INTRODUCTION

Based on concerns raised by the public and Bureau of Land Management (BLM) personnel during the preparation of the Green River Resource Management Plan, the BLM Green River Resource Area is preparing a Jack Morrow Hills Coordinated Activity Plan (JMHCAP). This activity plan is intended to provide more specific management direction to prevent or address potential conflicts from future development of energy resources, recreation activities, grazing, wildlife habitat, and other resources in the area.

As a part of this planning process, the Wyoming State Office of the BLM contracted with the University of Wyoming for an analysis of the regional economic effects on Southwest Wyoming associated with the alternatives developed by the JMHCAP. This report summarizes the results of the economic effect analysis for the JMHCAP. The Jack Morrow Hill's report is a follow-up to the Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation (1997) previously developed by the University of Wyoming for the BLM.

PROCEDURES

The economic impacts of the JMHCAP alternatives on Southwest Wyoming were analyzed using an input-output model developed specifically for the region. An input-output model mathematically maps the flow of dollars through a region's economy providing information on how the individual sectors interact with each other in the local economy and how the local economy is linked with the outside world. This type of model provides estimates of how a given amount of a particular economic activity translates into jobs and income in the region. The model considers both the direct effects on the producing sector(s) of a change in economic activity and the secondary effects on

other local sectors due to economic linkages within the region's economy. As a result, input-output models can provide estimates of the economic effects on the entire regional economy from a change in any one sector or economic activity.

This type of methodology is commonly used to estimate the impacts of potential changes in the structure of a region's economy. Non-survey input-output models are available (IMPLAN, REMI, etc.), however these models are developed with national coefficients that may not accurately represent certain sectors in the region's economy. This is especially true for natural resource based industries since they often have unique production characteristics that can vary substantially from region to region. The input-output model used for this analysis was developed from a combination of primary and secondary data specific to Southwest Wyoming.

The input-output model used for the JMHCAP analysis was an updated version of the model developed for the Southwest Wyoming Resource Evaluation report. For this analysis the model was updated to 1996 and included Lincoln, Sublette, Sweetwater, and Uinta Counties. The BLM provided estimates of physical outputs for selected commodities associated with the various alternatives. The University, in consultation with the BLM, determined the appropriate values for these commodities. The University then used the output and value data in the regional model to estimate the economic impacts of JMHCAP on Southwest Wyoming.

Most commodities are traded in an identifiable market. For these commodities, it is relatively easy to determine their economic value by observing their selling price in the market. However, most 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: 1) the expenditures associated with the use of the non-market commodity, and 2) 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. The second measure considers the value of the satisfaction that the non-market commodity provides the consumer.

For recreation, the first type of measure uses expenditures by participants to estimate the economic activity that is generated in the region in terms of income and jobs. In regional analysis, this type of measure is typically used to value recreation use by nonresidents. For resident expenditures it is assumed that they would have spent their money somewhere else in the region's economy if they had not been participating in the recreation activity. Thus, expenditures by residents on recreation 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.

For recreation, the second type of measure considers the value of the recreation activity to the participants after all his or her costs are subtracted. This measure represents the "net economic value" to the user over and above costs. It is similar to the concept of profit for a business. Special techniques based on observed consumer behavior or their expressed valuations are used to estimate this type of value. In regional analysis, this type of measure is typically used to value recreation use by residents. A detailed discussion of the estimation of "net economic values" is presented in the appendix of this report.

Following this methodology, recreational activities associated with the JMHCAP alternative were separated into resident and nonresident use and analyzed separately.

Residents were considered to be individuals residing in the four-county region. Nonresidents were considered to be individuals residing outside the four-county region.

Because Federal lands such as the Jack Morrow Hills are an important source of revenues for local government in Southwest Wyoming, the direct fiscal revenues to local government in Southwest Wyoming from the JMHCAP alternatives were also estimated in the analysis. Local government would include cities, towns, counties, special districts, and public schools. The estimates of revenue to local governments were based on the current rates and distributions that may be subject to change over the planning period.

The JMHCAP analysis was based on a twenty year planning horizon (1998-2017). Nineteen ninety-eight was designated as the base year. Cumulative economic effects were expressed as both short-term (1998-2007) and long-term (1998-2017). The economic analysis for the JMHCAP focused on three types of commodities associated with the Jack Morrow Hills including, energy resources (natural gas, crude oil, and coalbed methane), recreation activities (hunting and non-consumptive), and livestock grazing (cattle and sheep). The analysis considered four management alternatives including a No Action Alternative, Alternative A (Production), Alternative B (Protection), and Alternative C (Resource Tradeoff). The following is a discussion of the assumptions and projections used in the analysis for each of these alternatives.

Oil and Gas Activities

The economic impact of oil and gas activities in the Jack Morrow Hills area was analyzed in two parts. The first was the development phase, which considered the economic impacts associated with drilling and completion of oil and gas wells in the study area. The second was the production phase, which considered the economic

impacts associated with the production of crude oil and natural gas from the completed wells. Only the development phase was considered for coalbed methane wells, since production estimates for these wells were not available due to a lack of production history in the area. The JMHCAP Reasonable Foreseeable Development Scenario notes that:

> "About two-thirds of the JMH area will be unavailable for exploration and development under the no action alternative. This is due to the large amount of land not available for lease or not open to surface disturbing activities. Future activity, if exploration and development activity were allowed in the entire JMH area, was first determined. Actual activity expected under the no action alternative is expected to be only one-third of this total and is assumed for all activity projections made below."

Due to these restrictions a full development scenario was not considered in the economic analysis of energy resources.

Development Phase

Table 1 summarizes the economic assumptions used in the analysis for oil and gas development (the drilling and completion of oil and gas wells). Development costs were separated into wells that were drilled and completed and wells that were drilled and abandoned. Development costs were estimated for three types of wells: 1) Standard oil and gas wells (7,000-9,000 feet), 2) Deep coalbed methane wells (greater that 1,200 feet), and 3) Shallow coalbed methane wells (less than 1,200 feet). The BLM's Reasonable Foreseeable Development Scenario report (RFD) assumed that all shallow coalbed methane wells were completed, so no costs were estimated for drilled and abandoned shallow wells. Most of the drilling and completion cost information was taken or adapted from the Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation (SWRE) report. For some types of wells this information was supplemented with information from other sources.

Table 1. Economic Assumptions for Oil and Gas Development – JMHCAP

	Oil & Gas Wells Drilled & Completed	Oil & Gas Wells Drilled & Abandoned	Coalbed Methane Wells Drilled & Completed (Deep)	Coalbed Methane Wells Drilled & Abandoned (Deep)	Coalbed Methane Wells Drilled & Completed (Shallow)
Expenditures (1)	$567,600	$277,800	$500,000	$244,700	$65,000
Total Impact (1)	$774,600	$377,700	$682,400	$332,800	$88,705
Earnings (1)	$119,500	$57,600	$105,300	$50,800	$13,685
Jobs – AJE (1)	4.395	2.121	3.872	1.869	0.503

Source: Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation, 1997

Table 1 indicates that the estimated total cost of drilling and completing an oil and gas well was $567,600. This expenditure generated total economic impacts (direct and secondary) of $774,600 per well in the Southwest Wyoming economy. The total economic impact per well included $119,500 of labor earnings in the region. Drilling one oil and gas well supported the equivalent of 4.4 annual jobs in the region. A similar explanation applies to the other types of oil and gas wells shown in Table 1.

The estimated costs for standard oil and gas wells were taken from the SWRE report. The estimated cost for deep coalbed methane wells was provided by the BLM's Rock Springs Office. The estimated cost for shallow coalbed methane wells was based on reported costs for similar wells in Northeast Wyoming. The cost breakdown for deep and shallow coalbed methane wells was assumed to be proportional to that for a standard oil and gas well.

Estimates of the economic impacts of oil and gas development on the Southwest Wyoming economy in terms of total economic impact, earnings, and jobs were based on

the updated model from the SWRE report. The employment estimates were expressed as annual (12 month) job equivalents.

Information on the number and type of wells for the JMHCAP was taken from the BLM's RFD report. Table 2 summarizes projected drilling activity by type of well. The RFD assumed that the success rate for standard oil and gas wells and deep coalbed methane wells would be approximately 53 percent and that the success rate for shallow coalbed methane wells would be 100 percent.

Table 2. Drilling Projections for Oil and Gas Development – JMHCAP

Alternative	Oil & Gas Wells Drilled & Completed	Oil & Gas Wells Drilled & Abandoned	Coalbed Methane Wells Drilled & Completed (Deep)	Coalbed Methane Wells Drilled & Abandoned (Deep)	Coalbed Methane Wells Drilled & Completed (Shallow)
No Action (1998-2007)	17	15	5	5	15
No Action (1998-2017)	34	30	5	5	15
Alt. A (1998-2007)	25	23	5	5	15
Alt. A (1998-2017)	53	47	5	5	15
Alt. B (1998-2007)	12	10	3	2	15
Alt. B (1998-2017)	24	21	3	2	15
Alt. C (1998-2007)	16	15	3	2	15
Alt. C (1998-2017)	34	31	3	2	15

Source: Jack Morrow Hills CAP Reasonable Foreseeable Development Scenario, 1997

More details on the analysis of the oil and gas development for the Jack Morrow Hills area are shown in the worksheets at the end of the report.

Production Phase

Table 3 summarizes the economic assumptions used in the analysis for oil and gas production. Crude oil production was analyzed separately from natural gas production.

Natural gas is the predominate form of production in the Jack Morrow Hills area. Most of the production information was taken or updated from the SWRE report.

Table 3. Economic Assumptions for Oil and Gas Production - JMHCAP

	Crude Oil (Barrel)	Natural Gas (MMCF)
Value of Production (1)	$15.00	$1,750.00 *
Total Impact (2)	$23.16	$2,363.38
Earnings (2)	$2.50	$188.14
Jobs - AJE (2)	0.000072	0.005387
LG Revenue (2)	$1.00	$107.38

*   The value of production for natural gas is based on a price of $1.75 per MCF.

Source:
(1)   CREG, Wyoming State Government Revenue Forecast, January 1999.
(2)   Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation, 1997.

In Table 3 the price of oil was assumed to be $15.00 per barrel. At that price level one barrel of oil would generate $23.16 of total economic activity (direct and secondary) in the Southwest Wyoming economy. The total economic activity per barrel included $2.50 of labor earnings in the region. One barrel of oil supported .000072 direct and secondary jobs in the region or the equivalent of one annual job for about every 13,900 barrels. One barrel of oil also generated $1.00 of direct revenue for local governments in the region. A similar explanation applies to the per MMCF amounts for natural gas production. The value of natural gas production is based on a price of $1.75 per MCF.

The price of oil has varied substantially in Wyoming during recent years, ranging from a high of $19.56 in 1996 to a low of $9.50 in 1999 (Wyoming Geo-notes, 1999). As a result, forecasting future oil price is very difficult. The Wyoming State Government Revenue Forecast (January 1999) of $15.00 per barrel for 2002-2005 was used in the

analysis. This price level was comparable to the average for 1996 through 1999. In 1998 oil production represented about one percent of the total value of oil and gas production in the Jack Morrow Hills. The Wyoming State Government Revenue Forecast of $1.75 per MCF for 1999-2005 was used for natural gas production in the analysis. In 1998 natural gas production represented nearly 99 percent of the total value of oil and gas production in the Jack Morrow Hills.

Estimates of the economic impacts of oil and gas production on the Southwest Wyoming economy in terms of total economic impact, earnings, and jobs were based on the updated model from the SWRE. The employment estimates were expressed as annual (12 month) job equivalents. Estimates of local government revenue for oil and gas production were also taken from the SWRE report.

Information on the amount of oil and gas production for the JMHCAP was taken from the BLM's RFD report. Table 4 summarizes production by alternative. The RFD projected 117 barrels of oil/condensate and 84.6 MMCF of natural gas per well per year over a 26 year producing life for each well.

Table 4. Oil and Gas Production Projections – JMHCAP

Alternative	Oil (Barrels)	Gas (MMCF)
No Action (1998-2007)	62,244	45,007.2
No Action (1998-2017)	116,415	84,177.0
Alt. A (1998-2007)	66,573	48,137.4
Alt. A (1998-2017)	137,592	99,489.6
Alt. B (1998-2007)	58,734	42,469.2
Alt. B (1998-2017)	104,130	75,534.2
Alt. C (1998-2007)	61,308	44,330.4
Alt. C (1998-2017)	115,722	83,669.4

Source: Jack Morrow Hills CAP Reasonable Foreseeable Development Scenario

More details on the analysis of the oil and gas production in the Jack Morrow Hills area are shown in the worksheets at the end of the report.

Recreation Activities

As previously noted, recreation activities in the JMHCAP were separated into nonresident and resident use. Nonresident use was valued based on the economic impact from expenditures by nonresidents in the region. Resident use was valued based on the net economic value to the user. Direct fiscal revenues to local government from recreation were estimated based on the proportion nonresident sales, lodging, and gas tax revenues returned to local government in Southwest Wyoming. Table 5 summarizes the economic assumptions used in the analysis for recreation.

Table 5. Economic Assumptions for Recreation – JMHCAP

	Elk Hunters Per Day	Deer Hunters Per Day	Antelope Hunters Per Day	Non-consumptive Recreation Per Day
Expenditures (1)	$239.40	$139.06	$239.62	$55.00
Total Impact (2)	$330.69	$181.06	$331.25	$80.78
Earnings (2)	$47.28	$21.09	$45.59	$13.16
Jobs (2)	0.003307	0.001525	0.003214	0.001051
LG Revenue (3)	$3.69	$1.85	$3.85	$1.33
Net Econ Value (4)	$41.46	$41.46	$41.46	$26.57

Source:
(1) Wyoming Game and Fish Department, Annual Report, 1998 for hunting and Wyoming Division of Tourism, Region 2, 1997 for non-consumptive.
(2) Updated from Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation.
(3) Estimated
(4) U.S. Forest Service, Intermountain Region, 1999.

Table 5 indicates that on average nonresident elk hunters spent an estimated $239.40 per recreation day in Southwest Wyoming. This spending generated a total economic impact (direct and secondary) of $330.69 in the regional economy. The total economic

impact per hunter day included $47.28 of labor earnings in the region. One nonresident

elk hunter day supported 0.003307 direct and secondary jobs in the region or the

equivalent of one annual job for every 302 hunter recreation days. One nonresident elk

hunter day also generates $3.69 in direct revenue for local governments in Southwest

Wyoming. The net economic value of one resident elk hunter day was estimated to have

been $41.46. A similar explanation applies to the other recreation activities shown in

Table 5. A brief discussion on the meaning of "net economic value" is presented in the

appendix of this report.

   Estimated per recreation day expenditures for elk, deer, and antelope nonresident

hunters for 1997 were developed from the Wyoming Game and Fish Department's

Annual Report, 1998. They represent average statewide nonresident expenditure

estimates. Per day expenditures for non-consumptive, nonresident recreation were

adapted from Report on the Economic Impact of the Travel Industry in Wyoming, 1997

prepared for the Wyoming Division of Tourism by Morey and Associates. The estimates

were for Region 2, which includes Uinta, Sweetwater, Carbon, Albany, and Laramie

Counties. All visitor expenditures were assumed to occur in Southwest Wyoming and

were expressed in constant 1997 dollars throughout the planning period.

       Estimates of the economic impacts of nonresident recreation expenditures on the

Southwest Wyoming economy in terms of total economic impact, earnings, and jobs were

based on the updated model from the SWRE report. The employment estimates were

expressed as annual (12 month) job equivalents. Direct local government revenue

estimates were based on local tax rates and state government legislation regarding

distributions of sales tax, lodging tax, and gas tax revenues to cities, towns, counties, and

special districts. Estimates of the net economic value of resident recreation days were taken from a draft report for the U.S. Forest Service by Rosenberger, et al, Colorado State University, 1999. The estimates used in the analysis were for big game hunting and various non-consumptive recreation activities in the intermountain region of the U.S. The report did not provide separate estimates for elk, deer, and antelope.

Information on the number and type of recreation days for the JMHCAP was provided by the BLM. For hunter days, the BLM estimates were developed in consultation with the Wyoming Game and Fish Department. Hunting days estimates represent the 10-year average for the Jack Morrow Hills area. Non-consumptive days were based on 19 percent of total Green River Extensive Recreation Area days from the BLM's Recreation Management Information System. Since the BLM and the Wyoming Game and Fish Department measure recreation days differently hunting and non-consumptive estimates may not be strictly comparable. The following summarizes the estimated recreation days by alternative.

Elk Hunting

- No Action Alternative Impacts: Average elk hunter days would remain constant over the planning period at 424 hunter days per year. The 424 hunter days would include 65 nonresident days (15.3 percent) and 359 resident days (84.7 percent).

- Alternative A Production Impacts: Elk displacement would occur as habitat is fragmented. Average elk hunter days would increase in the short term from 424 in 1998 to 524 days by 2005. There would then be a gradual decrease for the remainder of the planning period to 324 hunter days by 2017. The proportion of nonresident and resident hunter days was assumed to remain constant.

- Alternative B Protection Impacts: Same as the No Action Alternative Impacts.

- Alternative C Resource Tradeoff Impacts: Same as Alternative A Impacts.

Deer Hunting

- No Action Alternative Impacts: Average deer hunter days would remain constant over the planning period at 1,830 hunter days per year. The 1,830 hunter days would include 75 nonresident days (4.1 percent) and 1,755 resident days (95.9 percent).
- Alternative A Production Impacts: Same as the No Action Alternative Impacts.

- Alternative B Protection Impacts: Same as the No Action Alternative Impacts.

- Alternative C Resource Tradeoff Impacts: Same as the No Action Alternative Impacts.

Antelope Hunting

- No Action Alternative Impacts: Average antelope hunter days would remain constant over the planning period at 2,274 hunter days per year. The 2,274 hunter days would include 812 nonresident days (35.7 percent) and 1,462 resident days (64.3 percent).

- Alternative A Production Impacts: Same as the No Action Alternative Impacts.

- Alternative B Protection Impacts: Same as the No Action Alternative Impacts.

- Alternative C Resource Tradeoff Impacts: Same as the No Action Alternative Impacts.

Non-consumptive Recreation

- No Action Alternative Impacts: A total of 48,700 non-consumptive recreation days were estimated for 1998. The 48,700 recreation days included 31,950 nonresident days (65.6 percent) and 16,750 resident days (34.4 percent). Non-consumptive recreation days were projected to increase by two percent per year during the planning period. Under this alternative non-consumptive recreation days are project to increase to 70,947 days in 2017. The proportion of nonresident and resident recreation days was assumed to remain constant.

- Alternative A Production Impacts: Non-consumptive recreation days were projected to increase by one percent per year during the planning period. The growth rate is lower under this alternative due to potential impacts from development that could impact open spaces and opportunities for solitude. Under this alternative non-consumptive recreation days are project to increase to 58,835 days in 2017. The proportion of nonresident and resident recreation days was assumed to remain constant.

- Alternative B Protection Impacts: Same as the No Action Alternative Impacts.

- Alternative C Resource Tradeoff Impacts: Same as the No Action Alternative Impacts.

More details on the analysis of the recreation activities for the Jack Morrow Hills are shown in the worksheets at the end of this report.

Livestock Grazing

Livestock grazing was separated into cattle and sheep animal unit months (AUMs) with each type of livestock grazing analyzed separately. Direct fiscal revenues to local government from livestock grazing were estimated based on the proportion of production taxes and Federal grazing fees received or returned to Southwest Wyoming. Table 6 summarizes the economic assumptions used in the analysis for livestock grazing.

Table 6. Economic Assumptions for Livestock Grazing – JMHCAP

	Cattle Grazing Per AUM	Sheep Grazing Per AUM
Production (1)	$33.27	$22.82
Total Impact (2)	$65.07	$41.16
Earnings (2)	$11.81	$8.99
Jobs (2)	0.000710	0.000639
LG Revenue (3)	$1.88	$1.44

Source:
(1)   Five year average derived from Wyoming Agricultural Statistic, 1993-97
(2)   Updated from Southwest Wyoming Resource Evaluation, Socio/Economic Evaluation, 1997.
(3)   Estimated.

Table 6 indicates that gross receipts for cattle production in Wyoming have averaged $33.27 per AUM over the last five years (1993-97). At that price level, cattle production would generate $65.07 of total economic impact (direct and secondary) in the Southwest Wyoming economy. The total economic impact per AUM included $11.81 of labor earnings in the region. One AUM of cattle production supported 0.000710 direct

and secondary jobs in the region or the equivalent of one annual job for every 1,408 AUMs. One AUM of cattle production also generated $1.88 of direct revenue for local governments in the region. A similar explanation applies to the per AUM amounts for sheep production in Table 6.

Gross receipts per AUM for cattle and sheep production were estimated from five year average prices (1993-97) reported in the Wyoming Agricultural Statistics, 1998. A five-year average was used in the analysis due to the variability in livestock price in recent years. Livestock prices were held constant throughout the planning period.

Estimates of the economic impact of livestock grazing in terms of earnings and jobs were based on the updated model from the SWRE report. The employment estimates were expressed as annual (12 month) job equivalents. Direct local government revenue estimates were based on local tax rates and state and Federal government legislation regarding the distribution of tax revenue to cities, towns, counties, and special districts.

Information on the number and type of AUMs for the JMHCAP was provided by the BLM. Due to changes in available forage, environmental conditions, business decisions by operators, and livestock prices, livestock grazing in the Jack Morrow Hills area has varied over time. Total permitted use for the area was 26,032 AUMs (22,767 cattle and 3,265 sheep). Yet the actual use for the last five years (1993-97) averaged 9,851 AUMs (8,861 cattle and 990 sheep). However, grazing use has trended up since 1997 with actual use for the baseline year of 1998 at 13,038 AUMs (11,991 cattle and 1,047 sheep). Given this variability in livestock grazing the following grazing assumption were used in the analysis.

No Action Alternative Impacts: Annual grazing AUMs were based on the average of the baseline year actual use (13,038 AUMs) and the total permitted use (26,032 AUMs). The average of the two amounts was 19,535 AUMs (17,379 cattle and 2,156 sheep). This grazing level was held constant throughout the planning period.

Alternative A Production Impacts: Annual grazing AUMs were based on the total permitted use of 26,032 AUMs (22,767 cattle and 3,265 sheep). This grazing level was held constant throughout the planning period.

Alternative B Protection Impacts: Annual grazing AUMs were based on the five-year average actual use of 9,851 AUMs (8,861 cattle and 990 sheep). This grazing level was held constant throughout the planning period.

Alternative C Resource Tradeoff Impacts: Annual grazing AUMs were based on the average of the five year average actual use (9,851 AUMs) and the total permitted use (26,032 AUMs). The average of the two amounts was 17,941 AUMs (15,814 cattle and 2,127 sheep). This grazing level was held constant throughout the planning period.

More details on the analysis of livestock grazing for the Jack Morrow Hills area are shown in the worksheets at the end of this report.

RESULTS

The JMHCAP economic analysis was based on a twenty year planning period (1998-2017) with 1998 as the base year. This section first summarizes the results of the economic analysis for the base year (1998). The cumulative economic effects are then summarized for the short-term (1998-2007) and the long-term (1998-2017) portions of the planning period. The short-term and long-term cumulative effects for Alternatives A (Production), B (Protection), and C (Resource Tradeoff) were compared with the impacts for the No Action Alternative on a percentage basis. More details on the analysis for each alternative appear in the worksheets at the end of this report.

Base Year Analysis

Table 7 summarizes the estimated physical outputs from the economic activities associated with the Jack Morrow Hills area in 1998. The Jack Morrow Hills area

supported a wide variety of economic activities including over 4 billion cubic feet of natural gas production, 13,038 AUMs of cattle and sheep grazing, 4,528 days of nonresident and resident hunting, and 48,700 days of nonresident and resident non-consumptive recreation in 1998.

Table 7. Physical Outputs for the 1998 Base Year – JMHCAP

Oil & Gas Wells Drilled	3
Oil & Gas Wells Completed	2
Oil Production (BBLs)	5,616
Gas Production (MMCF)	4,060.8
Livestock Grazing (AUM)	13,038
Nonresident Hunting Days	952
Resident Hunting Days	3,576
NRNC Rec Days	31,950
Resident NC Rec Days	16,750

Table 8 summarizes the **direct** economic impact of the Jack Morrow Hills area on Southwest Wyoming based on the quantities of physical outputs listed in Table 7. Direct economic impact represents the initial amount of dollars flowing into the region's economy as the result of an economic activity. It is estimated that the economic activities in the Jack Morrow Hills area generate $11.0 million of direct economic impact in the Southwest Wyoming economy in 1998. Oil and gas activity (development and production) was the largest source of this revenue, representing 78 percent of the total. The second largest source was nonresident non-consumptive recreation expenditures (16 percent). The rest of the revenue was from livestock grazing (4 percent) and nonresident hunter expenditures (2 percent).

Table 8. Direct Economic Impact for 1998 Base Year – JMHCAP

Oil & Gas	$8,603,640	78.2%
Livestock Grazing	$422,833	3.8%

Nonresident Hunting	$220,561	2.0%
Nonresident Nonconsumptive	$1,757,250	16.0%
Total Jack Morrow Hills	$11,004,284	100.0%

Table 9 summarizes the estimated **total** economic impact of the Jack Morrow
Hills area on the Southwest Wyoming economy. The total economic impact represents
the direct impact plus any secondary impacts resulting from the "multiplier effect". The
multiplier effect considers the re-spending that occurred within the region as a result of
economic linkages between the producing sectors and other sectors in the region's
economy. The total economic impact of economic activity in the Jack Morrow Hills area
was estimated to have been $15.3 million. This amount included the direct impact of the
$11.0 million plus $4.3 million in secondary impacts.

Table 9. Total Economic Impact for 1998 Base Year – JMHCAP

Oil & Gas	$11,654,180	75.9%
Livestock Grazing	$823,349	5.4%
Nonresident Hunting	$304,049	2.0%
Nonresident Non-consumptive	$2,580,921	16.8%
Total Jack Morrow Hills	$15,362,499	100.0%

Oil and gas activity (development and production) accounted for 76 percent of the
total economic impact from the Jack Morrow Hills area. Nonresident non-consumptive
recreation expenditures accounted for 17 percent of the total economic impact. The rest
came from livestock grazing (5 percent) and nonresident hunter expenditures (2 percent).

A portion of the total economic activity associated with the Jack Morrow Hills
area represented labor earnings (wage and salary payments and self-employment income)
in the region. Table 10 indicates that total earnings (direct and secondary) in the region
from economic activities in the Jack Morrow Hills area amounted to $1.7 million in 1998.

Table 10. Total Labor Earnings for 1998 Base Year – JMHCAP

Oil & Gas	$1,074,640	63.7%
Livestock Grazing	$150,992	8.9%
Nonresident Hunting	$41,676	2.5%
Nonresident Non-consumptive	$420,462	24.9%
Total Jack Morrow Hills	$1,687,770	100.0%

Oil and gas activity (development and production) represented 64 percent of the total earnings for the Jack Morrow Hills area. Nonresident non-consumptive recreation expenditures represented 25 percent of the total earnings. The rest represented earnings from livestock grazing (9 percent) and nonresident hunting expenditures (2 percent). The percentage of earnings from oil and gas activity was somewhat lower than that for the direct and total impacts because oil and gas activity was less labor intensive than other economic activities in the Jack Morrow Hills area. Similarly, the percentage of earnings from nonresident non-consumptive recreation expenditures was somewhat higher because the sectors associated with this economic activity were more labor intensive. Differences in the relative wage rates between economic activities also affected the percentage of earnings for different economic activities.

The economic activity associated with the Jack Morrow Hills area also supports employment in the Southwest Wyoming economy. Table 11 summarizes the total employment (direct and secondary) supported by the economic activity in the Jack Morrow Hills area. The employment estimates were expressed on annual job equivalents (AJE) basis. An AJE represents 12 months of employment. For example, one AJE could represent one job for 12 months or two jobs for six months or three jobs for four months. The total employment resulting from the economic activity in the Jack Morrow Hills area was estimated to have been the equivalent of nearly 80 annual jobs in 1998.

Table 11. Total Employment in Annual Job Equivalents for 1998 Base Year JMHCAP

Oil & Gas	33.2	42.1%
Livestock Grazing	9.2	11.7%
Nonresident Hunting	2.9	3.7%
Nonresident Nonconsumptive	33.6	42.6%
Total Jack Morrow Hills	78.9	100.0%

Nonresident non-consumptive recreation expenditures and oil and gas activity represented about 43 percent and 42 percent, respectively, of the total employment associated with the Jack Morrow Hills area. The rest came from livestock grazing (12 percent) and nonresident hunting expenditures (4 percent). The percentage of employment from oil and gas activity was lower than that for the direct and total impacts because oil and gas activity was less labor intensive than other economic activities in the Jack Morrow Hills. Similarly the percentage of employment from nonresident non-consumptive recreation expenditures was higher because the sectors associated with this economic activity were more labor intensive.

By comparing labor earnings and employment it is possible to get an estimate of the average earnings per job for the economic activities in the Jack Morrow Hills area. Table 12 summarizes the average earnings per job for the various economic activities found in the area. Average earnings per job for all economic activities in the Jack Morrow Hills area were $21,391. This was about 80 percent of the average earnings for all jobs in Southwest Wyoming ($27,122). There was substantial variation in average earning per job between different economic activities in the Jack Morrow Hills area. They ranged from a low of $12,521 per job for nonresident non-consumptive recreation expenditures to a high of $32,369 per job for oil and gas activities. Average earnings per job were over 2.5 times greater for oil and gas activities than for nonresident non-

consumptive recreation expenditures. Average earnings per job for livestock grazing

were only about one-half of those for oil and gas activity, but were about 30 percent

higher than for nonresident non-consumptive recreation expenditures. Average earnings

per job for nonresident hunting expenditures were about 14 percent higher than for

nonresident non-consumptive recreation expenditures. The earnings per job estimates

represent the average for all jobs directly or indirectly associated with the activity, not

just the direct jobs in the producing sectors.

Table 12 Average Earnings Per Job for 1998 Base Year – JMHCAP

Oil & Gas	$32,369	151.3%
Livestock Grazing	$16,443	76.9%
Nonresident Hunting	$14,224	66.5%
Nonresident Non-consumptive	$12,521	58.5%
Average Jack Morrow Hills	$21,391	100.0%

Economic activities on Federal land, such as the Jack Morrow Hills area, are an

important source of revenue for local governments in Southwest Wyoming. Table 13

summarizes the revenues to local governments in the region that result from the

economic activities in the Jack Morrow Hills area. The estimated total local government

revenue in Southwest Wyoming from economic activity in the Jack Morrow Hills area

was about $512,000 in 1998.

Table 13. Total Local Government Revenue for 1998 Base Year – JMHCAP

Oil & Gas	$441,659	86.3%
Livestock Grazing	$24,051	4.7%
Nonresident Hunting	$3,502	0.7%
Nonresident Non-consumptive	$42,501	8.3%
Total Jack Morrow Hills	$511,713	100.0%

Due to the tax structure in Wyoming, oil and gas activity (development and

production) was the largest source of local government revenue from the Jack Morrow

Hills representing 86 percent of the total. The second largest source was nonresident

non-consumptive recreation expenditures (8 percent). The rest of the revenue came from

livestock grazing (5 percent) and nonresident hunter expenditures (1 percent).

Recreation activities in the Jack Morrow Hills area were important to Southwest

Wyoming not only because they attract nonresident visitor expenditures but also because

they provide recreation opportunities for regional residents. As such, they are part of the

quality of life associated with living in Southwest Wyoming. Table 14 summarizes the

estimated net economic benefits to resident users from participating in recreation

activities in the Jack Morrow Hills area. The total net economic benefit from resident

recreation use in the Jack Morrow Hills area was estimated to be about $593,000 in 1998.

Resident non-consumptive recreation use represented 75 percent of the total with the

other 25 percent from resident hunting.

Table 14. Net Economic Value of Resident Recreation for 1998 Base Year-JMHCAP

Resident Hunting	$148,261	25.0%
Resident Non-consumptive	$445,047	75.0%
Total Jack Morrow Hills	$593,308	100.0%

Short-term Cumulative Impacts (1998-2007)

Table 15 summarizes the cumulative short-term physical outputs by alternative

for the JMHCAP. The top half of the table shows the physical units of output for each

alternative. The bottom half of the table indicates how the alternatives compare to the No

Action Alternative on a percentage basis.

Table 15. Short-term Cumulative Physical Outputs (1998-2007) – JMHCAP

	No Action Alternative	Alternative A	Alternative B	Alternative C
Oil &Gas Wells Drilled	32	48	22	31
Oil & Gas Wells Completed	17	25	12	16
Oil Production (BBLs)	62,244	66,573	58,734	61,308
Gas Production (MMCF)	45,007.2	48,137.4	42,469.2	44,330.4
Coalbed Wells Drilled	25	25	20	20
Coalbed Wells Completed	20	20	18	18
Livestock Grazing (AUM)	195,350	260,320	98,510	179,410
Nonresident Hunting Days	9,520	9,589	9,520	9,589
Resident Hunting Days	35,760	36,140	35,760	36,140
NRNC Rec Days	349,844	334,268	349,844	349,844
Resident NC Rec Days	183,408	175,242	183,408	183,408
Oil &Gas Wells Drilled	100.0%	150.0%	68.8%	96.9%
Oil & Gas Wells Completed	100.0%	147.1%	70.6%	94.1%
Oil Production (BBLs)	100.0%	107.0%	94.4%	98.5%
Gas Production (MMCF)	100.0%	107.0%	94.4%	98.5%
Coalbed Wells Drilled	100.0%	100.0%	80.0%	80.0%
Coalbed Wells Completed	100.0%	100.0%	90.0%	90.0%
Livestock Grazing (AUM)	100.0%	133.3%	50.4%	91.8%
Nonresident Hunting Days	100.0%	100.7%	100.0%	100.7%
Resident Hunting Days	100.0%	101.1%	100.0%	101.1%
NRNC Rec Days	100.0%	95.5%	100.0%	100.0%
Resident NC Rec Days	100.0%	95.5%	100.0%	100.0%

Alternative A (Production)

Due to the emphasis on production, Alternative A generates the most oil and gas well development activity of all the alternatives with 50 percent more oil and gas well drilling than the No Action Alternative. Alternative A also generates the most oil and gas production with 7 percent more production than the No Action Alternative. The increase in oil and gas production for Alternative A is less than the increase for drilling activity due to continued production from the existing inventory of producing wells. The production from the existing wells tapers off in the later years of the planning period.

Coalbed methane well drilling activity is the same for Alternative A and the No Action Alternative.

AUMs of livestock grazing for Alternative A are the highest of all alternatives with 33 percent more AUMs than the No Action Alternative. This alternative is higher because it projects that all permitted grazing will be utilized throughout the planning period. Nonresident and resident hunting days are about one percent higher for Alternative A than for the No Action Alternative due to the projected increase in elk hunting days between 1998 and 2005 due to displacement of elk caused by fragmentation of habitat. This increase would gradually decrease over the planning horizon to below current levels by 2012. Nonresident and resident non-consumptive recreation days are the lowest of all alternatives for Alternative A with 5 percent fewer days than the No Action Alternative. This alternative is lower due to a projected lower growth rate for non-consumptive use. The analysis makes no judgment regarding the quality of the hunting and recreation days under this or other alternatives.

Alternative B (Protection)

Due to increased restrictions, Alternative B generates the least oil and gas well development activity of all alternatives with about 30 percent less oil and gas well drilling than the No Action Alternative and 54 percent less drilling than Alternative A. Alternative B also generates less oil and gas production than the other alternatives with 6 percent less production than the No Action Alternative and 12 percent less production than Alternative A. The decrease in oil and gas production for Alternative B is less than the decrease in oil and gas well drilling due to the continued production from the existing inventory of producing wells in the short-term. Coalbed methane well drilling for

Alternative B is 20 percent lower that for either the No Action Alternative or Alternative A.

AUMs of livestock grazing for Alternative B are the lowest of all alternatives with 50 percent less AUMs than the No Action Alternative and 62 percent less AUMs than Alternative A. This alternative is lower because it projects that the previous five-year average actual use will continue throughout the planning period. Nonresident and resident hunting days are the same as the No Action Alternative and about 1 percent lower than Alternative A because the protective restrictions are not projected to increase hunter days. Nonresident and resident non-consumptive recreation days for Alternative B are the same as the No Action Alternative because the protective restrictions are not projected to increase the growth rate in non-consumptive use. However, non-consumptive recreation days are about five percent higher for Alternative B than for Alternative A due to the lower growth rate projected for Alternative A.

Alternative C (Resource Tradeoff)

Alternative C is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Standard oil and gas drilling and production activities are about 97 to 98 percent of the No Action Alternative. Coalbed methane drilling activity is 80 percent of the No Action Alternative. The AUMs of livestock grazing are 92 percent of the No Action Alternative. Hunting days and non-consumptive recreation days are comparable to the No Action Alternative.

Economic Effect by Alternative

Table 16 summarizes the cumulative short-term economic effects of the JMHCAP alternatives on the Southwest Wyoming economy. The top half of the table shows the

dollars amounts for each alternative. The bottom half of the table indicates how the

alternatives compare to the No Action Alternative on a percentage basis.

Table 16. Short-term Cumulative Economic Effects (1998-2007) – JMHCAP

	No Action Alternative	Alternative A	Alternative B	Alternative C
Direct Impacts	$125,931,969	$139,443,420	$112,376,699	$121,921,014
Total Impacts	$176,547,748	$195,991,237	$156,320,910	$170,781,215
Total Earnings	$19,771,046	$23,321,742	$16,925,705	$18,974,740
Total Employment (AJE)	923.9	1,022.4	796.2	891.4
Local Govt. Revenue	$5,753,214	$6,190,458	$5,300,248	$5,650,018
Resident Recreation	$6,355,755	$6,154,552	$6,355,755	$6,371,517
Direct Impacts	100.0%	110.7%	89.2%	96.8%
Total Impacts	100.0%	111.0%	88.5%	96.7%
Total Earnings	100.0%	118.0%	85.6%	96.0%
Total Employment (AJE)	100.0%	110.7%	86.2%	96.5%
Local Govt. Revenue	100.0%	107.6%	92.1%	98.2%
Resident Recreation	100.0%	96.8%	100.0%	100.2%

Due to the increased emphasis on production, Alternative A generates the most

economic activity in Southwest Wyoming of all the alternatives in the short-term. Under

Alternative A, direct and total economic impacts are 11 percent higher than the No

Action Alternative. Total labor earnings are 18 percent higher than the No Action

Alternative. Total employment is 11 percent higher than the No Action Alternative.

Revenues to local governments are 8 percent higher than the No Action Alternative.

Because there is less emphasis on protection of resources, Alternative A generate the

least resident recreation benefits of all alternatives with 3 percent less net economic

benefits than the No Action Alternative.

Due to the increased emphasis on protection, Alternative B generates the least

economic activity in Southwest Wyoming of all alternatives. Under Alternative B, direct

and total economic impacts are 11 percent lower than the No Action Alternative and about 20 percent lower than Alternative A. Total labor earnings are 14 percent lower than the No Action Alternative and 27 percent lower than Alternative A. Total employment is 14 percent lower than the No Action Alternative and 22 percent lower than Alternative A. Revenues to local government are 8 percent lower than the No Action Alternative and 14 percent lower than Alternative A. Resident recreation benefits under Alternative B are the same as the No Action Alternative. Because there is more emphasis on protection, Alternative B generates 3 percent more resident recreation benefits than Alternative A.

Alternative C is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Direct and total impacts for Alternative C are 98 percent of the No Action Alternative. Total earnings and employment are 96 to 97 percent of the No Action Alternative. Local government revenue is 98 percent of the No Action Alternative. Resident recreation benefits are comparable to the No Action Alternative.

Long-term Cumulative Impacts (1998-2017)

Table 17 summarizes the cumulative long-term physical outputs by alternative for the JMHCAP. The top half of the table shows the physical units of output for each alternative. The bottom half of the table indicates how the alternatives compare to the No Action Alternative on a percentage basis.

Table 17. Long-term Cumulative Physical Outputs (1998-2017) – JMHCAP

	No Action Alternative	Alternative A	Alternative B	Alternative C
Oil & Gas Wells Drilled	64	100	45	65
Oil & Gas Wells Completed	34	53	24	34
Oil Production (BBLs)	116,415	137,592	104,130	115,722
Gas Production (MMCF)	84,177.0	99,489.6	75,534.2	83,669.4
Coalbed Wells Drilled	25	25	20	20
Coalbed Wells Completed	20	20	18	18
Livestock Grazing (AUM)	390,700	520,640	197,020	358,820
Nonresident Hunting Days	19,040	19,070	19,040	19,070
Resident Hunting Days	71,520	71,686	71,520	71,686
NRNC Rec Days	776,301	703,507	776,301	776,301
Resident NC Rec Days	406,981	368,818	406,981	406,981
Oil & Gas Wells Drilled	100.0%	156.3%	70.3%	101.6%
Oil & Gas Wells Completed	100.0%	155.9%	70.6%	100.0%
Oil Production (BBLs)	100.0%	118.2%	89.4%	99.4%
Gas Production (MMCF)	100.0%	118.2%	89.7%	99.4%
Coalbed Wells Drilled	100.0%	100.0%	80.0%	80.0%
Coalbed Wells Completed	100.0%	100.0%	90.0%	90.0%
Livestock Grazing (AUM)	100.0%	133.3%	50.4%	91.8%
Nonresident Hunting Days	100.0%	100.2%	100.0%	100.2%
Resident Hunting Days	100.0%	100.2%	100.0%	100.2%
NRNC Rec Days	100.0%	90.6%	100.0%	100.0%
Resident NC Rec Days	100.0%	90.6%	100.0%	100.0%

Alternative A (Production)

Due to the emphasis on production, Alternative A generates the most oil and gas well development activity of all the alternatives with 56 percent more oil and gas well drilling than the No Action Alternative. Alternative A also generates the most oil and gas production with 18 percent more production than the No Action Alternative. The increase in oil and gas production for Alternative A is less than the increase for drilling activity due to continued production from the existing inventory of producing wells. The production from the existing wells tapers off in the later years of the planning period with

some existing wells going out of production. Coalbed methane well drilling activity is the same for Alternative A and the No Action Alternative.

AUMs of livestock grazing for Alternative A are the highest of all alternatives with 33 percent more AUMs than the No Action Alternative. This alternative is higher because it projects that all permitted grazing will be utilized throughout the planning period. Nonresident and resident hunting days are slightly higher for Alternative A than for the No Action Alternative. This occurs because displacement of elk causes projected elk hunting days to increase during the early years of the planning horizon. Although elk hunting days decrease below current levels later in the planning horizon the net effect is slightly higher cumulative hunting days for Alternative A. Nonresident and resident non-consumptive recreation days are the lowest of all alternatives for Alternative A with about 10 percent fewer days than the No Action Alternative. This alternative is lower due to the decreased projected growth rate for non-consumptive use. The analysis makes no judgment regarding the quality of the hunting and recreation days under this or other alternatives.

Alternative B (Protection)

Due to increased restriction, Alternative B generates the least oil and gas well development activity of all alternatives with about 30 percent less wells drilled than the No Action Alternative and 55 percent less drilling than Alternative A. Alternative B also generates less oil and gas production than the other alternatives with about 10 percent less production than the No Action Alternative and 24 percent less production than Alternative A. The decrease in oil and gas production is less than the decrease in oil and gas well drilling due to continued production from the existing inventory of producing

wells. Coalbed methane drilling activity for Alternative B is 20 percent lower than for either the No Action Alternative or Alternative A.

AUMs of livestock grazing for Alternative B are the lowest of all alternatives with 50 percent less AUMs than the No Action Alternative and 62 percent less AUMs than Alternative A. This alternative is lower because it projects that the previous five-year average actual use will continue throughout the planning period. Nonresident and resident hunting days are the same as the No Action Alternative and slightly lower than Alternative A because the protective restrictions are not projected to increase hunter days. Nonresident and resident non-consumptive recreation days for Alternative B are the same as the No Action Alternative because the protective restrictions are not projected to increase the growth rate in non-consumptive use. However, non-consumptive recreation days are about 10 percent higher for Alternative B than for Alternative A due to the lower growth rate projected for Alternative A.

Alternative C (Resource Tradeoff)

Alternative C is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Standard oil and gas drilling and production activities are similar to the No Action Alternative. Coalbed methane drilling activity is 80 percent of the No Action Alternative. The AUMs of livestock grazing are 92 percent of the No Action Alternative. Hunting days and non-consumptive recreation days are comparable to the No Action Alternative.

Economic Effects by Alternative

Table 18 summarizes the cumulative long-term economic effects of the JMHCAP alternatives on the Southwest Wyoming economy. The top half of the table shows the

dollar amounts for each alternative. The bottom half of the table indicates how the

alternatives compare to the No Action Alternative on a percentage basis.

Table 18. Long-term Cumulative Economic Effects (1998-2017) – JMHCAP

	No Action Alternative	Alternative A	Alternative B	Alternative C
Direct Impacts	$241,042,651	$283,759,214	$209,623,136	$237,640,262
Total Impacts	$338,894,815	$398,767,593	$292,630,396	$333,642,985
Total Earnings	$38,446,126	$45,144,903	$32,491,821	$37,670,140
Total Employment (AJE)	1,860.1	2,078.0	1,600.5	1,860.2
Local Govt. Revenue	$10,973,457	$12,776,687	$9,679,263	$10,858,691
Resident Recreation	$13,778,703	$12,771,602	$13,778,703	$13,785,583
Direct Impacts	100.0%	117.7%	87.0%	98.6%
Total Impacts	100.0%	117.7%	86.3%	98.5%
Total Earnings	100.0%	117.4%	84.5%	98.0%
Total Employment (AJE)	100.0%	111.7%	86.0%	100.0%
Local Govt. Revenue	100.0%	116.4%	88.2%	99.0%
Resident Recreation	100.0%	92.7%	100.0%	100.0%

Due to the increased emphasis on production, Alternative A generates the most

economic activity in Southwest Wyoming of all the alternatives in the long-term. Under

Alternative A, direct and total economic impacts are 18 percent higher than the No

Action Alternative. Total labor earnings are 17 percent higher than the No Action

Alternative. Total employment is 12 percent higher than the No Action Alternative.

Revenues to local governments are 16 percent higher than the No Action Alternative.

Because there is less emphasis on protection of resources, Alternative A generates the

least resident recreation benefits of all alternatives with 7 percent less net economic

benefits than the No Action Alternative.

Due to the increased emphasis on protection, Alternative B generates the least

economic activity in Southwest Wyoming of all alternatives. Under Alternative B, direct

and total economic impacts are about 13 percent lower than the No Action Alternative and 26 percent lower than Alternative A. Total employment is 14 percent lower than the No Action Alternative and 23 percent lower than Alternative A. Revenues to local government are 12 percent lower than the No Action Alternative and 24 percent lower than Alternative A. Resident recreation benefits under Alternative B are the same as the No Action Alternative. Because there is more emphasis on protection, Alternative B generates 8 percent more resident recreation benefits than Alternative A.

Alternative C is basically comparable to the No Action Alternative and represents a midpoint between Alternative A and Alternative B. Direct impacts, total impacts, total earnings, total employment, local government revenue, and resident recreation benefits are all 99 to 100 percent of the No Action Alternative.

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APPENDIX

The Net Economic Value of Recreation Activities

(Adapted from U.S. Fish & Wildlife Service, <u>1996 Net Economic Values for Bass, Trout and Walleye Fishing, Deer, Elk, and Moose Hunting, and Wildlife Watching</u>, Report 92-2)

While expenditures on recreation activities are a useful indicator of the importance of recreation activities to local, regional, state, and national economies, recreation expenditures (economic impacts) do not measure the economic benefit to individual participants. Net economic value, or consumer surplus, is the appropriate economic measure of the benefits to individuals from participation in recreation activities. Net economic value is measured as participants' "willingness to pay" above what they actually spend to participate. The benefit to society is the summation of willingness to pay across all individuals.

Figure 1. Individual Hunter's Demand Curve for Hunting Trips
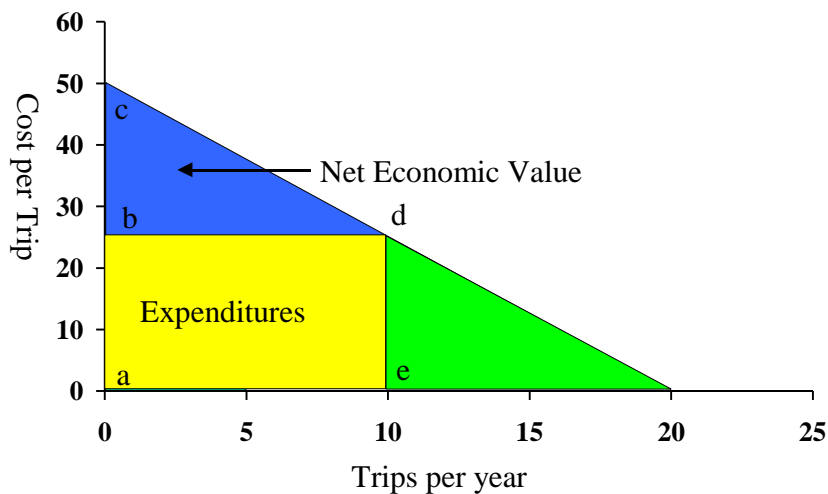
There is a direct relationship between expenditures and net economic value, as the demand curve for a representative hunter shows in Figure 1. The downward sloping demand curve represents marginal willingness to pay per trip and indicates that each

additional trip is valued less by the hunter than the previous trip. All other factors being

equal, the lower the cost per trip (vertical axis) the more trips the hunter will take

(horizontal axis). The cost of a hunting trip serve as an implicit price for hunting since a

market price generally does not exist for this activity. In the figure, at $50.00 per trip, the

hunter would choose not to hunt, but if hunting were free, the hunter would take 20

hunting trips.

At a cost per trip of $25.00 the hunter takes 10 trips, with a total willingness to

pay of $375.00 (area acde in Figure 1). The hunter will not take more than 10 trips

because the cost per trip ($25.00) exceeds what he would pay for an additional trip. For

each trip between zero and 10, however, the hunter would actually have been willing to

pay more than $25.00 (the demand curve, showing willingness to pay, lies above $25.00).

The difference between what the hunter is willing to pay and what is actually paid

is net economic value. In this simple example, net economic value is $125.00 (triangle

bcd in Figure 1) and hunter expenditures are $250.00 (rectangle abde in Figure 1). Thus

the hunter's total willingness to pay is composed of net economic value and total

expenditures. Net economic value is simply total willingness to pay minus expenditures.

The relationship between net economic value and expenditures is the basis for asserting

that net economic value is an appropriate measure of the benefit an individual derives

from participation in an activity and that expenditures are not the appropriate benefit

measure.

Expenditures are out-of-pocket expenditures on items a hunter purchases in order

to hunt. The remaining value, net willingness to pay (net economic value), is the

economic measure of an individual's satisfaction after all costs of participation have been

paid. Summing the net economic values of all individuals who participate in an activity derives the value to society. For this example, suppose there are 100 hunters who hunt and all have demand curves identical to that of our typical hunter presented in Figure 1. The total value of the hunting to society is $12,500 ($125.00 * 100).

Hunter expenditures have purposely been excluded from the calculations of societal benefits. Because individuals spend all of their income, with savings being a form of expenditure, hunting expenses are not counted as benefits from a national accounting perspective. Money that is not spent for hunting in a particular area will be spent for hunting in another area or might be spent on an entirely different activity (e.g., bowling). Thus any change in expenditures is simply a transfer from one type of consumption to another.

In regional analysis, there are limited conditions under which expenditures might be counted as benefits. For example, suppose that 50 resident hunters and 50 nonresident hunters hunt in an area in Southwest Wyoming. If hunting was not allowed in the area, the resident hunters are likely to hunt elsewhere in the region or participate in other recreation activities in the region. Their expenditures would probably not be lost to the Southwest Wyoming economy; they are simply transferred to another hunting area or recreation activity in the region. If nonresidents, however, choose to hunt outside Southwest Wyoming or in another state, their expenditures would be lost to the Southwest Wyoming economy. In this case, nonresident expenditures constitute new money in the Southwest Wyoming economy and their removal would result in a regional loss.

OIL AND GAS RECREATION & LIVESTOCK GRAZING WORKSHEETS