of those employees directly serving recreationists or manufacturing their goods, it also includes portions of the paychecks of, for example, the truck driver who delivers food to the restaurants serving

recreationists and the accountants who manage the books for companies down the supply chain, etc. This figure is based on the direct, indirect and induced effects, and is essentially a portion of the total economic effect figure reported in this study.

Jobs – much like Salaries and Wages, this figure reports the total jobs in all sectors of the economy as a result of the activity under study. These are not just the employees directly serving recreationists or manufacturing their goods, they also include, for example, the truck driver who delivers food to the restaurants serving recreationists and the accountants who manage the books for companies down the supply chain, etc. This figure is based on direct, indirect and induced effects.

GDP Contribution – this represents the total "value added" contribution of economic output made by the industries involved in the production of outdoor recreation goods and services. For a given industry, value added equals the difference between gross output (sales and other income) and intermediate inputs (goods and services imported or purchased from other industries). It represents the contribution to GDP in a given industry for production related to outdoor recreation.

Appendix B Methodology for Economic Contribution

The extent of the economic contributions associated with spending for outdoor recreation can be estimated in two ways:

- **Direct effects**: These include the jobs, income and tax revenues that are tied directly to the spending by outdoor recreationists without including multiplier effects.
- **Total effects**: These include the jobs, income and tax revenues that are tied directly to the spending by outdoor recreationists plus the jobs, income and tax revenues that result from the multiplier effects of outdoor recreation spending. The multiplier effect occurs when a direct purchase from a business leads to increased demand for goods and services from other businesses along their supply chain. Also included is economic activity associated with household spending of incomes earned in the affected businesses.

The economic contributions from outdoor recreation, both direct effects and total effects, were estimated with an IMPLAN input-output model for the state and regional economies of Colorado, and the county economies for hunting economic contributions. The IMPLAN model was developed by MIG, Inc. originally for use by the U.S. Forest Service. Inherent in each IMPLAN model is the relationship between the economic output of each industry (i.e. sales) and the jobs, income and taxes associated with a given level of output. Through those models, it is possible to determine the jobs, income and taxes supported directly by wildlife-based recreationists with and without the multiplier effects.

Input-output models describe how sales in one industry affect other industries. For example, once a consumer makes a purchase, the retailer buys more merchandise from wholesalers, who buy more from manufacturers, who, in turn, purchase new inputs and supplies. In addition, the salaries and wages paid by these businesses stimulate more benefits. Simply, the first purchase creates numerous rounds of purchasing. Input-output analysis tracks the flow of dollars from the consumer through all of the businesses that are affected, either directly or indirectly.

To apply the IMPLAN model, each specific expenditure for outdoor recreation activities was matched to the appropriate industry sector affected by the initial purchase. The spending was estimated with models of the Colorado economy, therefore all of the resulting contributions represent salaries and wages, total economic effects, jobs and tax revenues that occur within the state of Colorado. Likewise, models based on specific regions or counties represent the economic effects within the selected region or county. The results do not include any economic activity or indirect contributions that leak out of the state, region, or county of interest. As a result of this leakage, economic contributions at the state level are larger than the sum of corresponding regional or county contributions. This occurs because a portion spending in a particular region (or county) leaks to other regions (or counties) within the state, and this within-state leakage is captured in the Colorado model.

Estimating Tax Revenues

The IMPLAN model estimates detailed tax revenues at the state and local level and at the federal level. The summary estimates provided in this report represent the total taxes estimated by the IMPLAN model including all income, sales, property and other taxes and fees that accrue to the various local, state and federal taxing authorities.

Appendix C Spending Methodology

I. Overview

Spending in Colorado was estimated by applying spending profiles to participation numbers for 30 outdoor recreational activities (Table 11). The procedure involved first estimating participation and spending at the state level and then allocating spending to each region.

A. Estimating Participation

For most of these activities, a single data source was not sufficient to characterize both resident and non-resident participation in Colorado (Table 12). Procedures used to estimate final participation numbers varied between activities due to differences in the data available for each. The specific procedures used are detailed within sections II and III.

B. Estimating Spending at the State Level

Spending profiles for each activity group included a set of expenditures by item for a typical participant. Each spending profile included two components; equipment spending, and trip-related spending. Spending profiles were applied differently by activity due to differences in source data (Sections II and III).

C. Allocating Spending to each Region

Spending totals were allocated to regions differently for equipment and trip spending. We assumed that most consumers would not make many equipment purchases during a trip. Instead, they would likely purchase equipment prior to going on a trip. As a result many equipment purchases would be expected to occur in different regions than trip-related purchases. In order to more accurately reflect locations of equipment purchases, we used retail trade sales data by county (CDOR, 2012; Appendix H) to allocate these expenditures regionally. SCORP survey data was used to allocate trip-related expenditures. The percentages used to allocate regional expenditures are shown in Tables E2, F2, and G3.

Regional Allocation Calculations:

equipment spending in region j = (equipment spending) × (retail trade % in region j)
trip spending in region j = (trip spending) × (participation days % in region j)

II. Applying Profiles – General Approach

At the most basic level, spending was estimated using two data sources:

1. SCORP Survey: Used to estimate number of participants and days of participation
2. Secondary Source: Used to estimate spending per participant and/or per day

For each activity, spending in Colorado was estimated by multiplying the SCORP participation numbers by the relevant spending profile. Spending profiles are divided into two categories; trip spending (food, travel expenses, etc.) estimated on a per day basis, and equipment spending (apparel, gear, etc.) estimated on a per participant basis. Spending estimates are therefore based on two basic formulas:

*equipment spending = (count of participants) * (equip spending per participant)*
*trip spending = (days of activity) * (trip spending per day)*

Notes on Methodology Updates

It is important to note that the methodology used for this study was simplified from the previous (2014) report. The methodology in the previous report included a number of additional adjustments to avoid double-counting spending across activities. We were able to simplify our approach for the current study since these adjustments were already made in the secondary source estimates. So, for example, the OIA study was used to estimate hiking spending profiles. The adjusted trip profile is calculated by simply taking the total number of OIA hiking days divided by the total OIA hiking trip spending (which already includes adjustments to avoid double-counting).

Another change relates to the activity grouping used in the previous study. Because the most recent OIA study included larger sample sizes, we were able to incorporate spending profiles on a per-activity basis, so activity grouping was not necessary.

III. Applying Profiles – Selected Activities

Spending for several activities was estimated in a unique way due to the particular nature of the data that were used. Each of the following sub-sections includes the estimation details for the corresponding activity.

A. Fishing

In 2017 there were 776,472 anglers who purchases fishing licenses in Colorado (USFWS, Historical Fishing License Data, 2017). The per participant spending profile from the National Survey ($1,746.59 per person) was applied to estimate total fishing spending at the state level (USFWS, 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, 2016).

B. Hunting

Hunting spending profiles were also constructed using the USFWS 2016 National Survey. Hunter days by county (Table 17) were combined to estimate total hunter days in Colorado for residents and non-residents combined (CPW, 2018; CPW, 2013)[8]. For each hunting type[9] hunter day estimates were applied to the respective spending profiles to estimate total spending for hunting in Colorado. Trip spending by county was allocated using CPW participation estimates, and equipment spending by county was allocated using county trade sales data (CDOR, 2017; Appendix H).

C. Wildlife Watching

The 2018 SCORP survey was used to estimate total wildlife viewing days by Colorado residents. This was multiplied by the 2016 National Survey spending profile ($18.34 per day). For non-residents, the 2016 National Survey profile was multiplied by the most recent estimate of non-resident participation; the 2011 National Survey.

D. Golfing

The impact of golfing on the Colorado economy is based on national average spending by golf facilities for operations and capital investments, as well as estimated spending by golfers for equipment, apparel and media at on-course and off-course retail outlets (TEConomy Partners, LLC, 2018). Total spending in Colorado was estimated by multiplying the average per facility by 297 golf facilities in Colorado as reported by the National Golf Foundation and included in the TEConomy report. This estimate represents direct golf spending and does not include golf-related real estate, golf tourism or charitable events. Golf participation was not broken out as a separate activity in the SCORP survey. Therefore, the total golf spending was combined with other team or individual sports spending collected in the SCORP survey and distributed to regions based on total category regional participation.

E. Target Shooting

Data from a recent study of target shooting for the National Shooting Sports Foundation were used to estimate spending profiles for target shooters in Colorado (Southwick Associates, 2018). Detailed estimates of average spending per Colorado resident were used to construct the target shooter spending profile. This average spending profile was then applied to the regional SCORP survey participation numbers to estimate total spending per SCORP region.

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[8] Note that small game and waterfowl days estimates were not available in 2017. We increased the 2012 days by 7.9% to produce a corresponding 2017 estimate. This percentage equals the observed change in Colorado big game hunter days over that time period.

[9] Three hunting profiles were used: Big Game ($231.00 per day), Small Game ($142.99 per day), and Migratory Bird ($293.39 per day).

G. Running

The activity of running was defined differently for the OIA-based spending. In the OIA study, running participation was restricted to durations of 30 minutes or more, whereas the SCORP survey includes no such specification. As a result, the participants and days in the SCORP survey consists of a much broader range of activity than the corresponding OIA activity. For this reason, OIA estimates of total running spending were incorporated directly (i.e., not based on SCORP participation). This accounted for an estimated $1.6 billion in expenditures on running-specific equipment and trips.

Appendix D Activity-specific Data

Table 11. SCORP Outdoor Recreation Activities

SCORP Survey Activity	Activity for Economic Estimates
Trail	
Walking	Trail (apparel only)
Jogging/Running (outdoors)	Running
Hiking/Backpacking	Hiking
Horseback riding	Horseback Riding
Road biking	Road biking
Mountain biking	Mountain biking
Off-highway vehicle (OHV)	Off-road
Water-based	
Swimming (outdoors)	Trail (apparel only)
Power boating	Power Boating
Water/Jet skiing	Water Skiing
Sailing	Sailing
Canoeing/Kayaking	Canoeing/Kayaking
Whitewater rafting	Whitewater rafting
Stand up paddleboarding	Stand up paddleboarding
Winter	
Skiing (alpine/tele)/snowboarding	Skiing (alpine/tele)/snowboarding
Sledding/tubing	Sledding/tubing
Snowmobiling	Snowmobiling
Snowshoeing or cross country skiing	Snowshoeing or cross country skiing
Wildlife-based	
Hunting	Hunting
Fishing	Fishing
Bird Watching	Wildlife Watching
Wildlife Watching (excluding birding)	Wildlife Watching
Ice fishing	None (captured in fishing overall)
Other Outdoor	
RV camping/cabins	RV Camping
Tent camping	Tent Camping
Picnicking	Trail (apparel only)
Target or skeet shooting	Target Shooting
Rock climbing	Rock Climbing
Team or individual sports (outdoors)	Trail (apparel only)
Playground activities	Trail (apparel only)

Table 12. Data Sources Used to Estimate Participation and Spending Profiles[10]

Activity	Spending Profile Data Source	Resident Participation Data Source
Trail		
Walking	OIA (2017)	SCORP (2018)
Jogging/Running (outdoors)	OIA (2017)	OIA (2017)
Hiking/Backpacking	OIA (2017)	SCORP (2018)
Horseback riding	OIA (2017)	SCORP (2018)
Road biking	OIA (2017)	SCORP (2018)
Mountain biking	OIA (2017)	SCORP (2018)
Off-highway vehicle (OHV)	OIA (2017)	SCORP (2018)
Water-based		
Swimming (outdoors)	OIA (2017)	SCORP (2018)
Power boating	OIA (2017)	SCORP (2018)
Water/Jet skiing	OIA (2017)	SCORP (2018)
Sailing	OIA (2017)	SCORP (2018)
Canoeing/Kayaking	OIA (2017)	SCORP (2018)
Whitewater rafting	OIA (2017)	SCORP (2018)
Stand up paddleboarding	OIA (2017)	SCORP (2018)
Winter		
Skiing (alpine/tele)/snowboarding	OIA (2017)	SCORP (2018)
Sledding/tubing	OIA (2017)	SCORP (2018)
Snowmobiling	OIA (2017)	SCORP (2018)
Snowshoeing or cross country skiing	OIA (2017)	SCORP (2018)
Wildlife-based		
Hunting	USFWS (2016)	CPW (2018), CPW (2013)
Fishing	USFWS (2016)	USFWS (2018)
Bird Watching	USFWS (2016)	SCORP (2018)
Wildlife Watching (excluding birding)	USFWS (2016)	SCORP (2018)
Other Outdoor		
RV camping/cabins	OIA (2017)	SCORP (2018)
Tent camping	OIA (2017)	SCORP (2018)
Picnicking	OIA (2017)	SCORP (2018)
Target or skeet shooting	NSSF (2017)	SCORP (2018)
Rock climbing	OIA (2017)	SCORP (2018)
Team or individual sports (outdoors)	OIA (2017)	SCORP (2018)
Playground activities	OIA (2017)	SCORP (2018)
Golfing	N/A	TEConomy Partners, LLC. (2018)

[10] Since the SCORP survey did not include non-resident respondents, the spending profile data sources were also used for non-resident participation for all activities except hunting, fishing, and golfing.

Table 13. SCORP Survey Annual Participant estimates (thousands) incorporated in Equipment Spending Calculation

	Northwest	North Central	Metro	Northeast	Southeast	South Central	Southwest
Trail/Road Activities							
Walking	1,079.4	1,334.7	1,146.6	188.1	295.6	893.5	508.3
Hiking/Backpacking	929.4	900.2	774.8	58.2	118.7	718.9	331.4
Horseback riding	89.6	64.9	80.6	24.6	24.6	78.4	42.5
Road biking	201.5	421.0	297.8	53.7	44.8	118.7	47.0
Mountain biking	232.9	282.2	210.5	11.2	31.4	185.9	138.8
Off-highway vehicle (OHV) or 4-wheeling/motorcycling	398.6	232.9	76.1	31.4	67.2	248.6	237.4
Water-based Activities							
Swimming (outdoors)	210.5	385.2	219.5	38.1	89.6	174.7	129.9
Power boating	163.5	132.1	103.0	22.4	49.3	76.1	71.7
Water/Jet skiing	24.6	11.2	62.7	9.0	22.4	4.5	17.9
Sailing	49.3	9.0	67.2	2.2	2.2	4.5	4.5
Canoeing/Kayaking	134.4	241.9	132.1	2.2	29.1	78.4	58.2
Whitewater rafting	154.5	118.7	51.5	-	6.7	58.2	103.0
Stand up paddleboarding	159.0	150.0	112.0	-	15.7	17.9	82.9
Winter Activities							
Skiing (alpine/tele)/snowboarding	797.2	230.7	73.9	2.2	6.7	179.2	181.4
Sledding/tubing	315.8	244.1	147.8	11.2	22.4	138.8	67.2
Snowmobiling	132.1	60.5	42.5	-	9.0	26.9	38.1
Snowshoeing/cross country skiing	288.9	230.7	71.7	2.2	9.0	73.9	107.5
Other Outdoor Activities							
RV camping/cabins	459.1	230.7	179.2	56.0	132.1	445.6	302.3
Tent camping	555.4	369.5	223.9	51.5	105.3	369.5	284.4
Picnicking	421.0	512.8	423.3	38.1	85.1	253.1	125.4
Team or individual sports (outdoors) (e.g., basketball, golf, tennis, etc.)	109.7	488.2	459.1	22.4	56.0	123.2	56.0
Target or skeet shooting	127.6	197.1	85.1	58.2	76.1	112.0	85.1
Rock climbing	89.6	127.6	58.2	22.4	2.2	76.1	31.4
Playground activities	159.0	546.4	405.3	35.8	47.0	168.0	64.9

Note: Regional participation is based on destination (not residence). For example, an estimated 900 million Colorado adults hiked in the Northwest region in 2017.

Table 14. SCORP Annual Days per Participant estimates for Trip Spending Calculation

	Northwest	North Central	Metro	Northeast	Southeast	South Central	Southwest
Trail/Road Activities							
Hiking/Backpacking	10.3	16.3	16	**	22.7	13.4	16.5
Horseback riding	3.4	**	**	**	**	13	11.1
Road biking	15.1	39.3	23.4	**	24.5	11.8	15.3
Mountain biking	21.5	12.7	14.5	**	28.1*	15.1	15.7
Off-highway vehicle (OHV)	9	3.4	10.8*	13.9*	10.7	8.7	8.9
Water-based Activities							
Power boating	4.3	4.5*	2.4*	**	16.1	6.2*	6.8
Water/Jet skiing	**	**	**	**	6.6*	**	6.6*
Sailing	**	**	**	**	**	**	**
Canoeing/Kayaking	6	6.3	4.4*	**	10.3*	3*	8.9
Whitewater rafting	4.2	**	**	**	**	6.1*	5.3
Stand up paddleboarding	4.8	5*	2.6*	**	**	**	8.4
Winter Activities							
Skiing (alpine/tele)/ snowboarding	12.6	13.5	**	**	**	5.1	9.2
Sledding/tubing	6.5	6.8	4.6*	**	**	3	6.1
Snowmobiling	7.7	**	**	**	**	**	5.2*
Snowshoeing/cross country skiing	5.6	6.5	**	**	**	5.8	7.5
Wildlife-related Activities							
Bird Watching	14.1	20.6	25.2	25	54.7	18.6	29.3
Wildlife viewing (excluding bird watching)	15	15.2	19.6	14.4	40.2	9.6	31.5
Other Outdoor Activities							
RV camping/cabins	6.7	5.9	9.3	3.2	5.8	6.3	5.9
Tent camping	9.6	10	9.3*	**	7.4	11.9	6.4
Rock climbing	16.6*	**	**	**	**	16*	18.9*

** Sample size is under 30, interpret with caution*
*** Sample size is less than 10, not reported*
Note: Regional participation is based on destination (not residence).

Table 15. Colorado Resident Spending Profiles per Activity **(OIA, 2017)**

	Trip-related spending (per day)	Annual Equipment spending (per participant)
Other Outdoor		
Tent camping	$134	$265
Rock climbing	$150	$264
RV camping/cabins	$71	$846
Picnicking	$0	$33
Playground activities	$0	$33
Team or individual sports (outdoors) (e.g., basketball, golf, tennis, etc.)	$0	$33
Trail/Road		
Mountain biking	$46	$213
Road biking	$22	$196
Hiking/Backpacking	$47	$134
Horseback riding	$80	$343
Off-highway vehicle (OHV) or 4-wheeling/motorcycling	$45	$328
Jogging/Running (outdoors)	$16	$219
Walking	$0	$33
Water-based		
Canoeing/Kayaking	$71	$15
Stand up paddleboarding	$56	$155
Powerboating	$50	$351
Whitewater rafting	$118	$264
Sailing	$49	$448
Water/Jet skiing	$40	$89
Swimming (outdoor)	$0	$33
Winter		
Skiing (alpine/tele)/Snowboarding	$243	$603
Snowshoeing/Cross country skiing	$87	$178
Snowmobiling	$74	$323
Sledding/Tubing	$0	$46

Note: Spending details for activities that don't use OIA-based estimates are included in Appendix C Spending Methodology

Table 16. Colorado Estimated Total Spending per Activity

Outdoor Activities	Nonresidents[a]	Residents	Total
Fishing	N/A	N/A	**$1,384,660,430**
Shooting	$0	$490,053,759	**$490,053,759**
Wildlife viewing (excluding bird watching)	$481,513,459	$1,013,666,594	**$1,495,180,053**
Big game hunting	$163,035,349	$216,349,118	**$379,384,466**
Small game hunting[b]	N/A	N/A	**$63,861,420**
Waterfowl hunting[b]	N/A	N/A	**$47,102,565**
Golfing	N/A	N/A	**$817,168,577**
Skiing (alpine/tele)/Snowboarding	$4,392,006,177	$4,909,020,465	**$9,301,026,642**
Mountain biking	$105,480,964	$1,001,721,450	**$1,107,202,414**
Road biking	$342,059,305	$870,969,667	**$1,213,028,972**
Tent camping	$1,132,663,903	$2,141,717,404	**$3,274,381,307**
Canoeing/Kayaking	$432,342,149	$302,513,892	**$734,856,041**
Rock climbing	$361,858,405	$660,847,172	**$1,022,705,577**
Hiking/Backpacking	$2,151,434,334	$2,946,794,791	**$5,098,229,125**
Horseback riding	$383,109,812	$792,537,568	**$1,175,647,380**
Snowshoeing/Cross country skiing	$639,224,084	$542,601,911	**$1,181,825,994**
Off-highway vehicle (OHV) or 4-wheeling/motorcycling	$545,370,815	$786,302,666	**$1,331,673,481**
Stand up paddleboarding	$79,792,687	$219,337,851	**$299,130,538**
Picnicking	$0	$45,610,306	**$45,610,306**
Playground activities	$0	$40,997,191	**$40,997,191**
Power boating	$277,421,290	$368,183,723	**$645,605,012**
Whitewater rafting	$98,060,849	$365,210,964	**$463,271,813**
Jogging/Running (outdoors)	$808,814,397	$856,563,077	**$1,665,377,475**
RV camping/Cabins	$574,494,535	$1,896,612,753	**$2,471,107,288**
Sailing	$97,913,245	$88,173,000	**$186,086,245**
Sledding/Tubing	$0	$40,269,933	**$40,269,933**
Snowmobiling	$327,326,093	$251,154,680	**$578,480,773**
Swimming (outdoors)	$0	$34,003,115	**$34,003,115**
Team or individual sports (outdoors)	$0	$35,193,596	**$35,193,596**
Walking	$0	$104,836,738	**$104,836,738**
Water/Jet skiing	$26,425,219	$48,093,087	**$74,518,305**
All Activites			**$36,802,476,533**

[a]Nonresident includes trip spending only

[b]Separate spending estimates based on residency were not produced for fishing, golfing, small game hunting, and waterfowl hunting.

Appendix E CPW Hunter Days by County

Table 17. Hunting Participation by County in Hunter Days **(CPW, 2018; CPW, 2013)**

County	Big Game	Small Game	Waterfowl
Northwest Region			
Eagle	62,791	7,730	1,603
Garfield	100,116	10,605	2,134
Grand	108,189	4,796	2,106
Jackson	61,277	3,296	976
Mesa	78,227	43,788	6,540
Moffat	97,687	25,868	1,790
Pitkin	22,788	1,448	51
Rio Blanco	92,870	2,897	799
Routt	111,277	8,264	548
Summit	25,015	4,494	154
North Central Region			
Adams	4,481	3,561	7,089
Arapahoe	4,322	4,468	728
Boulder	10,473	9,399	5,878
Clear Creek	7,433	4,769	-
Gilpin	4,978	1,222	-
Larimer	66,552	14,183	14,983
Weld	12,038	32,236	47,506
Metro Region			
Broomfield	483	-	-
Denver	1,578	46	142
Douglas	7,850	1,284	694
Jefferson	18,481	3,170	121
Northeast Region			
Cheyenne	3,247	700	-
Elbert	8,768	2,310	136
Kit Carson	4,096	10,260	194
Lincoln	7,863	4,161	113
Logan	5,641	21,592	8,781
Morgan	3,960	18,715	18,630
Phillips	480	9,429	105
Sedgwick	1,907	16,079	3,039
Washington	2,936	11,059	375
Yuma	4,942	28,930	1,468

(Continued) Hunting Participation by County in Hunter Days (CPW, 2018; CPW, 2013)

County	Big Game	Small Game	Waterfowl
Southeast Region			
Baca	4,913	4,355	134
Bent	4,419	7,781	3,006
Crowley	2,231	697	766
Huerfano	21,803	619	162
Kiowa	4,010	1,115	602
Las Animas	28,726	2,178	1,845
Otero	4,352	6,980	2,985
Prowers	3,125	5,109	1,402
Pueblo	12,417	10,439	4,925
South Central Region			
Alamosa	7,766	3,115	1,534
Chaffee	20,758	4,891	960
Conejos	25,244	3,086	142
Costilla	8,012	70	256
Custer	14,975	1,965	187
El Paso	17,046	4,653	592
Fremont	20,450	3,624	286
Lake	5,846	6,434	15
Mineral	11,696	404	41
Park	30,929	6,094	1,211
Rio Grande	17,725	5,762	1,454
Saguache	45,481	4,007	1,049
Teller	11,182	2,903	301
Southwest Region			
Archuleta	35,675	7,407	67
Delta	41,387	5,734	2,708
Dolores	25,665	1,724	-
Gunnison	75,169	5,096	650
Hinsdale	16,776	132	-
La Plata	34,073	5,695	481
Montezuma	21,619	2,924	128
Montrose	44,671	8,078	2,602
Ouray	14,979	278	21
San Juan	9,068	999	-
San Miguel	23,675	2,311	46

Appendix F Retail Trade Sales by County

Table 18. Retail Trade Sales by County (CDOR, 2015[a])

County	Trade Sales	% of State Total
Northwest Region		
Eagle	$895,221	1.35%
Garfield	$1,011,264	1.52%
Grand	$160,955	0.24%
Jackson	$10,543	0.02%
Mesa	$2,183,408	3.29%
Moffat	$189,238	0.29%
Pitkin	$348,020	0.52%
Rio Blanco	$55,190	0.08%
Routt	$348,346	0.53%
Summit	$608,117	0.92%
North Central Region		
Adams	$5,697,508	8.59%
Arapahoe	$8,889,189	13.40%
Boulder	$3,855,848	5.81%
Clear Creek	$81,823	0.12%
Gilpin	$11,236	0.02%
Larimer	$4,038,476	6.09%
Weld	$3,106,335	4.68%
Metro Region		
Broomfield	$1,008,975	1.52%
Denver	$7,613,904	11.48%
Douglas	$3,982,905	6.00%
Jefferson	$7,069,549	10.66%
Northeast Region		
Cheyenne	$14,220	0.02%
Elbert	$146,396	0.22%
Kit Carson	$88,029	0.13%
Lincoln	$139,613	0.21%
Logan	$284,896	0.43%
Morgan	$306,094	0.46%
Phillips	$17,258	0.03%
Sedgwick	$24,757	0.04%
Washington	$13,663	0.02%
Yuma	$106,949	0.16%

(Continued). Retail Trade Sales by County (CDOR, 2015)

County	Trade Sales	% of State Total
Southeast Region		
Baca	$41,540	0.06%
Bent	$23,059	0.03%
Crowley	$16,568	0.02%
Huerfano	$65,846	0.10%
Kiowa	$11,709	0.02%
Las Animas	$170,706	0.26%
Otero	$191,333	0.29%
Prowers	$160,785	0.24%
Pueblo	$2,000,847	3.02%
South Central Region		
Alamosa	$342,012	0.52%
Chaffee	$263,645	0.40%
Conejos	$34,653	0.05%
Costilla	$12,090	0.02%
Custer	$23,201	0.03%
El Paso	$7,525,106	11.34%
Fremont	$340,110	0.51%
Lake	$47,375	0.07%
Mineral	$9,286	0.01%
Park	$65,577	0.10%
Rio Grande	$75,314	0.11%
Saguache	$25,219	0.04%
Teller	$211,815	0.32%
Southwest Region		
Archuleta	$115,808	0.17%
Delta	$290,862	0.44%
Dolores	$18,303	0.03%
Gunnison	$189,076	0.28%
Hinsdale	$8,848	0.01%
La Plata	$741,886	1.12%
Montezuma	$361,865	0.55%
Montrose	$527,781	0.80%
Ouray	$26,853	0.04%
San Juan	$5,950	0.01%
San Miguel	$90,829	0.14%

[a]The latest full year of data available from CDOR was 2015.

Appendix G SCORP Survey

A survey of Colorado resident participation was administered by Colorado Parks & Wildlife in collaboration with SSI in early 2018. The survey included 20 questions designed to characterize outdoor activity at the level of the 7 SCORP regions. Both email and mail-based surveys were employed.

Sample Design: by CPW, with collaboration from SSI

Target Population	Colorado residents aged 18 or older
Sampling Frame	Provided by SSI, from two data sources: 1. List of CO landline phone numbers (mailing addresses) 2. List of CO cellphone numbers (billing addresses)
Sampling Method	Stratification by 7 Colorado regions (random sampling within regions). For each region, 60% were drawn from the landline list & 40% from the cellphone list.
Survey Instrument	Questionnaire sent to selected addresses, including 2 survey response options: a. Online survey b. Paper mail-in

Data Collection: Response Statistics by Sampling Frame

	Listed Landline Address Sample	**Cellphone Billing Address Sample**	**Uncertain** (didn't report ID)	**Total**
# Surveys Sent	4200 (600 per region)	2800 (400 per region)	N/A	7000
# Survey Responses	976	810	125	1911
Response Rate	23% (+ 0 to 3.0%)	29% (+ 0 to 4.4%)	N/A	27.3%

Survey data were cleaned for consistency and accuracy. The per-questions specific details are included in the summary below.

Data Cleaning Summary

SCORP Question #	Question Summary	Outliers and Invalid values to set to Missing	Notes
Q3	Outdoor trips - % overnight	999	
Q5	# days by activity by region	Blank values were set to missing only if the respondent didn't fill in data for any of the activity-region options (i.e., they didn't answer the question). Otherwise blanks were set to zero	Online range responses were recoded to point values to match the point value coding of the mail survey: We use midpoints for all categories but the last (highest value) where we set to the lowest (e.g., recoding "51+" to 51)
Q6	# days by outdoor rec area		If days > 0 and activity = "No" (change "No" to "Yes" for activity)
Q9	minutes per week outdoors	> 1,000 minutes (16.6667 hours per week, 3.3333 hours each day/5 days – not uncommon for extremely active individuals)	If minutes > 0 and activity = "No" (change "No" to "Yes" for activity)
Q14	year of birth	remove cases < 18 years of age	
Q15	gender	"other", "prefer not to say"	
Q16	current zip code		Missing and out of state zip codes added from sampling frame when possible
Q17	how many years lived in CO	(years in CO) – (years lived) > 2	
Q18	race	those with no reasonable Census equivalent (e.g., rainbow, human, etc.)	Other (7) "White American" response was changed to White (1)
	Numeric variables		All numeric variables: If a numeric range was entered (instead of an exact number), it was replaced with the midpoint of the range. The same is true for items with ordinal numeric scales, but the lowest number was used to represent the highest range in the scale

Survey Weighting

Frequency weighting was applied to correct for differences in demographic distributions between the survey respondents and the target population. The target population consists of all Colorado residents aged 18 and over. The most recently available US Census data (2016 estimates) were utilized to estimate demographic distributions of the target population. Two data sources were used for this purpose:

Target Population Demographic	**Data Source Used**
Age, Sex, Race	SC-EST2016-ALLDATA6: Annual State Resident Population Estimates for 6 Race Groups (5 Race Alone Groups and Two or More Races) by Age, Sex, and Hispanic Origin: April 1, 2010 to July 1, 2016. *Accessed via direct download from the Census website in November 2017* https://www2.census.gov/programs-surveys/popest/technical-documentation/file-layouts/2010-2016/sc-est2016-alldata6.pdf
Region	American Community Survey (2016 estimates): • Dataset: ACS5 (ACS 5-Year Detailed Tables) • Table: B01001 (SEX BY AGE) broken out by county *Accessed using the US Census data API through the R package "acs" in May 2018* (Glenn, 2018)

Weighting Method

The R package "anesrake" was used to perform the rake weighting operation (Pasek, 2018). A weighting cap was set to 15 to minimize extreme weights.[11]

R Syntax: *Where "y" refers to the SCORP cleaned survey dataset (N=1910) and "census" refers to the population demographic distributions*

```
# calculate weights
z <- anesrake(census, y, caseid = y$SortID, force1 = TRUE, cap = 15, verbose = FALSE)
```

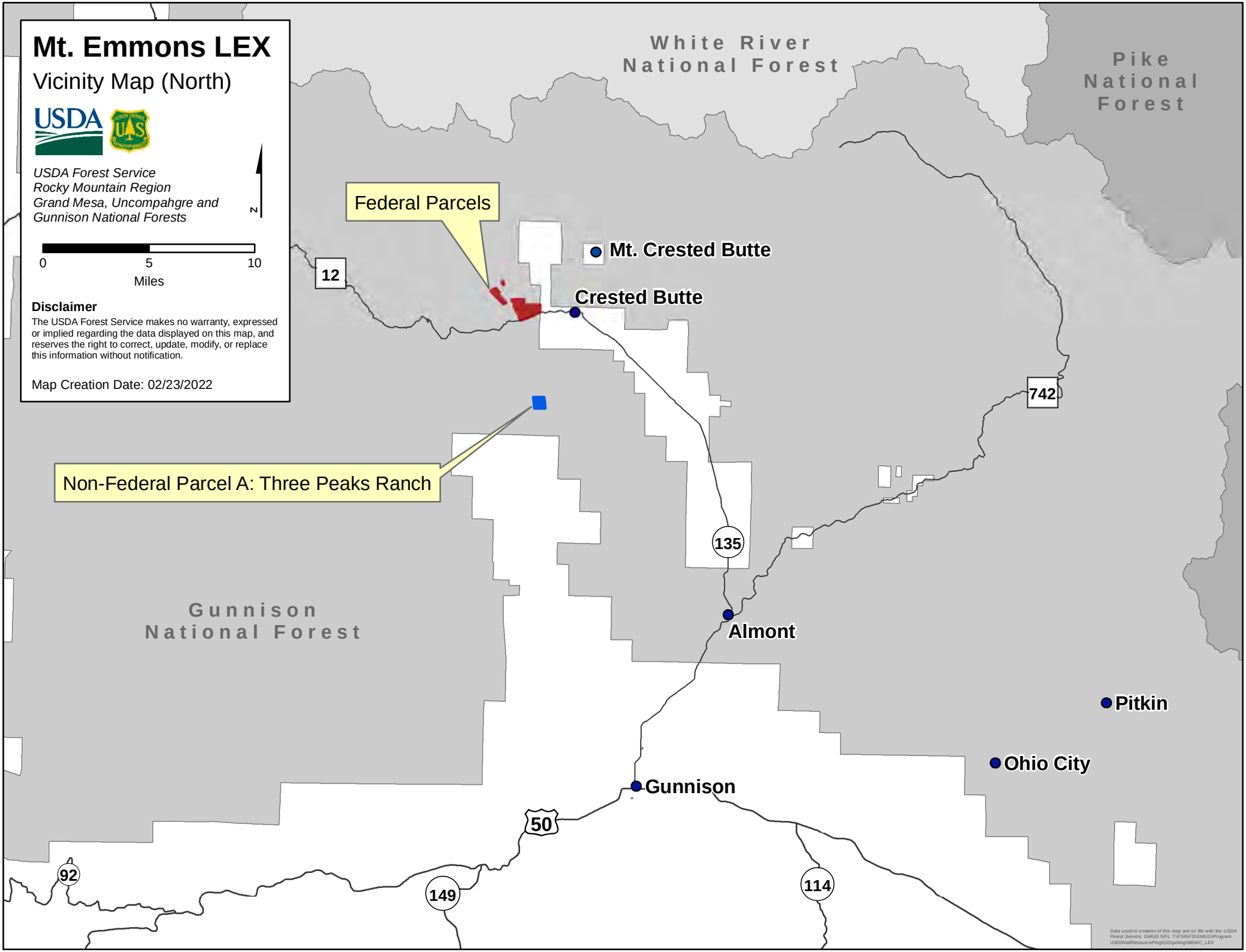
[11] The weighting cap results in N=10 survey respondents with a weight of 15. Without the cap, these would have received weighting values between 15 and 32 (the highest weight value for a run without any cap).

Survey & Population Distributions

		Survey Count	Survey Percent	Survey Weighted Percent	Census Percent
Region					
1	Northwest	268	14.1%	6.9%	6.9%
2	North Central	256	13.5%	37.4%	37.4%
3	Metro	338	17.8%	30.2%	30.2%
4	Northeast	173	9.1%	2.1%	2.1%
5	Southeast	272	14.3%	4.3%	4.3%
6	South Central	315	16.6%	15.4%	15.4%
7	Southwest	278	14.6%	3.8%	3.8%
		1900	100.0%	100.0%	100.0%
Age					
1	18 to 44	175	9.7%	49.5%	49.5%
2	45 to 64	796	43.9%	33.1%	33.1%
3	65 and over	841	46.4%	17.4%	17.4%
		1812	100.0%	100.0%	100.0%
Race					
1	Other	221	12.4%	27.8%	27.8%
2	White (Non-Hispanic)	1567	87.6%	72.2%	72.2%
		1788	100.0%	100.0%	100.0%
Sex					
1	Male	668	36.8%	50.0%	50.0%
2	Female	1147	63.2%	50.0%	50.0%
		1815	100.0%	100.0%	100.0%

R Summary Output

```
[1] "Raking converged in 25 iterations"
$`convergence`
[1] "Complete convergence was achieved after 25 iterations"

$base.weights
[1] "No Base Weights Were Used"

$raking.variables
[1] "age"    "sex"    "region" "race"

$weight.summary
    Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
 0.07315  0.15161  0.40895  1.00000  0.90959 15.00007

$selection.method
[1] "variable selection conducted using _pctlim_ - discrepancies selected using _total_."

$general.design.effect
[1] 4.871879

$age
      Target Unweighted N Unweighted %     Wtd N  Wtd % Change in %  Resid. Disc. Orig. Disc.
1     0.4951          175   0.09657837  890.4038 0.4951   0.3985216 -5.551115e-17   0.3985216
2     0.3311          796   0.43929360  595.4609 0.3311  -0.1081936  0.000000e+00  -0.1081936
3     0.1738          841   0.46412804  312.5675 0.1738  -0.2903280  0.000000e+00  -0.2903280
Total 1.0000         1812   1.00000000 1798.4323 1.0000   0.7970433  5.551115e-17   0.7970433

$sex
      Target Unweighted N Unweighted %     Wtd N  Wtd % Change in %  Resid. Disc. Orig. Disc.
1     0.5002          668    0.3680441  891.7531 0.5002   0.1321559 -1.110223e-16   0.1321559
2     0.4998         1147    0.6319559  891.0400 0.4998  -0.1321559  0.000000e+00  -0.1321559
Total 1.0000         1815    1.0000000 1782.7932 1.0000   0.2643118  1.110223e-16   0.2643118

$region
      Target Unweighted N Unweighted %      Wtd N  Wtd % Change in %  Resid. Disc. Orig. Disc.
1     0.0691          268   0.14105263  131.34743 0.0691 -0.07195263  1.387779e-17 -0.07195263
2     0.3739          256   0.13473684  710.72076 0.3739  0.23916316 -5.551115e-17  0.23916316
3     0.3016          338   0.17789474  573.29067 0.3016  0.12370526  0.000000e+00  0.12370526
4     0.0208          173   0.09105263   39.53729 0.0208 -0.07025263  0.000000e+00 -0.07025263
5     0.0433          272   0.14315789   82.30599 0.0433 -0.09985789  0.000000e+00 -0.09985789
6     0.1535          315   0.16578947  291.77758 0.1535 -0.01228947 -2.775558e-17 -0.01228947
7     0.0378          278   0.14631579   71.85142 0.0378 -0.10851579  0.000000e+00 -0.10851579
Total 1.0000         1900   1.00000000 1900.83114 1.0000  0.72573684  9.714451e-17  0.72573684

$race
      Target Unweighted N Unweighted %     Wtd N  Wtd % Change in % Resid. Disc. Orig. Disc.
1     0.2783          221    0.1236018  493.5878 0.2783   0.1546982            0   0.1546982
2     0.7217         1567    0.8763982 1279.9938 0.7217  -0.1546982            0  -0.1546982
Total 1.0000         1788    1.0000000 1773.5816 1.0000   0.3093964            0   0.3093964
```


Mt. Emmons LEX
Vicinity Map (North)
USDA Forest Service
Rocky Mountain Region
Grand Mesa, Uncompahgre and
Gunnison National Forests
N
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Miles
Disclaimer
The USDA Forest Service makes no warranty, expressed or implied regarding the data displayed on this map, and reserves the right to correct, update, modify, or replace this information without notification.
Map Creation Date: 02/23/2022
White River National Forest
Pike National Forest
Federal Parcels
Mt. Crested Butte
Crested Butte
12
742
Non-Federal Parcel A: Three Peaks Ranch
135
Gunnison National Forest
Almont
Pitkin
Ohio City
Gunnison
50
92
149
114
Data used in creation of this map are on file with the USDA Forest Service, GMUG NFs, T:\FS\NFS\GMUG\Program \1900\NatResourcePlng\GIS\prkng\MEMC_LEX

Environmental Assessment
Mt. Emmons Iron Bog Proposed Mineral Withdrawal (Colorado 61627)

USDA Forest Service
Grand Mesa, Uncompahgre, and Gunnison National Forests
Gunnison Ranger District
Gunnison, Colorado

Environmental Assessment
Mt.Emmons Iron Bog Proposed Mineral Withdrawal

USDA Forest Service
Grand Mesa, Uncompahgre, and Gunnison National Forests
Gunnison Ranger District
Gunnison, Colorado

I. Introduction:

This Environmental Assessment (EA) was prepared in response to the Grand Mesa, Uncompahgre, and Gunnison National Forests' (GMUG) Forest Land and Resource Management Plan (FLRMP) direction towards mineral withdrawal for the Mt.Emmons Iron Bog Special Interest Area.

This EA presents the environmental consequences of implementing the proposed action or alternatives to this action associated with withdrawal from mineral entry, National Forest lands within the boundaries of the Mt. Emmons Iron Bog Special Interest Area, and is not a decision document. It includes information about the affected environment and any concerns or issues that were presented.

For purposes of this EA, the Mt.Emmons Iron Bog Special Interest Area will be referred to as the "Iron Bog", based on past local use of the name, even though it is actually a fen (see *Affected Environment*).

For a period of two years from the date of original publication in the *Federal Register*, the Iron Bog is being segregated from the mining laws, but remains open to all other authorized uses unless the application is denied or cancelled or the withdrawal is approved prior to that date. The requested withdrawal is for a period of fifty years. The area segregated is shown on the map in Appendix C. The area to be segregated was determined by the Gunnison Ranger District in consultation with the Regional Office of the Forest Service and the BLM.

A. Purpose and Need of the Proposal:

The Iron Bog contains 75.6 acres administered by the Forest Service in T.14S., R.86W., 6th P.M., Section 6, Gunnison County, approximately 3.5 miles west of Crested Butte, Colorado. In 1991 the Iron Bog was given Special Interest Area designation, as part of the Amended FLRMP. To follow FLRMP direction and to protect this unique wetland from the effects of future (not from claims that are already present in the Iron Bog) mine claim location, mining, mineral development, and mine claim speculation, a withdrawal of these National Forest System lands from future mineral entry has been proposed.

The Forest Service seeks a withdrawal for the Iron Bog to follow the United States Department of the Interior, Fish and Wildlife Service (FWS) fen regulation. In June of 1998, the FWS designated the Iron Bog as a functioning fen (see *Affected Environment*)

under "Resource Category 1" of the Service's "Mitigation Policy" (*Federal Register*, Vol. 46, No. 15, February 4, 1981) because of the "irreplaceability" of this type of wetland habitat (see Appendix B, Cooper).

In addition to the above, a withdrawal for the Iron Bog would fall within the agreement reached between the Forest Service and Colorado Natural Areas Program in designation of the Iron Bog as a "Colorado Natural Area" (see *Affected Environment*).

The Iron Bog also needs protection as a research site. Local and regional researchers have been conducting biological, hydrological, and paleoecological research in the Iron Bog since 1981 (see *Justification*, Appendix A). It is a probable paleoecological site, being an 8,000 year old wetland (P.Fall, 1997), in addition to being the location for one Forest Service Sensitive plant population, three unusual insect populations, and one uncommon fungus population.

B. Public Notification:

Withdrawals of public lands are governed by Section 204 of the Federal Land Policy and Management Act of 1976 (FLPMA), regulations set forth in 43 CFR Part 2300, and the Bureau of Land Management (BLM). Pursuant to these regulations, on November 16, 1998, the notice of the proposed withdrawal for the Iron Bog was published in the *Federal Register* (Colorado 61627) to request public comment on the proposed action. The public notice started a 90-day comment period on the withdrawal application and the opportunity for a public meeting to be held. No objections were raised during this initial comment period. On September 15, 1999, the BLM conducted a meeting at the Gunnison County Courthouse in order to receive any additional comments from the public on the withdrawal. No objections were raised during this meeting. The public comment period for the EA started November 13, 1999 and lasted until April 3, 2000.

Based on the lack of negative issues identified during scoping for the EA and the lack of negative comments on the segregation, there appears to be little or no public opposition to the withdrawal.

II. Affected Environment:

The Iron Bog is actually a fen, according to Dr. David Cooper (Cooper, 1999) and the USDI Fish and Wildlife Service (McKee, 1999). A fen is a wetland maintained by ground water through active springs, which in this case, feed the fen with water at pH 2.6 to 4.4. The Iron Bog is a 2-3 acre acidic "iron fen" (Cooper, 1999) on the south side of Mt. Emmons. Two of the springs feeding the Iron Bog are warm springs and are open most of the winter. The fen is one of only a few rich fens (rich in mineral ions) with such low pH in all of Colorado. The water is rich in iron from its passage through layers of pyrite; when it reaches the surface of the fen, it oxidizes to sulfuric acid and deposits limonite that lines the bottom of the fen and also forms terraces. The spring water entering the fen is significantly higher in cadmium and zinc than at the outlet ($P<0.001$).

Thus, the fen acts to reduce these heavy metal ions from the fen waters before they drain into Coal Creek just above the intake of the Crested Butte Water Purification Plant.

According to N. Lamm (1998), the hydrology of the fen is complex. It lies below an unnamed fault on the south side of Mt. Emmons just west of the Keystone and Union faults where the Keystone adit is located. There are extensive dry iron deposits east of the pond and wetlands, suggesting that the wet portions of the fen were once larger than they are today. The water supply to the fen had already been diminished by 33% before 1980 by past mining development, and Lamm suggests that historic mining may have drained parts of the fen. According to Woodward-Clyde (Lamm, 1998), the tunnels of the old Keystone workings did drain some aquifers in the bedrock. The very existence of this unique fen is dependent on undisturbed groundwater movement, and any activities nearby – whether mining, recreational, or development – any activity must be carefully considered.

The biota of the acid fen is unique. The communities are dominated by the cottonsedge, Eriophorum angustifolium, various sedges of the genus Carex, rushes of Juncus species, and four or more species of Sphagnum moss. The fen is one of only 2 sites where the sundew, Drosera rotundifolia, is found in Colorado. As a result of its unique distribution, the Colorado Natural Heritage Program has listed the sundew as G5S2 (Globally: demonstrably secure; State: imperiled within state, vulnerable to extinction). An aquatic insect called a midge, Paroclus, was previously found only in South America, and the species is unknown (S. Dodson, U. Wisconsin). Another midge found in the fen, Boreochlus species, harbors a trichomycete fungus (uncertain species) in its gut and this symbiosis is found nowhere else in the world (M. White, U. Kansas). Zygogonium is a purple, filamentous alga, which is restricted to acidic, aquatic habitats and is of unknown species. The dragonflies, Somatochlora semicircularis and Leucorrhinia hudsonica, are also uncommon and found only in higher altitudes of Colorado and Canada, and yet they breed in the fen. There are no fish or salamanders in the waters of the fen that may explain the ability of some of the rare insect fauna to survive there. The diversity of the fen habitat combined with the surrounding forest and subalpine meadows supports at least five species of small mammals.

The Iron Bog (fen) has been a source of research interest to many scientists – particularly those at the Rocky Mountain Biological Laboratory at Gothic, Colorado (see Appendix B). At present there are 16 researchers, plus various accompanying graduate and undergraduate students, conducting research in the fen.

As a rare source of history on vegetation, the Iron Bog is a probable paleoecological site. A researcher has used pollen and plant macrofossils from the Iron Bog to document changes in dynamics and plant species composition of a subalpine forest in western Colorado over the past 8,000 years.

The USDI Fish and Wildlife Service consider the Iron Bog a Resource Category 1 functioning fen. It was designated a Special Interest Area by the USDA Forest Service in

1980. It was registered as a Colorado State Natural Area in 1980 and the formal Articles of Designation as a state Natural Area were signed in 1999.

The management area prescription from the FLRMP is:

10C – Special Interest Areas

The current 10C management direction is to protect these areas with unusual botanical, historical, scenic, geological, zoological, or paleontological characteristics and to "withdraw from mineral entry in conformance with Section 204 of the Federal Land Policy and Management Act of 1976 (90 Stat. 2743:43 U.S.C.1701, et seq.)." The proposed withdrawal will not affect the known cultural resource sites in the area (see Appendix D).

There are 11 existing mining claims overlying the Iron Bog. The proposed withdrawal will not affect the legality of these claims.

III. Proposed Action:

Following the USDI Fish and Wildlife Service's new fen regulation (see Attachment B), the Forest Service proposes to further protect the Iron Bog with the implementation of a mineral withdrawal request with the Department of the Interior. Under this alternative (Alternative 2), existing claims will continue but future claims will not be allowed. This will not change the on-the-ground management for the Iron Bog. The proposed action is consistent with the overall management direction provided within the Forest Plan. The Forest Plan is being implemented as required by the Forest and Rangeland Renewable Resources Planning Act of 1974, and the National Forest Management Act of 1976. The proposed action is not connected to or dependent upon any other action in this same area. This plan does not establish a precedent for other actions that result in significant environmental effects.

IV. Environmental Issues:

Under the National Environmental Policy Act, the USDA Forest Service is required to scope the public, affected individuals and/or groups, and other agencies to help identify significant issues related to the decision to be made. Internal scooping for the EA was completed at the Forest Service District and Supervisor's offices. The BLM and the Colorado Natural Areas Program are co-operating agencies in the preparation of this Environmental Assessment, per 43 CFR 2310.3. Sections 204 of FLPMA and 43 CFR Part 2310.3 require the preparation of certain materials for incorporation into a case file for submission to the Secretary of the Interior. This EA is one of those required documents. The issues noted below are in direct response to the requirements of 43 CFR Part 2310.

Biological Environment:

1. Impacts to any Threatened, Endangered, Sensitive (TES) species or other species of concern.

Economic Environment:

1. Impact of the proposed changes in use associated with the proposed action on individuals, local communities, state, and local interests (educational research values), and the regional economy.

Physical Environment:

1. Impacts on mining claims, mineral leases, known mineral deposits, past and present mineral production, future mineral potential, and present and potential mineral demand.

2. Impacts on the hydrology, water chemistry, and terrace structure of the Iron Bog.

3. Impacts to wetlands.

4. Impacts to heritage resources.

V. Alternatives:

Mitigation common to all alternatives:

All management treatments for these alternatives would be mitigated by following management requirements specified in the FLRMP, which contains standards and guidelines for quantifying the acceptable limits within which management practices must fall, and direction provided, by FSM 2372. For both alternatives below, there will be no changes in management and no on-the-ground disturbance. Surface management alternatives will not be considered here, as this EA only considers the effects of the mineral withdrawal.

Two management alternatives are considered for the Mt. Emmons Iron Bog mineral withdrawal area:

Alternative 1 (No Action, No Mineral Withdrawal)

Under this alternative, the Forest Service would withdraw their application for the Mineral Withdrawal of the 76 acres of the Iron Bog. National Forest system lands would remain subject to location, entry, development, and patenting under the General Mining Law of 1872. The Iron Bog (fen) would not be protected from future mineral claims. An operating plan, careful assessment for TES plants and

wildlife and paleoecological site status, possible 404 permit (U.S. Army Corps of Engineers) and Environmental Assessment (EA) or Impact Statement (EIS) would need to be completed with the Forest Service prior to project approval.

Alternative 2 (Withdrawal of the 76 acres of the Iron Bog as published in *Federal Register*)

Under this alternative, the Forest Service would continue with its application for withdrawal. If approved the subject 76 acres are removed from any future mineral location and entry under the general mining laws for a period of fifty years. The Forest Service would be able to protect the Iron Bog from future claims for the FWS's fen regulation. The withdrawal would be implemented by the BLM. Mining of the existing claims could still take place under the 1872 Mining Laws. For these claims only, an operating plan, validity report, paleoecological assessment, and Environmental Assessment (EA) or Impact Statement (EIS) would need to be completed with the Forest Service prior to project ground disturbance. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

VI. Environmental Effects:

This section discusses the effects in order of Environmental Issues. The specific effects of mining on the Iron Bog cannot be analyzed in this EA because there is no current mining plan submitted to the Forest Service. Without a conceptual mining plan there is not way to determine any effects from mining to the Iron Bog. When an operating plan is filed, there will be an Environmental studies conducted to determine those project specific effects. Because mining may take place on the existing claims with either alternative, we will only analyze the effects of the alternatives in regards to the mineral withdrawal.

A. Biological Environment:

1. Threatened, Endangered, and Sensitive (TES) Species and Species of Concern – Plants and Wildlife

Since there will be no change in management nor ground disturbance with the withdrawal, neither of the alternatives will have any measurable effects on Threatened, Endangered, or Sensitive (TES) plants, plants of concern, nor TES wildlife in the Iron Bog (USDA Forest Service, *Plant Biological Evaluation and Assessment*, 2000). Mining in general may have effects on the hydrologic processes of the fen and could potentially drain the fen. The vibration and shock waves associated with blasting, use of heavy equipment, and road construction could also drain the fen and destroy the Sensitive plant populations. Alteration of ground water flows by mining operations may affect the Mt. Emmons Iron Bog. The survival of the sundew plant or other bog [fen] organisms could depend on narrow ranges of water temperature, or trace mineral conditions that could be difficult to determine and duplicate" (Allison, 1999). Although mining is allowed under

both alternatives in existing claims, Alternative 2 (withdrawal) would provide better protection: No future claims could be located and if the existing claims were determined to be invalid, or released, potential mining would be eliminated from the Iron Bog.

Alternative 1 (no withdrawal): Under this alternative, the

Forest Service would remove their application for the withdrawal and the 76 acres of the Iron Bog on National Forest lands would remain open to location, entry, development, and patenting under the General Mining Law of 1872. No protection of the Iron Bog would be provided for the USDI Fish and Wildlife Service's "Resource Category 1" fen designation. This also goes against Forest Service regulation of providing protection in Special Interest Areas for the unusual historical, botanical, zoological, educational, hydrological, ecological, and biological resource values (FSM 2372.02).

Alternative 2 (withdrawal): Under this alternative, there will be no impact on the sundew and, more likely, there will be positive implications (USDA Forest Service, *Plant Biological Evaluation and Assessment*, 2000). Sundew species viability would be protected from mining under any new claims. Fen habitat for the sundew (*Drosera rotundifolia*), a Sensitive plant, found in the Iron Bog would be protected from degradation by mining operations on new claims or claims determined by a mineral examination to be invalid. All measures to protect the sundew would be investigated before approval of any mining operation plan. Wildlife habitat would also be protected from mining under any new claims (USDA Forest Service, Wildlife Biological Evaluation, 2000).

2. Irreplaceability of fen habitat

According to the FWS, fens cannot be considered a renewable resource because of their extremely slow rate of formation. Many of the fens in Colorado are over 10,000 years old because they only accumulate organic material in the form of peat at the rate of 4.3 to 16.2 inches per thousand years. At present in Colorado, no reliable methods have been found to be able to recreate a new fen or to restore a badly damaged one. Because of this irreplaceability of fen, the FWS recommends *every reasonable effort should be made to avoid impacting that habitat type* with a mitigation goal of *no loss of existing habitat value.*

Alternative 1 (no withdrawal): If the withdrawal were not completed for the Iron Bog, the Forest Service would be limited in its protection of the fen from mineral entry.

Alternative 2 (withdrawal): With this Alternative, the Forest Service could provide future protection for the Iron Bog fen habitat: no future claims beyond the existing claims could be located or developed. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

B. Economic Environment:

1. Impacts of the proposed changes in use associated with the proposed action on individuals, groups, and the regional economy.

Withdrawing this area from mineral entry would have little regional economic impact, as the economic molybdenum deposits in the area are located outside the withdrawal area.. Forest Service mineral specialists have determined that the mineral potential is low in the 76 acres of the Iron Bog. Ongoing research will not be affected by the withdrawal because there will not be any ground disturbance nor change in management.

Alternative 1 (no withdrawal): Removal of the application for withdrawal would leave the area open to the public for additional mineral exploration and possible development activities. In the event that prospecting or mineral development did take place, there could be significant disruption or halting of research activities associated with the Iron Bog. Alternative 1 is considered to have a higher risk than Alternative 2 (withdrawal) to cause loss of all or part of the Iron Bog fen habitat. Even partial loss of the fen habitat would result in the loss of the opportunity for research, and effect the opportunity to educate students and the general public on wetlands and a unique ecosystem.

Alternative 2 (withdrawal): This Alternative eliminates the risk of future mining claim activity. Helping ensure protection of the educational research values of the Iron Bog. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

C. Physical Environment:

1. Geology and minerals

Alternative 1 (no withdrawal): There would be no change to existing mining claims in the Iron Bog, mineral leases, known mineral deposits, past and present mineral production, future mineral potential, and present and potential mineral demand.

Alternative 2 (Withdrawal): Forest Service Policy requires that any existing claims within a mineral withdrawal must have a validity exam before any mining activity can be approved. If the claims were found to be invalid no mining activity could be permitted. If the claims were found to be valid there would be no additional impact on existing mining claims in the Iron Bog, mineral leases, known mineral deposits, past mineral production, and present mineral demand than Alternative 1. Alternative 2, which if approved by the BLM will prohibit future location or entry of claims to take place within the Iron Bog, will have little to no impact on future mineral potential within the Iron Bog. A mineral report prepared for the BLM by a Forest Service Hydro-geologist found that the locatable mineral potential is rated low for precious and base metals and for all other minerals. The withdrawal would have little to no effect on the amount of locatable minerals within the Gunnison National Forest. (USDA Forest Service Mineral Potential Report, 2000).

2. Water Resources

Since there will be no ground disturbance nor change in management with either of the Alternatives, neither Alternative 1 (no withdrawal) nor Alternative 2 (withdrawal) will have any effect on water resources within the Iron Bog. Alternative 2 will provide more protection for the water resources of the Iron Bog than Alternative 1: if the withdrawal takes place, no future claims may be located within the Iron Bog. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

3. Wetlands

The Iron Bog is a wetland but neither Alternative will have an effect on it because there will not be any ground disturbance nor change in management with implementation of either Alternative. Prior to any development of mining claims in wetlands within the Iron Bog, a 404 permit will need to be filed with the U.S. Army Corps of Engineers.

4. Heritage Resources

Even though the Iron Bog has been identified as a probable paleoecological site, neither Alternative will have an effect on this resource because there will not be any ground disturbance nor change in management. Alternative 2 will provide more protection for the probable paleoecological site than Alternative 1: no future claims may be located within the Iron Bog. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

D. Cumulative Effects:

The proposed action to withdraw the 76 acres of the Iron Bog is not connected to any other action. There are no identifiable cumulative effects associated with the proposed withdrawal. The Forest Service has taken action to clearly identify and protect the area for botanical resources, including adoption of designation 10C (Special Interest Area) in the Grand Mesa, Uncompahgre, and Gunnison National Forests Land and Resource management Plan (FLRMP), and cooperation with the Colorado Natural Areas Program for designation of the Iron Bog as a state Natural Area.

VII. Consultation with Others:

The following individuals from Federal, state, and local agencies were consulted during the preparation of this Environmental Assessment:

U.S. Forest Service:

John Almy, Forest Hydrologist, USDA Forest Service, Forest Supervisor's Office, Delta, CO.
Peter Ambrose, Forest Archeologist, USDA Forest Service, Forest Supervisor's Office, Delta, CO.
Evan DeBloois, Washington Office Archeologist, USDA Forest Service, Washington, DC.
Rusty Dersch, Regional Geologist, USDA Forest Service, Regional Office, Lakewood, CO.
Mark Hatcher, Natural Resource Manager, USDA Forest Service, Gunnison Ranger District, Gunnison, CO.
Carol Howe, Forest NEPA Coordinator, USDA Forest Service, Forest Supervisor's Office, Delta, CO.
Barry Johnston, Forest Ecologist, USDA Forest Service, Forest Supervisor's Office, Gunnison, CO.
Andy Kratz, Botanist, USDA Forest Service, Regional Office, Lakewood, CO.
Terry Liestman, Regional Archeologist, USDA Forest Service, Regional Office, Lakewood, CO.
Liane Mattson, District Geologist, USDA Forest Service, Paonia Ranger District, Paonia, CO.
Wendy Reinmuth, Wildlife Biologist, USDA Forest Service, Gunnison Ranger District, Gunnison, CO.
Ray Rossman, Archeologist, USDA Forest Service, Gunnison Ranger District, Gunnison, CO.
Steve Shelly, Botanist, USDA Forest Service, Regional Office, Missoula, MT.

U.S. Bureau of Land Management:

Doris Chelius, State BLM Mineral Withdrawal Coordinator, U.S. Department of the Interior, BLM, Colorado State Office, Denver

U.S. Department of the Interior, Fish and Wildlife Service, Denver, CO.,:

Jan McKee, Botanist

Colorado State University, Ft. Collins, CO:

Dr. David Cooper, Botanist and Wetland Research Scientist

Rocky Mountain Biological Laboratory, Gothic, CO.:

Dr. Ruth Willey, Senior Investigator

Colorado Natural Areas Program, Denver, CO.:

Janet Coles, Botanist

VIII. List of References:

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Weber, William A. and Wittmann, Ronald C., 1996, *Colorado Flora: Western Slope*, University Press of Colorado, Niwot, CO.

Attachment A

1. Dr. Taber Allison, Director of Rocky Mountain Biological Laboratory (RMBL), Crested Butte, CO.

"We feel this wetland [Mt. Emmons Iron Bog] has high scientific value and as such is an important resource for the Lab [Rocky Mountain Biological Laboratory], Gunnison County, and the nation. ...this Special Interest Area [Mt. Emmons Iron Bog] is a valuable and unique fen wetland" (see Attachment B).

2. Dr. Bobbi Peckarsky, RMBL Researcher, Cornell University:

"The acid fen on Mt. Emmons is an incredibly unique habitat for western Colorado, as well as other regions of the world. It has a natural input of iron, which creates a naturally acidic environment to which inhabitants have had sufficient evolutionary time to adapt. The flora and fauna that inhabit the fen are interesting , in that they have evolved mechanisms for living in a high acid environment. I was particularly struck with the aquatic insect fauna consisting mostly of beetles (Coleaptera) and true bugs (Hemiptera), which are often more tolerant to extreme conditions than other aquatic insects. These insects rely on atmospheric oxygen, which ties them to the surface of the water, but also enables them to be more independent of the conditions under water. The plant life at the fen is also extremely unique, especially the sundews, which live only in restricted environments. This habitat provides valuable opportunities for research and education due to it's uniqueness and accessibility. Thus, its preservation is essential" (see Attachment B).

3. Dr. Stanley Dodson, Professor of Zoology, University of Wisconsin:

"I am an aquatic ecologist who has done research in the RMBL region, including the Mt. Emmons acid bog. I collected midge larvae in the acid bog, and the stream leaving it. Some of the midges (including a species of Boreochlus), were found nowhere else in the region. These chironomids were included in the publication:
"A key to the aquatic insects of streams in the vicinity of the RMBL, including chironomid larvae from streams and ponds" by B.L. Peckarsky, S.I. Dodson, and D.J. Conklin, Jr., 1985, Colorado Division of Wildlife Publication, Denver, Colorado.
"The Mt. Emmons acid bog is a rare, irreplaceable type of aquatic habitat, serving as home for several rare and unusual organisms. I strongly recommend that it be given all the environmental protection possible" (see Attachment B).

4. Dr. Merlin White, Research Scientist, University of Kansas:

Dr. White is currently conducting research in the Iron Bog on the interactions of the Australian fungus, Smittium delicatum(?) in the gut of the midge, Boreochlus species, for his Ph.D. dissertation. He feels that the Iron Bog is a unique aquatic habitat that is invaluable for research (see Attachment B).

5. Dr. Robin Bingham, Botanist, Western State College:

Dr. Bingham and her students are currently monitoring the insectivorous sundew (Drosera rotundifolia) population found in the Iron Bog (fen) through documentation of

pollination, phenology, and reproduction. She is also conducting preliminary research on the genetic variability of the sundew in comparison with the other known population in Colorado and sundews from the eastern United States. She feels that this acid fen "represents unique and exceptional opportunities for biological research" with the sundew, hydrology, unusual species of dragonflies, and water chemistry in the area (see Attachment B).

6. Dr. Ruth L. Willey, Senior Investigator, RMBL:

Dr. Willey helped create the Colorado Natural Area designation for the fen. She also has been surveying for unusual midges and dragonflies in the fen. She feels that the fen is a "valuable and unique fen wetland" that is irreplaceable as a resource and as a research area.

7. Trista L. Hoffman, Graduate Student, University of Wisconsin:

Conducted research on 2 dragonfly species in 1987 at the fen. She was under the supervision of Dr. Stanley Dodson, University of Wisconsin; Dr. Ruth Willey, University of Illinois; and Robert Bohanan, University of Wisconsin.

8. Dr. John Harte, Senior Investigator, RMBL, and Professor of Energy and Resources, UC Berkeley:

Dr. Harte and his graduate students use the fen for 2 types of biogeochemical research. They are studying how climate change influences the amount of carbon stored in ecosystems and methane research using the fen as a "calibration" site for testing and calibration of methane research equipment used throughout the Rocky Mountains. According to Dr. Harte, "preservation of the Mt. Emmons bog should have the highest priority by the State of Colorado. It is a scientific as well as an ecological treasure that deserves the public's fullest support. In addition to its value as a site containing rare plants, it is a natural biogeochemical 'laboratory' that is of inestimable value to ongoing scientific research in global change processes. Were it to be drained, or suffer other disturbance, the scientific community would lose an irreplaceable resource" (see Attachment B).

9. Dr. Scott Wissinger, Principal Investigator, RMBL:

Dr. Wissinger has been monitoring the odonate (dragonfly and damselfly) populations at the Mt. Emmons Iron Bog (fen) for a number of years. The odonates in the fen are unique in that they are not often found this far south in the Rockies. He is continuing to search for other unique aquatic invertebrates within the fen.

10. Patricia L. Fall, Professor of Geography, Arizona State University:

In the early 1990's, Fall researched fire history using pollen cores from the Iron Bog (fen) to map forest changes over the past 8,000 years and is using the data in her

studies of fire in Colorado forests. Her findings were published in 1997 in the *Journal of Biogeography* (see Attachment B).

11. Nancy Lamm, Geologist:

Lamm conducted a ground water hydrology investigation for the Colorado Natural Areas Program in November, 1998 (see Attachment B).

12. Judith M. Daniels and K. Armitage, RMBL Biological Researchers from the University of Kansas:

Daniels and Armitage, under the supervision of Dr. Ruth L. Willey, have been conducting a small mammal survey in and around the fen since August of 1999.

13. Dr. David Cooper, Botanist, Colorado State University:

Dr. Cooper has been surveying the Iron Bog (fen) for inclusion in a new fen classification and researching the identification of species of Sphagnum there for the last several years. He says that "the Mt. Emmons Iron Bog is a type of fen that has never been described in the world" (see Attachment B). David also worked with Jan McKee, Botanist with the USDI Fish and Wildlife Service, using his fen data to help create their "Regional Policy on the Protection of Fens" (see *Environmental Assessment*, Appendix A).

14. Dr. William A. Weber, Botanist:

Conducted a floristic survey of the fen in 1987 (see Attachment B).

15. Dr. Keammerer, Botanist:

Completed vascular plant survey in the fen in 1980 (see Attachment B).

16. Dr. Howard H. Whiteman, Assistant Professor of Biology, Murray State University:

Researched aquatic ecology in and around the Iron Bog from 1990 to 1999 (see Attachment B).

Appendix B

Jan McKee (Botanist
303-275-2362
(contact)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:

FWS/R6
ES

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228-1807

JUN 0 8 1998

Memorandum

To: Project Leaders for Ecological Services, Refuges and Wildlife, and Fish and Wildlife Management Assistance, Region 6

From: Regional Director, Region 6 Mary L. Gessler

Subject: Regional Policy on the Protection of Fens

One of the Fish and Wildlife Service's wetland priorities in Region 6 (the Mountain-Prairie Region) is the protection and conservation of fens. Fens are wetlands that are primarily made up of organic soil material (i.e., peat or muck). Because they take thousands of years to develop, they are essentially irreplaceable. Many fens occur in the Mountain-Prairie Region, particularly in the middle to higher elevations of the Rocky Mountains and in the Nebraska sandhills. However, most fens are small and occupy an extremely small percentage of the overall landscape. They probably occupy much less than 1 percent of the total area in Region 6 and comprise only a small percentage of the total acreage of wetlands.

Although fens only occupy a minor portion of the landscape, they perform important hydrological and water quality functions. For example, rare native cutthroat trout often benefit from the water cleansing action of fens in headwaters of streams. They also often possess unique biotic assemblages, especially fens that are high in pH and calcium. The definitions of various classes of fens, the scientific justification for special consideration for these habitats, and literature references are described in the attachment.

Because of these factors, Region 6 decided that all its functioning fens, which were identified on U.S. Geological Survey, National Wetlands Inventory or other maps, and for which location information has been provided to applicable regulatory agencies, fall within Resource Category 1 of the Service's "Mitigation Policy" (Federal Register, Vol. 46., No. 15, February 4, 1981). The mitigation goal for Resource Category 1 is *no loss of existing habitat value*. In other words, because of the irreplaceability of the type of

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habitat, every reasonable effort should be made to avoid impacting that habitat type.

Functioning fens are those that (a) continue to support native plant communities and perform the functions inherent to fens or (b) have the potential to rapidly recover those functions with the removal or rectification of drainage, grazing, or other impacts.

Maps and other readily available documentation, such as descriptions of the functions of the fens, will be provided to applicable regulatory agencies (e.g., Corps of Engineers and State departments of water quality). When practicable, this information will be provided by Ecological Services and other Region 6 field offices in advance of project development to assist project planners in accordance with the intent of the Mitigation Policy.

I also encourage other agencies to help gather this important documentation. For example, the locations of fens also should be obtained (a) when wetland delineations are conducted in conjunction with project planning and development of permit applications under section 404 of the Clean Water Act and (b) for analysis of mitigation requirements for "Swampbuster" and section 404 violations. These wetland delineations should identify any fens in the project impact area and distinguish them from other wetland types. Fens identified during those delineations should be added to the regulatory agencies' databases and considered to be categorized as Resource Category 1 habitats.

For the purposes of this policy, fens will be defined as wetlands with organic material accumulations that are ground water driven. In other words, they may receive water from rain, snow, and surface sources. However, the hydrology, minerals, and nutrients that support the wetland are derived principally from ground water sources. Fens in Region 6 also normally have pH's above 5.5 and are dominated by grasses, sedges, or willows.

Region 6's recommended definition of a fen also includes soil characteristics. Often the wetland soils will meet the Natural Resources Conservation Service's definition of a Histosol in at least some part of the contiguous wetland, unless justified otherwise by a soil scientist. Histosols are widely recognized as organic soils formed by slow accumulation of plant debris in waterlogged situations where growth exceeds decomposition, which progresses very slowly. Fens in the Rocky Mountains have particularly slow decomposition rates because of the cold climate. In general, Histosol soils contain at least 20-30 percent organic matter in at least 16 of the top 32 inches of soil (or less on bedrock).

However, not all fens in Region 6 are dominated by or composed of Histosol soils. Some areas that can be characterized as fens have mineral soils. Generally, these areas occur as slope (HGM) or headwater wetlands, are dominated by ground water discharge, are saturated throughout for most if not all of the year, and commonly have an accumulation of organic soil material overlying the mineral soil. The organic layers are not thick enough to be classified as a Histosol. However, these wetlands have similar functions to organic soil fens and often have unique mineralotrophic fauna. In addition, fen wetland complexes can have mosaics of histosols and mineral soils.

Mitigation for losses of fen wetlands is problematic because, as mentioned above, the rate of organic material (e.g., peat) accumulation in fens is extremely slow. For example, many of the fens of Colorado are over 10,000 years old with organic soil accumulation rates ranging from 4.3 to 16.2 inches per thousand years. In consideration of this slow accumulation rate, such wetlands cannot seriously be considered a renewable resource. In addition, removal of organic material (e.g., for peat mining) results in alteration of site hydrology and the substrate in which fen plant species can grow. Therefore, onsite or in-kind replacement of peat wetlands is not thought to be possible. Furthermore, at present there are no known reliable methods to create a new, fully functional fen or to restore a severely degraded fen.

Because of their vulnerability, protection of all fens are a priority in this Region, including those which have not yet been mapped and officially designated as Resource Category 1. Accordingly, in a letter dated April 1, 1997, I requested the applicable Division and District Engineers of the U.S. Army Corps of Engineers to revoke the use of Regional and Nationwide Permits pursuant to section 404(e) of the Clean Water Act for projects involving fens. I was pleased to note in the April 17, 1998, public notice from the Albuquerque District that the Corps had demonstrated responsiveness to our concerns by revoking use of NWP 26 in Colorado for wetlands containing Histosols in Colorado. The notice also requires prenotification to the Corps for use of all other NWP's in Colorado wetlands containing Histosols when projects would affect greater than 0.1 acre of wetlands.

However, as Region 6 requested, this condition should be applicable to the NWP's throughout this Region, including those issued by (a) the Omaha District in North Dakota, South Dakota, Nebraska, Montana, and Wyoming; (b) the Kansas City District in Kansas; and (c) the Sacramento District in Utah. Furthermore, the permit conditions for Colorado require prenotification on all projects with emphasis on requiring documentation of efforts to avoid and minimize effects on the fens. At the very least, any prenotification acreage exclusion should be restricted to maintenance projects. In addition, as noted

above, not all fens have Histosols; fens with mineral soils would not be protected by the above NWP conditions. Therefore, Region 6 will press this issue again when the next round of draft revised NWP's are circulated for review this year. As Region 6 learns more about the functions and locations of its fens, our ability to promote protection of these wetlands should improve.

With regard to individual permit applications, Region 6 field offices will encourage the Corps to closely scrutinize all applications involving fens to ensure they meet the requirements of the Environmental Protection Agency's Section 404(b)(1) Guidelines. For example, the project sponsor must prove that, in accordance with section 230.10(a), every effort to avoid the impacts has been made through selection of the least damaging alternative, there is no practicable alternative for nonwater dependent activities, and the siting of a water-dependent project in a fen is essential to the project.

If those requirements are first met, every reasonable effort must be made to minimize potential adverse impacts through project modifications and project conditions then in accordance with Section 230.10(d) of the Guidelines. The ES Offices should encourage their counterparts in the Corps to require that projects with the potential to adversely affect fens strictly adhere to the mitigation sequencing requirements of the Memorandum of Understanding between the Department of the Army and the Environmental Protection Agency, dated February 6, 1990. Unavoidable impacts remaining after those steps have been satisfied must be fully compensated when practicable through restoration of nearby and in-kind fens that have been previously degraded but which are recoverable (e.g., through elimination of grazing or restoration of hydrology).

Similar steps should be required for other federally funded, licensed, or constructed projects affecting fens that are subject to the requirements of the Fish and Wildlife Coordination Act, Endangered Species Act, Migratory Bird Treaty Act, or National Environmental Policy Act. This type of increased scrutiny also should be applied to natural wetlands that surround or are immediately adjacent to fens because they may not easily be separable and their functions will often overlap.

Proposed in-kind restoration mitigation for unavoidable impacts to fens should be thoroughly evaluated for likelihood of success before a permit is issued. Because of the high degree of uncertainty associated with attempts to mitigate impacts, the success of proposed mitigation should be demonstrated prior to project initiation, and thorough postproject monitoring and reporting should be required. Furthermore, all such applications will be considered on a site-specific, case-by-case basis.

Because unavoidable impacts will rarely be satisfactorily compensated by replacement of in-kind habitat, Region 6 Ecological Services Field Offices will normally recommend denial of all permits for projects that may adversely affect functioning fens. However, they also will look for opportunities to restore degraded fens. Draining, mining, and filling of all fens will be strongly discouraged. In addition, concentrated efforts will be made to encourage relocation of proposed reservoirs and linear projects (e.g., roads, utility lines, and canals) that might impact fens.

Furthermore, restoration and proper management of fens should be given high consideration during the development and implementation of management plans on refuges and other public lands. Opportunities for restoration of fens also should be an area of focus for partnership opportunities with other agencies, citizens' organizations, and private landowners.

Copies of this policy were provided to several Federal and State agencies for their consideration, and this information will be available to other applicable entities for use in project planning and decisionmaking. However, the policy does not have any legal authority over Government or private decisions, and it does not affect ongoing, authorized development. The purposes of this policy are to help ensure consistent and effective recommendations by Service personnel and to provide other Federal, State, and local government agencies advance notification of Region 6's position regarding fens.

The attachment to this policy focuses on fens in general and on fens in Colorado. Therefore, I reiterate the request stated in the cover memorandum to the draft policy that was sent to Region 6 ES offices for review. Please continue to work with the Natural Heritage Programs and other sources of data in each State so we can broaden the base of our knowledge on fens and further substantiate the position Region 6 has taken in this policy. Please keep my ES staff abreast of new data development in this subject area. Questions on this policy should be directed to Dennis Buechler, Senior Staff Specialist for Federal Activities, at (303) 236-7400, ext. 231.

Attachment

cc: See Attached List

cc: Regulatory Branches, Kansas City, Omaha, Sacramento, and Albuquerque District Offices, and Missouri River Regional Office of USACE
Tim Carey, USACE, 9307 Hwy 121, Littleton, CO 80123
Anita Culp, USACE, 720 N. Main St., Suite 205, Pueblo, CO 81003
Grady McNure, USACE, 402 Rood Ave., Room 142, Grand Junction, CO 81501
Brooks Carter, USACE, 1403 S. 1600 W., Bountiful, UT 84010
Gary Davis, Wetland Coordinator, Bureau of Reclamation, Billings, MT
Paul Beels, Buffalo Ranger District, USFS, 1425 Fort St., Buffalo, WY 82834 (include note that he should copy the other forests in his region as per discussion with David Wheeler, Regional Ecologist)
Dave Ruiter, Ecosystem Protection Program, EPA, 999-18th St., Suite 500, Denver, CO 80202 (3 copies)
Tom Taylor, Water Resources Protection Branch, EPA, 726 Minnesota Ave., Kansas City, KS 66101
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DHC/BFA
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Jim Von Loh, Colorado Natural Areas Program, Colorado Dept. of Parks and Outdoor Recreation, Room 608, 1313 Sherman, Denver, CO 80225
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Edrie Vinson, Office of Program Development, 555 Zang St., Room 400, Lakewood, CO 80220
Darla Lenz, ND Parks & Recreation Dept., 1835 E. Bismarck Expressway, Bismarck, ND 58504
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Rory Reynolds, Habitat Manager, Northern Region, Utah Division of Wildlife Resources, 515 East 5300 South, Ogden, UT 84405
John Fairchild, Habitat Manager, Central Region, Utah Division of Wildlife Resources, 1115 North Main, Springville, UT 84663
Bruce Bonebrake, Habitat Manager, Southern Region, Utah Division of Wildlife Resources, 622 North Main, Cedar City, UT 84720
Bill Bates, Habitat Manager, Southeastern Region, Utah Division of Wildlife Resources, 475 West Price River Drive, Suite C, Price, UT 84501-2860
Jack Lytle, Habitat Manager, Northeastern Region, Utah Division of Wildlife Resources, 152 East 100 North, Vernal, UT 84078-2126

U. S. FISH AND WILDLIFE SERVICE
REGION 6

PEATLAND MITIGATION POLICY CONSIDERATIONS

Ecological Services
Colorado Field Office
Lakewood, Colorado

December, 1997

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U. S. FISH AND WILDLIFE SERVICE
REGION 6
PEATLAND MITIGATION POLICY CONSIDERATIONS

Introduction

One of the highest wetland priorities in this Region is the protection and conservation of mountain and prairie fens. These peatlands are scarce in the West, and many have unique assemblages of plant and animal species. Fens are also known to perform important wetland functions, some possibly unique to peatlands. Fens are under imminent threat from peat mining, water development projects, and recreational development, and because of the slow rate of organic matter accumulation, they are essentially irreplaceable. Mountain and prairie fen habitats are important to the plant and animal species dependent on their unique characteristics. Considering the imminent threats to these uncommon and irreplacable habitats, it is the position of Region 6 that fens deserve special consideration by regulatory, construction, and land management agencies, and the public.

Region 6 Mitigation Policy

Region 6 has decided that all its functioning fens, which have been mapped, and for which that information has been provided to applicable regulatory agencies, fall within Resource Category 1 of the U. S. Fish and Wildlife Service's "Mitigation Policy" (Federal Register, Vol. 46., No. 15, February 4, 1981). Functioning fens are those that (a) continue to support native plant communities and perform the functions inherent to peat fens or (b) have the potential to rapidly recover those functions with the removal or reversal of human, livestock, or other impacts.

The mitigation goal for Resource Category 1 is *no loss of existing habitat value*. In other words, because of the irreplaceability of that type of habitat, every reasonable effort should be made to avoid impacting that habitat type. Therefore, because of their vulnerability, protection of all fens will continue to be a priority in this Region, including those which have not yet been mapped and officially categorized.

Definition of Peatlands

Peatlands are defined by the presence of organic soils, generally referred to as peat. Organic soils form under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, July 13, 1994). Organic soils are classified by the USDA, Natural Resources Conservation Service, as the order Histosols, with three main suborders, fibric, sapric, and hemic (USDA, 1996).

Histosols have 40 cm (16 in) or more of the upper 80 cm (32 in) as organic soil material. Organic soil material has an organic carbon content (by weight) of 12 to 18 percent, or more, depending on the clay content of the soil. These organic soil materials include muck (sapric soil material), mucky peat (hemic soil material), or peat (fibric soil material) (USDA, 1996).

Peat or muck is defined as organic soil material that is saturated with water for long periods (or artificially drained) and, excluding live roots, has an organic-carbon content (by weight) of: a) 18 percent or more if the mineral fractions contains 60 percent or more clay; or b) 12 percent or more if the mineral fraction contains no clay; or c) 12 + (clay percentage multiplied by 0.1) percent or more if the mineral fraction contains less than 60 percent clay (USDA, 1996).

There are three types of organic soil materials; 1) fibric, 2) hemic, and 3) sapric. Fibers are pieces of plant tissue in organic soil (excluding live roots) which are: 1) large enough to be retained on a 100-mesh sieve (openings 0.15 mm in diameter) when the materials are screened after dispersion in sodium hexametaphosphate; and 2) show evidence of the cellular structure of the plants from which they are derived; and 3) are either 2 cm or less in their smallest dimension, or are decomposed enough so they can be crushed and shredded with the fingers (USDA, 1996).

Fibric soils contain three-fourths or more (by volume) fibers after rubbing, excluding rock fragments; or they contain two-fifths or more (by volume) fibers after rubbing, excluding rock fragments; and yield color values and chromas of 7/1, 7/2, 8/1, 8/2 or 8/3 (USDA, 1996).

Hemic soil materials are intermediate in decomposition between the less decomposed fibric and more decomposed sapric materials. Sapric soils are the most highly decomposed of the organic soil materials. They have the smallest amount of plant fiber, the highest bulk density, and the lowest water-holding capacity. Their fiber content, after rubbing, is less than one-sixth (by volume), excluding coarse fragments; and their sodium-pyrophosphate-extract color on white chromatographic or filter paper is below or to the right of a line drawn to exclude Munsell color blocks 5/1, 6/2, and 7/3 (USDA, 1996b).

Types of Peatlands

Peatlands can be classified based on a number of parameters, including water source and water chemistry (nutrient supply), floristics, and/or wetland functions. The following will outline some of the methods that are used to classify different types of peatlands.

Classification Based on Source of Water and Water Chemistry (Nutrient Supply)

Water sources for peatlands can be ground water, surface water, precipitation, or some combination. The following classifications have been used to define peatlands:

Bogs

Bogs are mineral-poor, acid peatlands that are raised above the influence of groundwater by the accumulation of peat. They generally have a pH of 3 to 4, and since they are no longer in contact with groundwater, the only water source for these peatlands is precipitation (Crum, 1988). As a result of the mineral-poor water source, the nutrient supply to bog plants is solely from precipitation and dust. Because of the low pH and low nutrient availability, few plants can survive in bogs and they generally have low species diversity. Bogs are most often dominated by mosses, especially *Sphagnum*.

Bogs in Colorado

No bogs have been identified in Colorado or in the Rocky Mountains south of Canada (Windell, et al. 1986). Low precipitation (Bierly, 1972) and high evapotranspiration in the arid West limits the potential for bog development (Windell, et al. 1986).

Fens

Relative to bogs, fens are mineral-rich peatlands with a pH of 4.0 to 7.5 and are dominated by graminoids, particularly sedges. These peatlands are in contact with groundwater and derive their water and nutrients from groundwater, surface water, and precipitation (Crum, 1988). Minerotrophic water is nutrient rich and more alkaline than the ombrotrophic water of bogs. The nutrients and pH of the ground and surface water supplying a fen significantly influence the type of vegetation that can grow on that fen. The higher pH, nutrient-rich water is reflected in the higher floristic diversity of fens. Fens have been classified based on their nutrient richness and pH. The most common fen divisions are poor, moderate, rich, and extreme-rich fens (Du Rietz, 1949, Sjors, 1950).

In general, poor fens are fed by water low in nutrients, from granite or other hard rocks, while rich fens occur where the water has been in contact with rocks that have high salt content, such as limestone or dolomite. The nutrients that are abundant in rich fen waters are calcium, sodium, and magnesium (Cooper, 1992). Although pH ranges are subject to seasonal and geographic variation, an approximation is that poor fens have a pH of 4-6, and richest fens 6-7.5 (Crum, 1988). However, some rich fens in Colorado exhibit a pH of up to 8.3 (Cooper, 1990).

Table 1 is a characterization of three of these fen types, poor, moderate, and rich/extreme-rich, based on pH, calcium, magnesium, sodium, and potassium.

Table 1 Water chemistry characteristics of several fens grouped into three minerotropic fen classes (Chee & Vitt, 1989 and Cooper, 1990)

Reference	Study Area	pH	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)
POOR FENS						
Zoltai & Johnson (1987)	Alberta	4.7	2	0.8	4.0	0.9
Comeau & Bellamy (1986)	Eastern Canada	4.3	7	2.0	4.0	0.4
Karlin & Bliss (1984)	Alberta	3.5-6.1	2	1.0-3.0	-	-
Bellamy (1968)	Western Europe	4.5	20	5.0	7.0	2.0
Sjörs (1963)	Ontario	4.1-5.4	2	0.5	0.3	0.1
Sjörs (1948)	Sweden	4.3	6	2.0	2.0	0.4
RANGES		**3.5-5.4**	**2-20**	**0.5-5.0**	**0.3-4.0**	**0.1-2.0**
MODERATE FENS						
Zoltai & Johnson (1987)	Alberta	6.0	28	11.0	5.1	1.8
Comeau & Bellamy (1986)	Eastern Canada	5.5	15	6.0	7.0	1.0
Karlin & Bliss (1984)	Alberta	4.6-7.1	4-5	2.0-12.0	-	-
Schwintzer (1981)	Michigan	5.7-7.0	11-75	-	-	-
Yefimov & Yefimova (1971)	U.S.S.R.	6.1	18	8.0	1.0	0.3
Persson (1961)	Sweden	5.4-7.0	40-50	30.0	85.0-93.0	10.0
Sjörs (1948)	Sweden	6.0	68	12.0	2.0	0.4
Johnson (1996)	Colorado (RMNP)	5.9-6.8	1-4	0.7-1.8	1.9-2.9	<0.5-1.1
RANGES		**4.6-7.1**	**1-75**	**0.7-30.0**	**1.0-93.0**	**0.3-10.0**
RICH/EXTREME RICH FENS						
Zoltai & Johnson (1987)	Alberta	6.5	54	17	6	0.8
Karlin & Bliss (1984)	Alberta	7.2-8.2	31-120	10-53	-	-
Bellamy (1968)	Western Europe	6.6	183	19	11	2.0
Sjörs (1963)	Ontario	5.8-7.4	9	2	1	0.3
Sjörs (1961)	Ontario	7.9	32	7	3	0.6
Persson (1961)	Sweden	5.7-7.9	100-1380	50-1690	47-144	20.0
Cooper (1990)	Colorado (South Park)	7.4-8.3	15-95	2-9	2-10	-
Johnson (1996)	Colorado (High Creek Fen)	7.0-7.8	48-139	224-440	3-8	0.7-3.2
RANGES		**6.5-8.3**	**9-1380**	**2-1690**	**1-144**	**0.3-20.0**

Chee & Vitt did not discriminate between rich fens and extreme-rich fens, but Sjörs (1963) described an extreme-rich fen with high nutrients, especially calcium, and pH generally higher than recorded in rich fens.

Fens in Colorado

All of the peatlands in Colorado are considered to be fens (Cooper, 1990). The proportion of these fens that are poor, moderate, rich and extreme-rich have not been determined. Cooper described three types of peat fens in Colorado; 1) extreme rich, 2) rich, and 3) transitional (moderate) fens (Cooper, 1996).

No true poor fens have been identified in Colorado. However, Cooper has identified "iron or acid fens" in Colorado. These fens can contain moderate mineral nutrients, may have a pH in the range of 3.0 to 4.5, and contain poor fen species such as *Sphagnum angustifolium* or *S.fuscum*. The acidic conditions are influenced by the geochemistry of these fens which generally contain pyrite. The reduction of pyrite produces the acidic conditions (Cooper, 1996).

Fens in South Park are rich and extreme-rich fens and are different from other peatlands in the state based their water chemistry and floristics. They are also very rare nationally, as well. (Cooper, 1990). Other than the South Park region of Colorado, inventories specifically addressing distribution of fen types have not been conducted in Colorado.

USFWS Wetland Classification/The Cowardin System

The Cowardin (USFWS, 1979) wetland classification system used in National Wetland Inventory (NWI) mapping can also be used to classify peatlands. Based on the Cowardin system, fens in Colorado would generally be classified as either; 1) palustrine, emergent, persistent, with a saturated water regime and organic soils, or 2) palustrine, scrub-shrub with a saturated water regime and organic soils. Peatlands can be further classified based on their dominance or dominant species composition and water chemistry, including salinity and pH. However, wetlands are rarely mapped to the detail which could distinguish specific types of fens.

Classification Based on Floristic Characteristics

In 1992, Cooper conducted ecological studies of the wetlands of South Park. The studies included a classification of wetlands, including 7 classes, 8 orders, 15 alliances and 40 associations according to the Braun-Blanquet system of vegetation classification.

The Mires (Fens or Peatlands) class includes all peatlands in the Rocky Mountain Region. These peatlands occur at high elevation (above 8,000 feet), usually have saturated soils for

most of the summer, and usually occur where ground water is being discharged. This fen or peatland class, referred to as the *Carex aquatilis - Pedicularis groenlandica* has diagnostic species which include:

Carex aquatilis,
Kobresia simpliciuscula
Trichophorum pumilum
Eriophorum caurinum
Drepanocladus aduncus
Scorpidium scorpiodes
Tomenthypnum nitens
Pedicularis groenlandicum
Thalictrum alpinum
Triglochin palustre

Within this class of wetlands, Cooper identified rich fens and extreme-rich fens.

Rich fens are in the order *Carex aquatilis - Pedicularis groenlandica*. This order includes the rich fens, those with circumneutral pH, low concentrations of dissolved calcium in the water and dominated by sedges or willows. These ecosystems occur at ground water discharge sites and are usually saturated for the entire growing season. Diagnostic species include:

Carex aquatilis
Carex simulata
Pedicularis groenlandica
Eleocharis quinqueflora
Salix planifolia
Salix wolfii
Drepanocladus aduncus

Within this order of rich fens, Cooper identified two alliances; *Carex aquatilis-Pedicularis groenlandica* and *Salix planifolia - Carex aquatilis*. The following is a brief description of these alliances and their associations:

Alliance	*Carex aquatilis - Pedicularis groenlandica*
Association	*Carex aquatilis.*
Association	*Carex simulata*
Association	*Eleocharis quinqueflora*
Alliance	*Salix planifolia - Carex aquatilis*
Association	*Salix planifolia - Carex aquatilis*
Association	*Salix planifolia - Calamagrostis canadensis*

Extreme-rich fens are in the order *Kobresia simpliciuscula - Trichophorum pumilum* which is characterized by water with dissolved calcium concentrations exceeding 20 mg/l. In addition, free carbonates are usually seen on the soil surface and covering hummocks. Marl may be present in pools. The water source is always ground water and the stands may occur in a matrix of drier vegetation. Indicator species include *Kobresia simpliciuscula, Trichophorum pumilum, Carex scirpoidea, Salix myrtillifolia,* and *Salix candida.*

Within this extreme-rich fen order, Cooper identified 1 alliance with 5 associations:

Alliance	*Kobresia simpliciuscula - Trichoporum pumilum*
Association	*Kobresia simpliciuscula - Trichophurum pumilum*
Association	*Kobresia myosuroides*
Association	*Carex scirpoidea*
Association	*Juncus alpinus*
Association	*Triglochin maritimum - Salix candida*

Classification Based on Hydrogeomorphic Method (HGM)

The hydrogeomorphic classification is a wetland classification scheme that focuses on assessing the physical, chemical, and biological functions of wetlands. The classification is in the development stage and was presented by Brinson in 1993 in *A Hydrogeomorphic Classification for Wetlands* as a generic approach, not a specific approach that can be used in practice. It is intended that existing wetlands in different geographic regions can be assigned hydrogeomorphic classes that will better reveal their ecosystem functions. This approach emphasizes the importance of abiotic features of wetlands for functions such as the chemical characteristics of water, habitat maintenance, and water storage and transport.

The classification is based on three wetland hydrogeomorphic properties: 1) geomorphic setting, 2) water source, and 3) hydrodynamics (Brinson, 1993). The following is a brief discussion of each of the HGM properties evaluated in the classification as they relate specifically to peatlands:

Geomorphic Setting

The geomorphic setting is a description of the location of a wetland in relation to surrounding landforms. This characteristic defines many wetland attributes as well as the hydrologic type of the wetland. Fens in Colorado are groundwater slope wetlands.

Table 2 is a summary of the characteristics of peatland geomorphic settings including qualitative evidence, quantitative evidence, functions, and ecological significance in Brinson's classification.

Table 2 Summary of the Characteristics of Groundwater Slope, Extensive Peatland, Geomorphic Settings as a Property of HGM Classification

Examples of Geomorphic Setting	Qualitative Evidence	Quantitative Evidence	Functions	Ecological Significance
EXTENSIVE PEATLAND				
Ombrotrophic Bog	Peat substrate; saturated most of time. Plant species indicate ombrotrophic bog; surface flows negligible.	Peat confirmed by organic content and thickness. Ombrotrophy evident from low pH and low ion content.	Surface storage may facilitate storm runoff; groundwater conservation occurs when water table is below surface. Peat deposits control topography and geomorphic surface.	Wetland-upland interactions minor relative to wetland-atmospheric exchanges. Upland habitats scarce. Species composition unique to bog conditions.
Rich Fens	Peat substrate; saturated most of time. Graminoid species indicative of groundwater supply.	Peat confirmed by organic content and thickness. Minerotrophy evident from circumneutral pH and high ion content.	Subsurface water supply maintains saturation to surface and hydraulic gradient to maintain flow.	Represents conduit for lateral water movement without channelized flow. Moderate levels of primary production and organic matter export.

Water Source

The source of water to a wetland determines the water chemistry of the wetland, as well as flow paths and the energy required to transport the water to the wetland surface. For the purposes of classification, three hydrologic inputs are considered: 1) precipitation, 2) groundwater discharge (inflow usually into and through wetland sediments), and 3) surface or near surface inflow (Brinson, 1993). **Figure A** illustrates the principal sources of water.

Precipitation, although important to all wetlands, by definition is not the primary source of water for fens. In Colorado, fens are primarily dependent on groundwater discharge and to a lesser degree on surface water for their water supply. **Figure B** illustrates the relative contribution of precipitation, groundwater discharge, and lateral surface flow with major wetland types within the triangle to show the relative importance of water sources (Brinson 1987). As shown in this diagram, fens and seeps are characterized by low contribution of surface water and a high contribution of groundwater.

The characters outlined in **Table 3** describe the wetland water sources as a property of the hydrogeomorphic classification including qualitative scale, quantitative estimates, functions, and ecological significance or characters maintained.

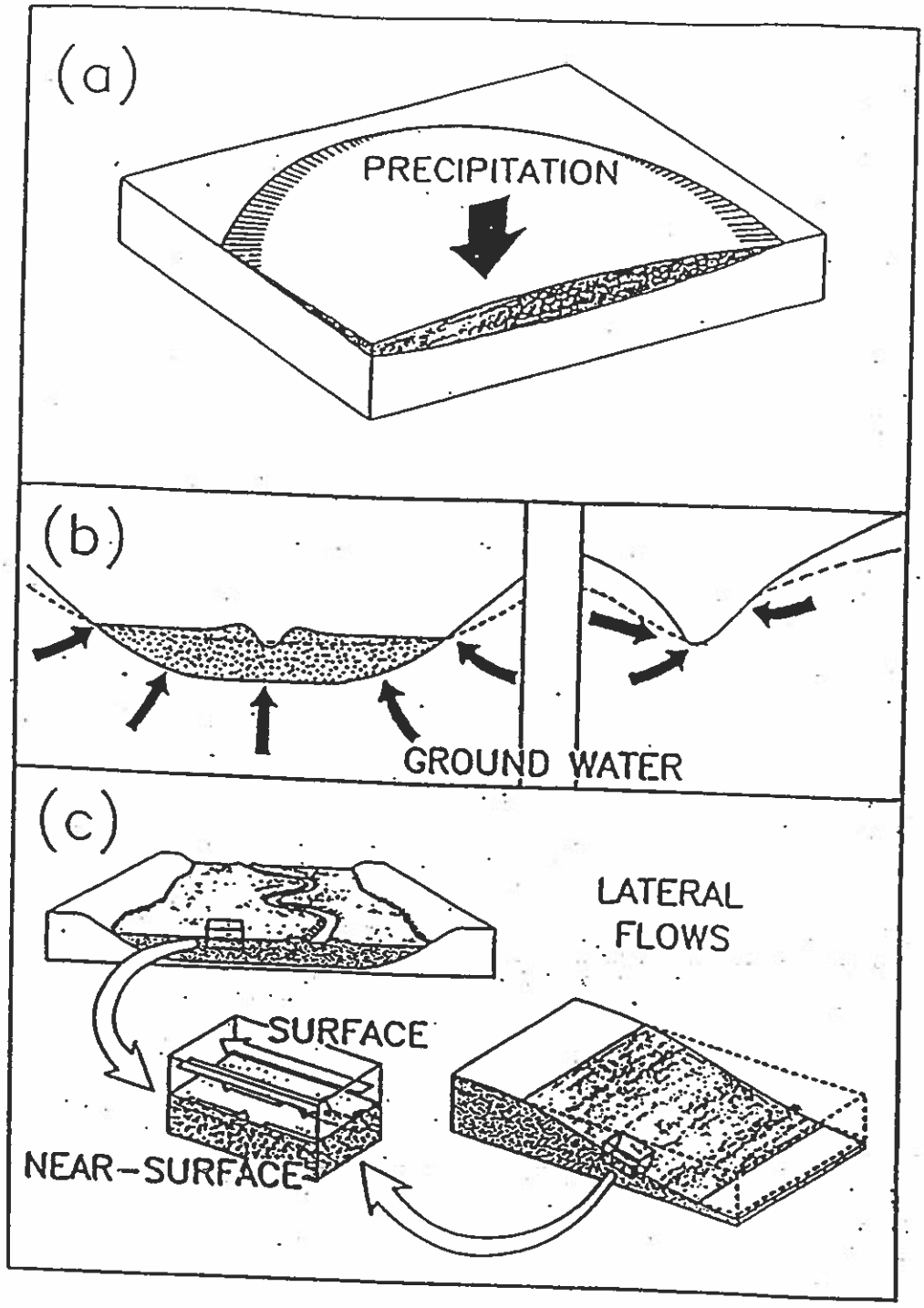

Figure A **Principal Sources of Water to Wetlands (Brinson, 1993)**

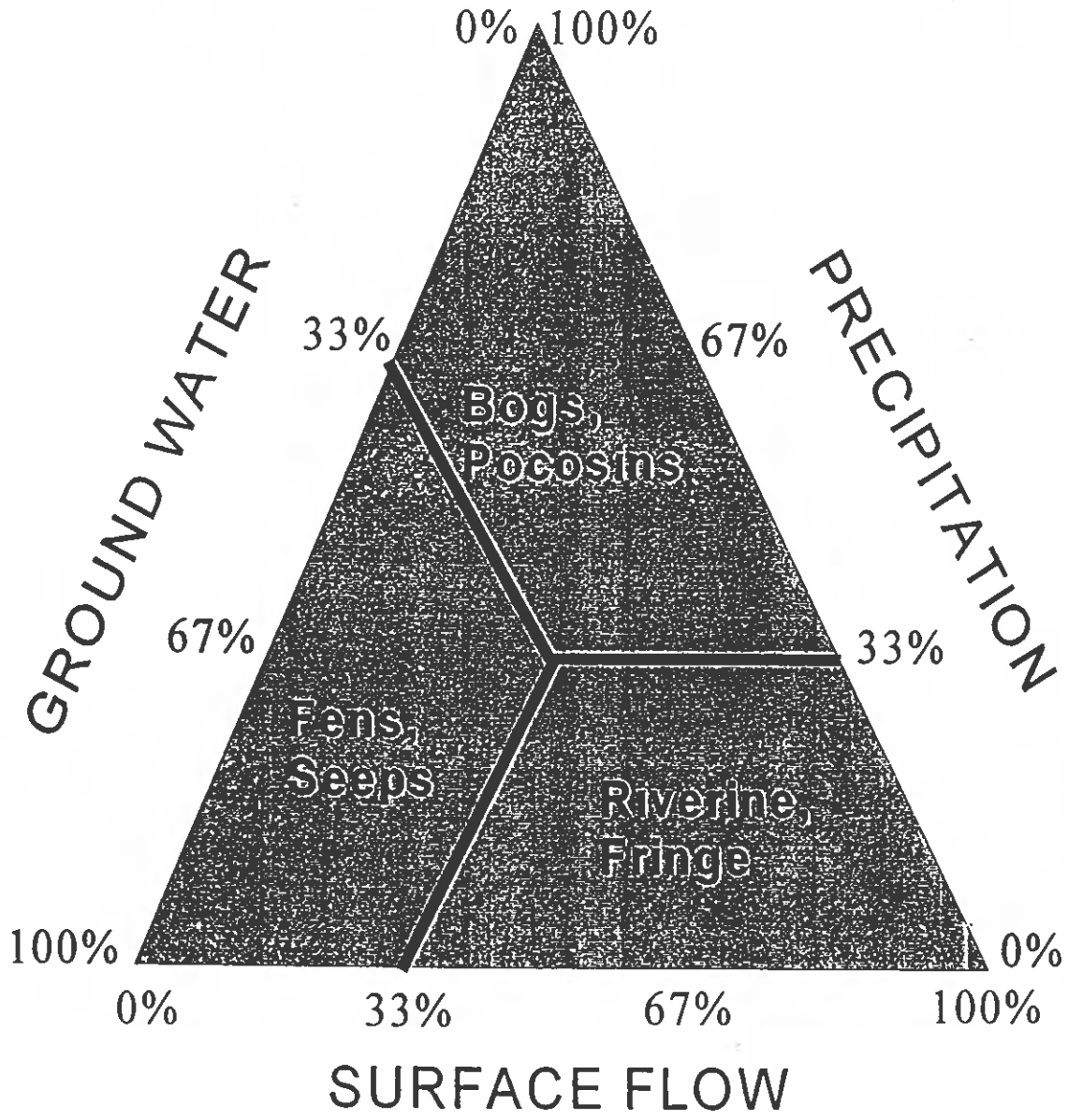

Figure B Relative Contribution of Precipitation, Ground Water Discharge, and Lateral Surface Flow with Major Wetland Types (Brinson, 1987)

Table 3 Wetland Water Sources as a Property of the HGM Classification

Examples of Water Source and (Climate Setting)	Qualitative Scale	Quantitative Estimate	Functions	Ecological Significance or Characters Maintained
Precipitation (moist climate)	Precipitation dominates site water balance and water supply to plant community.	Precipitation > PET during growing season.	Rarity of water table drawdown promotes organic matter accumulation, which further retards drainage: paludification is promoted.	Biogenic landscape isolates mineral soil from access by plants; low primary production eventually results.
Lateral surface or near-surface transport from overbank flow (moist climate).	Discharge commonly exceeds bankfull-channel capacity.	Duration and frequency of overbank flow to floodplain can be inferred from hydrographs and floodplain elevation.	Overbank flow contributes to both flashy hydroperiod and vertical accretion of sediments. This creates rapid biogeochemical cycling and supplies nutrients.	Conditions maintained for high primary productivity and complex habitat structure.
Groundwater (GW) discharge to wetland (mesic climate)	Seeps occur at bases of hillslopes or below breaks in slope, and along edges of streams and lakes.	Hydraulic gradient of groundwater increases with distance from wetland. Substrate permeable enough to allow flows.	GW supplies nutrients, renews water, and flushes potential plant growth inhibitors.	Conditions conducive for stable plant community of high productivity. Peat accumulation possible.
Both GW discharge and, during flood flows, lateral surface transport from upstream (arid climate).	Non-atmospheric sources greatly exceed supply from precipitation.	Precipitation << PET during growing season.	High water tables are maintained by catchment supplies from upstream and from GW sources.	Water supplies support vegetative complexity and habitat structure not found in uplands because of water stress in arid climate.
	All 3 sources, but precipitation is minor (subhumid to semiarid)	Alternate drought and wet periods produce decade-long cycles of water table fluctuations.	Precipitation < PET	High water levels induced by precipitation; GW discharge prevents extreme drawdowns; wetland may recharge GW when water table is high; conserves/reduces GW discharge when water levels are normal.

Hydrodynamics

The term hydrodynamics, as used in the HGM classification, refers to the motion of water and the capacity of that water to do work (Brinson, 1993). **Figure C** illustrates the three qualitative categories of hydrodynamics: 1) vertical fluctuation of the water table that result from evapotranspiration and subsequent replacement by precipitation or groundwater discharge in the wetland, 2) unidirectional flows that range from strong channel-contained currents to sluggish sheet flow across a floodplain, and 3) bidirectional, surface or near-surface flows resulting from tides or seiches. These prevalent directions of water movement correspond, respectively, to the geomorphic setting categories. **Table 4** Are examples of hydrodynamic properties of the HGM classification.

In general, fens in Colorado have hydrodynamic properties of two kinds; unidirectional flow and vertical fluctuations. Unidirectional flow results from topographical gradients. Significant fluctuations may or may not occur on a fen, or they may occur in some areas of a fen, but not others (Johnson, 1996).

HGM Classification of an Extreme Rich Fen in South Park, Colorado

In 1996, Johnson conducted an HGM classification of High Creek Fen. **Table 5** is a summary of the HGM characterization of High Creek Fen, and is likely to be representative of other extreme rich fens in Colorado. In summary, Johnson's classification included the following:

Geomorphic Setting
- Groundwater Slope Wetland
- Wetland with Water Tracks

Water Source
- Groundwater Discharge

Hydrodynamics
- Consistently High Water Table
- Unidirectional Flow -- Low Gradient

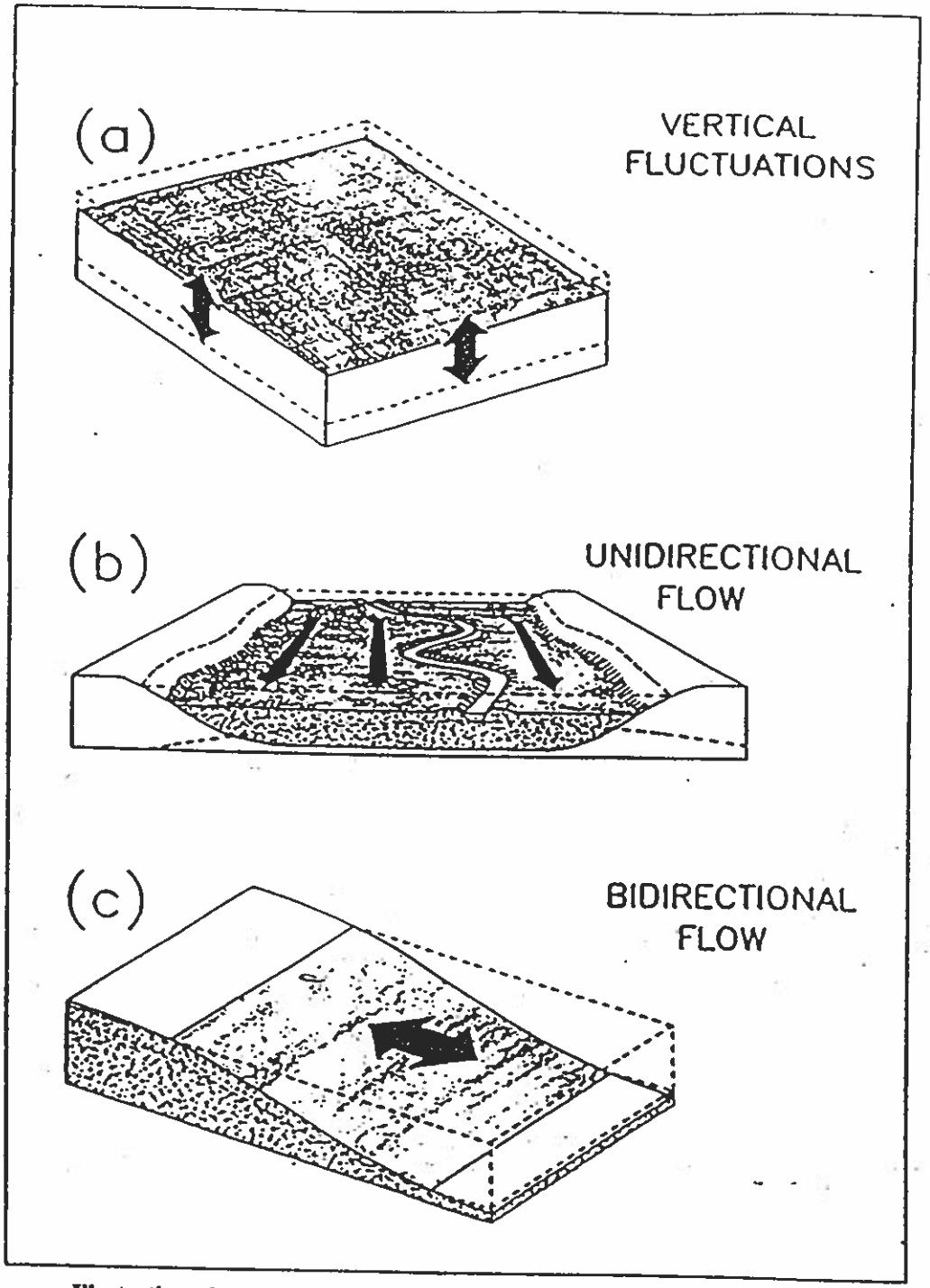

Figure C **Illustration of the Three Qualitative Categories of Hydrodynamics. Categories of hydrodynamics based on dominant flow patterns: (a) vertical fluctuations normally are caused by evapotranspiration and precipitation, (b) unidirectional flows are horizontal surface and subsurface, and bidirectional flows are horizontal across the surface (Brinson, 1993).**

Table 4 **Examples of Hydrodynamic Properties Applicable to Peatlands in the HGM Classification System**

Examples of Hydrodynamics	Qualitative Evidence	Quantitative Evidence	Functions	Ecological Significance
VERTICAL FLUCTUATION OF WATER TABLE				
Nearly constant water table at or near surface.	Relatively constant WT position suggest low ET because of cool, moist climate; if ET is high, strong groundwater discharge required.	Water table hydrographs have little fluctuation and are at or near surface. A cool, moist climate may suggest low ET; otherwise, strong GW discharge must be assumed.	Stable WT encourage peat accumulation. Where ET is low, ombrotrophic conditions promote bog formation. Strong groundwater sources encourage development of fens or maintain seepage slopes.	Landscape patterns dominated by biogenic process of peat accumulation that is vulnerable to changes in drainage and climate. For seepage slopes, species composition reflects waterlogged soils that are nevertheless well flushed and not strongly reduced.
UNIDIRECTIONAL FLOW				
Flow velocities correspond with low-gradient landforms.	Fine sediments (silt-clay and high organic content); barely perceptible flow during flooding.	Slope, flows, and particle size distribution all confirm low-energy system.	Residence time of water allows long contact between water and sediment; low-suspended load allows light penetration	Good conditions for trapping sediment and altering water quality. As nutrient trp, food web support is strong. Reducing conditions favor strongly obligate wetland species.

Table 5 Summary of the HGM Characterization of High Creek Fen

Geomorphic Setting	Qualitative Evidence	Quantitative Evidence	Functions	Ecological Significance
Ground water slope wetland	Peat substrate with high water table relative to surrounding areas; position at hill toe.	Nutrient rich water supply; regions of positive hydraulic head.	Groundwater recharge sites; allows growth of fen species in semi-arid habitat.	Greatly increases species diversity; provides habitat for a large number of rare plants.
Water Source				
Primarily groundwater discharge	Geomorphological position at hill toe; saturated conditions without or with inlet stream; floating mats and water-tracks; indicator species.	Nutrient rich water supply; regions of positive hydraulic head; presence of indicator species; high soil electrical conductivity, uranium content and bulk density.	Provides continual source of nutrient rich water; allows peat accumulation to take place in semi-arid environment; maintains water supply during dry periods.	Single most important factor for the maintenance of fens and all ecological attributes, thereof.
Hydrodynamics				
Constantly high water table	Presence of peat; water-tracks and floating mats indicate perennial saturation; tall hummocks suggest larger seasonal fluctuations, but water table still within a meter or less of the surface.	Depth to water table readings in groundwater wells.	Maintains saturated, reducing conditions; allows peat accumulation; provides habitat for hydrophilic species.	High water table necessary to maintain fen ecosystem; provision of rare and other fen species habitat.
Unidirectional flow - low gradient	Perceptible, but slow surficial flow; single trend in topography grade.	Slope and flow measurements.	Provide flow-through system without channelization; slow subsurface water flow allows long water residence times for chemical filtration to take place; provides a delay in water release; low energy system allows peat to accumulate.	Peat ecosystem substrate not eroded by low energy flow; increased filtration efficiency; continually renewed source of nutrients.

Scarcity of Peatlands in Colorado

In Colorado, the conditions required for formation of peat is restricted to alpine, subalpine, and upper montane regions, usually between 8,000 and 12,000 feet in elevation (Cooper, 1990). It is estimated that 1,000,000 acres of Colorado's 66,716,019 acres are occupied by wetlands; less than 1.5% of Colorado's total area. A very rough estimate of peatlands in Colorado is 100,000 acres, or 10% of Colorado's wetlands.

Species Endemic to, or Dependent, on Peatlands

Although biological inventories of peatlands have not been conducted on a large scale in Colorado, the extreme rich fens of South Park are known to support fourteen rare plant species, two important rare plant communities, and a number of rare invertebrates. These plants, plant communities, and invertebrates, including their Colorado Natural Heritage Program Ranks, are listed in **Table 6** (Sanderson and March, 1996). **Table 7** includes the definition of each of the Natural Heritage rankings.

Table 6 **Globally and State Rare Plants, Plant Communities, and Invertebrates of South Park's Extreme Rich Fens (Sanderson and March, 1996)**

Common Name	Scientific Name	Heritage Program Rank
Porter's feathergrass	*Ptilagrostis mongholica* ssp. *porteri*	G2T2S2
Pale blue-eyed grass	*Sisyrinchium palidum*	G2G3S2S3
Livid sedge	*Carex livida*	G5S1
Canadian single-spike sedge	*Carex scirpoidea*	G5S1
Green sedge	*Carex viridula*	G5?S1
Slender cottongrass	*Eriophorum gracile*	G5S2
Greenland primrose	*Primula egaliksensis*	G4S2
Hoary willow	*Salix candida*	G5S2
Low blueberry willow	*Salix myrtillifolia*	G5S1
Autumn willow	*Salix serissima*	G4S1
Pygmy bulrush	*Scirpus rollandii* (*Trichophorum pumilum*)	G2G3QS1
Few-flowered ragwort	*Senecio pauciflorus* (*Packera pauciflora*)	G4G5S1S2
Northern bladderwort	*Utricularia ochroleuca*	G4?S1
A moss	*Scorpidium scropoides*	G4G5S?
Extreme-Rich Fen	*Kobresia simpliciuscula-Scirpus rollandii* Plant Association	G2S1
Extreme-Rich Fen	*Kobresia myosuroides-Thalictrum alpinum* Plant Association	G1S1
An aquatic beetle	*Agabus bifarius*	G?S1?
An aquatic beetle	*Rhantus suturellus*	G?S1?
An aquatic beetle	*Hydropurus despectus*	G?S1?
An aquatic beetle	*Hydropurus notabilis*	G?S1?
An aquatic beetle	*Hydropurus paugus*	G?S1?
An aquatic beetle	*Hydropurus tenebrosus*	G?S1?
An aquatic beetle	*Helophorus sempervarians*	G?S1?
An aquatic beetle	*Helophorus angusticollis*	G?S1?

Common Name	Scientific Name	Heritage Program Rank
An aquatic beetle	*Haliplus salinarius*	G?S1?
A caddisfly	*Ochrotrichia susanae*	G1?S1?
Glass physa (snail)	*Physa skinneri*	G?S2

Table 7 Colorado Natural Heritage Program Ranks

Rarity Ranks (applied to an element only)	
S1(G1)	Extremely rare; usually 5 or fewer occurrences in the State (world); or simply a few remaining individuals, often especially vulnerable to extirpation.
S2(G2)	Very rare; usually between 5 and 20 occurrences in the state (world); or with many individuals in fewer occurrences; often susceptible to becoming endangered.
S3(G3)	Rare to uncommon; usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
S4(G4)	Common; usually >100 occurrences, but may be fewer with many large populations; may be restricted to only a portion of the state; usually not susceptible to immediate threats.
S5(G5)	Very common; demonstrably secure under present conditions.
S?(G?)	Unranked; some evidence that element may be imperiled, but awaiting formal rarity ranking.
SU(GU)	Status uncertain, often because of low search effort or cryptic nature of the element.
T	Used to indicate the status of a subspecies or variety. These taxa are ranked using the same criteria as for G and S ranks.
Element Occurrence Ranks (applied to the site where an element occurs)	
A	The occurrence is relatively large, pristine, defensible, and viable.
B	The occurrence is small but in good condition, or large but removed from its natural condition and/or not viable and defensible.
C	The occurrence is small, in poor condition, and possibly of questionable viability.
D	The occurrence does not merit conservation efforts because it is too degraded or not viable.
Biodiversity Ranks (applies to the site where element(s) occurs)	
B1	Outstanding biodiversity significance, for example, the best occurrence of a G1 element.
B2	Very high biodiversity significance, such as the best occurrence of a G2 or G3 element.
B3	High biodiversity significance, such as C-ranked occurrences of G2 or G3 elements, or A-ranked occurrences of G3S1 elements.
B4	Moderate biodiversity significance
B5	Of general conservation interest

Porter's Feathergrass (*Ptilagrostis mongholica* ssp. *porteri*) and pale blue-eyed grass (*Sysrinchium pallidum*) are two globally rare plants found in the extreme rich fens of South Park. Porter's Feathergrass is endemic to South Park and occurs only on peat hummocks in fens. There are twenty-five known occurrences of this plant and all are in Colorado. Pale blue-eyed grass is restricted to the southern Rocky Mountains. The plant is found in southern Wyoming and northern Colorado, but the vast majority of its occurrences are in South Park. It is not restricted to extreme rich fens, but does occur in many of them. As a result of their distribution, protection of their habitats in South Park is essential to the long-term viability of these species (Sanderson and March, 1996).

South Park's wetlands, especially the extreme rich fens, contain a number of state rare plants. Compound Kobresia (*Kobresia simpliciuscula*) occurs principally on peat hummocks that only occur in fens fed by a constant supply of carbonate rich ground water. Greenland Primrose (*Primula egaliksensis*) is known only from South Park peatlands; the only other known populations in the lower 48 occur in Wyoming. Hoary Willow (*Salix candida*) is a rare willow known only from rich fens in South Park, the San Juans, and northern Colorado. Low blueberry willow (*Salix myrtillifolia*), is known from only two areas in the western United States: South Park and northwest Wyoming. A number of the state rare plant species are extremely far removed from their core populations. The disjunct nature of the populations in South Park greatly increase the biodiversity significance of these occurrences (Sanderson and March, 1996).

Little work has been done on the species composition and distribution of invertebrates in peatlands in Colorado. However, Durfee and Polonsky (1995) collected invertebrates at High Creek Fen in South Park and demonstrated that extreme rich fens provide habitat for state and potentially globally rare invertebrates. A snail (*Physa skinneri*) is a state rare snail known only from a few sites at High Creek Fen and is believed to be associated with extremely rich fens. Nine species of aquatic beetle and a predaceous diving beetle that had not been reported west of Wisconsin in the U.S. were recorded for the first time at High Creek Fen. They also collected a caddisfly previously known from only one other location in the world. There appears to be a pattern of global rarity and extreme population discontinuities associated with these rare invertebrates that also appears among terrestrial invertebrates (Sanderson and March, 1996).

Peatland Functions

Peatlands, in general, perform many of the same functions as mineral wetlands. These include wildlife habitat, maintenance of water quality, ground water discharge sites, surface and ground water flow regulation, water storage, flood abatement and maintenance of groundwater table elevation both upstream and downstream of a peatland. A particularly important function performed by fens is the capacity of these wetlands to sequester heavy metals to a greater degree

than mineral substrate wetlands. Mineral substrate wetland types also remove heavy metals from source waters through plant uptake and adsorbtion. However, fens, in addition to having plants with the ability to uptake heavy metals, also have soils with high organic content with the ability to adsorb high levels of heavy metals. Fens in Colorado have been shown to trap uranium and other heavy metals (Ref. USGS).

The following is a brief discussion of each of the wetland functions known to be performed by peatlands:

Ground Water Discharge Sites

Ground water discharge is the movement of ground water into the surface water. Wetlands with significant ground water discharge typically are saturated throughout much of the year and can perform vital water quality functions because their soils are anaerobic and reducing conditions exist. Generally, wetlands with the strongest and most constant springs can have organic soils.

Short-term Nutrient Retention

Wetlands performing short-term nutrient retention are typically anaerobic for long periods of time during the growing season and can convert, trap, and/or transform nutrients and heavy metals and remove them from the water column. Peatlands also provide short-term and long-term nutrient retention through bioaccumulation of nutrients in herbaceous tissues contained in peat soils.

Long-term Nutrient Retention

Wetlands that can retain nutrients on a long-term basis are generally found in stable systems that have been supporting the same or similar types of wetlands communities for long periods of time. Fens and willow carrs are the most common wetland types performing this function. Because of the slow decomposition rate of peat, nutrients are retained for long-term periods of time in peatlands. Wetlands that provide long-term nutrient retention also provide short-term nutrient retention

Plant and Wildlife Habitats

Based on biological inventories of rich and extreme-rich fens in South Park, they are important in providing habitats for both unique plants and animals. In additions, several of the extreme-rich fens in South Park have been identified as sites of biological significance. Table 8 Is a listing of these significant sites:

Table 8 Biological significant sites, arranged by Biodiversity Rank (B-rank) (Sanderson and March, 1997)

Site Name	Biodiversity Rank
High Creek Fen	B1 (Outstanding significance)
Fremont's Fen	B1 (Outstanding significance)
Jefferson and Guernsey Creeks	B2 (Very high significance)
Old Railroad	B3 (High significance)
Hollthusen Gulch/Tarryall Creek	B3 (High significance)
Fourmile Creek at Peart	B3 (High significance)
Crooked Creek	B3 (High significance)

Although a number of fens are known to support unique species, extensive data is not available on wildlife species that utilize Colorado peatlands. In 1990, Stevens researched the range of wildlife species likely to inhabit peatlands in Colorado. Much of the data he found were on northern peatlands. These northern wetlands may or may not be entirely applicable to Colorado peatlands, but in general, they provide important information in the absence of specific data on fauna in Colorado peatlands. The following summarizes Stevens' findings.

- Subalpine peatlands dominated by willows (carrs) are much more heavily used by breeding birds relative to the surrounding upland habitats.
- Minnesota peatlands were also found to be very important to a number of avian species (waterfowl and terrestrial birds) in at least two ways: 1) as a source of food needed at critical times of the year; and 2) as habitat for rare or threatened species which may be dependent on the peatland habitat (Wagner and Wells, 1980)
- In Colorado, white-tailed ptarmigans are dependent on willow-dominated peatlands as a food source (Braun et al. 1976).
- In Minnesota, the following species are known to utilize or depend on peatland habitats (Marshall and Miquelle 1978).:

  moose (*Alces alces*)
  fisher (*Martes pennanti*)
  beaver (*Castor canadensis*)
  numerous small mammals (shrews, mice, moles, voles, squirrels, and chipmunks)
  numerous vertebrate and invertebrate aquatic organisms

Retention of Heavy Metals

In a study of more than 100 wetlands in Colorado, more than half showed uranium concentrations in the groundwater of greater than 20 ppm (Owen et al., 1992). The Environmental Protection Agency's proposed drinking water standard for uranium is a maximum contaminant level goal (MCLG) of 20 ppm. This is an non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety (EPA, 1991). Although undocumented, uranium concentrations retained in peatlands could represent an environmental concern. Wetlands are known to be efficient filters of metals dissolved in ground and surface waters. Peatlands can be particularly effective in this regard (Loparkina, 1967).

Organic matter in wetlands is an effective sorber of uranium and other metals. Organic matter degradation greatly increases the surface area available for sorption and yields humic material, humic acids, and fulvic acids, all of which facilitate geochemical enrichment (Robbins,1990). In laboratory experiments with uranyl sulfate, it has been found that peat could remove as much as 98 percent of added uranium (U) from solution (Moore, 1954).

Peat and peaty muck, because they have high organic contents, exhibit a large cation exchange capacity. Stednick (1988) pointed out that the pH of most riparian-wetland systems is near neutral, which helps limit metal solubility. Ibarra et al. (1979) concluded that humic acids produced from peat-forming processes, as well as those in existing peats, can exert a strong concentrating accumulating effect on heavy metals being transported by natural waters, even waters low in metal concentrations.

Tannins are water-soluble secondary plant products that can be observed as the "tea" or brown coloration in streams and peatland species. These tannins also form complexes with ions in solution (Crum, 1988).

Bacteria and fungi also play a role in concentrating metals in wetlands. Bacteria are the prime degraders of vegetation in the peat-forming process (Waksman, 1930; Moore and Bellamy, 1974) and are partially responsible for formation of sorbents such as humic acids. Bacteria themselves may trap metals in or on their cell walls. A common fungus has also been reported to be very efficient in biosorption of uranium (Tsezos and Volesky, 1981, 1982).

Uniqueness of Peatlands in Colorado

Many of Colorado's peatlands are unique based on their assemblages of plant and animal species, as well as their water quality improvement function of retention of heavy metals. The unique plants and animals found in some Colorado peatlands are discussed in the Species

Dependent on or Endemic to Peatlands section of this report. The metal retention characteristics of peatlands are discussed in the Functions of Peatlands section of this report.

Threats to Colorado Peatlands

Threats to Colorado peatlands include peat mining, ski and real estate development, water development projects, and draining and alterations associated with agriculture. The following is a brief overview of each of these threats to Colorado peat fens:

Peat Mining

It is estimated that historically, the total area directly affected by the extraction of peat has been approximately 200 to 500 acres. In 1989-1990 there were approximately 20 active peat operators in Colorado. The total estimated annual extraction of peat is 102,000 cu. yds. (51,000 tons). Colorado is fifth nationally in terms of peat tonnage extracted. Colorado's contribution to the national supply is estimated at 1.5 percent of the total. Approximately 80 to 90 percent of the peat extracted in Colorado is excavated in Park and Teller Counties. Peat is also mined to "dry up" land for use as pastureland and to create open water for recreation use (COE, 1996).

Peat is marketed to gardeners and landscapers for increasing the soil's acidity and organic content, but the effectiveness of Colorado's peat as a soil amendment is questionable. The quality of Colorado peat is widely variable, but can contain as little as 21 percent organic matter, compared to 90 percent or more for sphagnum peat As much as 79 percent of the remaining volume consists of finely pulverized mountain rock and sand (Borland, 1992).

Colorado's peat also usually has a high pH and a high calcium content. In a controlled study, Agut and Hartley (1981) found that plants grew worse in mountain peat mixtures than in other mixtures. Based on the soil characteristics of Colorado's peat, it appears it is most often ineffective as a soil amendment (Borland, 1992). In 1992, Jim Borland, President of the *Colorado Native Plant Society said of Colorado mountain peat, " . . . I have concluded the best thing that can be said for the product is that it is dark brown in color." In addition, Denver Water Board, the Colorado Garden Club, and Permagreen, Inc., among others, have boycotted the use of Colorado mountain peat due to its low quality and the destructive nature of the mining practices (Johnson, 1997).

The following is a list of some of the historic and operating peat mines in Colorado:

Park County (South Park)
- Universal Peat Mine -- 200 acres, mined for 25 years
- Brinkerhoff Peat Mine -- historic mining

R&R Enterprises -- 200 acres, a peatland that has had the hydrology altered, very dry

High Creek Fen -- historically mined

San Luis Valley

A large mining operation in an area similar to R&R Enterprises mine in Park County, altered hydrology, very dry, non-jurisdictional

Teller County

Scotts Hyponex -- historically mined peat, but are not currently mining

Gilpin County

Eureka Gulch -- small scale mining north of Central City, U. S. Army Corps of Engineers issued a cease and desist order for excavation without a permit. They continued mining and the case is now with the Department of Justice for enforcement resolution

Impacts Associated with Peat Mining

Peat mining destroys many of the wetland functions associated peatlands. The primary impact is the destruction of plant and wildlife habitats. Alteration of hydrology also has major impacts to peatland ecosystems.

Removal of peat affects the hydrology of a peatland in a number of ways. Drainage of the peatlands lowers the water table and results in oxidation of peat sediments. Peat extraction removes the more porous upper material which is the most active in water storage and pollutant trapping (EPA, 1993). Water quality analysis conducted on South Park peatlands indicates that water quality standards can be exceeded after peat removal (Cooper, 1990). The capacity of the peatland to store and slowly discharge storm water is known to decrease (Stevens et al. 1990; Johnson, 1996) and removal of peat severely alters or destroys the hydrologic patterns of water flowing through fen areas. In addition to impacts to uses and quality of water in an area from which peat has been extracted, potential changes in evaporation rates could impact downstream and upstream water balance relations (Borland, 1993; Johnson, 1996).

Disturbance to metalliferous fens could substantially impact water quality. If a peatland is partly or completely drained, the subsequent oxidation of the organic-rich sediments may liberate metals that have been accumulating from very dilute solutions for thousands of year (Langmuir, 1978). In a 1995 report on the geochemistry of Vassar Meadow in Eagle County, Colorado, the USGS recommended that any removal or draining of metalliferous wetland sediments should have safeguards in place to prevent escape of metals (particularly chromium and uranium) to ground or surface waters (Owen and Breit, 1995).

Real Estate Development

Peatlands in Colorado are also threatened by development, particularly ski areas since they occur at higher altitudes. Vassar Meadows, a rich fen in Eagle County, has historically been threatened by the proposed Adam's Rib resort development. Although the resort development is no longer planned in the area, the future of Vassar Meadows is uncertain.

Impacts Associated with Real Estate Development

Because of the removal of peat for construction of buildings, ski lifts, etc., the impacts resulting from development in peatlands are similar to those associated with peat mining. In addition, water quality entering wetlands can also be degraded by adjacent development. Depending on type of development, projects upstream of a fen could result in increases in nitrate and phosphorous loading, as well as the possibility of the introduction of herbicides and pesticides to the water source.

Water Development Projects

Fens in Colorado are also threatened by proposed water development projects. As an example, in South Park, innovative water development projects have been proposed that include pumping groundwater, through a series of wells, from an occluded aquifer to satisfy depletions downstream. In addition to the wells, the proposed project would include a number of recharge reservoirs (possibly located in fens) to recharge and store water in the area vacated by water pumped from the wells. Although these types of projects are in preliminary stages of design and will not be finalized for several years, they are a threat to peatlands in South Park because of potential adverse impacts to groundwater.

Impacts Associated with Water Development Projects

Fens in Colorado, by definition, dependent on groundwater. Therefore, water development projects which could result in a reduction in groundwater could threaten, or perhaps even preclude, the existence and/or continued viability of associated fens.

Grazing and Haying

Drainage to accomplish grazing and haying mostly occurs on lower elevation fens, but can also occur at higher elevations. This practice is common in South Park fens in Colorado. However, no studies have been conducted to establish the extent of, or the impacts of, this practice in peatlands in Colorado.

Impacts Associated with Grazing and Haying

Studies of the impacts of grazing on peatlands have not been conducted in Colorado. However, significant impacts can result from attempts to drain peatlands for conversion to pasture or haying. These impacts are similar to those associated with peat mining, and real estate and water development. In addition, in agricultural areas, the introduction of carbonates, sulfates, or phosphates is common. These substances are constituents of lime, gypsum, and fertilizer that may be applied to a wetland being used for agriculture. In any wetland, including peatlands, these substances can complex and mobilize uranium (Langmuir, 1978; Zielinski and Meier, 1988).

Replaceability of Colorado Peatlands

In the 1996 404 permit denial of the Robert Wright Peat Mining project in South Park, the U. S. Army Corps of Engineers stated that they know of "no demonstrated or realistically means by which peatlands, and the unique combination of functions and values they provide, can be replaced" (Tri-Lakes Project Office, 1996).

The following factors are considered to be the primary influences on the replaceability of peatlands:

Rate of Peat Accumulation

The rate of peat accumulation in Colorado fens is extremely slow. Most peatlands likely have peat accumulation rates of 8 to 11 inches per thousand years. With such slow rates of accumulation of peat, the fens of Colorado have been developing for many thousands of years. Cooper's 1990 study of South Park peatlands dated five peat cores using Carbon 14 dating. **Table 9** is a summary of these data. Some of Colorado's peatlands are more than 10,000 years old with peat accumulation rates ranging from 4.3 to 16.2 inches/thousand years. Considering the slow accumulation rate of peat, peatlands cannot seriously be considered as a renewable resource (Borland, 1993, Cooper 1990).

Table 9 **Ages and Peat Accumulation Rates for Five South Park, Colorado Peatlands (Cooper, 1990)**

Study Area	Date Before Present	Depth of Peat	Years/Inch (cm)	Inches(cm)/Thousand Years
Sacramento Creek	9,820 ± 150	7'0"-6'10"	117(297)	8.6 (21.8)
Carpenter's	9,280 ± 180 3,740 ± 90	10'3"-10'6" 4'11"-5'0.5"	61.8 (157) to 73.6 (186.9)	16.2 (41.1) to 13.6 (34.5)
McMasters	9,220 ± 110 3,710 ± 90 104.5 ± 0.8%	11'1:-10'11" 3'6"-3'7.5" 0-2"	69.3 (176.0) to 85.3 (216.7)	14.4 (36.6) to 11.7 (29.7)
Lost Park	10,080 ± 150 3,570 ± 100	8.54' 3.57'1.5"	98.4 (249.9) to 80.5 (204.5)	10.2 (25.9) to 12.5 (31.8)
High Creek-Windmill	8,270 ± 140	90 cm	233.4 (592.8)	4.3 (10.9)

Peat accumulates slowly in all southern Rocky Mountain peatlands, but the rate of accumulation in extreme rich fens, as low as 4 inches per thousand years (Cooper 1990b), is exceedingly slow. This slow rate is, in part, a result of the dry climate in South Park and low precipitation rates (Sanderson, 1996). **Table 10** is a comparison of depth of peat, peat accumulation rates, pH, calcium content in water, and important plant species.

Table 10 **Comparison of rich and extreme rich fens in and near South Park (based on Cooper (1990b) and Sanderson, 1995 field work)**

	Rich Fen	Extreme Rich Fen
Peat Depth	Moderate: up to 12 ft. (4 m)	Thin: typically less than 5 ft (1.5 m) in deepest spot, often 3 ft. (1 m) or less
Peat Accumulation Rate	Moderate: 10-16 in. (25-40 cm) per thousand years	Slow: 4.3 in. (11 cm) per thousand years at High Creek Fen
pH	Around neutral or slightly acidic (6.0-7.6)	Basic (7.4-8.6)
Calcium Content of Water	Moderate: 1.5-2.5 mg/l	High: 15-95 mg/l
Important Plants	*Salix planifolia, Carex utriculata, Carex aquatilis*	*Salix candida* (state rare), *Kobresia simpliciuscula, Kobresia bellardii* (typically alpine)

Mitigation for Wetland Losses from the Removal of Peat

Plant species present in fens are dependent on the peat substrate for hydrologic and nutrient support. Removal of peat results in alteration of the hydrology and the substrate in which fen plant species can grow. The alteration of hydrologic function in mined peatlands destroys the conditions necessary for natural revegetation (Borland, 1993). Because of the slow rate of peat formation, after peat is removed, the conditions are no longer present for the formation of new peat or the support of most fen plant species. Therefore, on-site or in-kind replacement of peatlands is not possible.

Mitigation Policy Habitat Value

No evaluation species have been identified or designated for peatlands in Colorado. However, in a FWS 1995 memorandum on Region 6 policy on the use of the Mitigation Policy to Protect Unique Ecosystems, the primary author of the mitigation policy, who is now the Assistant Regional Director for Fisheries in Region 3, stated that, "There is nothing in the Mitigation Policy that indicates than an evaluation species cannot be stated as an ecological community and there is nothing in the Mitigation Policy that states that wildlife only refers to ducks and deer and excluded insects, mollusks, zoo plankton and, of course, fish . . . " The author suggested that fens could be designated by the field supervisors as "unique and irreplaceable habitat, pursuant to Resource Category 1, and that the evaluation species are the very unique assemblage of both plants and animals that occupy the niche."

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Appendix C

USFS works to protect Mt. Emmons Iron Fen

Ninety-five acres at issue

by Melissa Ruch

The fate of the Mt. Emmons Iron Fen is currently being re-examined as the Forest Service works on negotiations with the Phelps-Dodge Corporation of Phoenix, Arizona that in 1999 took control of the Mt. Emmons Mining Company. According to Forest Supervisor Jim Dawson, the newest owners of the mine are not interested in a mineral withdrawal process that was in the works with previous mine owners Cyprus-Amax.

Mt. Emmons, commonly known as Red Lady, holds one of the world's largest molybdenum deposits. On January 3, Phelps-Dodge submitted their Colorado Supreme Court appeal to gain access to water rights for the purpose of mining Mt. Emmons. However, Red Lady holds more than molybdenum, it is home to an iron fen, a 95-acre area fed by underground water sources. In June of 1999 the Mt. Emmons Iron Fen was designated as a State Natural Area. The area is home to a rare wetland, which sustains one of two known populations of the Roundleaf Sundew. The fen also has unusual water chemistry, it has a low pH count and a high mineral content.

At the time of designation, the Forest Service was pursuing a "mineral withdrawal" for the property from Cyprus-Amax. A mineral withdrawal only protects the fen from junior claims, or those after the 1872 Mining Act. Dawson explained this past week that a mineral withdrawal does not provide any protection for the fen over existing claims, such as those held by Phelps-Dodge.

"Things changed hands and Phelps-Dodge has a different approach with things," explained Dawson. "My understanding," said Dawson of the mineral withdrawal, "is that Phelps-Dodge is opposed...but I don't know any definitive reasons why."

continued on page 13

U.S. Forest Service works to protect 95 acres on Red Lady

continued from page 1

So the Forest Service is in negotiations currently with Phelps-Dodge that would provide more immediate protection to the fen. However, Dawson said it is too early to tell what that protection could be. He said the Forest Service should know something more definitive in mid-February.

"The goal is to prevent disturbance from mining or anything else on the fen," said Dawson. "But it is in the hands of the Phelps-Dodge attorneys now."

Sandy Shea, the public lands director for High Country Citizens' Alliance expressed worries about the negotiations. "This still seems a backroom deal to us and its troubling the Forest Service is now in closed door negotiations with Phelps-Dodge and the public is left out of that loop."

Last summer an Environmental Assessment (EA) was completed over the mineral withdrawal when the Forest Service was still in negotiations with Amax.

The Forest Service received public comment on the EA but now, said Dawson, "we are basically just sitting on it."

He said if the Forest Service and Phelps-Dodge can come to an understanding the new resolution would be sent out to the public who commented on the previous EA.

Shea concluded, "I don't know why Phelps-Dodge would be opposed to a mineral withdrawal. Amax seemed to not have a problem with it. They realized it wouldn't effect their current claims."

Biological Evaluation and Assessment (Plants)
Mt. Emmons Iron Bog Mineral Withdrawal

Prepared by: Kay Austin Date: 6/7/00
District Biologist

Reviewed by: Mark Hallett Date: 6/6/00
Resource Management Specialist

Reviewed by: James R Dawson Date: 6/6/00
JAMES R. DAWSON, District Ranger

United States Department of Agriculture | Forest Service | Gunnison Ranger District | 216 N Colorado St. Gunnison, CO 81230 Voice: 970-641-0471 TDD: 970-641-6817

File Code: 2670 Date: 4-27-00
Route To: Mark Hatcher

Subject: Mt. Emmons Iron Bog

To: JAMES R. DAWSON, District Ranger

Biological Evaluation and Biological Assessment (Plants)

Location: Mt. Emmons Iron Bog near Crested Butte, Colorado

Project: Mt. Emmons Iron Bog Mineral Withdrawal

Situation Description: The Gunnison Ranger District proposes to withdraw the Mt. Emmons Iron Bog from future mineral entry. The Iron Bog (actually a wetland fen) is located west of Crested Butte, Colorado. Presently the 76 acres of the Iron Bog has been designated a Botanical Special Interest Area by the Forest Service and a Colorado Natural Area by the Colorado Natural Areas Program. The mineral withdrawal will have no change in management and no ground disturbance. Existing mining claims will not be affected by the withdrawal. The specific effects of mining on the Iron Bog will not be analyzed in this Biological Evaluation (BE) and Biological Assessment (BA) because the details of a mining operation will not be known until an operating plan is filed, at which time there will be an Environmental Impact Statement (EIS) written. Because mining may take place on the existing claims with either alternative, we will only analyze the effects of the alternatives in regards to the mineral withdrawal.

Eutrema penlandii (Penland alpine fen mustard) is the only Threatened plant that may be found in the Gunnison Basin. It lives in alpine plant communities along streambanks and in wetlands at an elevation of 12,300 –13,100 feet (The Colorado Rare Plant Technical Committee, 1997). There is no habitat such as this in the Iron Bog (see attached map). There will thus, be no effects on Penland alpine fen mustard.

Drosera rotundifolia (roundleaf sundew) is the only Sensitive plant found within the Iron Bog, according to the prefield check with the Colorado Natural Heritage Program and the *Colorado Rare Plant Field Guide*. Other Sensitive plants within the Gunnison Basin do not have habitat within this wet fen area (see *Environmental Assessment*, "Affected Environment"). Because there will be no ground disturbance, no change in management, no change in the existing mining claims, and no change in land use associated with the mineral withdrawal, there will be no effects from this mineral withdrawal on the sundew found within the Iron Bog.

Direct, Indirect, and Cumulative Effects Analysis: Within the watershed of the Iron Bog, no mining may take place on public lands without the filing of an operating plan and the writing of an EIS. On private land to the northeast of the Iron Bog, mining may take place. There may be indirect effects on the sundew if this takes place. Again, because there will be no ground disturbance, no change in management, no change in the existing mining claims within the Iron

Bog, and no change in land use associated with the mineral withdrawal, there will be no effects from this mineral withdrawal on the sundew found within the Iron Bog.

Gay Austin
Biologist

Contacts and References:

Contacts:

Susan Spackman – Colorado Natural Heritage Program, Botanist

Mark Hatcher - USFS, Taylor River-Cebolla RD, Resource Management Specialist

Barry Johnston - USFS; Grand Mesa, Uncompahgre, & Gunnison NF; Forest Ecologist

Wendy Reinmuth - USFS, Taylor River-Cebolla RD, District Wildlife Biologist

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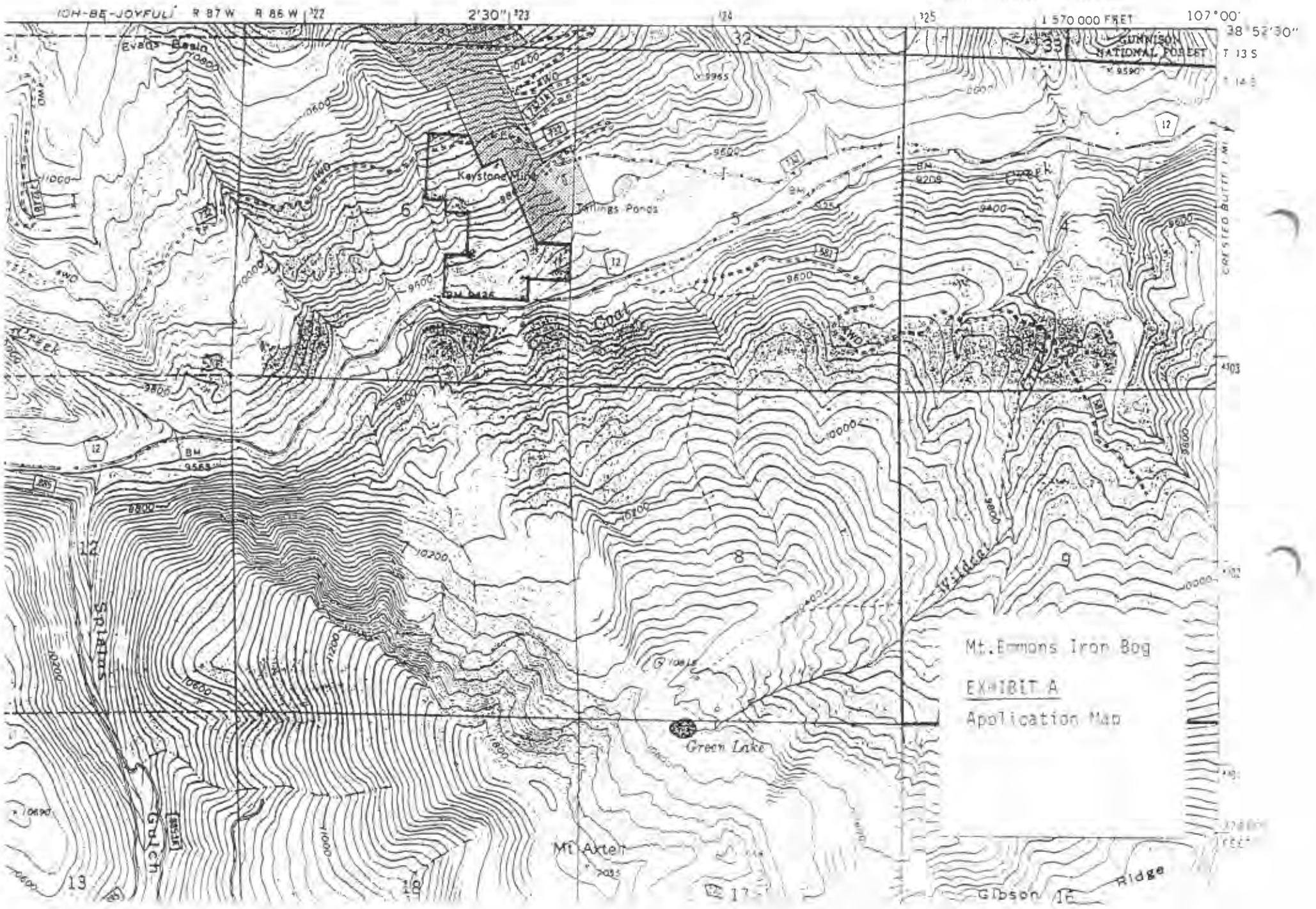
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Coal Creek
Creek
Ridge
Splains Gulch
Green Lake
Mt Axtell
Gibson Ridge
CRYSTED BUTTE 1 MI
Mt.Emmons Iron Bog
EXHIBIT A
Aplication Map

Letters Received in Mt. Emmons Iron Bog Mineral Withdrawal EA scoping period

	Date Received	Name, Address & Phone Number
1.	11-8-99	High Country Citizens' Alliance P.O. Box 1066 Crested Butte, CO 81224 970-349-7104
2.	11-18-99	Larry Kimball PO Box 322 Cotopaxi, CO 81223
3.	12-2-99	Michelle C. Carmody Alfers & Carver, LLC 303-592-7674 730 17th St. Suite 340 Denver, CO 80202
4.	12-2-99	Bob Clarke, Conservation Chair Colorado Native Plant Society 810 Samoan Drive Grand Junction, CO 81506-1742
5.	12-3-99	Janet Coles Colorado Natural Areas Program 1313 Sherman, Room 618 Denver, CO 80203 303-866-3203 Ext.330
6.	12-3-99	Dawn G. Meidinger, Esq. Phelps Dodge Corporation 2600 North Central Avenue, Suite 110 Phoenix, Arizona 85004-3014
7.	12-3-99	Dr. Ruth L. Willey, Senior Investigator Rocky Mountain Biological Laboratory 222 East Gothic Avenue Gunnison, CO 81230
8.	12-6-99	Ralph E. Clark III 519 East Georgia Ave. Gunnison, CO 81230 970-641-2907
9.	12-8-99	Wendy S. Brown PO. Box 1451 Crested Butte, CO 81224 wsbrown@csn.net

GAY:
These letters went out today 5/25/00
CS

IC Comments due June 26th

4850 Youngfield
Lakewood, CO
80215

United States Department of Agriculture
Forest Service
Gunnison Ranger District
216 N Colorado St.
Gunnison, CO 81230
Voice: 970-641-0471
TDD: 970-641-6817

Legal Notice

Date: May 21, 2000

The Gunnison Ranger District of the Grand Mesa, Uncompahgre, and Gunnison National Forests has completed an Environmental Assessment concerning the proposal of pursuing a Mineral Withdrawal for the Special Interest Area known as the Mount Emmons Iron Bog. There is a 30-day comment period for this Environmental Assessment; comments must be received by June 26th of this year. Those wishing to obtain a copy of the Assessment or make comments may do so by writing the Gunnison Ranger District at 216 North Colorado, Gunnison, CO 81230 or calling Gay Austin or Mark Hatcher at (970) 641-0471. E-mail requests or comments can be sent to gtaustin@fs.fed.us.

Environmental Assessment
Mt.Emmons Iron Bog Proposed Mineral Withdrawal

USDA Forest Service
Grand Mesa, Uncompahgre, and Gunnison National Forests
Gunnison Ranger District
Gunnison, Colorado

I. Introduction:

This Environmental Assessment (EA) was prepared in response to the Grand Mesa, Uncompahgre, and Gunnison National Forests' (GMUG) Forest Land and Resource Management Plan (FLRMP) direction towards mineral withdrawal for the Mt.Emmons Iron Bog Special Interest Area.

This EA presents the environmental consequences of implementing the proposed action or alternatives to this action associated with withdrawal from mineral entry, National Forest lands within the boundaries of the Mt. Emmons Iron Bog Special Interest Area, and is not a decision document. It includes information about the affected environment and any concerns or issues that were presented.

For purposes of this EA, the Mt.Emmons Iron Bog Special Interest Area will be referred to as the "Iron Bog", based on past local use of the name, even though it is actually a fen (see *Affected Environment*).

For a period of two years from the date of original publication in the *Federal Register*, the Iron Bog is being segregated from the mining laws, but remains open to all other authorized uses unless the application is denied or cancelled or the withdrawal is approved prior to that date. The requested withdrawal is for a period of fifty years. The area segregated is shown on the map in Appendix C. The area to be segregated was determined by the Gunnison Ranger District in consultation with the Regional Office of the Forest Service and the BLM.

A. Purpose and Need of the Proposal:

The Iron Bog contains 75.6 acres administered by the Forest Service in T.14S., R.86W., 6th P.M., Section 6, Gunnison County, approximately 3.5 miles west of Crested Butte, Colorado. In 1991 the Iron Bog was given Special Interest Area designation, as part of the Amended FLRMP. To follow FLRMP direction and to protect this unique wetland from the effects of future (not from claims that are already present in the Iron Bog) mine claim location, mining, mineral development, and mine claim speculation, a withdrawal of these National Forest System lands from future mineral entry has been proposed.

The Forest Service seeks a withdrawal for the Iron Bog to follow the United States Department of the Interior, Fish and Wildlife Service (FWS) fen regulation. In June of 1998, the FWS designated the Iron Bog as a functioning fen (see *Affected Environment*)

under "Resource Category 1" of the Service's "Mitigation Policy" (*Federal Register*, Vol. 46, No. 15, February 4, 1981) because of the "irreplaceability" of this type of wetland habitat (see Appendix B, Cooper).

In addition to the above, a withdrawal for the Iron Bog would fall within the agreement reached between the Forest Service and Colorado Natural Areas Program in designation of the Iron Bog as a "Colorado Natural Area" (see *Affected Environment*).

The Iron Bog also needs protection as a research site. Local and regional researchers have been conducting biological, hydrological, and paleoecological research in the Iron Bog since 1981 (see *Justification*, Appendix A). It is a probable paleoecological site, being an 8,000 year old wetland (P.Fall, 1997), in addition to being the location for one Forest Service Sensitive plant population, three unusual insect populations, and one uncommon fungus population.

B. Public Notification:

Withdrawals of public lands are governed by Section 204 of the Federal Land Policy and Management Act of 1976 (FLPMA), regulations set forth in 43 CFR Part 2300, and the Bureau of Land Management (BLM). Pursuant to these regulations, on November 16, 1998, the notice of the proposed withdrawal for the Iron Bog was published in the *Federal Register* (Colorado 61627) to request public comment on the proposed action. The public notice started a 90-day comment period on the withdrawal application and the opportunity for a public meeting to be held. No objections were raised during this initial comment period. On September 15, 1999, the BLM conducted a meeting at the Gunnison County Courthouse in order to receive any additional comments from the public on the withdrawal. No objections were raised during this meeting. The public comment period for the EA started November 13, 1999 and lasted until April 3, 2000.

Based on the lack of negative issues identified during scoping for the EA and the lack of negative comments on the segregation, there appears to be little or no public opposition to the withdrawal.

II. Affected Environment:

The Iron Bog is actually a fen, according to Dr. David Cooper (Cooper, 1999) and the USDI Fish and Wildlife Service (McKee, 1999). A fen is a wetland maintained by ground water through active springs, which in this case, feed the fen with water at pH 2.6 to 4.4. The Iron Bog is a 2-3 acre acidic "iron fen" (Cooper, 1999) on the south side of Mt. Emmons. Two of the springs feeding the Iron Bog are warm springs and are open most of the winter. The fen is one of only a few rich fens (rich in mineral ions) with such low pH in all of Colorado. The water is rich in iron from its passage through layers of pyrite; when it reaches the surface of the fen, it oxidizes to sulfuric acid and deposits limonite that lines the bottom of the fen and also forms terraces. The spring water entering the fen is significantly higher in cadmium and zinc than at the outlet ($P<0.001$).

Thus, the fen acts to reduce these heavy metal ions from the fen waters before they drain into Coal Creek just above the intake of the Crested Butte Water Purification Plant.

According to N. Lamm (1998), the hydrology of the fen is complex. It lies below an unnamed fault on the south side of Mt. Emmons just west of the Keystone and Union faults where the Keystone adit is located. There are extensive dry iron deposits east of the pond and wetlands, suggesting that the wet portions of the fen were once larger than they are today. The water supply to the fen had already been diminished by 33% before 1980 by past mining development, and Lamm suggests that historic mining may have drained parts of the fen. According to Woodward-Clyde (Lamm, 1998), the tunnels of the old Keystone workings did drain some aquifers in the bedrock. The very existence of this unique fen is dependent on undisturbed groundwater movement, and any activities nearby – whether mining, recreational, or development – any activity must be carefully considered.

The biota of the acid fen is unique. The communities are dominated by the cottonsedge, Eriophorum angustifolium, various sedges of the genus Carex, rushes of Juncus species, and four or more species of Sphagnum moss. The fen is one of only 2 sites where the sundew, Drosera rotundifolia, is found in Colorado. As a result of its unique distribution, the Colorado Natural Heritage Program has listed the sundew as G5S2 (Globally: demonstrably secure; State: imperiled within state, vulnerable to extinction). An aquatic insect called a midge, Paroclus, was previously found only in South America, and the species is unknown (S. Dodson, U. Wisconsin). Another midge found in the fen, Boreochlus species, harbors a trichomycete fungus (uncertain species) in its gut and this symbiosis is found nowhere else in the world (M. White, U. Kansas). Zygogonium is a purple, filamentous alga, which is restricted to acidic, aquatic habitats and is of unknown species. The dragonflies, Somatochlora semicircularis and Leucorrhinia hudsonica, are also uncommon and found only in higher altitudes of Colorado and Canada, and yet they breed in the fen. There are no fish or salamanders in the waters of the fen that may explain the ability of some of the rare insect fauna to survive there. The diversity of the fen habitat combined with the surrounding forest and subalpine meadows supports at least five species of small mammals.

The Iron Bog (fen) has been a source of research interest to many scientists – particularly those at the Rocky Mountain Biological Laboratory at Gothic, Colorado (see Appendix B). At present there are 16 researchers, plus various accompanying graduate and undergraduate students, conducting research in the fen.

As a rare source of history on vegetation, the Iron Bog is a probable paleoecological site. A researcher has used pollen and plant macrofossils from the Iron Bog to document changes in dynamics and plant species composition of a subalpine forest in western Colorado over the past 8,000 years.

The USDI Fish and Wildlife Service consider the Iron Bog a Resource Category 1 functioning fen. It was designated a Special Interest Area by the USDA Forest Service in

1980. It was registered as a Colorado State Natural Area in 1980 and the formal Articles of Designation as a state Natural Area were signed in 1999.

The management area prescription from the FLRMP is:

10C – Special Interest Areas

The current 10C management direction is to protect these areas with unusual botanical, historical, scenic, geological, zoological, or paleontological characteristics and to "withdraw from mineral entry in conformance with Section 204 of the Federal Land Policy and Management Act of 1976 (90 Stat. 2743:43 U.S.C.1701, et seq.)." The proposed withdrawal will not affect the known cultural resource sites in the area (see Appendix D).

There are 11 existing mining claims overlying the Iron Bog. The proposed withdrawal will not affect the legality of these claims.

III. Proposed Action:

Following the USDI Fish and Wildlife Service's new fen regulation (see Attachment B), the Forest Service proposes to further protect the Iron Bog with the implementation of a mineral withdrawal request with the Department of the Interior. Under this alternative (Alternative 2), existing claims will continue but future claims will not be allowed. This will not change the on-the-ground management for the Iron Bog. The proposed action is consistent with the overall management direction provided within the Forest Plan. The Forest Plan is being implemented as required by the Forest and Rangeland Renewable Resources Planning Act of 1974, and the National Forest Management Act of 1976. The proposed action is not connected to or dependent upon any other action in this same area. This plan does not establish a precedent for other actions that result in significant environmental effects.

IV. Environmental Issues:

Under the National Environmental Policy Act, the USDA Forest Service is required to scope the public, affected individuals and/or groups, and other agencies to help identify significant issues related to the decision to be made. Internal scooping for the EA was completed at the Forest Service District and Supervisor's offices. The BLM and the Colorado Natural Areas Program are co-operating agencies in the preparation of this Environmental Assessment, per 43 CFR 2310.3. Sections 204 of FLPMA and 43 CFR Part 2310.3 require the preparation of certain materials for incorporation into a case file for submission to the Secretary of the Interior. This EA is one of those required documents. The issues noted below are in direct response to the requirements of 43 CFR Part 2310.

Biological Environment:

1. Impacts to any Threatened, Endangered, Sensitive (TES) species or other species of concern.

Economic Environment:

1. Impact of the proposed changes in use associated with the proposed action on individuals, local communities, state, and local interests (educational research values), and the regional economy.

Physical Environment:

1. Impacts on mining claims, mineral leases, known mineral deposits, past and present mineral production, future mineral potential, and present and potential mineral demand.

2. Impacts on the hydrology, water chemistry, and terrace structure of the Iron Bog.

3. Impacts to wetlands.

4. Impacts to heritage resources.

V. Alternatives:

Mitigation common to all alternatives:

All management treatments for these alternatives would be mitigated by following management requirements specified in the FLRMP, which contains standards and guidelines for quantifying the acceptable limits within which management practices must fall, and direction provided, by FSM 2372. For both alternatives below, there will be no changes in management and no on-the-ground disturbance. Surface management alternatives will not be considered here, as this EA only considers the effects of the mineral withdrawal.

Two management alternatives are considered for the Mt. Emmons Iron Bog mineral withdrawal area:

Alternative 1 (No Action, No Mineral Withdrawal)

Under this alternative, the Forest Service would withdraw their application for the Mineral Withdrawal of the 76 acres of the Iron Bog. National Forest system lands would remain subject to location, entry, development, and patenting under the General Mining Law of 1872. The Iron Bog (fen) would not be protected from future mineral claims. An operating plan, careful assessment for TES plants and

wildlife and paleoecological site status, possible 404 permit (U.S. Army Corps of Engineers) and Environmental Assessment (EA) or Impact Statement (EIS) would need to be completed with the Forest Service prior to project approval.

Alternative 2 (Withdrawal of the 76 acres of the Iron Bog as published in *Federal Register*)

Under this alternative, the Forest Service would continue with its application for withdrawal. If approved the subject 76 acres are removed from any future mineral location and entry under the general mining laws for a period of fifty years. The Forest Service would be able to protect the Iron Bog from future claims for the FWS's fen regulation. The withdrawal would be implemented by the BLM. Mining of the existing claims could still take place under the 1872 Mining Laws. For these claims only, an operating plan, validity report, paleoecological assessment, and Environmental Assessment (EA) or Impact Statement (EIS) would need to be completed with the Forest Service prior to project ground disturbance. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

VI. Environmental Effects:

This section discusses the effects in order of Environmental Issues. The specific effects of mining on the Iron Bog cannot be analyzed in this EA because there is no current mining plan submitted to the Forest Service. Without a conceptual mining plan there is not way to determine any effects from mining to the Iron Bog. When an operating plan is filed, there will be an Environmental studies conducted to determine those project specific effects. Because mining may take place on the existing claims with either alternative, we will only analyze the effects of the alternatives in regards to the mineral withdrawal.

A. Biological Environment:

1. Threatened, Endangered, and Sensitive (TES) Species and Species of Concern – Plants and Wildlife

Since there will be no change in management nor ground disturbance with the withdrawal, neither of the alternatives will have any measurable effects on Threatened, Endangered, or Sensitive (TES) plants, plants of concern, nor TES wildlife in the Iron Bog (USDA Forest Service, *Plant Biological Evaluation and Assessment*, 2000). Mining in general may have effects on the hydrologic processes of the fen and could potentially drain the fen. The vibration and shock waves associated with blasting, use of heavy equipment, and road construction could also drain the fen and destroy the Sensitive plant populations. Alteration of ground water flows by mining operations may affect the Mt. Emmons Iron Bog. The survival of the sundew plant or other bog [fen] organisms could depend on narrow ranges of water temperature, or trace mineral conditions that could be difficult to determine and duplicate" (Allison, 1999). Although mining is allowed under

both alternatives in existing claims, Alternative 2 (withdrawal) would provide better protection: No future claims could be located and if the existing claims were determined to be invalid, or released, potential mining would be eliminated from the Iron Bog.

Alternative 1 (no withdrawal): Under this alternative, the

Forest Service would remove their application for the withdrawal and the 76 acres of the Iron Bog on National Forest lands would remain open to location, entry, development, and patenting under the General Mining Law of 1872. No protection of the Iron Bog would be provided for the USDI Fish and Wildlife Service's "Resource Category 1" fen designation. This also goes against Forest Service regulation of providing protection in Special Interest Areas for the unusual historical, botanical, zoological, educational, hydrological, ecological, and biological resource values (FSM 2372.02).

Alternative 2 (withdrawal): Under this alternative, there will be no impact on the sundew and, more likely, there will be positive implications (USDA Forest Service, *Plant Biological Evaluation and Assessment*, 2000). Sundew species viability would be protected from mining under any new claims. Fen habitat for the sundew (*Drosera rotundifolia*), a Sensitive plant, found in the Iron Bog would be protected from degradation by mining operations on new claims or claims determined by a mineral examination to be invalid. All measures to protect the sundew would be investigated before approval of any mining operation plan. Wildlife habitat would also be protected from mining under any new claims (USDA Forest Service, Wildlife Biological Evaluation, 2000).

2. Irreplaceability of fen habitat

According to the FWS, fens cannot be considered a renewable resource because of their extremely slow rate of formation. Many of the fens in Colorado are over 10,000 years old because they only accumulate organic material in the form of peat at the rate of 4.3 to 16.2 inches per thousand years. At present in Colorado, no reliable methods have been found to be able to recreate a new fen or to restore a badly damaged one. Because of this irreplaceability of fen, the FWS recommends *every reasonable effort should be made to avoid impacting that habitat type* with a mitigation goal of *no loss of existing habitat value.*

Alternative 1 (no withdrawal): If the withdrawal were not completed for the Iron Bog, the Forest Service would be limited in its protection of the fen from mineral entry.

Alternative 2 (withdrawal): With this Alternative, the Forest Service could provide future protection for the Iron Bog fen habitat: no future claims beyond the existing claims could be located or developed. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

B. Economic Environment:

1. Impacts of the proposed changes in use associated with the proposed action on individuals, groups, and the regional economy.

Withdrawing this area from mineral entry would have little regional economic impact, as the economic molybdenum deposits in the area are located outside the withdrawal area.. Forest Service mineral specialists have determined that the mineral potential is low in the 76 acres of the Iron Bog. Ongoing research will not be affected by the withdrawal because there will not be any ground disturbance nor change in management.

Alternative 1 (no withdrawal): Removal of the application for withdrawal would leave the area open to the public for additional mineral exploration and possible development activities. In the event that prospecting or mineral development did take place, there could be significant disruption or halting of research activities associated with the Iron Bog. Alternative 1 is considered to have a higher risk than Alternative 2 (withdrawal) to cause loss of all or part of the Iron Bog fen habitat. Even partial loss of the fen habitat would result in the loss of the opportunity for research, and effect the opportunity to educate students and the general public on wetlands and a unique ecosystem.

Alternative 2 (withdrawal): This Alternative eliminates the risk of future mining claim activity. Helping ensure protection of the educational research values of the Iron Bog. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

C. Physical Environment:

1. Geology and minerals

Alternative 1 (no withdrawal): There would be no change to existing mining claims in the Iron Bog, mineral leases, known mineral deposits, past and present mineral production, future mineral potential, and present and potential mineral demand.

Alternative 2 (Withdrawal): Forest Service Policy requires that any existing claims within a mineral withdrawal must have a validity exam before any mining activity can be approved. If the claims were found to be invalid no mining activity could be permitted. If the claims were found to be valid there would be no additional impact on existing mining claims in the Iron Bog, mineral leases, known mineral deposits, past mineral production, and present mineral demand than Alternative 1. Alternative 2, which if approved by the BLM will prohibit future location or entry of claims to take place within the Iron Bog, will have little to no impact on future mineral potential within the Iron Bog. A mineral report prepared for the BLM by a Forest Service Hydro-geologist found that the locatable mineral potential is rated low for precious and base metals and for all other minerals. The withdrawal would have little to no effect on the amount of locatable minerals within the Gunnison National Forest. (USDA Forest Service Mineral Potential Report, 2000).

2. Water Resources

Since there will be no ground disturbance nor change in management with either of the Alternatives, neither Alternative 1 (no withdrawal) nor Alternative 2 (withdrawal) will have any effect on water resources within the Iron Bog. Alternative 2 will provide more protection for the water resources of the Iron Bog than Alternative 1: if the withdrawal takes place, no future claims may be located within the Iron Bog. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

3. Wetlands

The Iron Bog is a wetland but neither Alternative will have an effect on it because there will not be any ground disturbance nor change in management with implementation of either Alternative. Prior to any development of mining claims in wetlands within the Iron Bog, a 404 permit will need to be filed with the U.S. Army Corps of Engineers.

4. Heritage Resources

Even though the Iron Bog has been identified as a probable paleoecological site, neither Alternative will have an effect on this resource because there will not be any ground disturbance nor change in management. Alternative 2 will provide more protection for the probable paleoecological site than Alternative 1: no future claims may be located within the Iron Bog. If the existing claims were determined to be invalid, or released, potential mining could be eliminated from the Iron Bog.

D. Cumulative Effects:

The proposed action to withdraw the 76 acres of the Iron Bog is not connected to any other action. There are no identifiable cumulative effects associated with the proposed withdrawal. The Forest Service has taken action to clearly identify and protect the area for botanical resources, including adoption of designation 10C (Special Interest Area) in the Grand Mesa, Uncompahgre, and Gunnison National Forests Land and Resource management Plan (FLRMP), and cooperation with the Colorado Natural Areas Program for designation of the Iron Bog as a state Natural Area.

VII. Consultation with Others:

The following individuals from Federal, state, and local agencies were consulted during the preparation of this Environmental Assessment:

U.S. Forest Service:

John Almy, Forest Hydrologist, USDA Forest Service, Forest Supervisor's Office, Delta, CO.
Peter Ambrose, Forest Archeologist, USDA Forest Service, Forest Supervisor's Office, Delta, CO.
Evan DeBloois, Washington Office Archeologist, USDA Forest Service, Washington, DC.
Rusty Dersch, Regional Geologist, USDA Forest Service, Regional Office, Lakewood, CO.
Mark Hatcher, Natural Resource Manager, USDA Forest Service, Gunnison Ranger District, Gunnison, CO.
Carol Howe, Forest NEPA Coordinator, USDA Forest Service, Forest Supervisor's Office, Delta, CO.
Barry Johnston, Forest Ecologist, USDA Forest Service, Forest Supervisor's Office, Gunnison, CO.
Andy Kratz, Botanist, USDA Forest Service, Regional Office, Lakewood, CO.
Terry Liestman, Regional Archeologist, USDA Forest Service, Regional Office, Lakewood, CO.
Liane Mattson, District Geologist, USDA Forest Service, Paonia Ranger District, Paonia, CO.
Wendy Reinmuth, Wildlife Biologist, USDA Forest Service, Gunnison Ranger District, Gunnison, CO.
Ray Rossman, Archeologist, USDA Forest Service, Gunnison Ranger District, Gunnison, CO.
Steve Shelly, Botanist, USDA Forest Service, Regional Office, Missoula, MT.

U.S. Bureau of Land Management:

Doris Chelius, State BLM Mineral Withdrawal Coordinator, U.S. Department of the Interior, BLM, Colorado State Office, Denver

U.S. Department of the Interior, Fish and Wildlife Service, Denver, CO.,:

Jan McKee, Botanist

Colorado State University, Ft. Collins, CO:

Dr. David Cooper, Botanist and Wetland Research Scientist

Rocky Mountain Biological Laboratory, Gothic, CO.:

Dr. Ruth Willey, Senior Investigator

Colorado Natural Areas Program, Denver, CO.:

Janet Coles, Botanist

VIII. List of References:

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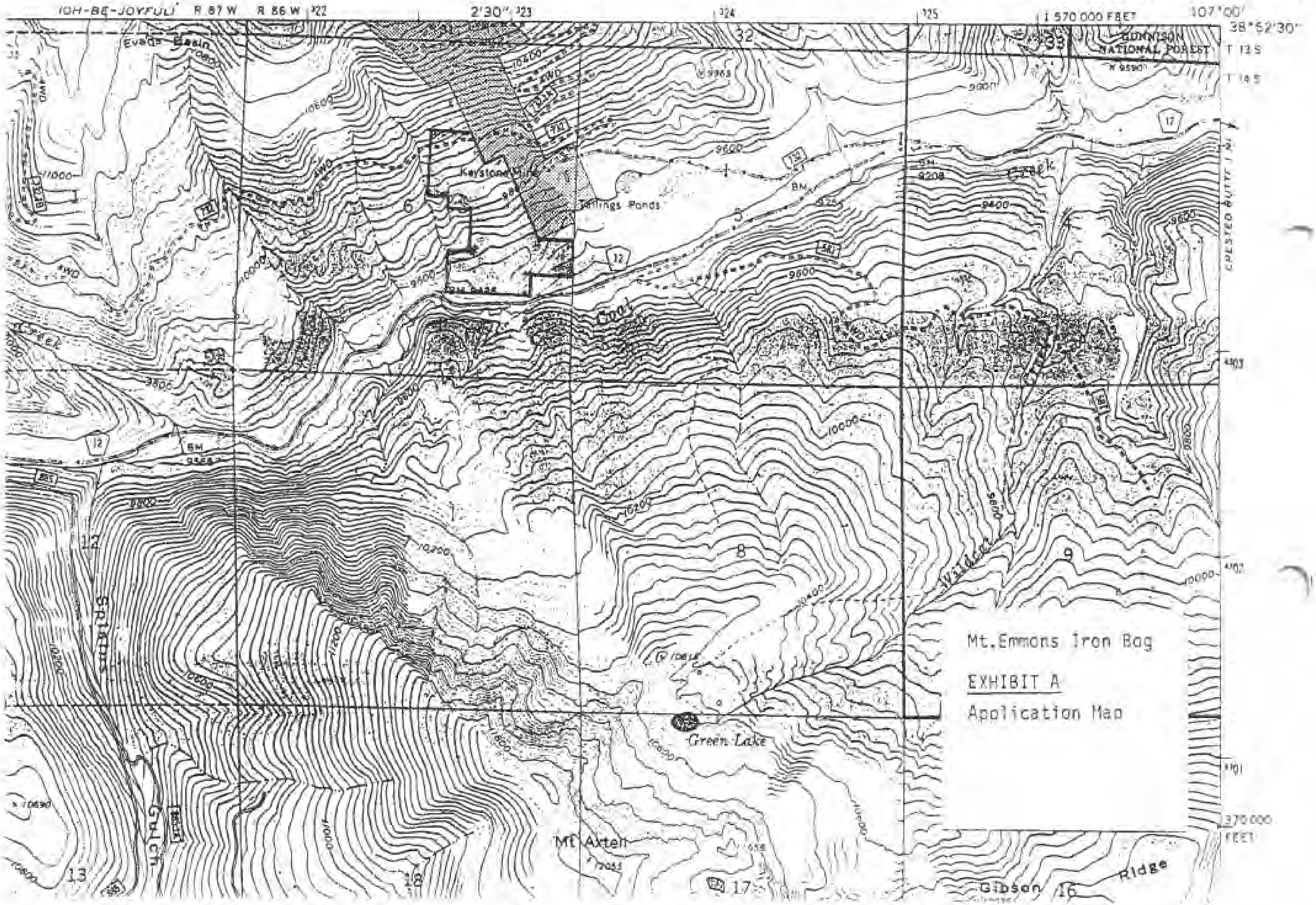
Appendix A

MT. AXTELL QUADRANGLE
COLORADO–GUNNISON CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 ANTHRACITE 15' QUADRANGLE



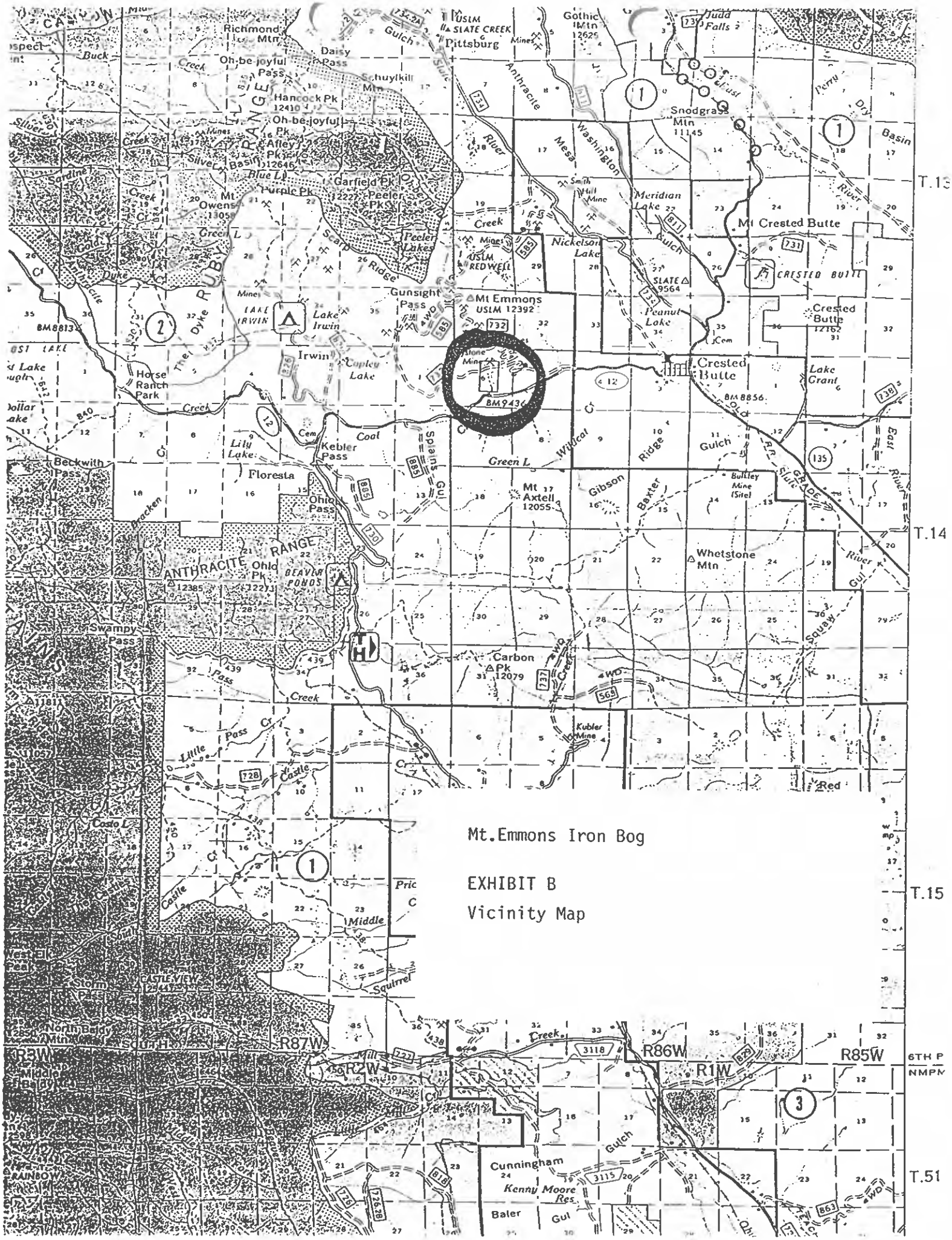

Mt.Emmons Iron Bog
EXHIBIT B
Vicinity Map
T.13
T.14
T.15
T.51
R87W
R86W
R85W
R2W
R1W
6TH P
NMPM
Mt Emmons
USLM 12392
Mt Crested Butte
Crested Butte
Gunsight Pass
Irwin
Lake Irwin
Kebler Pass
Ohio Pass
Floresta
Beckwith Pass
Swampy Pass
Carbon Pk
12079
Whetstone Mtn
Mt Axtell
12055
Snodgrass Mtn
11145
Gothic Mtn
12625
Pittsburg
Richmond Mtn
Schuylkill Mtn
Hancock Pk
12410
Oh-be-joyful Pk
12646
Garfield Pk
12227
Peeler Pks
Mt Owens
13056
Purple Pk
Scarp Ridge
Peeler Lakes
Nickelson Lake
Meridian Lake
Peanut Lake
Lake Grant
Cement Creek
Coal Creek
Green L
Wildcat Ridge
Gibson Gulch
Baxter Gulch
Anthracite Range
Ohio Pk
12385
Beaver Ponds
Castle Creek
Middle Creek
Cunningham Gulch
Kenny Moore Res.
Baler Gulch
Kubler Mine
Bulkley Mine (Site)
Horse Ranch Park
Lily Lake
Cement Creek
Crested Butte
12162
Slate Creek
Pittsburg
Judd Falls
Dry Basin
Perry Creek
Washington Mesa
Anthracite Creek
Ruby Anthracite Creek
Oh-be-joyful Creek
Silver Creek
Sardine Creek
Cold Creek
Dyke Creek
Thel Dyke
Lake Irwin
Copley Lake
Lake Irwin
Stone Mine
BM 9436
BM 8813
BM 8856
Slate Δ 9564
Crested Butte
Mt Crested Butte
Lake Irwin
Irwin
Kebler Pass
Ohio Pass
Gunsight Pass
Mt Emmons
Carbon Pk
Whetstone Mtn
Mt Axtell
Snodgrass Mtn
Gothic Mtn
Pittsburg
Judd Falls
Meridian Lake
Nickelson Lake
Peanut Lake
Lake Grant
Cement Creek
Coal Creek
Green L
Wildcat Ridge
Gibson Gulch
Baxter Gulch
Anthracite Range
Ohio Pk
Beaver Ponds
Castle Creek
Middle Creek
Cunningham Gulch
Kenny Moore Res.
Baler Gulch
Kubler Mine
Bulkley Mine (Site)
Horse Ranch Park
Lily Lake
Cement Creek
Crested Butte
Slate Creek
Pittsburg
Judd Falls
Dry Basin
Perry Creek
Washington Mesa
Anthracite Creek
Ruby Anthracite Creek
Oh-be-joyful Creek
Silver Creek
Sardine Creek
Cold Creek
Dyke Creek
Thel Dyke
Lake Irwin
Copley Lake
Lake Irwin
Stone Mine
BM 9436
BM 8813
BM 8856
Slate Δ 9564
Crested Butte
Mt Crested Butte

Exhibit C

Area recommended for Withdrawal from Mineral Entry Under the General Mining Laws

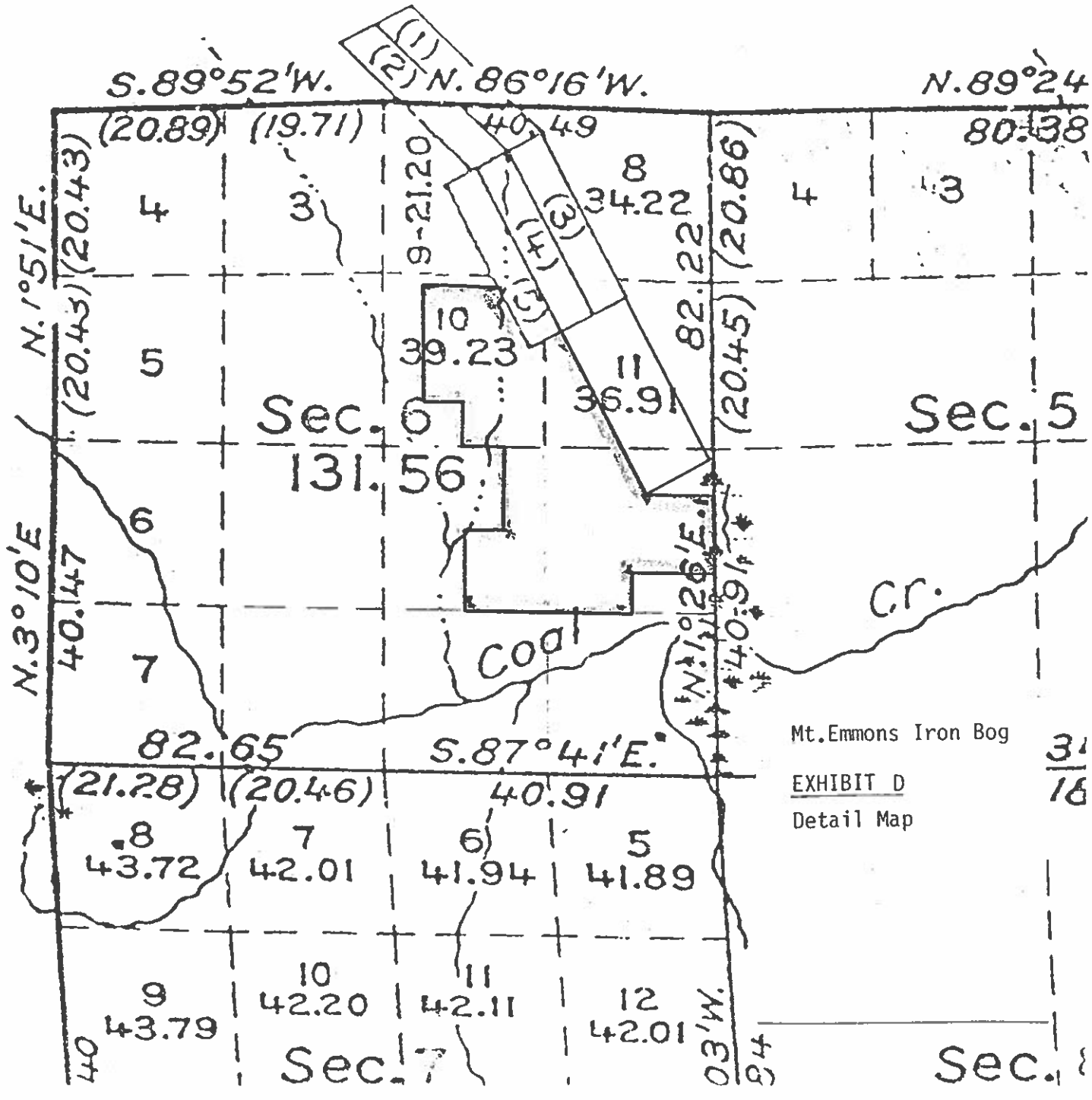
National Forest System lands within the Following described area:

Gunnison National Forest

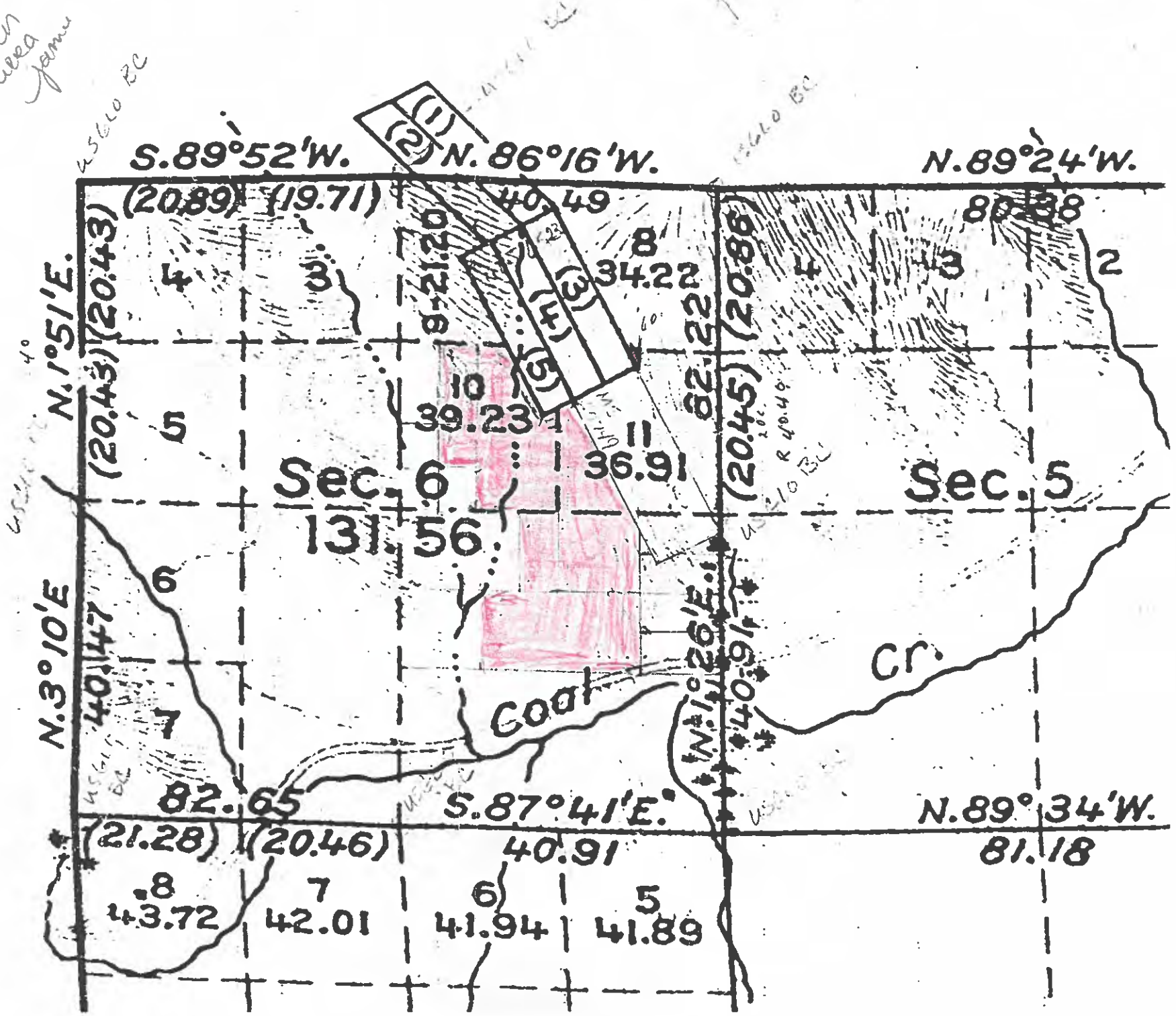
T.14S.,R.86W., 6th P.M.
Section 6

	ACRES
E1/2 Lot 10 except MS 6523	15.7
NE1/4SW1/4 Lot 10	2.5
E1/2NW1/4 Lot 10	4
W1/2 Lot 11 except MS 6523 & MS 20749	8
SE1/4NW1/4SE1/4	10
E1/2NE1/4NW1/4SE1/4	5
W1/2NE1/4SE1/4 except MS 20749	20
N1/2SE1/4NE1/4SE1/4	5
S1/2NE1/4NE1/4SE1/4	5
W1/2W1/2N1/2NE1/4NE1/4SE1/4 except MS 20749	0.4
Total	75.6

WNSHIP NO. 14 SOU

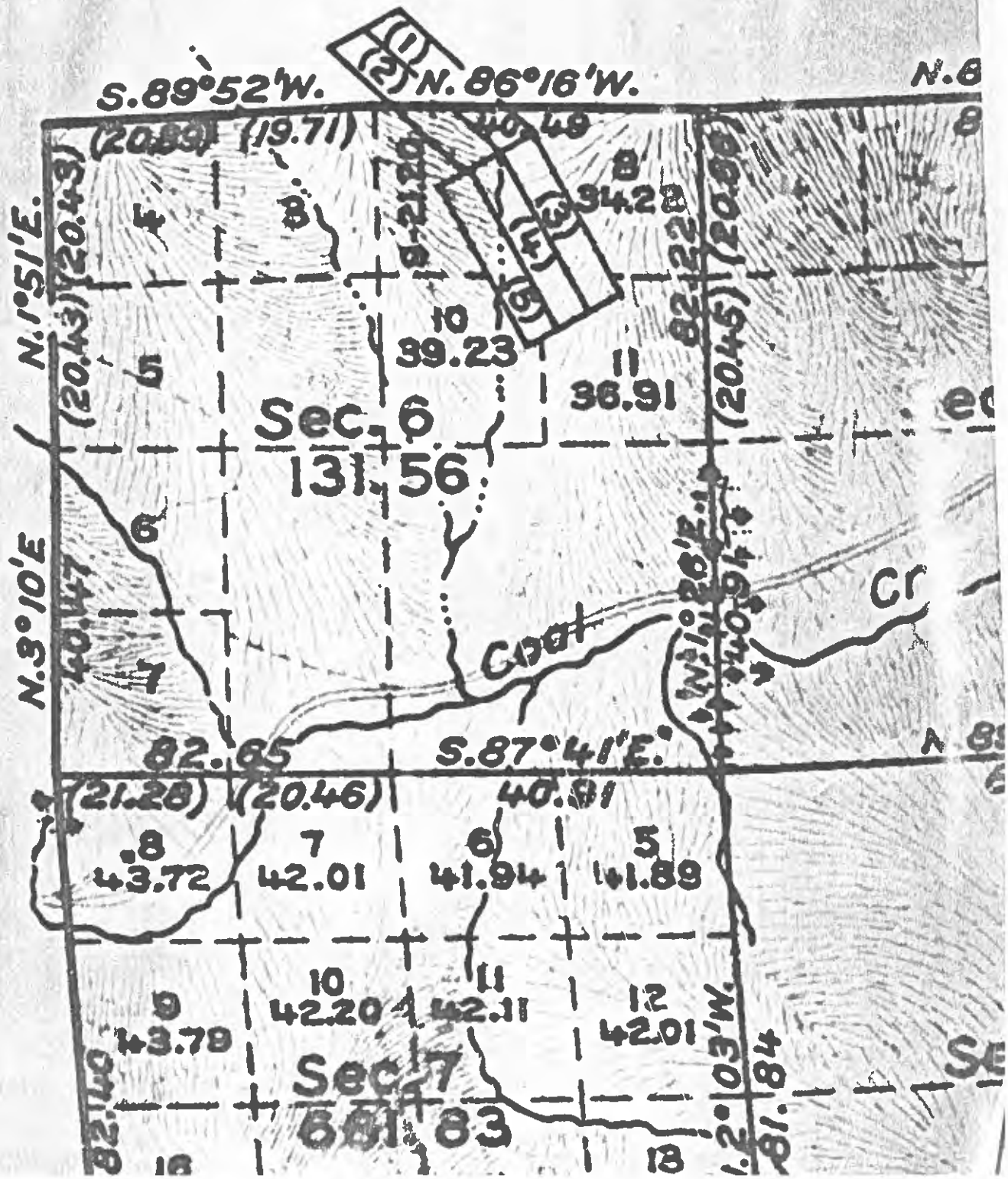


Gary -
this is
from Dennis
Valdovinos - Fen
Withdrawal area
Jamie



TOWNSHIP NO.14 SO

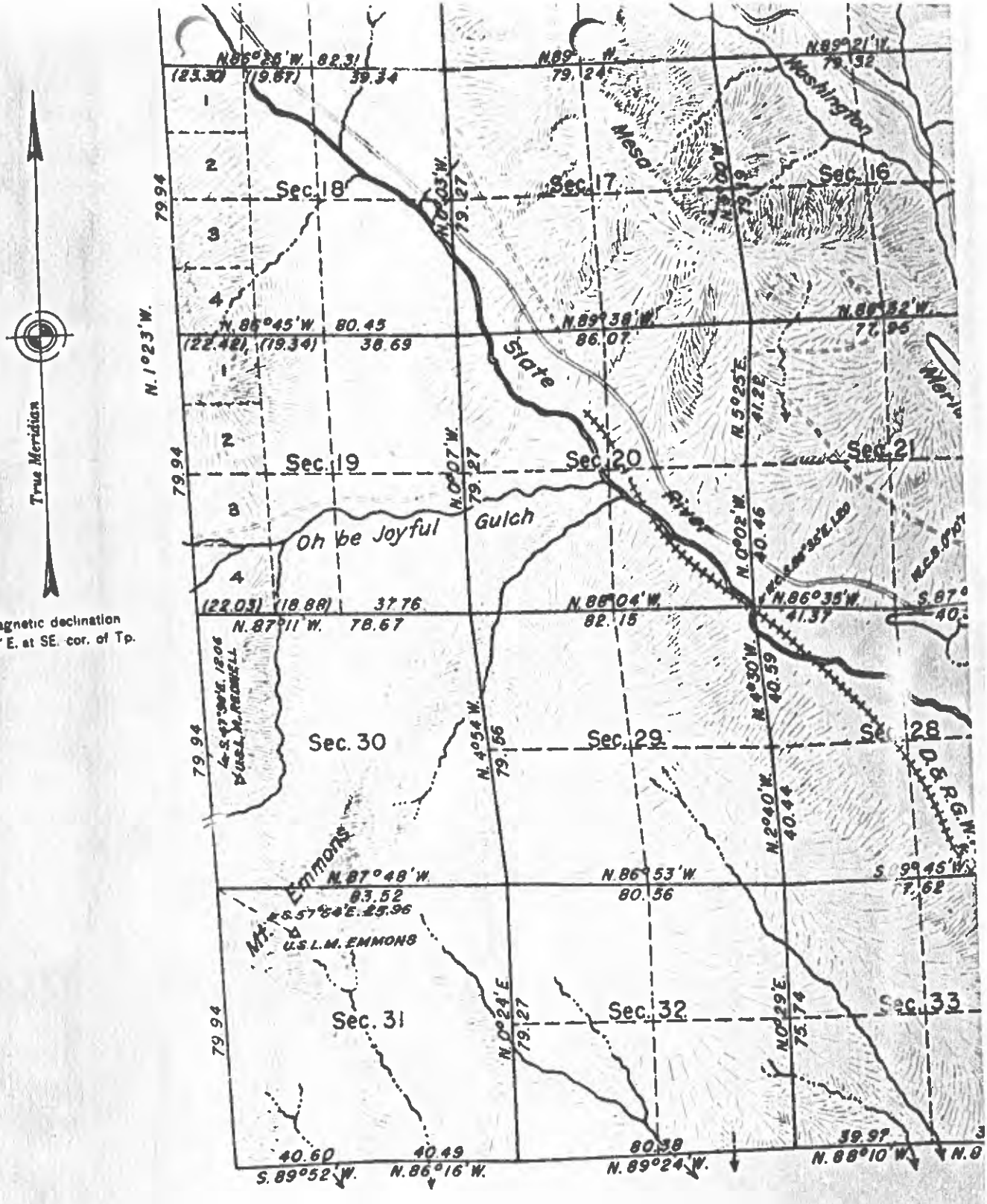
—from Ron Keister
BLM Surveyor
6/6/00



Sec 6
T14S
R.86W.

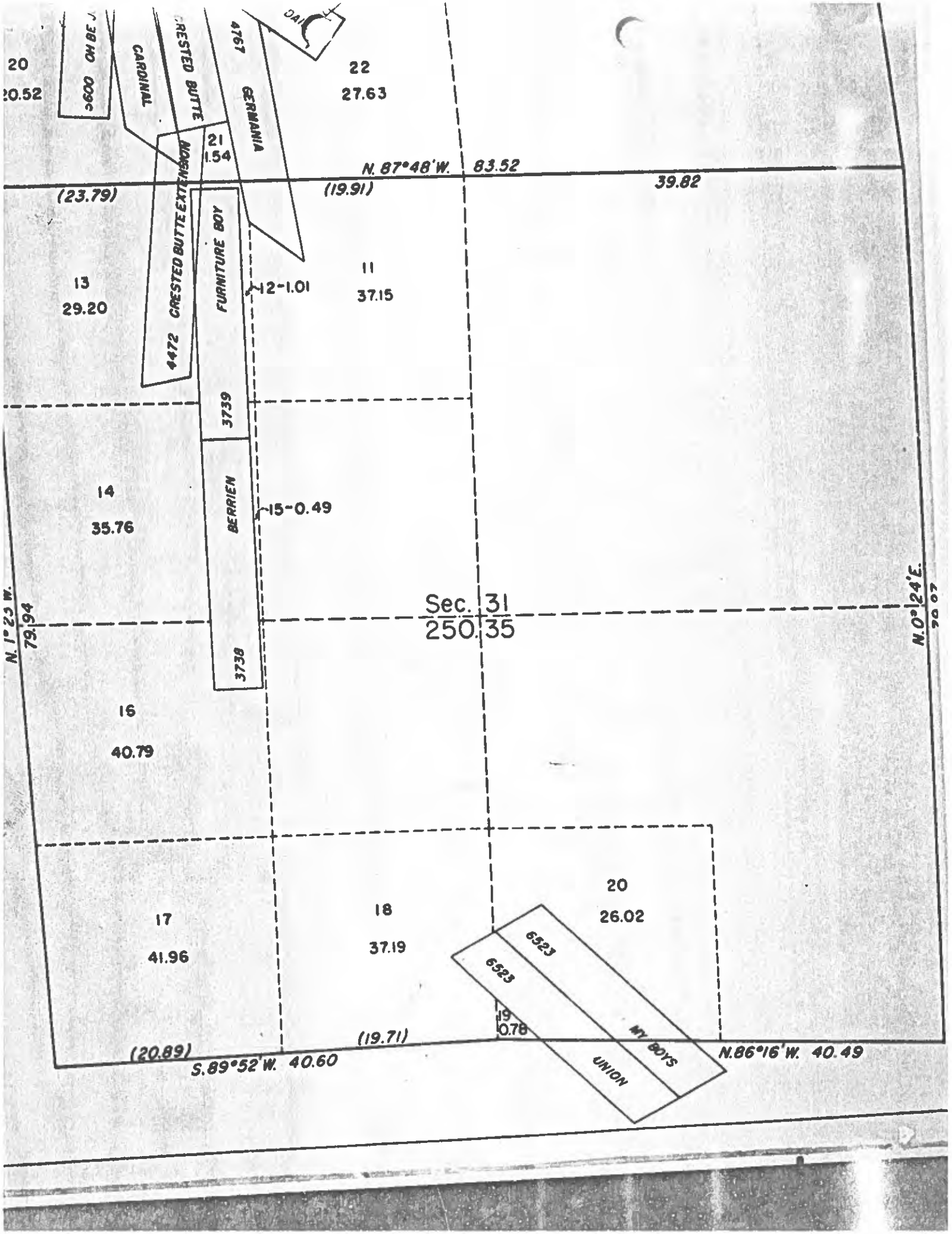
NSHIP NO.14 SOUTH, RANGE NO.86 WEST OF T

DEPENDENT R



All boundaries originally surveyed by Deputy Kellogg in 1878, the township subdivided by Deputy Swindler in 1879. South boundar surveyed by Lyle F. Jones in 1939, who partially resurveyed the Ea boundary and a portion of the subdivisional lines August 23 to Sep 20, 1946, while the North and West boundaries and remainder of the boundary and subdivisional lines were resurveyed by F. Wayne Forr Leo M. Petersen August 20 to October 3, 1947, all under Special In structions dated December 13, 1938, for Group 318, Colorado.

J.V.M.
W.E.G.


20
20.52
CARDINAL
CRESTED BUTTE
4767 GERMANIA
22
27.63
21
1.54
N. 87°48'W. 83.52
(23.79)
(19.91)
39.82
CRESTED BUTTE EXTENSION
4472
FURNITURE BOY
13
29.20
12-1.01
11
37.15
3739
BERRIEN
14
35.76
15-0.49
Sec. 31
250.35
N. 1°23 W.
79.94
N.0°24'E.
3738
16
40.79
17
41.96
18
37.19
20
26.02
6523
6523
MY BOYS
UNION
19
0.78
(19.71)
(20.89)
S. 89°52'W. 40.60
N.86°16'W. 40.49

Mt. Crested Butte, CO
Town Clerk/Court Clerk

December 6, 2022

Doug Vilsack, State Director
Bureau of Land Management, Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215
Via email at: BLM_CO_Thompson_Divide@blm.gov

Re: Support for the Proposed Thompson Divide and Mt. Emmons Mineral Withdrawal

Dear State Director Vilsack:

The Town of Mt. Crested Butte strongly supports the proposed Thompson Divide Administrative Mineral Withdrawal, a landscape that includes the Mt. Emmons area in close proximity to our community. We support the proposal to withdraw – subject to valid existing rights – lands in the Thompson Divide and Mt. Emmons areas from all forms of (1) entry, appropriation, and disposal under the public land laws; (2) location, entry, and patent under mining laws; and (3) operation of the mineral leasing, mineral materials, and geothermal leasing laws.

Included in the proposed Thompson Divide withdrawal area are federal lands near Mt. Crested Butte, such as the iconic Kebler Pass landscape along County Road 12 and lands adjacent to the Raggeds and West Elk Wilderness. The inclusion of federal lands surrounding Mt. Emmons is of particular importance to our community and ski town economy. The Town of Mt. Crested Butte has a vibrant local economy based on outdoor recreation, ranching, and tourism. Our visitors come here to experience and enjoy the picturesque and healthy environment that supports diverse outdoor recreation opportunities. Conservation of Mt. Emmons and the greater Thompson Divide is critical to the economic and environmental sustainability of Mt. Crested Butte, and we strongly support the 20-year protection that the mineral withdrawal would secure.

Hunting, fishing, hiking, mountain biking, and backcountry winter sports are cherished activities that occur within the mineral withdrawal area. Wildlife thrives here, with abundant herds of elk and mule deer, and streams teaming with trout serve as the critical headwaters of the Colorado River. Historic ranching also stands to benefit from this withdrawal, as livestock operations rely on federal grazing in the withdrawal area. In addition, the withdrawal area in Gunnison County is directly upstream from the farms, orchards, and vineyards of Paonia and surrounding communities, an area that supplies much of the fresh, local produce for Mt. Crested Butte residents and businesses.

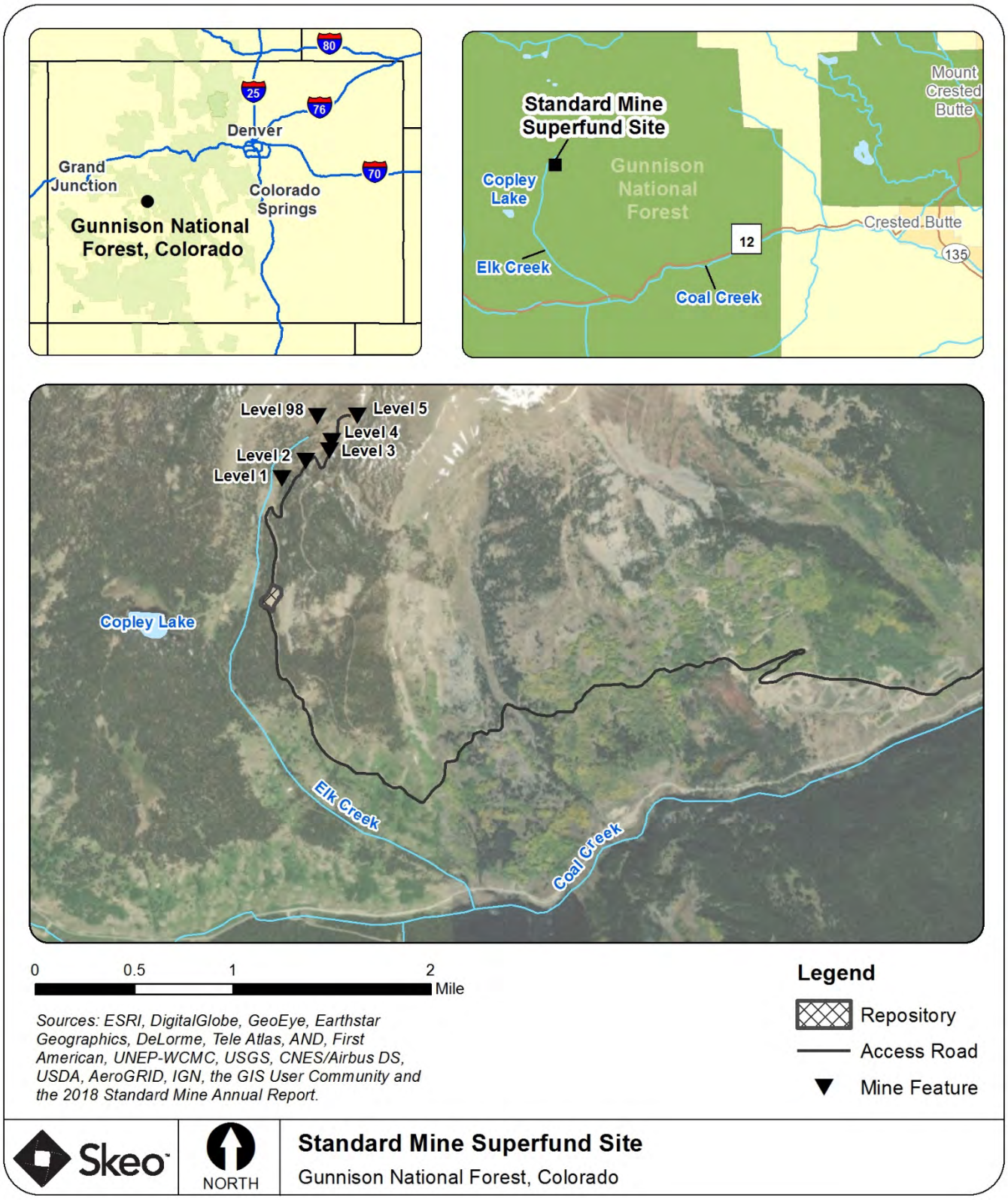
The proposed mineral withdrawal is good for Mt. Crested Butte, good for its residents and visitors, and

good for its surrounding public lands, waters, and wildlife.

Sincerely,

Nicholas Kempin
Mayor, Town of Mt. Crested Butte

Figure 1: Site Vicinity Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

City of Gunnison

November 16, 2022

State Director, Bureau of Land Management
Colorado State Office
2850 Youngfield Street
Lakewood, Colorado 80215
Email: BLM_CO_Thompson_Divide@blm.gov

USDA Forest Service
Rocky Mountain Region
1617 Cole Blvd. Building 17
Lakewood, Colorado 80401

Re: Support for the Proposed Thompson Divide and Mt. Emmons Mineral Withdrawal

To Whom it May Concern:

The City of Gunnison, Colorado, strongly supports the proposed withdrawal of the Thompson Divide area, including the area surrounding Mt. Emmons. We specifically support the proposal to withdrawal- subject to valid existing rights- approximately 224,794 acres of land in the Thompson Divide area from all forms of (1) entry, appropriation, and disposal under the public land laws; (2) location, entry, and patent under mining laws; and (3) operation of the mineral leasing, mineral materials, and geothermal leasing laws.

Included in the Thompson Divide withdrawal area are federal lands at the headwaters of the Gunnison Valley, including the iconic Kebler Pass landscape along County Road 12, lands near Ohio Pass, and lands adjacent to the Raggeds Wilderness and West Elk Wilderness. Tourists base out of Gunnison to tour the West Elk Scenic Byway, particularly during fall foliage for our valley's scenic views. Large-scale industrial mining in this area would negatively impact this tourism.

The inclusion of lands surrounding Mt. Emmons is of particular importance to our City's economic well-being. Local stockgrowers have in the past expressed concern over potential impacts to cattle health if there were to be increased levels of molybdenum in our local streams due to the mining of the molybdenum deposit in Mt. Emmons. Our robust recreational economy relies on high-quality waters to sustain our fisheries and intact habitat to support our wildlife and hunting. The proposed withdrawal will protect our community from potential water quality and quantity impacts from mining, helping to protect our water supply while preserving our agricultural heritage and natural environment.

Conservation of this interconnected landscape is critical to the economic and environmental sustainability of the City of Gunnison, and we support the 20-year protection of this area through this mineral withdrawal.

Sincerely,

Ben Cowan
Acting City Manager, City of Gunnison

Town of Crested Butte

P.O. Box 39 Crested Butte, Colorado 81224

-A National Historic District-

Phone: (970) 349-5338
FAX: (970) 349-6626
www.townofcrestedbutte.com

Douglas J. Vilsack
BLM Colorado State Director
2850 Youngfield St.
Lakewood, CO 80215

Director Vilsack and Team:

The Town of Crested Butte is pleased to see the Notice of Proposed Withdrawal for Thompson Divide published in the federal register on October 17th, 2022. This takes lands in our area one step closer to permanent protection from large scale extractive industries, a pursuit our Town has undertaken for the last 4 decades. While this withdrawal does not hold the permanence that a congressional withdrawal may, we are largely supportive of its implementation until a congressional solution can be employed.

We would like to reiterate our desire to engage with the lead agency, which was said to be the GMUG National Forest at the December 14th, 2022, public meeting in Carbondale, as a cooperating agency. The Town of Crested Butte has participated as a cooperating agency on several forest initiatives to help produce positive results both for the agencies and our constituency. The Thompson Divide Mineral Withdrawal will be no different. Our qualification as special expertise in the planning area under 43 CFR § 46.225 would require an invitation by the lead agency and we hope to see one as the NEPA process begins.

The Town has been working diligently with the GMUG leadership, Gunnison County, Mt. Emmons Mining Company (MEMC), and the Crested Butte Land Trust to execute a land exchange, conservation easement, and mineral extinguishment on properties on Mt. Emmons. This exchange is intended to permanently protect this area from large scale mineral extraction and ensure that water treatment facilities can be maintained by MEMC with permanence. The map released in the Federal Register notice for the Proposed Withdrawal for Thompson Divide unfortunately overlaps with federal parcels 2 and 3 of the exchange, theoretically segregating them from disposal by the Forest Service through the land exchange. Town would like to see the Thompson Divide legal description amended to the absolute minimum necessary degree to exclude these parcels so the land exchange can be completed as scheduled. We have attached the legal descriptions of these parcels as an exhibit to this comment letter.

We appreciate the opportunity to continue working with the federal agencies that surround our Township and own most of the land in our primary watershed. We are hopeful that the Proposed Withdrawal for Thompson Divide will be accepted by Secretary Haaland after the NEPA process is complete, allowing us to bridge the gap until a congressional withdrawal can be implemented. The Town of Crested Butte is ready and willing to participate in the withdrawal process and we look forward to doing so.

Regards,

Mayor Ian Billick

Cc: Chad Stewart-GMUG Forest Supervisor
Anthony Edward-GMUG Deputy Forest Supervisor
Dayle Funka-Gunnison National Forest District Ranger
Jennifer Jardine-BLM Senior Realty Specialist
Scott Fitzwilliams-WRNF Forest Supervisor

Parcels Town of Crested Butte is requesting to be *excluded from* the Proposed Withdrawal for Thompson Divide to facilitate completion of the federal land exchange already underway.

Federal Parcel 2: Lands west of MEMC patented mineral surveys

Township 13 South, Range 86 West

Section 31:

Portions of Government lots 16-18, by extending line 3-4 of M.S. No. 20825, Park City No. 1 southwesterly 600.00 feet distance from corner no. 2, M.S. 20825, Park City No. 11, on said line 3-4 of M.S. No. 20825, Park City No. 1 to intersect a line parallel to line 2-3, M.S. No. 20825, Park City No. 11, thence along the said parallel line northwesterly to the intersection of the section line between section 31 and 36, and portions of Government lots 14 and 16, being the portion of M.S. No. 20926, Park City No. 15 lying east of the section line between section 31 and 36.Excepting there from all lands conveyed as Mineral Survey No. 20825, Patent No. 1226111, and Mineral Survey No. 20926, Patent No. 05-2004-0003;

and

Township 13 South, Range 87 West

Section 36 (unsurveyed):

All portions of M.S. No. 20926, Park City No. 15 in Section 36 (unsurveyed), and by extending line 2-3, M.S. No. 20926, Park City No. 15 southwesterly 600 feet +/_ to intersect a line described above from the intersection of sections 31 and 36 paralleling line 2-3, M.S. No. 20825, Park City No. 11.

Totaling approximately 81.49 acres, more or less.

Federal Parcel 3: Mineral Survey Fraction north of MEMC patented mineral surveys

Township 13 South, Range 86 West

Section 30: Government lot 21,

Section 31: Portion of Government lot 12 north of line 2-3 M.S. No. 20926, Park City 19, A Mineral Fraction bounded on the NE by Line 7-8, M.S. No. 4767, Germania Lode, bounded on the South by line 2-3, M.S. No. 20926, Park City 19 and bounded on the West by the East line of Government Lot 12.

Totaling approximately 3.15 acres, more or less.