THE WILDERNESS SOCIETY

February 10, 2006

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RE: Economic Analysis of Management Alternatives in the Little Snake Field Office Resource Management Plan (RMP)

Dear John and Jeremy:

Thank you for the opportunity to comment on the draft "Economic Analysis of Management Alternatives in the Little Snake Field Office Resource Management Plan (RMP)" (Economic Analysis) for this planning process. We summit these comments on behalf of The Wilderness Society, The Colorado Wilderness Network, and The Center For Native Ecosystems.

It is important that land use decisions be made with as complete and comprehensive information as possible. We feel these comments will allow for substantial improvement of this information, and in turn an improved analysis in the Draft EIS.

The Scope of Work for the Economic Analysis includes some key directives which have been missed in the Economic Analysis. Specifically: 1) the Scope of Work does not preclude discussion of non-market values but nowhere in the analysis are these values discussed; 2) the Scope of Work specifically asks for inclusion of economic and social impacts beyond the planning area (at the regional and national level), but no such analysis was made; 3) the Scope of Work specifies that impacts to local governments and private entities be included, however the Economic Analysis neglects to specify these impacts; and 4) the Scope of Work states that mitigation measures are to be discussed which would necessitate the measurement of negative impacts. The Economic Analysis does not discuss the negative impacts of the alternatives, nor does it include any discussion or analysis of mitigation measures.

There are also several major issues with the methods used in the Economic Analysis: 1) the use of IMPLAN to predict economic impacts; 2) the treatment of non-labor income; 3) the estimation of oil and gas jobs; 4) questions on how the analysis was completed; 5) reliance on industry data that was not peer reviewed; 6) misunderstanding of the impacts of wildlife stipulations on production; 7) the inappropriate use of technically recoverable gas estimates in Economic Analysis; and 8) errors in the IMPLAN industry budget tables and a table of oil and gas resources estimates.

Missing Elements per the Scope of Work:

1) Non-market values

The Scope of Work states that non-market values will be included on a case-by-case basis. We therefore request that the Economic Analysis include a discussion of these values (such as changes in property values, declines in quality of life, changes in the "custom and culture" of the area, the value of ranchland for open space, the value of wilderness, etc.). In addition the Scope of Work also says that "the assessment of impacts for non-market values may be presented qualitatively." A thorough presentation of these values should therefore include a discussion of other studies showing the range of values for wilderness, wildlife habitat, open space, quality of life, etc. It should include a review of the literature which is also called for in the Scope of Work (and in fact is a specific deliverable).

2) National and regional level impacts

The Scope of Work also calls for a discussion of national level impact "where appropriate." We feel that it is appropriate to place both the total estimated undiscovered natural gas and oil in the area into a regional and national context, and to discuss the value of other outputs of the federal public lands in the planning area at the regional and national level.

The Scope of Work also requests that the contractor include information on "values, beliefs, and attitudes" (p. 4, under Social Information). We feel that values, beliefs, and attitudes encompass the non-market values associated with wildlands, wilderness, wildlife habitat, and open space, among others. This is another place where a national and regional scope would be appropriate.

3) Impacts to private entities and local government and 4) discussion of mitigation measures

The Scope of Work calls for the inclusion of the "importance of impacts to local government or private entity…" These impacts should include the added costs and unintended consequences of oil and gas drilling. These include increased costs to private land owners, increased costs to local governments, economic instability, loss of economic diversity, water impacts (both quality and quantity), the impact associated with well spacing and actual well numbers, the pace of development, fragmentation of wildlife habitat due to well pads, pipelines, roads and subsequent ORV use. Moffat county is experiencing some of the impacts of accelerated oil and gas development already. In addition to infrastructure costs such as road maintenance and upgrades, local governments also face increased costs to law enforcement and social services as a result of oil and gas development.[1] All of these impacts should be measured. The Scope of Work also calls for the contractor to "identify measures that may reduce or avoid potential adverse economic or social impacts of the alternatives, and maximize their positive impacts." This implies that the Economic Analysis must measure adverse impacts such as those described above, along with impacts to the environment and to other values and outputs associated with public lands. Appendix A provides a more detailed description of these negative impacts, and we have also attached a document produced by the Pinedale Anticline Working Group detailing plans to monitor the impacts of oil and gas drilling in that area (which was based on first-hand experience of said impacts).[2] We also refer the contractors to several reports on wildlife habitat fragmentation, many

[1] See Farrel, Patrick. Methamphetamine fuels the West's oil and gas boom, High Country News, October 3, 2005 http://www.hcn.org/servlets/hcn.Article?article_id=15811# (describing costs to Moffat County Sheriffs and District Attorney's Office in investigating and prosecuting methamphetamine-related cases).; Gebhart, Rob. County's discuss sharing resources, Craig Daily Press, July 7, 2004 http://www.craigdailypress.com/section/localnews/story/12740 (describing increased costs to Moffat County in maintaining paved county roads due to increased heavy truck traffic associated with energy development); Gebhart, Rob. Residents mull magwater issue, Craig Daily Press, March 9, 2005 http://www.craigdailypress.com/section/localnews/story/16200 (Moffat County commissioners authorize county Road and Bridge director to "upgrade" County Road 21 N "so it can handle the heavy traffic of oil and gas industry trucks").

[2] Pinedale Anticline Working Group. 2005. BLM Pinedale Anticline Working Group PAWG Task Groups' Report

of which focus on oil and gas development, and all of which are relevant. These are Hartley et al. 2003,[3] Weller et al. 2002,[4] Gilbert (year unknown),[5] Thomson et al. 2005,[6] Strickland and Manley 2003,[7] and Braun, 2002.[8]

The Economic Analysis should also discuss the potential impact the plan alternatives will have on hunting recreation in the plan area. While hunter success is an important factor in determining the choice of hunting locations, other factors (such as the scenic values of the area, remoteness, quiet, accessibility, etc.) also influence these choices and the impact of the plan alternatives on these factors (and thus on the local economic impacts of hunting) needs to be estimated.

Overall major concerns with the Economic Analysis:

1) IMPLAN

The IMPLAN model is an economic model often used by public land management agencies to project jobs and income from proposed actions. While the IMPLAN model can be useful as a tool to develop static analyses of the regional economy, communities must be aware of the shortcomings and poor track record of the model. A more accurate, dynamic, and complementary approach would examine regional trends in jobs and income.

Models like IMPLAN, which are grounded in economic base theory, assume that an economy is static (i.e. it does not change), which is not the case. IMPLAN models also do not consider the impacts of many important variables that affect regional growth in the rural West, such as amenities like high quality hunting, fishing and recreational opportunities, open space, scenic beauty, clean air and clean water, a sense of community, and our overall high quality of life. Many of these amenities are associated with attracting new migrants as well as retaining long-time residents.

Many long-time residents and new residents earn retirement and investment income. As shown by an analysis of economic trends, retirement and investment income is becoming increasingly important to rural economies of

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[3] Hartley, D. J. Thomson, P. Morton, and E. Schlenker-Goodrich. 2003. *Ecological effects of a transportation network on wildlife: A spatial analysis of the Upper Missouri Breaks National Monument*. The Wilderness Society. Denver, CO, Seattle, WA. 31 p. http://www.wilderness.org/Library/Documents/upload/Missouri-Breaks-Transportation-Effects-full-report-w-o-covers.pdf

[4] Weller, C.; Thomson, J.; Morton, P. and Aplet, G. 2002. Fragmenting our Lands: The Ecological Footprint of Oil and Gas Development. http://www.wilderness.org/Library/Documents/upload/Energy-Footprint-Full-Report.pdf

[5] Gilbert, B.K. Motorized Access on Montana's Rocky Mountain Front: A Synthesis of Scientific Literature and Recommendations for Use in Revision of the Travel Plan for the Rocky Mountain Division. Prepared for the Coalition for the Protection of the Rocky Mountain Front http://www.wilderness.org/Library/Documents/upload/Motorized-Access-on-Montana-s-Rocky-Mountain-Front.pdf

[6] Thomson, J.L.; Schaub, T.S.; Culver, N.W. Aengst, P.C. 2005. Wildlife at a Crossroads: Energy Development in Western Wyoming, Effects of Roads on Habitat in the Upper Green River Valley. http://www.wilderness.org/Library/Documents/upload/Pinedale-report-full.pdf

[7] Strickland, D.M. and B. Manley, 2003. An Evaluation of the 1988 BLM Pinedale Resource Management Plan, 2000 BLM Pinedale Anticline Final EIS and Recommendations for the Current Revision of the Pinedale Resource Management Plan. Prepared for The Wilderness Society, The Wyoming Outdoor Council, and The Greater Yellowstone Coalition. http://www.wilderness.org/Library/Documents/upload/Big-Game-Impacts-from-Energy-Development-in-Wyoming-s-Upper-Green-River-Valley-full-report.pdf

[8] Braun, C. 2002. A Review of Sage-Grouse Habitat Needs and Sage-Grouse Management Issues for the Revision of the Balm's Pinedale District Resource Management Plan. Prepared for The Wilderness Society, The Wyoming Outdoor Council, and The Greater Yellowstone Coalition. http://www.wilderness.org/Library/Documents/upload/Scoping-Comments-Sage-Grouse-Impacts-from-Energy-Development-in-Upper-Green-River-Valley-WY.pdf

the West. A recent letter from 100 economists (Whitelaw, et al. 2003)[9] reinforces the importance of non-labor income to the economy of the West. Unfortunately, most IMPLAN models completely fail to consider the important economic role of retirement and investment in the economy of a community – which can be a fatal flaw of the model.

Our more specific concerns have to do with the technical assumptions used in most IMPLAN models. These questionable assumptions include: no changes in relative prices; no input substitution or technological change in the production processes; no labor mobility; no change in products or tastes; no regional migration; and no changes in state and local tax laws. The assumption of no labor mobility draws into question the issue of local versus non-local job creation, and this is particularly important when analyzing a proposal such as oil and gas development. There is no guarantee that the oil and gas jobs projected by IMPLAN will be filled by local workers. And with respect to oil and gas drilling, workers in non-local wildcat crews fill most, if not all the direct jobs.

Another major assumption used by IMPLAN is the constant technology assumption. Most IMPLAN models, by failing to consider the downward impact of technology on job growth, will exaggerate the job potential from oil and gas drilling. Industries attempting to maximize profits seek to reduce costs. Technological improvements reduce labor costs and result in fewer jobs. In Northwest Colorado for example, companies now produce about twice the amount of coal with half as many workers. It is likely that current coal jobs are much less than originally forecast by coal companies. The downward trend in resource extraction jobs only becomes apparent if the agency completes a trend analysis of the change in jobs and income over time.

With respect to oil and gas, the constant technology assumption contradicts the fact that technological change occurs in the oil and gas industry. Investments in technology have resulted in fewer workers required for each well drilled. Computer technology has over time also reduced the number of workers required to produce natural gas and oil. The trends of technology replacing jobs in the oil and gas industry will continue. As a result of holding technology constant, IMPLAN tends to overestimate future job gains associated with an increase in drilling and production of gas and oil (and coal). A review of government data confirms this: since 1987, output per worker in the oil and gas industry has been increasing.

Laitner, et. al (1998)[10] cite Bureau of Labor Statistics data which indicate that in 1988, oil and gas drilling generated about 1.72 jobs per million dollars of spending. By 1998 that number fell to 1.44 jobs per million dollars. Further, BLS estimates this number will fall to 0.71 jobs per million dollars of spending by 2008. This indicates that the direct jobs estimated with a static model like IMPLAN will be much more than the number actually created from drilling. As a result of this failure to account for technology improvements, input-output models are well known to predict higher multiplier effects than are actually experienced (Hoffman and Fortmann, 1996).[11]

In a review of 23 studies that empirically tested the economic base hypothesis, Krikelas (1991)[12] found only four studies that provided any evidence in support of economic base theory as a long run theory of economic growth

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[9] Whitelaw, E., et al. 2003. A letter from economists to President Bush and the governors of eleven western states regarding the economic importance of the west's natural environment. (100 total authors) Available at: http://www.econw.com/pdf/120303letter.pdf

[10] Laitner, S.; Bernow, S. DeCicco, J. 1998. Employment and other macroeconomic benefits of an innovation-led climate strategy for the United States. Energy Policy 26(5): 425-432.

[11] Hoffman, S.A. and Fortmann, L. 1996. Poverty in forested counties: an analysis based on aid to families with dependent children. In Sierra Nevada Ecosystem Project: Final report to Congress, vol. II, Assessments and scientific basis for management options. Davis: University of California, Centers for Water and Wildland Resources, 1996.

[12] Krikelas, A.C. 1991. Industry structure and regional growth: A vector autoregression forecasting model of the Wisconsin regional economy. Ph.D. Dissertation. University of Wisconsin-Madison.

-- a dismal track record. Despite dire predictions, history is replete with cases of communities and areas that lost their export base and continued as successful economies with their social capital intact. The local-serving sectors of the economy were the persistent ones, as new exports were substituted for the old.

Tiebout (1956)[13] recognized the shortcomings of the economic base theory when he wrote, "Without the ability to develop residentiary activities, the cost of development of export activities will be prohibitive." Krikelas (1992)[14] concludes that economic base theory has severe limitations, especially for economic planning and policy analysis. This is a conclusion that community leaders and land management officials and planners can no longer ignore, and one that should be incorporated into public land and community-level planning. As Haynes and Horne (1997)[15] note:

> Where the economic base approach gets into trouble is when it is **used inappropriately as a tool for planning or predicting impacts** of greater than one year in duration; a snapshot of current conditions tells little about the form a region's future economy may take (emphasis added).

Economists with both the Forest Service (Hoekstra, et. al, 1990)[16] and the Office of Technology Assessment (OTA, 1992)[17] concluded that while IMPLAN is useful for appraising the total economic impacts of a management plan, the model is insufficient for evaluating the economic impacts for communities. According to the OTA (1992), IMPLAN has an additional shortcoming for assessing community impacts: the economic data used to construct IMPLAN do not provide comparable details for all resource-based sectors of the economy. While economic data for oil and gas is classified as a separate manufacturing industry, recreation is scattered among a variety of industries generally classified in services and retail, with some in transportation. The ease of data acquisition for estimating oil and gas impacts combined with the difficulty of estimating the impacts of recreation and tourism underscores the potential bias favoring oil and gas development in IMPLAN modeling.

The 25th anniversary issue of the Journal of Regional Science included an article by H.W. Richardson, a noted regional scientist, who believed that 40 years of research on economic base models "has done nothing to increase confidence in them." In addition, he concluded that it would be hard to "resist the conclusion that economic base models should be buried, and without prospects for resurrection" (Richardson, 1985).[18] He is not alone. Many have suggested that economic base theories be abandoned in favor of other, more comprehensive theories of regional growth and development (Krikelas, 1992; Rasker, 1994; Power, 1995 and 1996).[19] Many of these economists recommend analysis of regional trends in total personal income as a better way to understand where the local economy came from and where it is headed.

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[13] Tiebout, C.M. 1956. Exports and regional economic growth. Journal of Political Economy 64:160-64.

[14] Krikelas, A.C. 1992. Why regions grow: A review of research on the economic base model. Economic Review. Vol. 77(4).

[15] Haynes, R. W.; Horne, A.L. 1997. Economic Assessment of the Basin. In T.M. Quigley and S.J. Arbelbide (eds.), An assessment of ecosystem components in the Interior Columbia Basin and portions of the Klamath and Great Basins: Volume IV. 1715-1870. USDA Forest Service, PNW-GTR-405, Pacific Northwest Research Station, Portland, OR.

[16] Hoekstra, T.W., Alward, G.S., Dyer, A.A., Hof, J.G., Jones, D.B., Joyce, L.A., Kent, B.M., Lee, R., Sheffield, R.C., Williams, R. 1990. Analytical tools and information. Critique of Land Management Planning, Volume 4. USDA Forest Service, FS-455. 47 pp.

[17] US Congress, Office of Technology Assessment. 1992. Forest Service planning: Accommodating uses, producing outputs, and sustaining ecosystems, OTA-F-505. Washington, DC.

[18] Richardson, H.W. 1985. Input-Output and Economic Base Multipliers: Looking backward and forward. Journal of Regional Science Vol. 25(4).

[19] Rasker, R. 1994. A new look at old vistas: the economic role of environmental quality in western public lands. University of Colorado Law Review. Volume 52, Issue 2 pp369-399.

Power, T. 1995. Economic well being and environmental protection in the Pacific Northwest: a consensus report by Pacific Northwest economists. Missoula, MT: University of Montana.

Power, T. M. 1996. Lost landscapes and failed economies. Island Press, Covelo, CA.

The concern over the accuracy of models like IMPLAN combined with concern over the use of these models for planning, suggests that it is not only inappropriate but a disservice to rural communities to rely on IMPLAN to estimate the economic impacts of public land management alternatives on rural communities. We recommend that the agency stop relying on IMPLAN and other models derived from economic based theory, or at the very least augment IMPLAN with an analysis of the trends in the important sectors of the local economy.

2) Non-labor income

The Economic Analysis appears to completely ignore non-labor income. Retirement and investment income account for over 20% of total personal income in the planning area, and in fact it is the single largest source of income. At least some of this income is from people moving into the area for quality of life and recreation. These residents fuel spillover spending in the local economy, as well as provide property tax income. High paying service jobs in health care, education and financial services are among the sectors likely to enjoy spillover from residents with non-labor income. Some resident recreation spending may also be attributable to the non-labor sector. Large-scale changes to the management of the area's public lands will impact the value of all residents' property (and thus property taxes). A study in La Plata County found a significant drop in property values when wells were drilled.[20] Large scale drilling may also influence the quality of life and hence the location decisions of current and future residents whose income is wholly or primarily derived from the large non-labor sector. It is important for the Economic Analysis to recognize the importance of non-labor income and the potential negative impact to this sector from large scale drilling. Appendix B provides a more detailed description of the key components of the western economy, including non-labor income, which we feel should be examined for both the baseline and Economic Analysis.

3) Estimates of jobs associated with oil and gas drilling

The drilling phase should have a much smaller employment multiplier than the extraction phase. It is almost always the case that the drill rig crews travel with the rigs or are migrant rather than drawn from the local labor pool so this phase doesn't generally result in many direct local jobs, if any. These workers most likely will not move to the area and are less likely to spend much of their salary in the local economy. Does the IMPLAN analysis account for this?

There are very few jobs during the production phase, and while these are more likely to be long term, they are often filled by people who move to the area. In order to assess the impact from this phase of oil and gas development it is necessary to estimate the proportion of production jobs that will be filled from the local labor pool and the proportion filled by in-migrating workers. Both types will have impacts to the local economy. Current residents hired for oil and gas jobs will create impacts to other employers if they are simply shifted from other jobs. On the other hand, in-migrant workers will increase the population of the towns in the planning area. This will increase the demand for and cost of housing in the area. The costs for local governments to provide public services will increase, and many studies show that "boom" times in rural areas lead to increases in social problems such as increased crime, domestic violence, and drug use. These will place added costs on local governments over and above the current per capita costs to provide public services. These costs need to be estimated and included in the Economic Analysis.

It should also be noted that the indirect employment impacts from the drilling phase are more likely to occur outside the planning are, since the main area of expected new oil and gas activity is in the northwest corner, so new wells will be closer to either Rock Springs, WY or Vernal, UT than to towns

[20] BBC Research and Consulting. November 12, 2001. Measuring the Impact of Coalbed Methane Wells on Property Values, Appendix B of the La Plata County Impact Report
(Appendix B: http://co.laplata.co.us/pdf/plan_doc/final_impactrpt/final_ir_appb.pdf, Full report: http://co.laplata.co.us/publications.htm)

in the Little Snake area. The potential impacts from employment in the area are likely to be smaller if workers choose to live closer to the fields.

4) Starting point for the analysis

Another issue has to do with the general starting point for the analysis. The Economic Analysis should begin from the "status quo." It is clear that for recreation and agriculture, the impacts from drilling are going to be negative - these sectors will lose either quality or quantity (or both) of the outputs they currently enjoy from public lands. The same is especially true for the environmental and non-market sectors. However, the oil and gas sector is anticipating a net gain in this plan. All the alternatives include an increase in oil and gas leasing. The Economic Analysis merely compares the four potential future scenarios. This is inadequate, as the Economic Analysis should also include a comparison of all the alternatives in terms of the change from the current situation (in which certain areas, such as the Vermillion Basin, are administratively closed to leasing). To do the analysis with the assumption that continuing the closure of these areas is a "loss" to the oil and gas industry is misleading. They do not currently have such access. The analysis should look at the net changes for each sector under each alternative and make explicit who loses, who gains, and how much.

5) Reliance on industry data that has not been peer-reviewed

Another issue is the apparent reliance on industry-supplied information on the costs of environmental protection. Are these data and conclusions peer reviewed? Will the specific cost estimates be made public? What assumptions were made by the industry to arrive at these costs? What assumptions about future prices were used by industry or by the contractors to estimate the total impacts of the environmental protection measures?

The oil and gas industry has a history of exaggerating the amount of gas recoverable and exaggerating the cost of protecting the environment. Rose (2001) [21] states, "Since 1993, most oil companies have acknowledged that their geotechnical staffs persistently overestimate prospect reserves, commonly by about 30% to 80%." Mr Rose goes on to say, "...overoptimism is not limited to certain companies -- it appears to be a chronic industry shortcoming that has proved to be difficult to correct." Shanley et al. (2004) reinforce this point as well.[22]

6) The impacts of wildlife stipulations

A particularly troubling example of industry-supplied information appears on page 14 where you cite "Cameron, 2005." Is this a peer-reviewed source? Please provide the original reference. This section states that seasonal closures in the winter for big game winter range will result in reduced production of natural gas during the winter when the prices are higher (per the Cameron reference). There are several problems with this assertion. First, drilling restrictions do not limit production, they only prohibit the drilling of new wells during critical wildlife seasons. Once a well is in place, gas production is not affected by wildlife stipulations. Second, it is unlikely that the wells in the Little Snake area are going to produce enough natural gas to impact wellhead prices (we are assuming this reference is implying that winter drilling will somehow help consumers; it won't).

[21] Rose, P. 2001. Risk Analysis and Management of Petroleum Exploration Ventures. AAPG Methods in Exploration Series, No. 12. Tulsa OK: The American Association of Petroleum Geologists. 164 p.

[22] Shanley, K.W.; Robinson, J.; Cluff, R.M. 2004. Tight-gas myths, realities have strong implications for resource estimation, policymaking, operating strategies. Oil and Gas Journal, August 2, 2004

7) The use of technically recoverable resources in the Economic Analysis

Perhaps the most significant issue is that economic impacts were apparently estimated based on technically recoverable resources. NEPA requires a realistic assessment of economic impacts, and it is not realistic to assume that 100% of the technically recoverable gas will ever be recovered. Yet the draft Economic Analysis apparently assumes that 100% of technically recoverable resources will be extracted, and then proceeds to estimate the economic impacts and the "costs" of environmental protection or the provision of other public lands outputs based on this assumption. We believe that this method is seriously flawed. The potential costs from protecting the environment must be based on estimates of economically recoverable resources. Many factors (flow rates, market price, drilling costs, etc. -not just environmental protection) will influence whether resources are economic to produce, and industry experts make these assessments all the time. The price and costs assumptions used to estimate total production under each alternative must be critically examined and made clear. To be specific, when estimating the amount of gas recoverable, the price or price range that was assumed, and the costs of production that were assumed in the analysis, must be spelled out. If a company cannot get the gas out of the ground at a cost less than the assumed wellhead price, then the opportunity costs of protecting the environment are zero. This is just basic economics. To comply with NEPA, we request that the Economic Analysis be based on estimates of economically recoverable resources. See the RAND Corporation reports (LaTourette, et. al, 2002 and Vidas, et. al, 2003)[23],[24] detailing methods to estimate economically recoverable resources for the Greater Green River Basin (links below) and Attanasi (1998) which describes methods used to estimate economically recoverable resources for all the basins analyzed in the Energy Planning and Conservation Act's (EPCA) 2002 Assessment .[25] We have also used Attanasi's results to make our own estimates of the economically recoverable resources in two areas in the Rocky Mountain West.[26]

8) Errors

Finally, there are several errors in the budget tables used in the IMPLAN analysis. The percent of total cost for several of the sectors was calculated by dividing the industry cost by the per firm total (resulting in percentages greater than 100 in some cases). We're not sure if these affect the analysis, but they should be corrected anyway. The errors all occur in the Moffat County tables for the following industries: heavy construction, food services, food and beverage retailing, hotels. Also the "recreation" cost table is identical to the "outfitters" cost table which may have had some impact on the analysis.

The table on page 12-13 of the Socio-economic Analysis Report contains errors in the units for the resource estimates. Oil should be labeled as thousands of barrels (not millions) and gas should be

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[23] LaTourrette, T., Bernstein, M., Holtberg, P., Pernin, C., Vollaard, B., Hanson, M., Anderson, K., Knopman, D. 2002. Assessing Gas and Oil Resources in the Intermountain West: Review of Methods and Framework for a New Approach. RAND Science and Technology, Santa Monica, CA. 94 p. http://www.rand.org/pubs/monograph_reports/MR1683/index.html (the .pdf files are included at the end of the webpage)

[24] Vidas, E. H., R.H. Hugman, and P.S. Springer. 2003. Assessing Natural Gas and Oil Resources: Technical Details of Resource Allocation and Economic Analysis: RAND Science and Technology, Santa Monica, CA. 79 p. http://www.rand.org/pubs/monograph_reports/2005/MR1683.1.pdf

[25] Attanasi, E.D. 1998. Economics and the 1995 National Assessment of United States Oil and Gas Resources. US Geological Survey Circular 1145. Available at: http://pubs.usgs.gov/circ/1998/c1145/c1145.pdf

[26] The Wilderness Society. 2004a. A GIS analysis of economically recoverable gas and oil in the Rocky Mountain Front of Montana. May 3, 2004. Available at: http://www.wilderness.org/Library/Documents/upload/GIS-Analysis-of-Economically-Recoverable-Gas-and-Oil-in-the-Rocky-Mountain-Front-of-Montana.pdf

The Wilderness Society. 2004b. A GIS analysis of economically recoverable gas and oil underneath the Roan Plateau, Colorado. October 26, 2004. Available at: http://www.wilderness.org/Library/Documents/upload/A-GIS-Analysis-of-Economically-Recoverable-Gas-and-Oil-Underneath-the-Roan-Plateau-Colorado.pdf

million cubic feet (not billion). Any impact calculations that were based on these numbers need to be re-estimated. (Ad valorem taxes would have been based on these numbers, along with production estimates, and if costs were presented as foregone revenue for the oil and gas industry these inflated resources numbers will have inflated the costs - this may explain the dominance of the oil and gas sector in the Economic Analysis).
Thank you again for the opportunity to comment. If you have questions or need additional information, please don't hesitate to call at (303) 650-5818 ext. 109.

Sincerely,

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THE WILDERNESS SOCIETY

Appendix A

THE IMPACTS OF OIL AND GAS DRILLING
February 10, 2006

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1. Socio-economic Costs to Communities from Oil and Gas Development

a) Increased costs to private land owners

The current oil and gas boom has generated significant costs to communities in the West. One such area is Wyoming's Powder River Basin, the site of massive coalbed natural gas development. While this development has increased the fortunes of some, others are not faring as well (Pederson Planning Consultants 2001). Landowners are spending thousands of dollars on attorneys in order to attempt to protect their property, often to no avail, as these areas have seen dramatic declines in property values.

b) Increased costs to local governments

Accelerated oil and gas development has resulted in increased costs to the communities in the Pinedale Anticline area of Wyoming (Pinedale Anticline Working Group, 2005). These costs include increased costs and in some cases shortages of housing, increased crime rates,

Costs to "boomtowns" in the Powder River Basin include an increase in truck traffic resulting in increased road maintenance costs. Increased traffic also results in dust from poorly constructed access roads which causes health problems for both humans and livestock, reduces the grass available for cattle, and negatively impacts air quality and visibility. Crime and other social problems intensify in boomtowns, with these areas seeing increases in larceny, traffic violations and accidents, destruction of private property, family violence, and child abuse. All of these escalating problems increase the cost of emergency services for cities and counties. Boomtowns often experience a shift in the labor force. Workers leave for oil and gas jobs, resulting in instability in the labor force and difficulty hiring public workers (e.g. policemen, firemen) at a time where the counties and cities are stretched thin to handle the increased workload.

Gulliford (1989) examined the consequences of boom and bust nature of oil and gas development. He chronicles the fortunes of Garfield County, Colorado before, during, and after the push to extract oil from oil shale in the late 1970's. Extraction of oil from oil shale proved to be uneconomical even at high prices. The companies who had planned to exploit the resources encouraged a large investment in infrastructure by the communities in the area, and then abandoned them before any oil was produced, leaving overbuilt towns with large debt burdens. Before leaving the county however, the oil shale boom also resulted in an increase in social problems related to rapid population growth and the sudden influx of money.

Accelerated oil and gas development has left many counties and communities unable to pay for or finance the increase in public service costs. We have every reason to believe that similar costs and burdens will be placed on other communities where public and private land is threatened by oil and gas drilling.

c) Economic instability

The agency should analyze and discuss the socio-economic costs associated with an historic emphasis on resource extraction industries, which has resulted in repetitious cycles of socio-economic distress for rural communities (Limerick, et al., 2002). Resource extractive workers find themselves in a vicious cycle of relatively high paying jobs with frequent layoffs and unemployment. This cycle is what Freudenburg (1992) calls the "intermittent positive reinforcement regime." While resource extractive workers develop high skills, such skills are not readily transferable to other jobs, and the workers become overspecialized (Freudenburg and Gramling, 1994).

These areas attract resource extraction industries, often to the exclusion of other industries. Investment in education and job retraining is low because "the potential return on their investment in their education is either too low or too uncertain to justify sacrifice" (Humphrey et al. 1993). The resultant pattern of "rational under-investment" in the development of skills and other forms of human capital can result in reduced economic competitiveness in resource-dependent communities.

Several studies have examined the problem of poverty in rural areas which are dependent on the extraction of only one or a few natural resources for most of their economic activity. As Freudenburg and Gramling (1994) point out, "At the regional level, the highest levels of long-term poverty in the United States… tend to be found in the very places that were once the sites of thriving extractive industries…" They point out that the problem of poverty in these resource-dependent regions is not limited to the times of lower or zero production, but also occurs during the active operations of the extractive industry. Even though mining-dependent counties have been found to have slightly higher median household incomes than other rural counties, they also have a higher proportion of households living in poverty, and the highest incidence of extreme poverty.

When a county or area is dependent upon only one or a few industries for most of its employment and income there are often negative consequences, mostly stemming from fluctuations in the dominant industries. Limerick, et al. (2002) describe Western resource-dependent communities this way:

> In many towns, communities, settlements, and sub-regions of the West, everyone's fortune depended on the production and marketing of one commodity. Dependence on one commodity brought a particular kind of precariousness, instability, and vulnerability to external changes, whether of markets or climate. Farm towns, mining towns, cattle towns, and logging towns had no insulation from any problems that might strike the industries on which they relied. (p. 1)

Past research has indicated significant social costs (e.g. employment that is only sporadic or seasonal, higher unemployment rates, etc.) associated with economic specialization and dependency on resource extractive industries. In essence, resource extractive communities have an inherent economic instability associated with them. This instability, in income and employment, for example, is a result of laborsaving technological improvements, business cycles sensitive to interest rates and housing starts, and fluctuations in world resource markets -- macroeconomic forces completely outside local control. Fluctuations in jobs and income in the extractive industries illustrate the economic instability and lack of local control associated with promoting rapid oil and gas development. Communities have little control over the local economy because they have absolutely no control over global commodity prices. When prices drop, companies abandon wells, lay off workers, and leave the communities high and dry to suffer the economic consequences.

Smith (1986) examined the boom and bust phenomenon in the specific context of oil and gas extraction. He points out that high prices for oil in the late 1970's led to an increase in drilling, but there was no corresponding increase in production during the same period. He speculates about the reason for this: "Drilling in some states may have been extended into marginal areas under very optimistic price expectations, and such operations had to be abandoned when prices were no longer adequate." These sorts of activities lead to the classic boom and bust economic cycle typical of many rural resource-dependent areas. "Those states that showed the largest rate of growth in oil and gas extraction during 1972-81 tended to have the largest rate of decline in the post 1981 period." There is every reason to expect that the current boom will eventually lead to a similar bust.

Economic instability is of concern to community leaders because if a local economy is unstable, economic development plans are more likely to fail. The economic instability created in the "boom and bust" economies associated with resource extraction increases the risk for capital investment in linked industries. As such, resource specialization and the resulting economic instability can prevent the formation of forward and backward economic linkages in the local and regional economy.

There are other drawbacks to specialization in resource extractive employment. After examining the less desirable aspects of the wood products industry Fortmann et al. (1989) concluded:

> Disincentives for stable employment, preferences for younger and cheaper labor that leave the less mobile and less trainable older worker out of work, cycles of market activity that carry with them high rates of unemployment, injury and illness rates and fatality rates that top all other employment categories are not attributes of a stabilizing industry, no matter how stability is defined.

Similar socio-economic trends are associated with oil and gas industries (Goldsmith, 1992; Guilliford, 1989; Smith, 1986) and should be examined when analyzing public land management alternatives. The socio-economic risks to communities and the economic instability associated with boom and busts from oil and gas development should be addressed as part of the NEPA process

The extractive industries, including oil and gas development, are becoming an ever smaller portion of the total jobs and income in the Rocky Mountain West. The relative importance of these industries compared to expanding industries in the professional and service sectors, and those which depend on non-labor income needs to be acknowledged in planning for public land management

d) Loss of economic diversity

An emphasis on resource extraction has inhibited the diversification of rural economies throughout the West. The continued emphasis on export activities, if left unchallenged, will only insure future cycles of socio-economic distress in rural communities in the West, especially in isolated Western communities. History is replete with cases of communities and areas that lost their export base in resource extraction, but continued, despite dire predictions, as reasonably successful economies with their social capital intact. In these examples, the local-serving sectors of the economy were the persistent ones, as new exports were substituted for the old. It becomes reasonable to ask: which are the important sectors of rural economies, the enduring or the transitory ones? The impacts on local economic diversity from oil and gas development must be analyzed and addressed as part of the NEPA process.

2. Environmental Costs of Oil and Gas Development

The environmental costs of drilling include erosion, loss of wildlife and fish habitat, declines in the quality of recreational opportunities, proliferation of noxious weeds, and increased air and water pollution. These costs increase with the scale of oil and gas operations. Environmental impacts can be mitigated with the implementation and enforcement of lease stipulations and monitoring of impacts throughout the project's life. Proper monitoring of the environmental impacts of oil and gas and other development programs require that accurate and complete data be collected and used. Lease stipulations help protect wildlife but only if they are enforced, and data from the Bureau of Land Management and other sources indicate that they are not. In the Rocky Mountain West, where hunting, fishing, and wildlife viewing generated $5.9 billions in revenue in 2001, drilling (and its direct impacts on wildlife and their habitat) has hidden economic costs in terms of lost revenues from license fees, equipment sales, and other related purchases. See Morton et al. (2004), Morton et al. (2002), Weller, et al.,(2002), Hartley, et al.,(2003), Thomson, et. al., (2004,) and Thomson, et al. (2005).

a). Water Impacts

Oil and gas drilling will have impacts on the amount of water available for other uses and the displacement of large volumes of water - *quantity* impacts, as well as *quality* impacts resulting from the discharge of pollutants and from the increased levels of pollutants resulting indirectly from quantity changes.

i) Water quantity impacts

One of the major environmental costs associated with oil and gas drilling is increased water pollution. Accelerated drilling activity for coalbed natural gas is having profound real life impacts on many families and communities in the West. In order to release the natural gas from coal beds, enormous amounts of ground water must be pumped from coal aquifers to the surface. The water discharged on the surface comes from shallow and deep aquifers often containing saline-sodic water. The amount of water produced from individual coalbed gas

wells is generally much higher than that from other types of oil and gas wells (USGS, 1996). Coalbed natural gas wells in Wyoming and Colorado discharge between 20,000 to 40,000 gallons per day per well (Darin, 2000). The disposal of the produced water not only affects the economics of development, but also poses serious environmental concerns.

The total amount of water discharged from CBM wells in Wyoming has skyrocketed in recent years, increasing from approximately 98 million gallons (300 acre feet) per year in 1992, to 5.5 billion gallons (17,000 acre feet) per year in 1999 (Wyoming State Engineer's Office cited in Darin 2000). The discharging of 17,000 acre feet of water in the arid West is wasteful in the short-term (generally an acre-foot of water will supply a family of four for one year), and has potentially devastating economic impacts for affected communities in the long-term. Dewatering of deep aquifers may upset the hydrologic balance, eliminating or reducing the availability of this water for future agricultural and domestic uses, as well recharge for shallow aquifers and surface water.

The discharge of ground water can deplete freshwater aquifers, lower the water table, and dry up the drinking water wells of homeowners and agricultural users. The short-term economic costs include drilling new wells for current and future landowners, when successful wells can be found, and the costs of relocating families to new homesites when they cannot. If the freshwater aquifers do not fully re-charge, the long-term economic costs to affected landowners, homeowners, communities, and states across the West could be severe, including the foregone opportunity (option value) to use aquifer water in the future.

The discharge of tens of thousands of gallons of ground water transforms many streams that normally flow intermittently (only during spring runoff or after storms) into all-season streams. The influx of water has resulted in deep channel scouring, erosion, and increased sedimentation. Increased sedimentation in streams can negatively impact native fisheries. This in turn increases the financial costs for fishery restoration projects. The altered water flows from surface discharge of produced water will negatively impact thermal and flow regimes, and likely contribute to bank erosion and changes in riparian vegetation (Allan, 2002). Gore (2002) warned that the loss of habitat caused by increased water flows from discharged water at coalbed natural gas projects could eliminate up to 30 aquatic species within 20 years.

The discharge of water into intermittent stream channels damages native flora and fauna not adapted to year-round water and promotes the spread of noxious weeds such as Scotch burr and Canadian thistle. The change in native vegetation composition, combined with the increase in noxious weeds, negatively impacts threatened and endangered species and other wildlife, as well as cattle. The loss of native species and the spread of noxious weeds across the West has enormous economic costs to the public and private interests.

The landscape is also impacted from the retaining ponds or reservoirs constructed to store the water discharged from the drilling operation. The constructed earthen dams and retaining ponds destroy additional habitat and introduce artificial structures to the landscape. Habitat and homes on property nearby reservoirs also have potential flood risk from structural failure of the poorly designed, quickly built retaining ponds and reservoirs during storm events.

When proposing oil and gas development, the agency must fully examine and account for the risks and costs associated with water depletion, loss of native fisheries and fisheries restoration, the additional costs of noxious week mitigation, and the costs associated with the building and potential failure of artificial water retention.

ii) Water quality impacts

Trout Unlimited recently published a literature review of the impacts of oil and gas development and exploration on coldwater fisheries (Trout Unlimited, 2004). The findings of the report conclude that many of the studies reviewed "point towards confirmed deleterious effects caused by gas and oil exploration and development." One study found that the allowable discharge level in most states were far too high, 400 times that recommended by the EPA, and produced significant physical and toxic effects on trout in Wyoming. While

also pointing out the need for further studies, the Trout Unlimited report supports the conclusion that oil and gas development results in substantial negative effects on water and the wildlife that depends on it for survival.

The water discharged from oil and gas wells can be highly saline with a very high sodium absorption ratio (SAR) – a ratio that affects how water interacts with soil. Water with a high SAR can permanently change chemical composition of soils, reducing soil, air, and water permeability and thereby decreasing native plant and irrigated crop productivity.

And finally, drilling for oil involves ecological risks and potential economic costs associated with blowouts -- the catastrophic surge of the highly pressurized fluid from the drill hole that can cause fires, loss of life and property, and the potential contamination of surface drinking water sources. To reduce the number of blowouts, rotary drilling operations typically inject a fluid of drilling muds into the drill hole in order to lubricate and cool the drill bit. While reducing the number of blowouts, the drilling fluids themselves create a risk of contamination of adjacent freshwater aquifers (Gauthier-Warinner, 2000).

b. Oil and Gas Footprint

Oil and gas drilling operations leave behind a large footprint on the landscape – a footprint that extends well beyond the several-acre drilling sites. Beginning with exploratory activities, large trucks with seismic surveying equipment crisscross the landscape using a crude system of roads. These roads are made to the lowest standards possible in order to minimize the financial costs of gathering geophysical information, with little consideration for wetlands, fragile soils, storm water runoff or critical habitat. Exploratory drilling operations then require more large trucks with drill rigs using a network of constructed roads to access drill sites. If the exploratory well is determined to have no potential for production, the well is plugged, but the landscape scars remain. If producible resources are found, more wells, along with the attendant roads and pipelines will follow. Depending on the agency with oversight, there is typically little enforcement or monitoring of environmental regulations. In addition, no surety bonds are required for restoration or clean up. <u>All of these factors create footprint that extends beyond the drillpad and the costs associated with extended zone of impacts this must be accounted for in agency analyses of oil and gas development.</u>

i) Well spacing and actual well numbers

States usually have general rules setting default minimum spacing requirements between producing wells. They are set to establish the maximum area of an oil or gas deposit that can be efficiently drained with one well. In most cases the operator can petition for a change in well spacing, usually to a more dense spacing if they can show that such spacing decreases result in more efficient production.

Well spacing limits apply to each formation, meaning that if formations overlap, more well pads may be established on the surface than might be indicated by the stated spacing limits. The spacing limits do not include dry holes, only producing wells. In order to estimate the full extent of surface disturbance, the agency must correctly account for potential decreases in spacing limits, success rates for both exploratory and development wells, and estimate the cumulative environmental and economic impact of all wells drilled and all well pads established on the surface.

When a well is drilled it is unknown whether it will eventually produce oil or gas, or whether it will be a dry hole. If the well has potential for production, the well is cased with pipe and cemented (in an attempt to prevent oil and gas from seeping into nearby aquifers), and the drilling rig is replaced by a well head. Electric or gas powered motors are used to power the pumps that collect the gas at each well and to power the series of 24-hour compressor stations that pressurize gas for pipeline transport from the wells to customers in distant markets (WORC, 1999). Furthermore, additional wells are usually drilling in the immediate vicinity when a producing well is discovered.

Many drill sites also involve the construction of sediment ponds and retention reservoirs to collect storm water drainage and store the ground water brought to the surface as a result of the drilling and extraction

operation – the latter process is called dewatering. Injection wells are sometimes used to dispose of the water produced and to enhance oil and gas recovery – an action that may necessitate additional drilling of up to hundreds of injection wells throughout the field (Gauthier-Warinner 2000). The ecological footprint not only extends across the forest and range landscape, it also penetrates to shallow aquifers as well as aquifers thousands of feet below the earth's surface. The agency must fully examine the environmental impacts from the footprint associated with oil and gas development.

Exploiting the gas in unconventional, tight sands deposits will require drilling a significant number of wells, as the distribution of these resources is not well understood. Based on existing technology, the USGS indicates that nationwide approximately 960,000 productive wells will be required to recover potential gas reserve additions of 300 trillion cubic feet. However the habitat loss would not end there as extrapolation of current success ratios indicate that that roughly 570,000 "dry" holes would have to be drilled in addition to the productive wells – for a total of 1,530,000 drilling sites on public and private lands. If we assume 2-5 acres per drilling pad and 1,530,000 drill sites, exploitation of just the tight sands gas deposits would consume approximately 3 - 7.7 million acres of habitat on public and private land across the nation. As noted by the USGS (1996), **"land-use planners are not in a good position to determine the societal impacts of the drilling (density) that would be necessary if these continuous reservoirs of (tight) gas were exploited."** (emphasis added).

ii) Pace of development

The pace at which an oil or gas field is developed will influence the extent of the oil and gas footprint. When drilling is phased to take place over a longer period of time, the impact of concurrent drilling operations can be lessened, and dry holes and wells that stop producing can be reclaimed before beginning new well drilling. When drilling is pushed through in a short period of time the total area impacted is much larger. Rapid development also intensifies the socio-economic impacts which accompany drilling. More wells being drilled at once mean more workers moving into an area at the same time. If development is staged the community will be better able to absorb them, reducing the need for accelerated infrastructure upgrades.

We formally request that the agency require phased development of oil and gas resources on public lands, and that the costs associated with rapid development be fully analyzed as part of the NEPA process.

iii) Fragmentation of wildlife habitat

Even though oil and gas infrastructure can occupy relatively small percentages of a larger landscape, their broad distribution can have negative impacts on an area more than 20 times the size of that occupied area. When oil and gas is developed, roads, pipeline corridors, well-heads, retention ponds, buildings, parking lots, and other components of the infrastructure pepper larger landscapes, coming within a quarter of a mile of as much as 97% of wildlife habitat. In addition to their direct effects (such as immediate landscape disturbance and habitat fragmentation), motorized routes also have negative impacts such as noise, dust, erosion, and human presence that extend beyond the immediately disturbed area. Road densities as low as 1% or less of a given landscape can impact more than 99% of that landscape, leaving little undisturbed area in which wildlife can thrive. (Weller, et al., 2002; Hartley, et al. 2003, Thomson, et al. 2004; Thomson, et al. 2005). Wildlife fragmentation results in both market and non-market costs. These costs must be analyzed as part of the NEPA process for oil and gas development.

iv) Pipelines

In order to bring gas to market, thousands of miles of pipeline must also be constructed – extending the impacts of gas drilling far from the actual drill site. There are currently more than 270,000 miles of gas transmission pipelines and another 952,000 miles of gas distribution lines. The cumulative costs and environmental impacts associated with pipeline construction must be included in the agency analysis – because drilling wells and building pipelines are connected actions. The environmental costs associated with construction, maintenance, and repair of pipelines, as well as the costs of the habitat fragmentation pipelines cause must be examined as part of the NEPA process for and oil and gas development.

v) Roads and subsequent ORV use

Oil and gas exploration also requires roads that increase ecological costs and invite cross-country travel and subsequent habitat damage by ORVs. Oil and gas drilling often require daily vehicular trips to monitor and maintain wells and pipelines. The increased traffic disrupts wildlife, may result in more road kill, and diminishes quality of life for local residents. The linear deforestation associated with road construction degrades habitat and fragments travel corridors needed by wildlife species. Roads become conduits for non-native species that displace native species resulting in significant mitigation costs for taxpayers. Roads, by providing access, increase the frequency of human-caused fires. Humans cause ninety percent of all wildfires in the national forests; more than half of those wildfires begin along roads. In addition, roads increase the damage to historical, cultural and archeological resources due to increased ease of access. Roads increase sediment deposits in streams resulting in reductions in fish habitat productivity. In addition to keeping sediment from access roads and drill sites out of community water sources, roadless areas protect communities from catastrophic events such as landslides.

The economic costs from road construction for oil and gas drilling include increased ORV monitoring costs, increased frequency and costs of stream restoration projects, increased noxious weed mitigation costs, increased damage to archaeological sites and the decline in future benefits from visiting these sites, increased water treatment costs for downstream communities, and increased road maintenance and closure costs for taxpayers. The agency must include a detailed analysis of the costs associated with increased road mileage as part of the NEPA analysis.

The agency also needs to analyze the costs of road maintenance and restoration and compare these costs with the budgets available to complete the work. For example, on average, the annual maintenance cost of a mile of Forest Service road is about $1,500 per mile. Each new mile of road added to the FS transportation system competes for limited road maintenance funding, as Congressional funding is less than 20% of the funding necessary to maintain the existing road infrastructure The costs for road maintenance must be accounted for in the NEPA process.

c. Enforcement of environmental protection and mitigation requirements

Additional costs are associated with the inability of agency enforcement staff to adequately inspect oil and gas wells and associated facilities for violations of applicable laws and to enforce requirements for protection and restoration of the area. A recent report by the Western Organization of Resource Councils (2005) found that:

- agency enforcement staff levels have not kept pace with the rapid expansion of oil and gas development;
- oil and gas wells and associated facilities are not inspected often enough;
- agency environmental compliance inspectors spend too much time on other activities;
- agencies take too few enforcement actions; and
- citizen complaints are often ignored.

The Government Accountability Office (2005) also found a similar lack of resources for monitoring and enforcement of oil and gas development and attributed this lack to an unbalanced emphasis on processing permits to drill. The resulting costs are evidenced in the impact on the ecosystem.

The agency must assess the adequacy of funding and staffing to achieve the required environmental and safety enforcement for an oil and gas development. If inadequate funding and/or staff resources might prevent thorough enforcement and monitoring, this needs to be made clear and the costs associated with the additional impacts must be analyzed as part of the NEPA process.

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THE WILDERNESS SOCIETY

Appendix B

SOCIO-ECONOMIC FRAMEWORK FOR PUBLIC LAND MANAGEMENT PLANNING

INDICATORS FOR THE WEST'S ECONOMY

December 20, 2005

I. PURPOSE

This brief is submitted as part of the NEPA process for this land use proposal. It is intended to identify issues that must be analyzed in the plan and offer methodologies to assist agencies responsible for analyzing the socio-economic impacts of proposed land use decisions on Western economies.

In making land use decisions, federal agencies have an obligation under the National Environmental Policy Act (NEPA) to take a "hard look" at the environmental consequences of a proposed action, and the requisite analysis "must be appropriate to the action in question." This brief presents a framework and indicators to be used in analyzing the impact of public land management proposals on the economies of Western communities. Federal agencies cannot evaluate the consequences of proposed decisions or determine how best to avoid or mitigate negative impacts without adequate data and analysis. Through the application of the methodology we have provided below, using data collected from identified sources and measuring potential impacts through key indicators, federal agencies can better fulfill their obligations to evaluate the direct, indirect, and cumulative socio-economic impacts of various alternative decisions.

II. INTRODUCTION

We have organized this paper to facilitate the identification of key issues related to the impact of federal public land decisions on Western economies, and to provide key indicators for analyzing the impacts of those decisions on the economy of the West. The first section describes the changing economy of the western region, and how public land management planners should evaluate the economic impacts of land management alternatives. Next, we present key economic indicators with which to measure the vigor of the West's economy and discuss the implications of these indicators for the selection and analysis of land management alternatives.[27] The third section presents sources of data that are readily available at the state and county level, to which land managers should refer when preparing economic analyses for public lands. Next we outline the methodology we recommend agencies use to analyze the economies of western communities, in order to fully account for information that is traditionally absent in public land management assessments. Finally we provide a detailed list of our NEPA scoping questions, including specific recommendations for analyzing economic trends and conditions affected by the proposed management decisions.

These analyses and methods provide a necessary, but not sufficient, basis for the evaluation of proposed land management decisions. The socio-economic impacts to communities are only one facet of the total economic impact of such decisions. The Western federal public lands belong to all Americans, and in order to fully evaluate the merits of land management decisions a complete benefit-cost analysis, including non-market values, must be made. While the specific methods for benefit-cost analyses are beyond the scope of this brief, we expect the agency to implement benefit-cost analyses in addition to the requested socio-economic impact analyses outlined here.

III. OVERVIEW OF THE WESTERN ECONOMY

[27] We provide examples of the statistics and data available to analyze each of the key indicators. These examples focus on the five Rocky Mountain states, but the methods and analyses presented apply to other states throughout the region. The states we focus on in this brief are: Colorado, Montana, New Mexico, Utah, and Wyoming. The Western states, especially the Rocky Mountains, are currently facing accelerated development of oil and gas on their federal public lands while at the same time realizing the potential embodied in the amenity-based economy.

In the last 30 years, the West has evolved from a region largely focused on extractive industries into a much more diverse area with a more diverse economy (Bennett and McBeth 1998, Johnson 2001). Table 1 shows the current proportion of total personal income from resource extraction industries in the Rocky Mountains. Recent research shows that most western counties are not "resource dependent," and have instead developed diversified economies based on recreation, tourism, knowledge-based industries and the service sector. A recent study examining the impact of public lands on economic well-being in eleven western states found that only three percent of western counties could be classified as resource-extraction dependent (Rasker et al. 2004). Public land management decisions all too often rely on a misconception of a resource-extraction-dependent rural West. Given the changing nature of the western economy, such assumptions exclude important non-extractive economic drivers and may even harm the economy of the region in the long run by depleting the natural capital responsible for the economic growth of Western communities.

Table 1. Extractive Industry Income as a Percentage of Total Personal Income

	Colorado	Montana	New Mexico	Utah	Wyoming	Rocky Mountains
Farm proprietors' income	0.18%	0.03%	0.90%	0.22%	0.65%	0.31%
Farm earnings	0.46%	0.77%	1.36%	0.44%	1.22%	0.66%
Forestry, fishing, related activities	0.14%	0.85%	0.29%	0.09%	0.29%	0.22%
Forestry and logging	(D)	0.46%	(D)	0.01%	0.05%	0.04%
Fishing, hunting, and trapping	(D)	0.03%	(D)	0.02%	0.02%	0.01%
Agriculture and forestry support activities	0.13%	0.37%	0.26%	0.06%	0.23%	0.16%
Mining	1.35%	1.93%	2.51%	0.87%	9.77%	1.94%
Oil and gas extraction	0.88%	0.44%	1.10%	0.16%	2.79%	0.84%
Mining (except oil and gas)	0.26%	1.19%	0.58%	0.47%	4.01%	0.62%
Support activities for mining	0.21%	0.30%	0.83%	0.24%	2.97%	0.47%
Wood product manufacturing	0.12%	0.94%	0.10%	0.15%	0.18%	0.19%
Paper manufacturing	0.12%	(D)	0.09%	0.23%	(D)	0.12%
Total extractive industry income	2.39%	4.52%	5.25%	1.99%	12.11%	3.44%

Source: U S Department of Commerce, Bureau of Economic Analysis (http://www.bea.doc.gov)
(D) Not shown to avoid disclosure of confidential information

As the economies of rural communities in the West diversify, the basis for making public land management decisions must also evolve. Merely counting jobs in resource extraction is not a sufficient way to measure the economic impact of public land management decisions. Many of these communities have diversified economies that are no longer solely dependent on the export of fossil fuels or logs. Management plans for public lands need to account for all aspects of the economic and social systems of these communities, including recreation, tourism and entrepreneurial businesses attracted to scenic locations, when evaluating alternatives.

There is a vast and growing body of research that indicates that the environmental amenities provided by public lands are an important economic driver in the rural West (Rudzitis and Johansen 1989; Johnson and Rasker 1993, 1995; Rasker 1994; Power 1995, 1996; Duffy-Deno 1998; Rudzitis 1999; Rasker et al. 2004; Holmes and Hecox 2004). In a letter to the President and the Governors of the western states, economists from universities and other organizations throughout the United States pointed out that "The West's natural environment is, arguably, its greatest long-run economic strength" (Whitelaw et al. 2003).

The western United States is growing at a rate faster than any other region (U.S. Census Bureau 2001), and, counter to the norm, population growth has preceded employment growth in the rural West (Vias 1999),

indicating that people migrate to the region for its amenity resources. Furthermore, counties with high levels of natural amenities (such as varied topography, access to water bodies, and a pleasant climate) are more likely to experience higher growth than those counties with fewer such amenities (McGranahan 1999). Along with that growth comes demographic change. As Shumway and Otterstrom (2001) point out, "Population change represents more than a simple redistribution of people; it is an indicator and, in many instances an instigator, of a wide range of economic, social, cultural, political/policy, and environmental changes." As more people move from urban areas to rural communities they bring with them expectations about how local public lands ought to be managed. Changing community values must be accounted for in land management planning.

Management plans for the public lands in the West must consider the increasing importance of industries and economic sectors that rely on these public lands, but not necessarily on the extraction of natural resources. As the population of the entire country grows, the presence of undeveloped lands becomes more and more important. Indeed, much recent research has concluded that the presence of protected public lands strengthen western rural economies by meeting growing needs for clean water, wildlife habitat and recreation opportunities (Power 1995, 1996; Rasker 1994; Rasker et al. 2004; Rudzitis 1999; Rudzitis and Johansen 1989; Johnson and Rasker 1993, 1995; Whitelaw et al. 2004).

IV. KEY ECONOMIC INDICATORS OF THE WEST'S ECONOMY

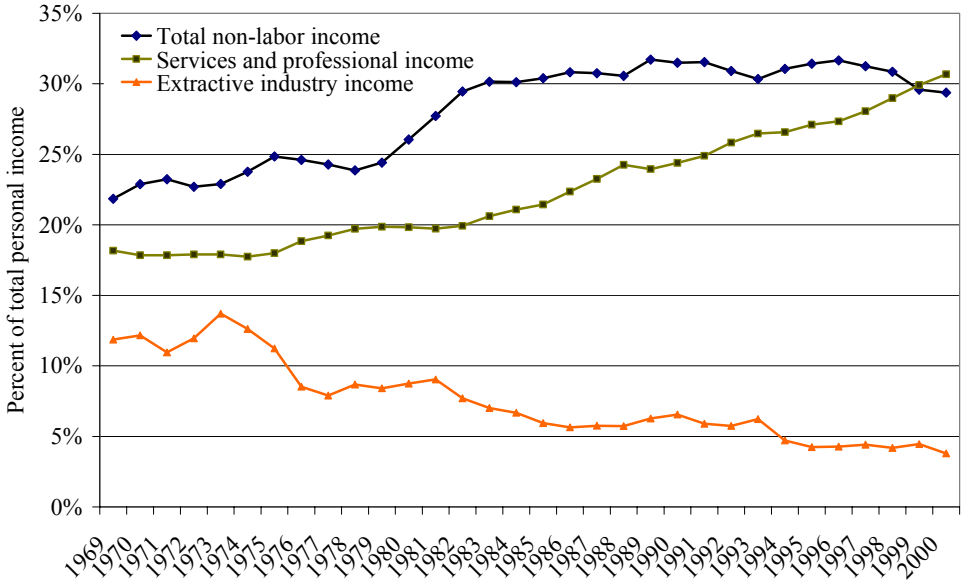
The West's economy is characterized by many indicators that must be considered in the economic analyses performed by land management agencies, we have selected a few to focus on in this brief. These include the growing importance of non-labor income from investments and retirement, increasing employment in high technology, knowledge-based, and service industries, the important role that recreation and tourism plays in providing jobs and income, and the rise of small businesses and other entrepreneurial endeavors. Other features of the western economy include the decline in extractive industries, the increase in public awareness and appreciation of the environmental and recreation amenities of their home counties, and the diversification of rural economies. This section describes a concise set of indicators that land use planners should examine as part of the description of the socio-economic profile of an area, and presents example data from the Rocky Mountain states for each indicator.

A. Non-labor income

A complete analysis of regional economic trends should include an analysis of total personal income, including all sources of income, rather than relying solely on employment. A full accounting of income is necessary to an understanding of the important role that non-labor income, such as retirement income, interest payments, rents, and profits, plays in the regional economy. Investment and retirement income makes up nearly one quarter of total personal income in the Rockies, which would make it the top "industry" in the region. An economic impact analysis that excludes this income is inadequate and misleading.

Researchers have found that areas with high levels of natural amenities attract residents, many of whom rely on non-traditional sources of income (Duffy-Deno 1998, Nelson 1999, McGranahan 1999, Rudzitis 1999, Shumway and Otterstrom 2001, Lorah and Southwick 2003). When an investor living in a community receives dividends on his or her investments, that money represents an influx of income for the local community. The same thing is true of a retiree's income. Due to the high levels of natural amenities in the coastal and mountain regions of the West, these non-labor sources of income are concentrated in those areas (Nelson 1999).

An influx of retirees in those rural communities has been shown to have positive effects on both income and employment (Deller 1995), with non-labor income fueling increases in income and employment for many other sectors including health, financial and real estate services. Figure 1 shows the trend in total personal income for the five-state Rocky Mountain region. Service sector income has been rising in recent years while extractive industry income has fallen. Non-labor income makes up the largest proportion of total personal income.



Source: Regional Economic Information System, Bureau of Economic Analsyis, US Department of Commerce
Extractive industries: Farm proprietors' income; Farm earnings; Ag services, forestry, fishing; Mining; Lumber and wood products; Paper and allied products
Service and professional: Services; Eating and drinking places; Finance, insurance, and real estate
Note: The figure is based on SIC data for 1969-2000 in order to show the long-term trend. While not explicitly compatible, NAICS data for 2001-2003 show similar trends for non-labor, service and professional, and extractive industry income.

Figure 1. Total Personal Income in the Rocky Mountains

It should be noted that non-labor income also includes income support payments such as Medicaid, welfare and unemployment. However this category is consistently a small portion of total non-labor income and therefore a small portion of total personal income. Income support is less than four percent of total personal income and only 14 percent of non-labor income in the Rockies. It is important for a complete analysis of non-labor income to make a distinction between income support and other forms of non-labor income. Table 2 shows non-labor income, broken into its components as a percentage of total personal income for the five Rocky Mountain States. Investment and retirement income is the largest portion of non-labor income for each state, while income support reflects a much smaller portion.

Table 2. Non-labor income as a percentage of total personal income (2003)

	Colorado	Montana	New Mexico	Utah	Wyoming	Rocky Mountain Region
Investment income [a]	17%	19%	15%	15%	23%	16%
Retirement income [b]	6%	11%	10%	7%	9%	7%
Income support [c]	3%	4%	7%	3%	3%	4%
Other [d]	0.7%	1.1%	1.4%	1.1%	0.8%	0.9%
All non-labor income	26%	35%	33%	26%	36%	28%

[a] Dividends, interest, and rent
[b] Includes veterans' benefits, military benefits, and Medicare
[c] Income Maintenance, Supplemental Security Income, Family Assistance, Food Stamps, Medicaid, Unemployment
[d] Includes federal education and training assistance, settlements between individuals and businesses and transfer payments from non-profit institutions
Source: U S Department of Commerce, Bureau of Economic Analysis (http://www.bea.doc.gov)

A complete analysis of an area's economy must consider non-labor income, and a thorough evaluation of land management alternatives must consider the impacts of each alternative on non-labor income.

B. Knowledge-Based, Service Sector and Other Non-Recreation Businesses

Bennett and McBeth (1998) cite the emergence of a trend toward increasing western rural populations as early as the 1970s and state that this trend was partly motivated by the high quality of life in these areas. Johnson (2001) points out the importance of technology in this transition. He credits the advancement of technology with both the downward trend in extractive employment (where improved technology results in reduced labor requirements) and the potential (currently being realized in many communities) for economic growth and stability. Johnson points out that improving technology, especially in information and communication, also mitigates the constraints imposed by remoteness and permits employment in knowledge-based and service industries previously unavailable for rural residents.

Many of the counties in the Rocky Mountain West with economies that are characterized by a predominance of service industries have the highest incomes (Shumway and Otterstrom 2001). Over the past quarter century, the U.S. economy has seen a shift from extractive and primary manufacturing industries to service oriented businesses. A common misconception about the service sector is that it includes only low paying jobs. This is not the case. The service sector in the West includes several high-paying industries, many of which are linked closely with the increase in non-labor income. Employment and income in the health care services increases as the number of retirees in an area increases. As people with investment income move into a region, the demand for financial, insurance, and real-estate service also increases.

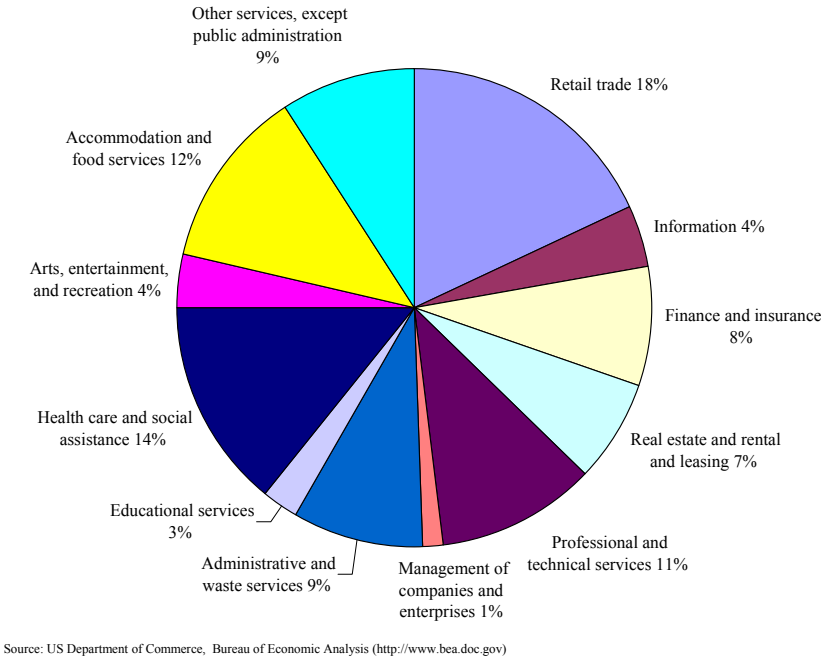


Figure 2. Service and Professional Employment in the Rocky Mountains (2003)

The service sector includes occupations and industries that are classified as "knowledge based," defined by Henderson and Abraham (2004):

> "Knowledge-based activities emerge from an intangible resource that enables workers to use existing facts and understandings to generate new ideas. These ideas produce innovations that lead to increased productivity, new products and services, and economic growth."

Knowledge-based occupations have grown nationwide since 1980, with growth in the Rocky Mountain region being among the highest (Henderson and Abraham 2004). Local amenities that enhance quality of life are among the factors correlated with this growth. Other factors contributing to the growth of knowledge-based occupations are a high quality workforce, colleges and universities, infrastructure in the area, and the size and diversity of the local economy. These factors are likely to be interrelated and in many cases dependent on the quality of the environment and the availability of public lands, as cities and counties in the region leverage scenic amenities to attract high quality workers and knowledge-based industries. Other research confirms the role that amenities, including environmental and recreational amenities, play in attracting businesses to locations in the rural Rocky Mountain West (Whitelaw and Niemi 1989; Johnson and Rasker 1993, 1995). The most recent income data available from the Bureau of Economic Analysis (BEA) includes a category called "information," which captures a good deal of the new knowledge-based industry. Land management decision makers should take advantage of these expanded industry classification categories when analyzing the potential impacts of public land management on the diverse economies of western counties.

A complete analysis of an area's economy must take into account the growth in income and employment in the service and professional sectors, and consider the impacts of each alternative on those sectors.

C. Recreation & Tourism

Many rural communities in the Rocky Mountain region have experienced firsthand the surge in demand for recreation experiences outdoors, especially on federal public lands. Moab, Utah is a good example. This town was once a dying mining center and is now a top destination for recreation seekers of all sorts. Other towns around the West have seen an upswing in migration and economic health as they become "discovered" by recreationists (Rasker, et al. 2003, 2004; Holmes and Hecox 2004).

A 2005 report by the Outdoor Industry Association estimates that 159 million Americans participate in outdoor recreation each year. A 2002 study by the same organization estimates annual spending on outdoor recreation at $18 billion. The public lands provide much of the open space that makes this important economic activity possible.

In 2000, the Forest Service estimated the economic impacts of their program areas. These estimates account for the impact a range of activities exerts on both income and employment. Recreation and protection programs account for a much greater economic impact than do extractive programs (Alward et al. 2003).

Table 3. Economic Significance of Forest Service Program Activities (for 1999)

	Percentage of Total Value Added (GDP)	Percentage of Total Income	Percentage of Total Wages	Percentage of Total Jobs
Recreation and Landscape Protection *Recreation, Heritage & Wilderness; Wildlife, Fish & Rare Plants; Watershed & Air Mg.t; Ecosystem Mgt. Coord.; Access & Travel Mgt.*	70%	69%	71%	76%
Extraction of Commercial Resources *Range Mgt.; Forest Mgt.; Minerals & Geology Mgt.*	22%	22%	20%	17%
Other *Lands & Realty Mgt.; Fire & Aviation Mgt.; Law Enforcement; Facilities Mgt., General Admin.; S&P Forestry; R&D*	9%	9%	8%	7%

Source: Alward et al. 2003.

Quality hunting and fishing opportunities require wildlife habitat, which generally means large areas of open land. As the population grows, these are increasingly found only on the federal and other public lands. Pickton and Sikorowski (2004) estimate that the total economic impact of hunting, fishing, and wildlife-

watching in Colorado at over $1.8 billion, with corresponding employment at 33,000 full-time jobs. An April 2004 report from the Center for the Study of Rural America calls wildlife recreation "rural America's newest billion-dollar industry" (Henderson 2004), with wildlife-related activities boosting tourism, spurring business growth and contributing to increased property values. The US Fish and Wildlife Service and the Census Bureau team up to track participation and expenditures on wildlife-related recreation. Nationwide these activities generate $108 billion for local economies. Much of these expenditures are in the Rocky Mountain West, with hunters, anglers, and wildlife watchers spending nearly $6 billion in the five-state region alone in 2001 (U.S. FWS and U.S. Census Bureau 2001). Table 4 presents the participation in and expenditures on wildlife recreation for Colorado, Montana, New Mexico, Utah and Wyoming.

Table 4. Participation and expenditures from hunting, fishing, and wildlife associated recreation in the Rocky Mountains (2001)

	Participation	Expenditures
Colorado	2.1 million	$2 billion
Montana	871,000	$943 million
New Mexico	884,000	$1 billion
Utah	1.1 million	$1.4 billion
Wyoming	662,000	$634 million

Source: U.S. DOI et al. 2001.

A complete analysis of an area's economy must present data and analysis that fully accounts for the important role that tourism, recreation, hunting, and fishing play in ensuring a sustainable and diversified economy for rural western communities.

D. Entrepreneurs

All of the indicators previously discussed are related to the increasing entrepreneurial activity being experienced West-wide. Entrepreneurs in high technology and knowledge-based industries can often choose their location, and are likely to choose high-amenity locations (Rasker and Glick 1994, Snepenger et al. 1995, Johnson and Rasker 1995, Beyers and Lindahl 1996, Rasker and Hansen 2000, Low 2004, Henderson and Abraham 2004). Recreation- and tourism-oriented businesses are often founded by footloose entrepreneurs seeking to live and work in places rich in amenities. Retirees and others relying on investment income also choose amenity-rich locations that include certain businesses and services. These new migrants bring with them entrepreneurial opportunities for those who can provide the services they seek.

Figure 3 shows personal income by type for the Rocky Mountain region. While wage and salary income is still the largest portion of total personal income, non-farm proprietors' income has shown an upturn in recent years.

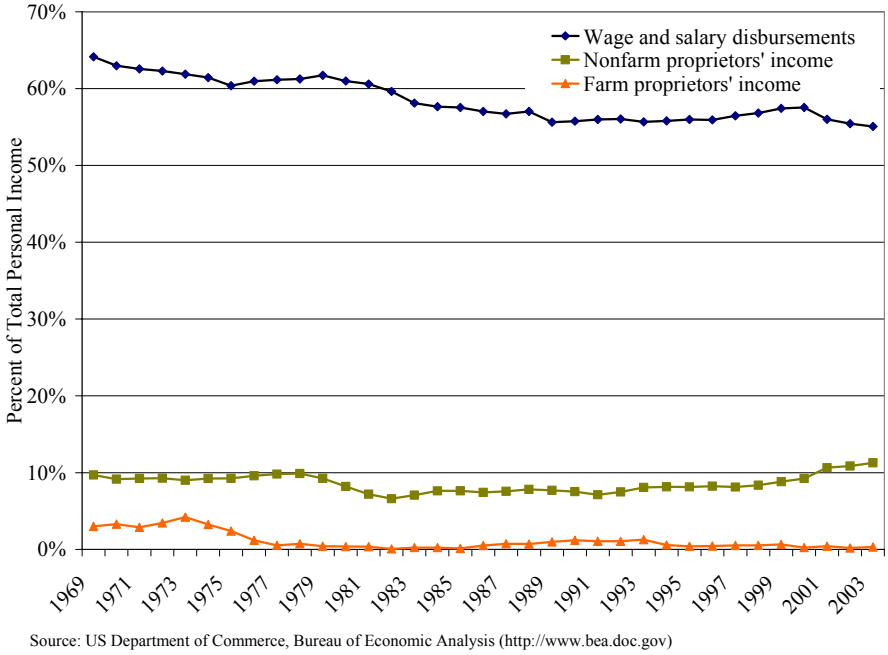


Figure 3. Rocky Mountain Personal Income by Type

As the proportion of total personal income from non-farm proprietors grows, implications for rural communities and for management of the public lands that surround them also grows. As Low (2004) points out: "Entrepreneurs create local jobs, wealth, and growth — and are themselves innovative users of other regional assets and resources." Furthermore, Low notes: "Entrepreneurs bolster a region's quality of life while promoting economic prosperity. Research has found a strong correlation between entrepreneurship and long-term regional employment growth."

Beyers and Lindahl (1996) specifically examine businesses which provide "producer services" and find these businesses are expanding rapidly in rural areas, and that most of them conduct much of their business interregionally or even internationally, bringing outside income into the rural region where they are located. These researchers also found that the decision to locate in rural areas is mostly for quality-of-life reasons, providing further evidence of the importance of such factors to local economies and the need to examine public land management activities and the potential impacts on quality of life.

A complete analysis of an area's economy must take into account the growing role of entrepreneurial businesses, and consider the impacts of each alternative on those businesses attracted by the environmental amenities provided by public lands in those communities.

E. The Role of Protected Public Lands

More and more people in the West, and all over the US, are able to choose where they live and work. Technology makes it easier for professionals to "telework" using electronic communications. Many businesses are able to conduct national or international commerce from any location they choose. Other entrepreneurs simple choose to live in a particular place and build a business in response to local needs. Retirees and others who collect non-labor income are not tied by a job to a specific location. All of these people seek an attractive place to live. More and more, as development pressures increase, public lands become a backdrop or setting which contributes to or even creates the amenities on which a community's economy will thrive and grow. Research supports the assertion that protected public lands contribute to rural economic health (Rudzitis and Johansen 1989, Rudzitis and Johnson 2000, Rasker et al. 2004).

Local communities with protected wildlands reap measurable benefits in terms of employment and personal income. For instance, the Sonoran Institute (Sonoran Institute 2004b) has found that protected lands have the greatest influence on economic growth in rural isolated counties that lack easy access to larger markets. From 1970 to 2000, real per capita income in isolated rural counties with protected land grew more than 60 percent faster than isolated counties without any protected lands.

These findings confirm earlier research showing that wilderness is in fact beneficial for local economies. Residents of counties with wilderness cite the presence of that wilderness as an important reason why they moved to the county, and long-term residents cite it as a reason they stay. Recent survey results also indicate that many firms decide to locate or stay in the West because of scenic amenities and wildlife-based recreation, both of which are strongly supported by wilderness areas (Morton 2000).

As noted by Freudenburg and Gramling (1994):

> "…it needs to be recognized as a serious empirical possibility that the future economic hope for resource-dependent communities of...the United States could have less to do with the consumption of natural resources than with their preservation."

This sentiment is reiterated by Deller et al. (2001):

> "Rural areas endowed with key natural resource amenities can manage those resources to capture growth more effectively. This may entail expansion beyond policies that have historically been focused on extraction of the resource base."

Resource managers, economic planners and community leaders must become aware of this potential. We therefore request that the NEPA process fully address the economic importance to local communities of protecting public wildlands from resource extraction

V. SOURCES OF DATA

This section presents selected sources of economic, demographic, and recreation data.

A. Economic and Demographic Data

Data are available for several economic indicators by county from the U.S. Department of Commerce, Bureau of Economic Analysis and the U.S. Department of Labor, Bureau of Labor Statistics. The U.S. Census Bureau also tracks economic trends along with demographic trends, most by county as well. Economic profiles showing these and other trends by state, county, or groups of counties are available form the Sonoran Institute's Economic Profile System.

Federal economic and demographic data sources:

- Bureau of Economic Analysis (Department of Commerce): http://www.bea.doc.gov
  - Date on income, farm income, transfer payments, and employment for states, counties, and regions. Annual data, 1969-2000 (Standard Industry Classification) and 2001-2003 (North American Industry Classification System)
- Bureau of Labor Statistics (Department of Labor): http://www.bls.gov
  - Data on income, wage and salary, employment, unemployment rates by industry, for counties, states, and regions. Monthly data, 1990-2005
- Census Bureau (U.S. Department of Commerce): http://www.census.gov
  - Data on population, demographics, business, and economics for states and counties
- The Sonoran Institute Economic Profile System: http://www.sonoran.org
  - Generates detailed economic profiles, including trends in employment and income, farm income, economic resilience, and demographics for states, counties, or groups of counties. The

companion, Economic Profile System — Community, will generate profiles to reflect just the rural or urban areas of a county.

The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, (U.S. Department of the Interior, Fish and Wildlife Service and US Department of Commerce, Census Bureau): http://www.census.gov/prod/www/abs/fishing.html
Data at the state level on participation in and expenditures for wildlife-associated recreation

Selected state economic and demographic data sources:

Colorado Economic and Demographic Information System: http://www.dola.state.co.us/is/cedishom.htm

Montana Census and Economic Information Center (CEIC): http://ceic.commerce.state.mt.us/

New Mexico Labor Market Information: http://www.dol.state.nm.us/dol_lmif.html

New Mexico Economic Development Data Center: http://ww1.edd.state.nm.us/index.php?/data/C31/

Utah Governor's Office of Planning and Development, Demographic and Economic Analysis: http://www.governor.utah.gov/dea/

Wyoming Department of Administration and Information, Economic Analysis Division: http://eadiv.state.wy.us/

B. Recreation Data

Data on recreation use in the area where a land management plan is being developed is critical to making an informed decision. Surveys of users at recreation areas can be used to obtain information on the levels and types of recreation use. Information on users' expenditures in the area is also important to learn the overall impact of public lands recreation. Federal land management agencies collect some data on recreation use of public lands. The Bureau of Land Management's Recreation Information Management System (RIMS) and the USDA Forests Service's National Visitor Use Monitoring System (NVUMS) are two examples.

Other information may be obtained through surveys of local residents, recreation visitors and through using existing data on the recreation and tourism revenues to local businesses, and the value of these activities to participants. The lack of complete visitation data does not justify ignoring the jobs and income from recreation. Furthermore, the Data Quality Act requires use of the best available, reliable data on all impacts and affected sectors of the economy.

The National Survey on Hunting, Fishing and Wildlife-Associated Recreation (noted above) is also a source of state-wide data on participation in wildlife recreation that should be used to supplement more specific studies for the location in question. State agencies are also a source of data on fishing and hunting and other wildlife-associated recreation.

Colorado Division of Wildlife: http://wildlife.state.co.us/index.asp

Montana Fish, Wildlife, and Parks: http://fwp.state.mt.us/default.html

New Mexico Game and Fish: http://www.wildlife.state.nm.us/index.htm

Utah Division of Wildlife Resources: http://wildlife.utah.gov/index.php

Wyoming Game and Fish: http://gf.state.wy.us/

C. Data Gaps and Other Issues

Land managers may encounter gaps in county- or state-level economic data or may notice that data series are not continuous. These are not, however, obstacles to doing a thorough and comprehensive analysis of the trends in the economies of the local area.

1. Disclosure Gaps

Some data gaps are due to disclosure restrictions. The Bureau of Economic Analysis and the Bureau of Labor Statistics will suppress data in cases where disclosing it may reveal private information about individuals. For example, if only one business represents a specific industry in a given area, any data on employment and/or income in that industry will not be publicly disclosed since it may make it possible to identify an individual's or business' private information. Disclosure suppression is more likely to be a problem in counties with small

populations. The Sonoran Institute suggests several potential techniques to address the issue of data gaps due to disclosure issues. The Economic Profile System will also automatically estimate the data gaps for major industry categories. These are described in detail in the User's Manual for the EPS (Sonoran Institute 2004b.)

2. Other Data Gaps

BEA and Bureau of Labor Statistics (BLS) data are sometimes not available for certain industries and/or certain years. Other data are suppressed, but are identified as falling within a range of values. Data gaps where an "L" appears instead of a number are described as follows:

Less than 10 jobs, but the estimates for this item are included in the totals, or
Less than $50,000 (for income data), but the estimates for this item are included in the totals

3. Industry Classification Using SIC and NAICS

Income and employment data from the Bureau of Economic Analysis and the Bureau of Labor Statistics for 1969-2000 are classified according to the Standard Industry Classification system (SIC), while the most recent data (2001 and forward) are classified by the North American Industry Classification System (NAICS). NAICS was developed jointly by the U.S., Canada, and Mexico in order to make statistics comparable across all three countries.

The NAICS provides greater detail for the service and professional sectors which are of growing importance in the rural West, and indeed all over the country. This classification scheme also includes some emerging industries such as "information" which includes the growing Internet and information phenomenon. The Bureau of Economic Analysis' Regional Economic Information System (REIS) uses SIC to classify industries and the Sonoran Institute's EPS system uses SIC data from the REIS in order to show trend analyses, along with NAICS data.

VI. Recommended Methods for Analysis

In general, it is inappropriate to examine a region's economy solely as a single point in time because economies are dynamic. To the extent that data are available, the economic profile of an area should be developed based on the trends in key economic indicators. This can help guide resource management by showing the likely future situation in an area and can point out periods of economic downturn. It may be instructive to look at other variables during these periods to see if there are correlations between land management activities and economic activity.

Looking at the changes in the employment and income (including non-labor income) is important to understanding the overall direction in which an area's economy is moving. Trend analysis will show long-term patterns in income and employment that may be masked when looking at only a point in time. Data on employment and income are available from 1969-2000 from the BEA under the SIC system. The BEA changed to the NAICS in 2001, and reconstructed NAICS data for years prior to 2001 are not yet available. However, one can certainly look at a general picture of the economy over time by using both sets of data. This analysis should be applied to all the segments of the economy to see the long-term trends in both extractive and other industries along with non-labor income.

A lack of data on recreation activities on public lands should not be an excuse to avoid analysis of potential impacts of public land management decisions on the recreation sector. Several examples of research on recreation use, values to participants, and expenditures are available (a very limited sample includes: Fix and Loomis 1997, Chakraborty and Keith 2004, Cordell and Tarrant 2002, Kaval and Loomis 2003). Rosenberger and Loomis (2001) present a detailed bibliography of recreation valuation studies and present methods by which analysts can transfer estimates of the value of recreation in one area to other similar areas. Of course the best way to truly understand the value of recreation in an area is to conduct a survey specifically focused on that area. At a minimum, such a survey should collect information on recreation visitation and expenditures. An estimate of the economic impacts of recreation can be made by multiplying the total number of recreation

visitors in an area by the estimated expenditures per visitor day. These data need to be collected and analyzed as part of a comprehensive analysis of the socio-economic impacts of land management.

VII. RECOMMENDED ANALYSES

The preceding sections of this brief have presented the key indicators that must be included in a socio-economic impact analysis, identified data sources for conducting that analysis, and provided methods for completing an analysis that more accurately reflects the West's economy. In making land-use decisions, federal agencies have an obligation under NEPA to take a "hard look" at the environmental consequences of a proposed action, and the requisite analysis "must be appropriate to the action in question."[28] The impacts and effects of a proposed action, such as oil and gas development, that federal agencies are required to assess include: "ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative."[29] Under the Data Quality Act, federal agencies are required to use information that is of high quality and that is objective, useful, and verifiable by others.[30] The agency must also use "sound statistical and research" methods.[31]

Federal agencies cannot evaluate the consequences of proposed decisions or determine how best to avoid or mitigate negative impacts without adequate data and analysis. NEPA's hard look at environmental consequences must be based on "accurate scientific information" of "high quality."[32] Essentially, NEPA "ensures that the agency, in reaching its decision, will have available and will carefully consider detailed information concerning significant environmental impacts."[33] The Data Quality Act and the agencies' interpreting guidance expand on this obligation, requiring that influential information or decision-making input be based on "best available science and supporting studies conducted in accordance with sound and objective scientific practices."[34]

Through the application of the methodology, key indicators and data sources we have provided, federal agencies can better fulfill their obligations to evaluate the direct, indirect, and cumulative impacts of various alternative decisions. In this section, we have provided both general recommendations on the scope of the socio-economic impact analysis that should occur and specific inquiries to be made in this analysis. Again we note that completion of the socio-economic analyses outlined in this brief are necessary but not sufficient to fully evaluate a land management decision. A thorough benefit-cost analysis is also required and expected.

We formally request that the NEPA analysis fully reflect and account for the following scoping comments:

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[28] 42 U.S.C. § 4321 et seq.; *Metcalf v. Daley*, 214 F.3d 1135, 1151 (9th Cir. 2000); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 348 (1989).

[29] 40 C.F.R. § 1508.8.

[30] Treasury and General Government Appropriations Act for Fiscal Year 2001, Pub.L.No. 106-554, § 515. *See also*, Office of Management and Budget "Information Quality Guidelines," available at http://www.whitehouse.gov/omb/inforeg/iqg_oct2002.pdf and individual "Agency Information Quality Guidelines," available at http:/www.whitehouse.gov/omb/inforeg/agency_info_quality_links.html.

[31] *Ibid*.

[32] 40 C.F.R. § 1500.1(b).

[33] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

[34] Treasury and General Government Appropriations Act for Fiscal Year 2001, Pub.L.No. 106-554, § 515. *See also*, Office of Management and Budget "Information Quality Guidelines," available at http://www.whitehouse.gov/omb/inforeg/iqg_oct2002.pdf and individual "Agency Information Quality Guidelines," available at http://www.whitehouse.gov/omb/inforeg/agency_info_quality_links.html.

A. The socio-economic analysis should include an analysis, graphs and discussion of historic personal income trends — including non-labor sources of income.

The analysis of regional economic impacts must include an analysis of all sources of income, including non-labor income. A full accounting of all sources of income is necessary to understand the important role that retirement and investment income — as well as other sources of non-labor income, such as interest payments, rents, and profits — play in the regional economy. An economic impact analysis that excludes non-labor income is inadequate and misleading.

- **Specific Requests and Requirements for examining the Total Personal Income and the Importance of Non-Labor Income as Part of the NEPA Process:**

For all counties in the planning area, please show the role of non-labor income in the area's economy.

Show the percentage of current total personal income that is non-labor income (excluding income support).

Analyze and discuss the role that retirement and investment income currently plays in the area's economy, including the spillover effects that retirees have for businesses in the area.

Analyze and discuss the role that amenities, including recreation opportunities and environmental quality, currently play in attracting and retaining non-labor income to the area.

Analyze and discuss the potential impacts that public land management alternatives will have on the level and trend of investment and retirement income in the area.

Show the trend in non-labor income (again excluding income support) as a percentage of total personal income.

B. The socio-economic analysis must include an analysis and discussion on the indirect role public lands play in the regional economy in attracting knowledge-based businesses, service sector business, recreation and tourism businesses, and other entrepreneurs.

Public wildlands often define the character of an area and are an important component of the quality of life for local residents and future generations. Their protection enables the customs and culture of western communities to continue. The socio-economic analysis also must account for these economic benefits.

A growing number of economists are recognizing that protecting the quality of the natural environment is key in attracting new residents and businesses, and that therefore the environment is the engine propelling the regional economy. A letter to President Bush from 100 economists concludes, "The West's natural environment is, arguably, its greatest, long-run economic strength… A community's ability to retain and attract workers and firms now drives its prosperity. But if a community's natural environment is degraded, it has greater difficult retaining and attracting workers and firms" (Whitelaw et. al, 2003). Given these findings, we request that, as part of the economic impact analysis of management alternatives, the socio-economic analysis fully consider the indirect role of public lands in attracting and retaining non-recreational businesses and retirees and encouraging entrepreneurial efforts.

- **Specific Requests and Requirements for Examining the Role of Protected Public Lands in the Local Economy as Part of the NEPA Process:**

For all counties in the planning area, please show the role of various industries in the area's economy.

Show the current distribution of employment and income by industry (for each industry, show employment as a percentage of total jobs and income as a percentage of total personal income).

Discuss the relative importance of each industry.

Analyze and discuss the impacts that public land management alternatives will have on non-extractive industries if extractive activities are accelerated on public lands in the area.

Show a complete analysis of the segments of service and professional employment and income for the area.

Analyze and discuss the potential impacts of land management alternatives on these sectors of the economy.

Show trends in employment and income by industry, including a detailed examination of the service and professional sectors.

Discuss the level of diversity in the region's economy. Discuss trends in income and employment that have led to the current mix of industries

Analyze and discuss the potential impacts of public lands management alternatives on the overall makeup of the economy of the area.

Show trends in non-farm proprietor's income as a percentage of total personal income for the area.

Collect data on the various sectors that make up non-farm proprietors. Analyze the sectors where entrepreneurship is growing.

Analyze and discuss the factors which have attracted new businesses to the area.

Analyze and discuss the potential impacts that public land management alternatives will have on these sectors and the ability of proprietors to start and grow businesses.

C. The socio-economic analysis must account for the economic importance of the recreation, hunting, and fishing that occurs on public land.

The recreation opportunities provided by wilderness-quality lands also yield direct economic benefits to local communities. The socio-economic analysis must include an analysis of the income and jobs associated with recreation, hunting and fishing from each alternative.

- **Specific Requests and Requirements for Examining the Economic Importance of Recreation, Hunting and Fishing on Public Lands as Part of the NEPA Process:**

For all counties in the planning area, show the role of recreation, hunting and fishing in the area's economy.

Collect data on participation in all recreation activities (hunting, fishing, hiking, camping, backpacking, biking, skiing, wildlife watching, boating, ORV use, etc.)

Collect data on expenditures by recreation visitors in the region.

Analyze the economic impact of hunters' and anglers' expenditures on area businesses and local economies.

Analyze the economic impact of other recreationists' expenditures on area businesses and local economies.

Show the impact of lodging taxes, sales taxes, and property taxes in the local economy.

Analyze and discuss the impact of public land management alternatives on recreation, hunting, and fishing businesses.

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