4.0 IMPACT ANALYSIS

4.1 ECONOMIC ANALYSIS OVERVIEW

Regional economic activity is little influenced by political boundaries. Typically, it is difficult to describe anything smaller than a county, and more often a group of counties or a metropolitan area, as constituting a functioning economy.

The economic study area for this analysis includes the counties and communities most likely to be affected, including LaBarge in Lincoln County; Pinedale, Big Piney, Marbleton, and Boulder in Sublette County; and Eden, Farson, and Rock Springs in Sweetwater County.

An area's economic base is comprised of industries that are primarily responsible for bringing outside income into the local economy. These industries typically export their goods and services outside the region and in turn support ancillary industries such as retail trade, housing construction, and personal services within the region. The location of important industries in certain areas has traditionally been tied to such factors as natural resource base, cost factors (transportation and labor), and existing transportation infrastructure. However, technology has affected these location factors.

Existing documents and documents in preparation that were utilized to estimate potential and cumulative economic impacts for the study area included the following reports:

- SWREE (UWAED 1997);
- the economic effect analysis developed for the JMHCAP (UWAED 2003);
- the JMHCAP Draft EIS (BLM 2003a);
- BLM's *Socioeconomic Profile-Pinedale* (BLM 2003b);
- the economic impact analysis currently being prepared for the PFO RMP (UWAED [2004]);
- BLM's reasonable foreseeable development information; and
- the existing county planning documents (SCBC and SCPC 2003).

Additional information was obtained from BLM and Operators as necessary.

4.1.1 Methods of Economic Analysis

4.1.1.1 Time Series and Cross-Sectional Analysis

In economic analysis, the two most commonly used tools are time series analysis and cross-sectional comparisons. Time series analysis, as the name implies, involves plotting data trends over time for one or more geographic areas or other units (e.g., industries) of analysis. Options for the nature of this analysis include nominal data (i.e., the actual numbers), percentage change over time from some base year (e.g., where the base year figure is converted to 100), and the ratio between two figures (e.g., a state's per capita income as a percentage of the national figure). Time series analysis provides the basis for understanding how an economy is evolving over time, and in relation to other areas. While time series tracks trends over time, cross-sectional analysis examines the distribution of one variable in relation to other variables at one point in time. Typical visual tools include bar graphs and pie charts. Examples of cross-sectional analysis include the distribution of jobs by industry, of population by race, and of income by source. Cross-sectional analysis allows an understanding of the economic structure.

4.1.1.2 Location Quotient

Location quotients are used to measure the extent to which the contribution of one subgroup of economic factors (e.g., an industry, occupational group) to a regional economy is greater or lesser than the contribution of that subgroup to a larger, reference economy (usually, the U.S.). For instance, if the manufacturing sector provided 18% of all jobs in a region, and the U.S. figure was 15%, the location quotient would be 1.2 (i.e., 18/15). When used to measure industry concentration, a location quotient is taken as a rough indicator of a region's competitiveness in that industry. The higher the location quotient, the greater the competitive advantage a region appears to have. Plotting location quotients over time for key industries in an economic base is one visual way to gauge changes in relative competitiveness.

However, the location quotient can be spurious. For example, if a region suffers a major job loss with the closure of a large employer that is not replaced, other economic base industries' share of total jobs (and their location quotients) would rise even if their employment is stable, because the total number of jobs (the denominator) has fallen. In this case, an apparent increase in competitiveness is in fact illusory.

To assess the importance of major industries as a basic industry, BLM calculated location quotients on nine major industries as listed in Table 4.1 (BLM 2003a). A location quotient was calculated for both employment and income and compares each industry's share of total local employment or income (PFO area) to the industry's state or national share. This quotient yields a value generally between 0 and 2, where 1 indicates an equal share percentage between the local and state or national economies. Location quotients greater than 2 indicate a strong industry concentration while those less than 0.50 indicate a weak concentration. Table 4.1 indicates the PFO area mirrors the state's economy as a whole in many ways. However, there are industries that show a stronger concentration in the area compared to the state's economy, including mining, manufacturing, and transportation and utilities.

Two industries that are weak in this area compared with the state are services and FIRE. When compared to the national economy, mining (includes oil and gas) shows an extremely high concentration in both employment and earnings. This is true for the earnings in the transportation and utilities sector as well. Alternatively, earnings for farm and agriculture services, manufacturing, trade, and FIRE for the area show a weak concentration compared to the national economy.

4.1.1.3 Shift-Share Analysis

Shift-share analysis is a means of attributing change in a region's economy (e.g., change in jobs or earnings) to various factors--change in the nation's economy, the particular industry mix in the region, and the competitiveness of the region's economic base industries compared to

Table 4.1 Location Quotients, 2000.[1]

	Location Quotient			
	Employment		Earnings	
Industry	Wyoming	U.S.	Wyoming	U.S.
Farm and Agricultural Services	1.12	1.53	0.43	0.23
Mining	2.22	26.20	2.09	182.63
Construction	1.17	1.53	0.99	1.80
Manufacturing	1.79	0.66	1.78	0.27
Transportation and Utilities	1.54	1.68	1.21	12.55
Trade	0.96	0.95	0.78	0.31
FIRE	0.76	0.65	0.59	0.38
Services	0.74	0.60	0.60	3.86
Government	0.90	1.30	0.71	1.53

[1] Source: BLM (2003a).

similar industries elsewhere. Shift-share analysis is complex and if insufficient data exists for particular economic factors, the analysis is meaningless.

4.1.1.4 Economic Modeling

Modeling encompasses a variety of analytic approaches, such as input-output analysis and economic simulation, that forecast how an economy would behave under certain circumstances. These circumstances may be a specific event in the regional economy (e.g., opening of a new mill, closure of an old one, building of a convention center), a particular type of policy intervention (e.g., change in the property tax rate), or macroeconomic in nature (e.g., shift in the prime rate).

Economic impact analysis is defined as an assessment of change in overall economic activity as a result of some change in one or several economic activities. It involves applying a final demand change to a predictive I/O model, then analyzing the resulting changes in the economy. This study primarily utilizes I/O analysis performed by the UWAED.

4.2 IMPLAN® MODELING SYSTEM

IMPLAN® (**IM**pact **A**nalysis for **PLAN**ning) was originally developed by the U.S. Department of Agriculture, Forest Service (USFS) in cooperation with the Federal Emergency Management Agency and the BLM to assist in land and resource management planning (Minnesota IMPLAN Group, Inc. 2000). IMPLAN® provides estimates of the additional economic activity associated with sales of goods or services. This methodology has been packaged, along with the necessary data files, as IMPLAN® Pro by the Minnesota IMPLAN Group, Inc. (MIG) of Stillwater, Minnesota, and is the basis for the analysis in this report. Some of the conventions used by IMPLAN® are discussed below.

4.2.1 Database Components

The IMPLAN® databases consist of two major parts: 1) national-level matrices and tables and 2) economic and physical data at the county and/or state level. The national matrices are combined with regional data to create a regional model which can be edited to reflect local conditions. For this analysis, UWAED used updated calibrated county-specific data to more accurately reflect activities in the study area.

The IMPLAN® data is divided into four main categories:

1. industry output,
2. employment,
3. value added (includes employee compensation), and
4. final demands.

Industry output represents the dollar value of an industry's total production. The data is derived from a number of sources including U.S. Census Bureau economic censuses and the BLS employment projections.

Employment is listed as a single number of jobs for each industry. The data is derived from ES202 employment security data supplemented by county business patterns and Regional Economic

Information System (REIS) data. All IMPLAN® databases (after 1985) include both full-time and part-time workers in employment estimates.

Value added includes employee compensation, proprietor income, other property type income, and indirect business taxes. Employee compensation includes the total payroll costs (including benefits) of each industry in the region. Proprietary income consists of payments received by self-employed individuals (includes private business owners, doctors, and lawyers). Other property type income consists of payments from rents, royalties, dividends, and interest. Indirect business taxes consist primarily of excise and sales taxes paid by individuals to businesses.

Final demands are the dollar value of goods and services purchased by consumers and institutions (federal, state, and local government). Personal consumption expenditures are the largest component of final demand, and consists of payments by individuals/households to industries for goods and services used for personal consumption. IMPLAN® final demands are measured in terms of producer prices.

4.2.2 Multipliers

Each industry that produces goods and services generates demands for other goods and services. Other producers, in turn, purchase goods and services. These indirect purchases (indirect effects) continue until "leakage" from the region (imports, wages, profits, etc.) stop the cycle. These iterations are described by multipliers.

Each of these multiplier types can be calculated for output, employment, and income (value added). Output multipliers are derived by dividing the total (direct, indirect, and induced) output effects by the direct output. An output multiplier provides an indicator of the total output created (direct, indirect, and induced) for each dollar of direct output.

Income multipliers (or any of the value added components) are derived by dividing the total (direct, indirect, and induced) income effects by the direct income. An income multiplier provides an indicator of the total income created (direct, indirect, and induced) for each dollar of direct income. Employment multipliers are created in the same manner as the income multiplier, but using employment rather than income. An employment multiplier provides an indicator of the total jobs (direct, indirect, and induced) for each direct job.

4.2.3 Key Assumptions

IMPLAN® bases I/O modeling on several assumptions (MIG 2000).

- Constant returns to scale. Production functions are considered linear; if additional output is required, all inputs increase proportionately.
- No supply constraints. An industry has unlimited access to raw materials and its output is limited only by the demand for its products.
- Fixed commodity input structure. Assumes that price changes will not cause a firm to buy substitute goods. This structure assumes that changes in the economy will affect the industry's output, but not the mix of commodities and services it requires to make its product.
- Homogenous sector output. The proportions of all the commodities produced by the industry remain the same, regardless of total output (i.e., an industry will not increase the output of one product without proportionately increasing the output of all its other products).
- Industry technology. An industry uses the same technology to produce all its products (i.e., an industry has a primary or main product and all other products are byproducts of the primary product).

4.2.4 Wyoming Data and Analysis Conventions

This analysis makes use of a data set representing Wyoming for the Year 2000. All impact amounts expressed in 2000 dollars were adjusted to 2002 dollars using IMPLAN deflators based on the BLS's

CPI. Through IMPLAN, direct employment from the model was used to estimate all of the associated indirect and induced effects.

4.3 IMPACT ANALYSIS

Project-specific economic activity analyses were prepared using the methods developed for the SWREE (UWAED 1997) and the economic effect analysis developed for the JMHCAP (UWAED 2003; BLM 2003a). Additional information was obtained from the Operators, BLM, BLM's pertinent reasonable foreseeable development documents, Wyoming Agricultural Statistics, WGFD, or other sources as necessary.

The economic impacts of the JIDP and SPP and alternatives on the economic study area were analyzed using IMPLAN® as directed by BLM (personal communication, October 14 and 17, 2003, with Roy Allen, Economist, BLM Wyoming State Office). IMPLAN® I/O modeling provides a mathematical accounting of the flow of dollars and commodities through a region's economy. These types of models provide estimates of how a given amount of a particular economic activity translates into jobs and income in a region. This I/O analysis used coefficients specifically calibrated by the UWAED for the study area. The coefficients were developed as part of the SWREE from a combination of primary and secondary data specific to the region. The calibrated county-specific coefficients have been updated for Lincoln, Sublette, and Sweetwater Counties for the new Pinedale RMP (UWAED 2004; BLM 2004a). The Year 2000 was used as the base year for this analysis.

TRC Mariah, in consultation with the Operators, BLM, and UWAED, developed estimates of physical outputs for selected commodities associated with the various alternatives and determined the appropriate values for these commodities. UWAED then used the output and value data in IMPLAN® to estimate the economic impacts of the projects on the economic study area.

The economic analysis for the projects focused on three types of commodities, including natural gas, cattle grazing, and recreation activities (nonconsumptive and hunting). The I/O models used county-specific calibrated coefficients updated from the model developed for the SWREE (UWAED 1997) and JMHCAP (UWAED 2003; BLM 2003a). The model used 2000 data for Lincoln, Sublette, and Sweetwater Counties, and provides a reasonable estimate of the structure of the economy for the study area. The I/O model estimated aggregate changes in employment and earnings across all counties; however, it is not possible to estimate where these impacts will occur within each of the counties. Some secondary and induced impacts may occur outside the study area in the state, region, or nation.

Prior to modeling, input data was adjusted for inflation and converted to 2000 dollars. After modeling, impact dollar values were discounted using a 3.25% real discount rate as recommended by the OMB (2004). The OMB recommended using a real discount rate of 3.25% for constant-dollar benefit-cost analysis to approximate the marginal pretax rate of return on an average investment in the private sector in recent years (BLM 2003a).

The I/O model required a series of inputs and assumptions specific to the study area. Assumptions included the value of production resulting from land uses within the JIDPA and SPPA under each alternative (see Sections 3.5 and 3.6). BLM staff and cooperating agencies provided information on current project area uses and how those uses may change under each alternative. This provided a physical quantitative measure of inputs necessary for the economic impact analysis (e.g., number of gas wells, AUMs, RVDs).

Estimates of inputs, including prices, were used to evaluate the potential sales from uses of the JIDPA and SPPA under each alternative. This is the direct sales estimate that serves as the input into the I/O model to obtain an estimate of total economic impact for each alternative (changes in direct and indirect income and employment).

The economic impact analysis for the No Action Alternatives was the first model prepared to provide a baseline for the alternatives analysis. It contains a discussion of impacts that were used for comparison with other alternatives. Where impacts are the same among alternatives, reference was made to those alternatives so that impact discussions are not repeated. Cumulative impacts for the Proposed Actions and each alternative are discussed and include the social and economic impacts of the Proposed Actions and alternatives in combination with other proposed, existing, or reasonable foreseeable developments.

The SPP analysis was based on a 20-year development horizon (2004-2024) and a 47-year production horizon (2004-2051), with year 2000 being used as the base year. Cumulative economic effects are expressed as both short-term (2004-2013) and long-term (2014-2051).

The JIDP analysis was based on a 3- to 42-year (2004-2046) development horizon and a 43- to 85-year (2004-2089) production horizon, with year 2000 being used as the base year. Cumulative effects are expressed both as short-term (2004-2013) and long-term (2014-2089). It was assumed for the purposes of analysis that production from all wells would follow an average decline curve (see Chapter 5) over a 40-year life of well based on actual Jonah Field production information provided by Operators. It was assumed that 4.2% of production would be derived from state minerals (to calculate severance taxes) and 95.8% of production would be derived from federal minerals (to calculate federal royalties).