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SUBJECT: U.S. Forest Service (USFS) Environmental Assessment (EA) on Proposed 20-year Mineral Leasing Withdrawal in Superior National Forest

Dear Supervisor Cummins,

I write with regard to the proposed withdrawal of approximately 234,328 acres of federal lands within the Superior National Forest from disposition under laws relating to mineral and geothermal leasing for a period of 20 years (“proposed withdrawal”).

I understand that the official comment period for the proposed withdrawal has closed and that the Forest Service might not provide a public comment period on its forthcoming environmental assessment. I hope, however, that the Forest Service is willing to consider this letter and the included analysis in its review of the economic impacts of the proposed withdrawal. Please include this letter in the official project record.

I am an economist with expertise in macroeconomics, the economics of the environment, and the analysis of economic data (econometrics). Jacob Bradt, a PhD student at the Harvard Kennedy School, has assisted me in the preparation of this letter, which he co-signs. We write as private citizens. We have received no compensation for this analysis, and neither of us have any financial interest in this matter.

We have reviewed the facts of the proposed withdrawal, economic studies of the withdrawal<sup>1</sup>, and related economics literature. The existing economic studies largely focus on the short-run effects of the withdrawal or their effects at some unspecified point over a medium-run horizon. This short- or medium-run focus misses what is in our view a key aspect of the economics of this proposal, the dynamic and longer-term economic effects of the proposed withdrawal.

In this letter, we provide an estimated range of the effects of the proposed withdrawal over its 20-year period. We compare two cases. The first case is that the proposed withdrawal is put in place. The second case is that the proposed withdrawal is not put in place and mining commences in the Superior National Forest. In light of the Bureau of Land Management’s

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<sup>1</sup> University of Minnesota-Duluth (2012), Hjerpe and Phillips (2013), Sungur et al. (2014), Barber et al. (2014), Phillips and Alkire (2017), Helmberger (2017), Hjerpe (2018), and Ward (2018)..

(BLM) recent decision to formally reinstate two federal mineral leases held by Twin Metals Minnesota (TMM) within the portion of the Superior National Forest proposed for withdrawal, we focus on the development of the TMM project as the most immediate, direct impact of a negative withdrawal decision. Therefore, we study the impact of the TMM project over a 20-year period, as the counterfactual to the withdrawal. Because the focus is on the TMM project, the economic analysis focuses on the greater Ely, MN region including usage of the Boundary Waters Canoe Area Wilderness (BWCAW) and recreational use in the region in addition to the BWCAW.

We have three main findings.

- If mining is commenced at TMM, there would likely be an initial but temporary net growth in employment and income associated with the mining activity. Over time, the economic benefits of mining would be outweighed by the negative impact of mining on the recreational industry and on in-migration. This leads to a boom-bust cycle in all the scenarios we examine, in which the region is in the end left worse off economically than it would be under the withdrawal.
- There is considerable uncertainty about the timing and magnitude of the costs and benefits because of the limited data specifically applicable to this withdrawal and the greater Ely region. For that reason, we examined 72 different income scenarios that represent a range of growth parameters consistent with historical data, previous studies of the region, and the academic literature. All the scenarios show the boom-bust cycle of employment and income. In 69 of the 72 income scenarios we consider, the net present value of income under withdrawal exceeds that under no-withdrawal, in many cases by a large margin.
- Our findings are consistent with the academic literature on boom-bust cycles in extractive resource use and the literature on the value of outdoor recreational amenities to regional economies.

Our analysis focuses on three effects: employment and income generated by mining; employment and income generated in the recreation industry; and income associated with in-migration into the area because of its amenity value. In this regard, we have omitted many additional factors which are likely important, but more difficult to quantify, than those we consider. These omitted factors include: effects on real estate values in the region; the value of the BWCAW and Superior National Forest as a regional attractor of talent in the Duluth area and elsewhere; the employment and income driven by the BWCAW and Superior National Forest elsewhere in the state; and negative long-term effects of an economy based on extraction after the resource has been exhausted. Because such factors are omitted from our analysis, we consider our estimates of the economic benefits of withdrawal to be conservative.

We first develop our scenarios and present the net present value calculations. We then discuss factors omitted from this analysis and discuss our results in the context of the relevant academic literature.

## Computing Costs and Benefits over a 20-Year Horizon

Our approach is to compute the net present value of the costs and benefits of the proposed withdrawal compared to the counterfactual of mining at the TMM site (“the TMM counterfactual”). The starting point for net present value analysis is a stream of annual costs and benefits of the TMM counterfactual, relative to the withdrawal case, over the 20 years of the withdrawal. The net present value uses a discount factor to discount this stream of benefits to the present.

Our calculations consider direct and indirect employment and income effects of the TMM counterfactual, relative to the withdrawal case. Direct employment is in the industries under study (mining and recreation). Indirect employment is in industries that serve the industry or project under study, for example in the case of mining, the change in employment in industries that provide mining services such as equipment repair. The direct and indirect income effects of the TMM counterfactual in a given year is the net effect on incomes from direct and indirect employment in mining and recreation of the TMM project, relative to the withdrawal case, plus the net direct effect on income from those attracted to the region by amenity values. This latter term captures the income spent in the region by those who choose to live in the region because of its amenity effects, and whose decision to live in the region might be affected by the withdrawal/no withdrawal decision.<sup>2</sup>

The construction of our scenarios entailed developing benchmark assumptions for employment and income under the case of the withdrawal, then considering alternative assumptions under the TMM counterfactual. The counterfactual assumptions all have uncertainty, so we vary those to generate a total of 36 employment scenarios and 72 income scenarios.

For our employment calculations, we make the following assumptions. For the case of the withdrawal, absent extant third-party growth forecasts of recreational employment in the greater Ely area, we rely on two sources of growth in employment related to recreation. In the Arrowhead region (St. Louis, Lake, and Cook counties), employment in the tourism and hospitality industries from 2012 to 2016 grew by 1.4% per year (MNDEED). USDA (2016) provides projections of increased recreational usage by category for 2008-2030; for the category “Backcountry/challenge” the annualized growth rate of user-days is, 1.2%. We use this lower, more conservative, value as the baseline in the withdrawal scenario. Although Arrowhead region tri-county employment in recreational industries is available, we are unaware of data on the

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<sup>2</sup> The literature on regional economic development characterizes three employment effects: direct, indirect, and induced. The indirect effect depend on the direct effect but in a way that varies by industry. To maintain internal consistency, we assume that indirect effects are proportional to direct effects using proportionality factors from the IMPLAN model reported for mining by UMD-Duluth (2012) and for recreation/hospitality by Hjerpe (2018). Induced employment is the employment resulting from the spending of direct and indirect income on other local goods and services. We omit induced employment effects for two reasons. First, there is considerable uncertainty associated with estimating induced effects in a region because those estimates depend on the availability of unemployed or underemployed resources locally and on the amount of income that is retained locally rather than spent elsewhere in the state or out of state; this uncertainty calls into question the value of computing induced effects. Second, there is in any event no reason to think induced effects would differ depending on the income source so they would be proportional to direct plus indirect income changes for both the mining and hospitality industry.

recreational employment base potentially specifically affected by the TMM project. Full tri-county recreational employment (tourism and hospitality) in 2016 was 12,642, however that includes activity not likely to be directly impacted by the mining, such as hotels and restaurants serving University of Minnesota-Duluth and Duluth hospitals. Using the IMPLAN model and a survey of actual user expenditures, Hjerpe (2018) estimates that BWCAW visits from out-of-region visitors alone supports 1100 direct and indirect jobs. Use of the BWCAW is just one way that recreational users take advantage of the outdoors in the region, so jobs potentially affected include more than just those supported by BWCAW out-of-region users. We therefore approximate the narrow direct and indirect employment definition from Hjerpe (2018) as accounting for one-fourth of potentially affected jobs. The broader Superior National Forest area extends well to the east of Ely beyond the Gunflint trail. For this reason, the assumption of 4400 affected jobs could be an underestimate. We therefore consider an alternative case in which the number of affected jobs in tourism and recreational is 50% greater, 6600, which is roughly one-half the number of recreational and tourism jobs in the tri-county area.

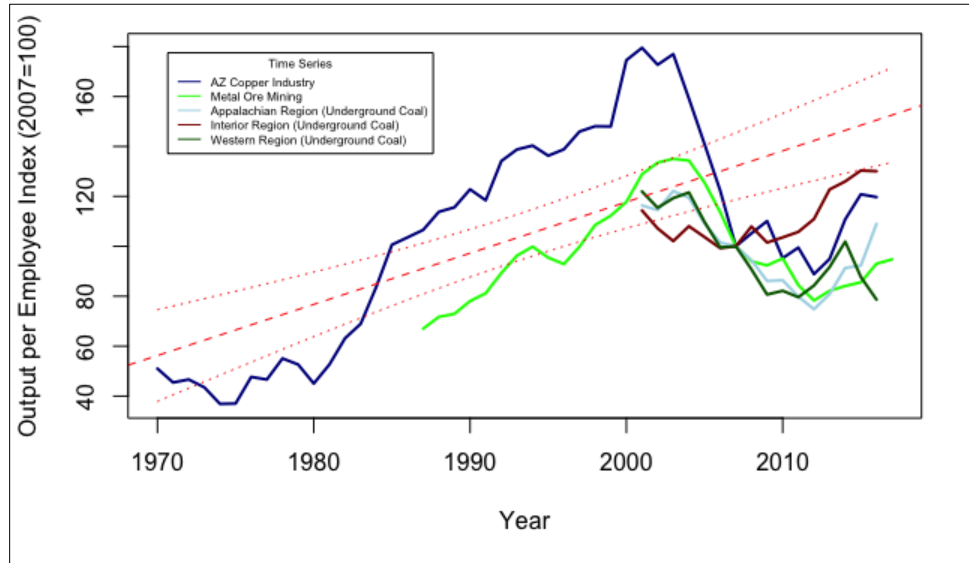
Under the TMM counterfactual, in our high-mining scenario, we assume that TMM direct employment starts at 650 jobs, a figure taken from TMM materials (Barber et al. 2014). We consider this assumption conservative for two reasons. First, the UMD-Duluth (2012) study projected 427 direct employment jobs in non-ferrous mining. Second, in May 2018 TMM announced that it would scale back the planned mining from 50,000 tons per day to 20,000 tons per day. A proportional employment reduction of the TMM 650 jobs at 50,000 tons/day yields 260 direct employment jobs. We therefore consider two additional mining scenarios, intermediate, at 427 direct jobs, and low, at 260 direct jobs.

As shown in Figure 1, non-ferrous mining generally, and copper mining specifically in the US, has exhibited substantial gains in productivity. Using the data in Figure 1, we consider three mining productivity growth scenarios.<sup>3</sup> In all, this generates nine paths for annual mining employment (three initial levels, three productivity growth rates).

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<sup>3</sup> Figure 1 shows an overall positive trend in labor productivity (tons per hour) in the Arizona copper industry from 1970 to 2016; across all hard rock metal mining from 1987 to 2017; and in underground coal mining across the three major U.S. coal producing regions from 2001 to 2016. The declines in output per employee in the mid- to late-2000's are associated with temporary changes in global commodity prices. We assume a baseline of 2.1% productivity growth per year which is the average growth rate in the Arizona copper industry. We incorporate uncertainty using low and high productivity growth scenarios of 1.4%, and 2.7%, which are the end points of a 95% confidence interval for productivity growth estimated from the Arizona data. We assume a constant annual extraction rate, so that employment falls by the rate of growth of productivity for the three productivity scenarios.

**Figure 1.** Output per employee in non-ferrous mining (copper, metal ore, and underground coal), index.



Sources: US Energy Information Administration, Arizona Department of Mines and Mineral Resources, US Geological Survey, US Bureau of Economic Analysis, US Bureau of Labor Statistics.

Under the TMM counterfactual, we consider two paths for recreational employment, a low-impact path and a high-impact path. Because we are not aware of a directly comparable project (large-scale sulfide ore mining proximate to a water-based wilderness area) for which there are historical data, we consider a scenario in which recreational employment contracts at the rate of 1.2% per year and one in which it contracts at the rate of 2.4% per year. The first of these rates reverses the growth projected under the USDA baseline (USDA 2016). The second of these rates is a reversal of twice the growth projected under the USDA baseline (USDA 2016).<sup>4</sup> These counterfactuals are in line with previous studies of growth of other US amenity-based regional economies.<sup>5</sup> We consider the high-impact scenario conservative in the sense that the impact on

<sup>4</sup> Rasker and Hackman (1996) examine employment and income trends in northwestern Montana and find that from 1969 to 1992, employment in counties characterized by pristine wilderness grew by 93%, an annualized rate of 2.9%. In contrast, resource-extractive counties observed employment growth of 15% over the same period, an annualized rate of 0.6%, a difference of roughly 2.3%. The scenario in which recreational employment contracts at the rate of 1.2% represents a difference of roughly 2.4% with respect to the withdrawal scenario. Thus, our rate of a 1.2% contraction in hospitality employment is reasonable assuming a reversal of Rasker and Hackman's (1996) estimate and is perhaps conservative given the degree to which hospitality and tourism employment is amenity-dependent.

<sup>5</sup> Rasker and Hansen (2000) examine rural counties in Idaho, Montana, and Wyoming and found that ecological and natural amenity variables are correlated with growth in these areas. Deller et al. (2001) find similar results, confirming that individuals appear to place greater value on natural-resource-based amenities and related attributes that contribute to regional quality of life. Winkler et al. (2007), find that "New West" communities, areas typically characterized by amenity migration, see anywhere from 38% to 195% higher employment in the tourism industry when compared to "Old West" communities. According to Winkler et al. (2007), this transition from "Old" to "New West" economic models has occurred over a 30-year period, which would imply an annual growth rate of between 1.2% and 6.5%. Empirical evidence supports the assertion that amenity-driven growth has supplanted extractive industries as the foundation of many amenity-rich, rural western counties (Lorah and Southwick 2003).

tourism over the long run of a major spill or acid mine drainage event are plausibly substantially more consequential.<sup>6</sup>

For the income scenarios, the incomes associated with direct mining and recreational employment are computed using average local wage rates in those industries (US Bureau of Labor Statistics and MNDEEP). These closely align with the figures used in recent studies of the area using the IMPLAN model (UM-Duluth 2012, Hjerpe 2018).

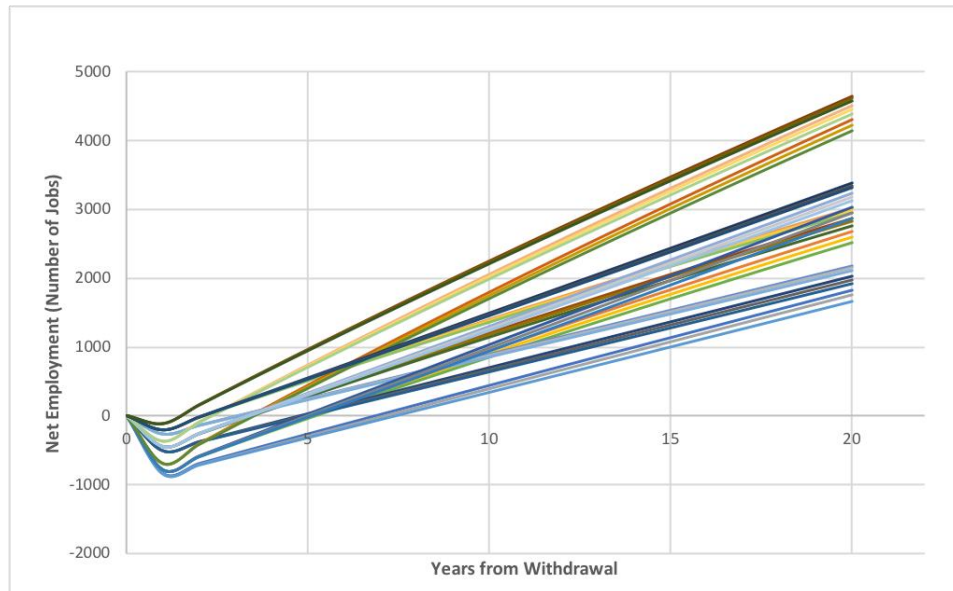
The remaining component of income is the direct effect from those who move away from the region because of the mining and the related direct effect of those deterred from moving to, or retiring in, the region because of the mining (the “in-migration direct income”). To estimate this component, we used as a baseline the 2016 Census Bureau (American Community Survey) total income of the five-township Ely region (Ely, Eagles Nest, Fall Lake, Morse, and Stony River). We projected withdrawal baseline income growth as the sum of per-capita income growth and population growth. Our per-capita income growth projection is the historical per-capita income growth from 2000-2016 for the Arrowhead counties (Headwaters Economics, Economic Profile System 2018). There is a large literature that documents increased population growth in amenities-rich areas, see Rickman and Rickman (2011) and Holmes (2016) for surveys. We adopt the population growth rate from Rickman and Rickman (2011) for counties with USDA amenity rank equal to the average Arrowhead amenities rank. For the TMM counterfactual, we considered two scenarios for in-migration direct income. The first is that population growth slows to zero; the second is that in-migration population for amenity values declines by 10% over the 20-year period. This latter estimate is less than one-half of the fraction of residents (23%) surveyed by Sungur et al. (2014) who indicated they would consider moving from the region in the event that the TMM project were undertaken.

In all, these assumptions generated 36 employment and 72 income paths under the various scenarios. The employment paths are plotted in Figure 2, and the income paths are plotted in Figure 3.

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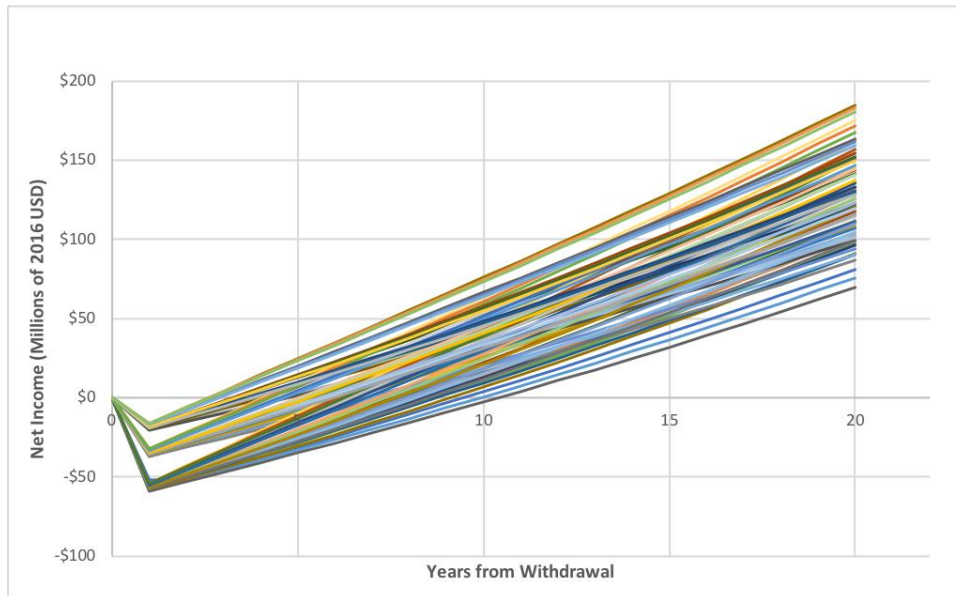
<sup>6</sup> The environmental risks associated with sulfide-ore copper mining within the watershed of the BWCAW are potentially economically consequential. Mining and beneficiation processes for underground copper ore generate large volumes of tailings. In a watershed hydrology model of possible mining locations in northeastern Minnesota, Myers (2016) finds that even relatively short-term leaks of tailing materials on the surface at mining locations in the region could cause substantial loads of sulfate, a major product of acid mine drainage, in the rivers and valuable downstream resources of the BWCAW. When considering the economic costs associated with these adverse environmental impacts, the economics literature proves helpful. In a study of acid mine drainage-impaired lakes in rural Ohio, Mishra et al. (2012) find a negative relationship between sulfate levels in impaired lakes and recreational use. Moreover, the literature documenting the structural transition of amenity-rich communities from reliance on extractive industries to tourism-based growth suggests a link between the two: were sulfide-ore copper mining to proceed at the TMM project, it is reasonable to assume that a contraction in tourism and recreation-based economic activity will likely occur, and would increase with the severity of spills, breaches, and/or drainage.

**Figure 2.** Net annual employment effects of withdrawal over time (36 scenarios) in the mining and recreational sectors of the Arrowhead economy. A positive employment value means that, under that scenario, the number of jobs in the withdrawal case exceeds the number of jobs in the TMM counterfactual case.



*Notes: the horizontal axis denotes time, starting with the commencement of production at the TMM site.  
Source: Authors' calculations.*

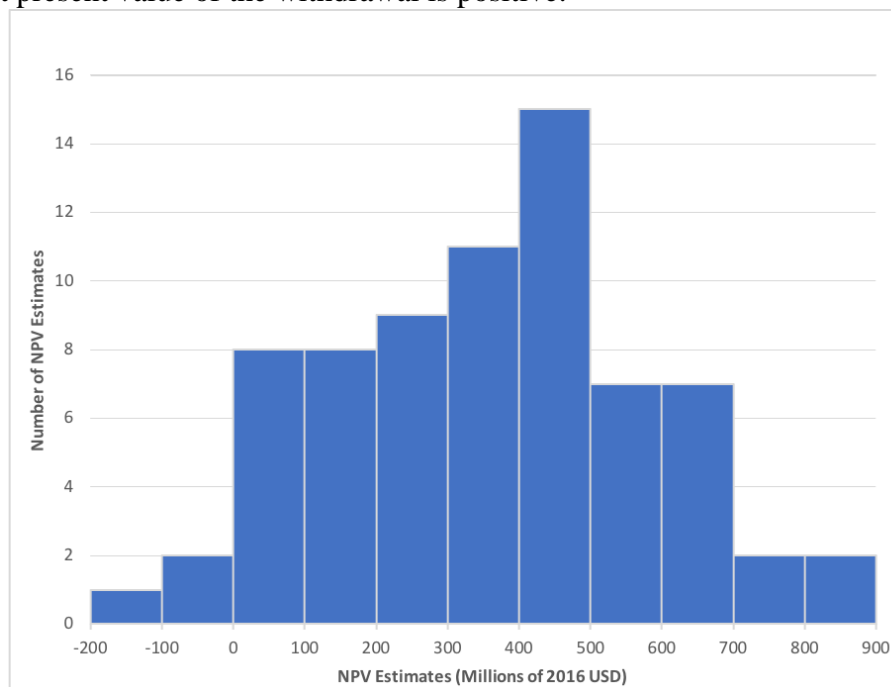
**Figure 3.** Net annual income effects of withdrawal over time (72 scenarios). Income effects are based on estimates of the net employment effects of the withdrawal over time in the mining and recreational sectors of the Arrowhead economy as well as estimates of the effects of potential out-migration from the greater Ely economy. A positive income value means that, under that scenario, the annual income in the withdrawal case exceeds the annual income in the TMM counterfactual case.



*Notes: the horizontal axis denotes time, starting with the commencement of production at the TMM site.  
Source: Authors' calculations.*

We computed the net present value for each of the income paths, using a 5% nominal (3% real) discount factor. A histogram of the net present values is presented in Figure 4. In 69 of the 72 cases, the net present value of the withdrawal is positive, that is, the benefits of the withdrawal outweigh the cost. The cases for which the net present value of the withdrawal is negative are those in which we assume mining employment starts at the highest level (650 jobs, despite the 2018 announcement that the project would be scaled back), mining productivity growth is low, and impacts to tourism and amenity-based in-migration are also low. We consider each of these assumptions to be questionable and collectively they seem improbably optimistic.

**Figure 4.** Histogram of the 72 estimated net present value (NPV) scenarios. In 69 of the 72 cases, the net present value of the withdrawal is positive.



Source: Authors' calculations.

### Our estimates in the context of other studies

**Other studies of rural economic growth and amenities.** Multiple studies conclude that outdoor recreation and recreational amenities, especially wilderness amenities, have been the basis for strong and sustainable economic growth in rural communities with those attributes over the past two decades. This literature looks at a variety of measures including income, job growth, population growth in wilderness-abutting regions, willingness-to-pay, and property values. In early influential research, Deller et. al. (2001) studied rural U.S. counties and concluded that “the empirical results provide strong evidence that rural areas which can be characterized as endowed with high levels of key natural resource amenity endowments and overall quality of life experience higher overall levels of growth” (p. 363). Rickman and Rickman (2011) examine nonmetropolitan counties across the U.S. and construct measures of outdoor and recreational amenity; they establish a positive relationship between amenity values and population growth.



Lorah and Southwick (2003) look at the role of protected federal lands, which hold an intrinsic natural amenity value, on rural population growth in western counties and find that counties with protected federal lands within 50 miles of their center grew approximately 11.7 times faster than nonmetropolitan western counties without protected federal lands within 50 miles of their center. Poudayal et al. (2008) analyze nationwide county-level data on the role of natural resource amenities in attracting retiree in-migration; they find that the percentage of a county under forest, the quantity of high quality water resources, and the presence of federally protected national parks are all statistically significant drivers of retiree in-migration. Winkler (2007) finds similar demographic trends. McGranahan et. al. (2011) study the underlying mechanism whereby sustainable growth is linked to amenity values and find that this growth has an endogenous element through the channel of entrepreneurs being attracted to rural locations with high outdoor amenity value.

Holmes et. al. (2016) provide a recent survey of the literature on valuation of proximity to wilderness areas. In addition to reviewing estimates of local economic effects as discussed here, they include two concepts which we have not relied on, willingness-to-pay, option value, and bequest value (so-called passive use values). They argue that these latter values can be large, a point that is relevant to the withdrawal proposal because they attempt to estimate directly the value of pristine wilderness.

These studies validate the inclusion of in-migration effects that are supported by the withdrawal and are potentially at risk if the withdrawal does not occur. In addition, these studies support a broader interpretation of the value of the BWCAW and Superior National Forest as an attractor of non-tourism, non-retirement jobs to the area because of the proximate wilderness. This latter category of job is not included in our study, and by excluding such jobs our study is conservative and understates the economic benefits of the withdrawal.

***Resource extraction and sustainable growth.*** The question of resource extraction and economic growth has long been of interest in the economics literature at the country level (e.g., oil export economies), regional level, and local level. Although we are not aware of any recent hard-rock mining studies on the sustainable growth cycle, the boom in nonconventional oil and gas development has stimulated recent research on extractive resource growth cycles.

Jacobsen and Parker (2014) study county-level data for the American West and examine the consequences of oil and gas well drilling arising from the oil price increases of the 1970s and early 1980s. They summarize their findings as follows:

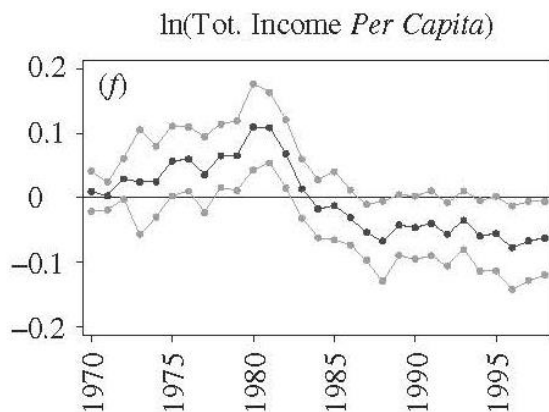
... We find that the boom created substantial short-term economic benefits, but also longer term hardships that persisted in the form of joblessness and depressed local incomes. In particular, we find positive short-term effects of the boom on local income per capita, which increased by more than 10% above pre-boom levels during the height of the boom. Local employment also increased considerably during the boom, particularly in the extraction and nontradable (e.g. construction, services, retail) sectors, which is consistent with the findings of previous research... In the longer run, after the full boom-and-bust cycle had concluded, we find that local per capita income was about 6% lower than it would have been if the boom had never occurred. Local unemployment

compensation payments – which proxy for job loss – increased immediately following the peak of the boom and did not contract back to pre-boom levels during the entire post-bust period. (p. 2)

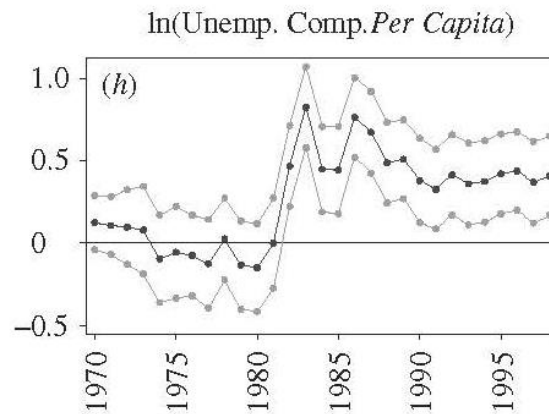
This finding is summarized in Figure 5, which is Figures 5(f) and 5(h) in Jacobsen and Parker (2014). Their methodology is to compare two otherwise similar rural counties that differ in whether they had oil and gas that could be exploited using 1970s technology. Those with exploitable oil or gas (the “treatment” group) saw a surge in drilling and pumping associated with the price spikes of the 1970s, while those without oil and gas resources (the control group) did not. The figure compares the outcomes for the treatment and control groups (the light lines are uncertainty bands). As the figure shows, during the boom income per capita rose in the treatment counties, but by the 1990s income per capita (5a) for the treatment group counties was below that for the control group. One legacy in the oil and gas counties was a higher rate of unemployment compensation per capita (5b) that also persisted into the 1990s. By inference, the oil and gas boom left the counties worse off by these per-capita measures than those that avoided the boom-bust cycle. From an economic development perspective, what is striking about these estimates is that the investment and employment booms associated with this oil and gas development did not simulate, on net, lasting new incomes from manufacturing that left the county better off, rather they find that earning gains left after the oil and gas played out.

**Figure 5.** Income and unemployment compensation per capita in counties that had an oil and gas boom in the 1970s and 1980s, compared to comparable rural counties that did not (Jacobsen and Parker (2014)).

(a) Income per capita (logarithm)



(b) unemployment compensation per capita (logarithm)



Source: Jacobsen and Parker (2014, Figure 5(f) and 5(h)).

Allcott and Keniston (2017) study US county-level manufacturing data in connection with oil and gas booms and conclude that “while county-level population, employment, wages, and revenue productivity are all procyclical [i.e. all go up in the initial extractive stage], the booms are cancelled out by the busts. By the end of the 1990s, we see no significant remaining long-term effects of the boom and bust cycle of the 1970s and 1980s (p. 5)”

There is also some work on the economic impacts of nonconventional oil and gas extraction, however the scope for dynamic analysis is limited because that development is new and

insufficient time has elapsed to observe a full cycle. One set of limited dynamic estimates is provided, however, by Feyrer, Mansur, and Sacerdote (2017). They use local geographic data to provide some estimates of the dynamic effect of nonconventional oil and gas extraction in the 2000s; they find that it has large employment effects, but that those employment effects are transitory at the local level. They only estimate dynamics over the first two years following the initial local extraction shock and find that wage income gains, including direct, indirect, and induced, dissipate by 1/3 within two years (the dissipation is faster if only direct and indirect wages are considered, see their Figure 4). The technology for nonconventional oil and gas extraction has a shorter life cycle than hard rock mining or conventional oil and gas extraction, but the findings of these studies are all qualitatively consistent with an extractive boom-bust cycle.

These studies are designed to estimate the effects of these booms on counties with average amenity values. Thus these estimates capture the boom-bust effect on mining and related jobs but do not include any special effects that mining disamenities or environmental damage would have on employment and in-migration related to high-amenity regions like the area surrounding the BWCAW. Such effects would exacerbate the boom-bust nature because of the deterioration in environmental conditions and amenity values that would reduce non-mining amenity-related incomes.

***Property values and mining disamenities.*** There is substantial evidence that mining disamenities reduce housing values. In their study of acid mine drainage from coal mining in the Cheat River Watershed of West Virginia, Williamson et al. (2008) find that location near an AMD-impaired stream has an implicit marginal cost of \$4,783 on housing, or nearly 12.2% of a home's value. Kim and Harris (1996) examine the broader suite of possible mining disamenities and their effect on property values near a copper mine in Green Valley, AZ and find that parcels closest to the mining site lost 5.74% of their value with homes further away losing 0.66% of their value as well. In their study of sulfide-ore copper mining in the Arrowhead region, Phillips and Alkire (2017) use Kim and Harris' (1996) findings to estimate that the total loss in property value for a single year due to sulfide ore copper mining would be over \$508 million (2016 USD), or roughly 1.9% of the total property value of the three Arrowhead region counties.

Phillips and Alkire's (2017) estimate of a decline of 1.9% is in the range of those in related studies. Boxall et al. (2005) examine the impact of oil and gas facilities on rural residential property values in Central Alberta, Canada using hedonic regression methods for property valuation. They find that location within four km. of industry facilities leads to a four to eight percent decrease in property value. Leggett and Bockstael (2000) use a hedonic property model to show that water quality has a significant effect on property values along the Chesapeake Bay, an amenity-rich, non-metropolitan setting with high recreational value. Poor et al. (2007) find a similar result in the Chesapeake Bay watershed examining non-point source pollutants, including suspended solids and nitrogen. In a study of the impact of lake water clarity on New Hampshire lakefront properties, Gibbs et al. (2002) find that water clarity—a measure of the degree of eutrophication—has a significant effect on prices paid for residential properties.

In the case of the proposed withdrawal, these negative effects on housing values would be compounded by the downward pressure on housing values from reduced in-migration or,

possibly, out-migration. Consistent with the boom-bust literature, one could see an initial rise in housing values as mine and associated industry workers buy or rent in the greater Ely area, however that increase would be temporary as mining employment, recreational employment, and in-migration housing demand subsequently decline. By omitting this effect, our analysis is conservative and likely understates the benefits of the proposed withdrawal.

### **Conclusion**

We find that, over the 20-year time horizon of the proposed withdrawal, introducing mining in the Superior National Forest is very likely to have a negative effect on the regional economy. Our calculations omit some factors, notably the negative effect of mining on real estate values, that would strengthen this conclusion. We reviewed the relevant literature and conclude that our findings are consistent with the literature, most notably the history of boom-bust economies associated with resource extraction that leave the local economy worse off. We encourage the U.S. Forest Service to consider carefully the full economic effects of the proposed withdrawal over the entire 20-year period included in the proposal.

Sincerely,



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