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## 2.0 METHODS

### 2.1 ECONOMIC PROFILES

TRC Mariah developed baseline profiles from selected statistics for the counties and affected communities in the JIDP/SPP study area for the 20-year study period (1980 to 2000). The baseline profiles were developed using existing documents, documents in preparation, the EPS, and data obtained from other extant sources. The baseline profiles developed from EPS provided the foundation from which social and economic impacts arising from the JIDP/SPP and alternatives were projected and compared. The EPS profiles, tables, and graphs used for this analysis are on file at TRC Mariah's Laramie, Wyoming, office under Project 35982. EPS software is available to the public at no charge from <[www.sonoran.org](http://www.sonoran.org)>, where it may be downloaded and individual county profiles may be created. Additionally, the State of Wyoming has developed county profiles which may be viewed at <<http://eadiv.state.wy.us/wef/eps.asp>>.

#### 2.1.1 Resources

The EPS was formally adopted by the U.S. Department of the Interior, BLM, Washington, D.C. (Instruction Memorandum No. 2003-169, May 16, 2003) for use with all RMPs in the 14-state region covered by EPS. The BLM Wyoming State Office specified that EPS be used to profile affected counties and communities in the JIDP/SPP EIS study area (personal communication, October 14 and 17, 2003, with Roy Allen, Economist, BLM Wyoming State Office).

The EPS was developed by the Sonoran Institute Socio/Economics Program, in partnership with the BLM, to provide analysts and planners with a way to efficiently and consistently produce detailed socioeconomic profiles at the state, regional, county, and multi-county level. Profiles produced from EPS contain narrative, tables, and figures that illustrate long-term trends:

- in population;
- in employment and personal income by industry;
- in average earnings;

- in retirement and other non-labor income;
- in business development; and
- in agriculture.

Additional or more-detailed information used to compile profile and baseline socioeconomic data may have been obtained from extant sources, including the following:

- the U.S. Census Bureau;
- the U.S. Department of Commerce, Bureau of Economic Analysis (BEA);
- other U.S. departments and agencies;
- various State of Wyoming departments and agencies;
- local county and community governments;
- UWAED;
- BLM;
- JIDP and SPP proponents (collectively referred to as Operators herein); and
- personal interviews with individuals in affected areas (particularly on subjects where an apparent disconnect between published data and actual circumstances seemed to exist).

### **2.1.2 Socioeconomic Study Factors**

TRC Mariah compiled baseline statistics for a 20-year study period (1980 to 2000) for the social and economic factors detailed in the sections below.

#### **2.1.2.1 Population and Demography**

Factors related to population and demography include the following:

- population trends;
- income, poverty, and unemployment; and
- workforce age, gender, and disabilities.

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### 2.1.2.2 Employment and Personal Income

Factors related to employment and personal income include the following:

- average wages by area;
- median wages by job category;
- total personal income (TPI) (adjusted for place of residence and place of work), including labor income (i.e., earnings from work; wages, salaries, and self-employment income), investment income (i.e., dividends, interest, and rent), and transfer payments (i.e., Social Security benefits, Medicare and Medicaid benefits, and other income support and assistance); and
- per capita personal income (PCPI)

### 2.1.2.3 Quality of Living

Factors related to quality of life (e.g., the degree to which a person enjoys the important possibilities of his or her life) of residents in the economic study area were gathered and enumerated where possible. Baseline statistics were compiled on quality of life in the affected communities, counties, and the State of Wyoming. Quality of life factors include the following:

- crime (including crimes against people and crimes against property);
- health care (facilities and providers);
- housing (type, quality, quantity, cost, assessed values, building permits issued);
- cost of living;
- inflation; and
- education (primary, secondary, post-secondary).

### 2.1.2.4 Industry and Economy

Factors related to income and the economy include the following:

- gross state product ("value added" or the gross output [sales, operating income] minus intermediate inputs [purchased or imported goods or services used in production]);

- industry compensation of employees (sum of employees wages and salaries plus supplements to wages and salaries);
- industry employment and job growth trends; and
- earnings by industry and industry growth trends.

#### 2.1.2.5 Taxes and Revenues

Factors related to taxes and revenue include the following:

- mineral severance taxes and federal minerals royalties received by Wyoming and directly distributed to counties, cities, and towns;
- fiscal year general fund revenue collections by source;
- fiscal year distribution of mineral severance taxes to all accounts by mineral;
- royalties from state minerals received and distributed by the State of Wyoming;
- payments in lieu of taxes (PILT);
- state-assessed real and personal property valuations;
- state-assessed production valuations;
- proportionate taxable valuation of various classes of property in Wyoming;
- locally assessed property valuations;
- ad valorem taxes;
- sales tax collections;
- use tax collections; and
- lodging tax collections.

#### 2.1.2.6 Grazing

Factors related to grazing include the following:

- historic cattle grazing use within JIDP area (JIDPA) and SPP area (SPPA) and
- estimated direct fiscal revenues to local government from livestock grazing based on the proportion of production taxes and federal grazing fees received or returned to the JIDPA/SPPA .

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### 2.1.2.7 Recreation

TRC Mariah compiled baseline statistics for consumptive (hunting) and nonconsumptive recreation in the JIDPA and SPPA, utilizing the methodology developed for the SWREE (UWAED 1997). Historical information was derived from previously listed sources (see Sections 1.0 and 2.2) and/or the Wyoming Game and Fish Department (WGFD) and the Wyoming Division of Tourism.

Where sufficient data were available, recreation activities in the JIDPA and SPPA were separated into nonresident and resident use. Nonresident use value was based on the economic impact from expenditures by nonresidents in the region. Direct fiscal revenues to local governments from recreation were estimated based on the proportion of nonresident sales, lodging, and gas tax revenues returned to local governments in the study area.

Recreation data included the following items:

- BLM-recorded recreation visits;
- BLM recreation days (visits split into 12-hour days);
- net consumer value per day for outdoor recreation activities;
- visitor expenditures;
- hunter recreation days for appropriate herd units (obtained from WGFD);
- number of hunters; and
- surface ownership status of herd units.

## **2.2 IMPACT ANALYSIS**

TRC Mariah developed the socioeconomic impact analysis for the JIDP/SPP EISs utilizing the methods used 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 Service, WGFD, and other sources.

The economic impacts of the JIDP/SPP and alternatives on the economic study area were analyzed using IMPLAN, which is an input/output (I/O) modeling system (personal communication, October 14 and 17, 2003, with Roy Allen, Economist, BLM Wyoming State Office). I/O modeling is 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. The I/O analysis used coefficients calibrated by the UWAED specifically for the SWREE from a combination of primary and secondary data specific to Lincoln, Sublette, and Sweetwater Counties. These calibrated county-specific coefficients were updated for the JMHCAP (BLM 2003a) and the Pinedale RMP (UWAED 2004; BLM 2004a). The year 2000 was used as the base year.

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

The JIDP/SPP analysis was based on a 20-year development horizon (2003-2023) and a 47-year production horizon (2003-2050), with 2000 being used as the base year. Cumulative economic effects are expressed as both short term (2003-2012) and long term (2013-2050 for the SPP; 2013-up to 2085 for the JIDP). The economic analysis focused on three types of commodities, including natural gas infill development, cattle grazing (sheep are approved for grazing on the Boundary allotment in the JIDPA; however, sheep have not been grazed in more than 5 years, and for the purposes of the analysis herein, it is assumed that sheep shall not be grazed on JIDP- or SPP-affected allotments), and recreation activities (hunting and nonconsumptive).

Prior to modeling, input data used for the I/O model was adjusted for inflation and converted to 2000 constant-dollars, as necessary. After modeling, impact dollar values were discounted using a 3.5% discount rate as recommended for projects exceeding 30 years by the Office of Management and Budget (OMB) Circular No. A-94 (OMB 2004). The OMB recommendation for using a real

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discount rate of 3.5% for constant-dollar benefit-cost analysis approximates the marginal pretax rate of return on an average investment in the private sector in recent years (BLM 2003a).

The OMB describes the discount rate policy in OMB (2004). To compute net present value, it is necessary to discount future benefits and costs. This discounting reflects the time value of money. Benefits and costs are worth more if they are experienced sooner. All future benefits and costs, including nonmonetized benefits and costs, should be discounted. The higher the discount rate, the lower is the present value of future cash flows. For typical investments, with costs concentrated in early periods and benefits following in later periods, raising the discount rate tends to reduce the net present value. On the other hand, when costs and revenues are both concentrated in early periods with lower benefits following in later periods, raising the discount rate tends to increase the net present value.

Real versus Nominal Discount Rates. The proper discount rate to use depends on whether the benefits and costs are measured in real or nominal terms.

- A real discount rate that has been adjusted to eliminate the effect of expected inflation is used to discount constant-dollar or real benefits and costs. A real discount rate can be approximated by subtracting expected inflation from a nominal interest rate.
- A nominal discount rate that reflects expected inflation is used to discount nominal benefits and costs. Market interest rates are nominal interest rates in this sense.

As presented herein, the "nominal" value of project activities is the simple calculation of dollars with no adjustments. The "present value" is the value of those activities after the real discount rate has been applied over time.

The discount factor is calculated as  $1/(1+i)^t$  where  $i$  is the interest rate and  $t$  is the project year (OMB 2004).

The I/O model required a series of assumptions and inputs specific to the study area. Assumptions included the value of production resulting from land uses within the JIDPA and SPPA under each alternative. BLM staff and cooperating agencies provided information on current uses in the JIDPA and SPPA and how those uses may change under each alternative. This information provided a physical quantitative measure of inputs necessary for the economic impact analysis (e.g., number of gas wells, animal unit months [AUMs] [an AUM is the amount of forage necessary to feed a cow and a calf for one month], recreational visitor days, etc.). Primary data and sources used to estimate physical inputs for the I/O model are summarized in Chapter 4.0.

Estimates of inputs, including prices, were used to evaluate the potential sales from uses of the JIDPA and SPPA under each alternative. This direct sales estimate serves as the input for 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 Alternative 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. Methodology for the Proposed Action impact analyses are fully discussed in Chapter 4.0. Project-specific impacts are discussed for the JIDP in Chapter 5.0 and for the SPP in Chapter 6.0. 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 Action and each alternative are discussed and include the social and economic impacts of the Proposed Action or alternatives in combination with other proposed, existing, or reasonable foreseeable developments.

### **2.2.1 Natural Gas Activities**

The economic impact of the Proposed Actions, alternatives, and cumulative effects on the study-area economy were analyzed in two parts using the methods developed for the SWREE (UWAED 1997) and JMHCAP (UWAED 2003; BLM 2003a). The first part of each project analyzed was the development phase and the economic impacts associated with drilling and completion of wells in

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the JIDPA and SPPA. The second part analyzed was the production phase and the economic impacts associated with the production of natural gas from the completed wells.

Estimated average per well development and production costs were provided by the Operators. Certain economic assumptions were used in the natural gas development analyses (the drilling and completion of natural gas wells), including the following:

- expenditure per well (cost to drill);
- volume of production (million cubic feet [MMCF]) per well;
- value of production (the average price of natural gas used for the price forecast by the Consensus Revenue Estimating Group (CREG) [CREG 2004]);
- total economic impact per well (direct and indirect);
- industry earnings per well;
- annual job equivalents (AJEs) per well (An AJE represents 12 months of employment. For example, one AJE could represent one job for 12 months or two jobs for 6 months or three jobs for 4 months. For the purposes of this analysis, a job [one AJE] is defined as 260 worker-days = 1 worker-year, a person year is 365 days; therefore, there are approximately 1.4 worker years per person year [one AJE = 1.4 person-years]); and
- local government taxes and revenues.

### **2.2.2 Grazing**

The economic impact of the Proposed Actions, alternatives, and cumulative effects on livestock grazing in the JIDPA and SPPA was estimated using the methods described in the SWREE (UWAED 1997) and JMHCAP (UWAED 2003; BLM 2003a).

The value of cattle grazing AUMs was estimated using data obtained from the Wyoming Agricultural Statistics Service which included the value of livestock sold in Wyoming each year from 1998 to 2002 (Wyoming Agricultural Statistics Service 2003). Gross receipts per AUM were estimated from 5-year average prices and adjusted for inflation each year to 2002 dollars. A 5-year average was used in the analysis due to the variability in livestock prices in recent years and the lack

of correlation between livestock prices, other industries, and inflation. Livestock prices were conservatively held constant throughout the planning period. Total livestock sales were divided by the number of animals that calved in each year, which provides a value per animal sold. The value per cow was divided by an AUM conversion factor, which resulted in an estimated value per AUM per year. The value and number of AUMs per alternative were used in combination with IMPLAN to estimate economic impacts of grazing under each alternative.

Based on the information described above, certain AUM economic assumptions were developed for impact analysis. These included:

- gross production receipts per AUM;
- total economic impact (direct and secondary) per AUM;
- labor earnings generated per AUM;
- AJEs per AUM; and
- local government revenue generated per AUM.

### **2.2.3 Recreation**

The economic impact of the Proposed Actions, alternatives, and cumulative effects on recreation were estimated using the methods developed for the SWREE (UWAED 1997) and JMHCAP (UWAED 2003; BLM 2003a).

Recreation activities are not purchased in an identifiable market so their economic value must be determined indirectly. Two types of measures are typically used for "non-market" commodities:

- the expenditures associated with the use of the non-market commodity, and
- the net value of the non-market commodity to the consumer.

The first measure considers the economic activity generated by the use of the non-market commodity by measuring participant expenditures to estimate the economic activity that is generated in the region in terms of income and jobs. In regional analyses, this type of measure is typically used to value recreation use by nonresidents and this was the measure employed in this analysis.

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For resident expenditures, it was assumed that recreationists would have spent their money elsewhere in the region's economy if they had not been participating in the recreation activity. Recreation expenditures by residents are viewed as a shifting of dollars from one site or commodity to another based on personal consumption preferences and not a net gain to the region's economy.

The second measure considers the value of the satisfaction that the non-market commodity provides the consumer by considering the value of the recreation activity to the participant after all his or her costs are subtracted. This measure represents the "net economic value" to the user that is over-and-above costs. It is similar to the concept of profit for a business. Special techniques based on observed consumer behavior or the expressed valuations by the consumer are used to estimate this type of value. In regional analysis, this type of measure is typically used to value recreation use by residents. This measure was not used for this analysis due to a lack of available data on resident use. A detailed discussion of the estimation of "net economic values" is presented in the appendix of the economic effect analysis developed for the JMHCAP (UWAED 2003; BLM 2003a).

Recreation impacts were estimated utilizing information obtained from the sources described in Chapter 1.0 and Section 2.2.1. From those estimates, certain economic assumptions were developed for use in the analysis for consumptive (i.e., hunting pronghorn and greater sage-grouse) and nonconsumptive recreation (e.g., wildlife and scenery viewing, off-road vehicle use), including the following:

- expenditures by individual per recreation day;
- total economic impact (direct and secondary) per recreation day;
- labor earnings generated per recreation day;
- AJEs generated per recreation day;
- local government revenue generated per recreation day; and
- net economic value generated per recreation day.

#### **2.2.4 Social Impacts**

Baseline social and economic factors, including population, personal income, and quality of living factors described in Sections 2.1.2.1-2.1.2.3 were compared to expected changes in the economy that would affect a typical family in the study area. Impacts were evaluated against the potential for changes in quality of life factors (i.e., availability of necessities, recreation and leisure time) and the ability of residents to maintain or improve the current quality of life as a result of the proposed projects and alternatives.

#### **2.2.5 Economic Justice**

The potential direct, indirect, and cumulative effects to the social, cultural, and economic well-being and health of minority and low-income groups were evaluated per *Executive Order (EO) 12898*. This was done by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental impacts of the proposed projects (including cumulative effects) on minority populations and low-income populations.