Appendix N

Socioeconomics Data and Methodology

APPENDIX N
SOCIOECONOMICS DATA AND METHODOLOGY

DETAILED EMPLOYMENT AND EARNINGS DATA BY COUNTY

Table N.1 through **Table N.7** provide detailed employment and earnings data by county.

Table N.1
Employment Levels by Industry Sector and County in 2010[1,2]

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[3]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Farm	184	738	248	142	2,076	524	339	654	2,113	54	975	370	267
Forestry, fishing, & related activities[4]	(D)	189	138	75	359	148	(D)	218	595	(D)	105	(D)	(D)
Mining (including oil and gas)	(D)	2,286	94	69	3,621	664	921	678	1,084	(D)	2,915	462	5,823
Utilities	71	220	(D)	(L)	232	(D)	(D)	(D)	255	(D)	146	75	(D)
Construction	4,092	4,509	1,117	(D)	6,019	418	352	2,053	12,018	1,895	1,283	781	2,241
Manufacturing	389	323	166	(D)	3,028	106	83	213	11,933	164	258	(D)	1,384

[1] (D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.
[2] (L) Fewer than 10 jobs, but the estimates for this item are included in the totals.
[3] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.
[4] "Related activities" includes hunting and trapping, as well as agricultural services such as custom tillage.

Table N.1
Employment Levels by Industry Sector and County in 2010[1,2]

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[3]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Wholesale trade	543	866	(D)	(D)	2,622	283	(D)	(D)	3,725	(D)	667	76	(D)
Retail trade	3,590	3,662	897	99	9,938	961	298	1,775	21,174	2,975	1,869	958	2,935
Transportation and warehousing	664	905	193	(D)	3,141	(D)	140	451	2,938	351	964	539	1,656
Information	471	260	56	(D)	1,101	90	28	218	3,287	(D)	169	98	245
Finance and insurance	1,789	1,309	334	(D)	4,135	224	120	901	9,683	908	792	280	702
Real estate and rental and leasing	5,124	2,481	1,141	40	4,380	288	124	2,257	10,517	3,015	827	406	1,248
Professional and technical services	2,375	2,168	500	(D)	4,286	(D)	(D)	1,318	16,663	1,380	554	287	881
Management of companies and enterprises	240	260	47	0	384	(D)	(D)	103	610	130	(D)	20	93
Administrative and waste services	2,277	1,755	416	(D)	4,454	222	193	835	11,750	1,201	(D)	267	752
Educational services	373	511	71	12	666	(D)	17	326	2,775	255	121	(D)	125
Health care and social assistance	2,297	2,618	302	60	9,978	(D)	94	1,454	19,552	1,141	1,075	(D)	1,299
Arts, entertainment, and recreation	3,962	891	1,139	28	1,780	139	63	1,502	5,078	1,551	122	202	262
Accommodation and food services	7,048	2,742	1,680	84	6,289	525	314	2,113	15,194	5,909	998	964	2,293
Other services, except public administration	2,300	1,720	434	(D)	4,416	455	159	1,119	9,464	1,032	1,065	444	1,213
Federal government	312	488	206	46	2,004	219	109	214	3,383	157	570	338	513
State government	107	498	68	25	2,134	231	203	146	11,756	155	145	549	273
Local government	2,904	4,326	1,095	119	5,975	867	859	1,589	13,576	2,168	2,252	1,319	4,031
Categories for which data were not disclosed	438	0	149	404	0	1,417	284	508	0	791	652	1,281	1,389
Total Employment	**41,550**	**35,725**	**10,491**	**1,203**	**83,018**	**7,781**	**4,700**	**20,645**	**189,123**	**25,232**	**18,524**	**9,716**	**29,625**

Source: US Department of Commerce 2012

Table N.2
Employment Percentages by Industry Sector and County in 2010[1,2]

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[3]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Farm	0.4%	2.1%	2.4%	11.8%	2.5%	6.7%	7.2%	3.2%	1.1%	0.2%	5.3%	3.8%	0.9%
Forestry, fishing, & related activities[4]	(D)	0.5%	1.3%	6.2%	0.4%	1.9%	(D)	1.1%	0.3%	(D)	0.6%	(D)	(D)
Mining (including oil and gas)	(D)	6.4%	0.9%	5.7%	4.4%	8.5%	19.6%	3.3%	0.6%	(D)	15.7%	4.8%	19.7%
Utilities	0.2%	0.6%	(D)	(L)	0.3%	(D)	(D)	(D)	0.1%	(D)	0.8%	0.8%	(D)
Construction	9.8%	12.6%	10.6%	(D)	7.3%	5.4%	7.5%	9.9%	6.4%	7.5%	6.9%	8.0%	7.6%
Manufacturing	0.9%	0.9%	1.6%	(D)	3.6%	1.4%	1.8%	1.0%	6.3%	0.6%	1.4%	(D)	4.7%
Wholesale trade	1.3%	2.4%	(D)	(D)	3.2%	3.6%	(D)	(D)	2.0%	(D)	3.6%	0.8%	(D)
Retail trade	8.6%	10.3%	8.6%	8.2%	12.0%	12.4%	6.3%	8.6%	11.2%	11.8%	10.1%	9.9%	9.9%
Transportation and warehousing	1.6%	2.5%	1.8%	(D)	3.8%	(D)	3.0%	2.2%	1.6%	1.4%	5.2%	5.5%	5.6%
Information	1.1%	0.7%	0.5%	(D)	1.3%	1.2%	0.6%	1.1%	1.7%	(D)	0.9%	1.0%	0.8%
Finance and insurance	4.3%	3.7%	3.2%	(D)	5.0%	2.9%	2.6%	4.4%	5.1%	3.6%	4.3%	2.9%	2.4%
Real estate and rental and leasing	12.3%	6.9%	10.9%	3.3%	5.3%	3.7%	2.6%	10.9%	5.6%	11.9%	4.5%	4.2%	4.2%
Professional and technical services	5.7%	6.1%	4.8%	(D)	5.2%	(D)	(D)	6.4%	8.8%	5.5%	3.0%	3.0%	3.0%
Management of companies and enterprises	0.6%	0.7%	0.4%	0.0%	0.5%	(D)	(D)	0.5%	0.3%	0.5%	(D)	0.2%	0.3%
Administrative and waste services	5.5%	4.9%	4.0%	(D)	5.4%	2.9%	4.1%	4.0%	6.2%	4.8%	(D)	2.7%	2.5%
Educational services	0.9%	1.4%	0.7%	1.0%	0.8%	(D)	0.4%	1.6%	1.5%	1.0%	0.7%	(D)	0.4%
Health care and social assistance	5.5%	7.3%	2.9%	5.0%	12.0%	(D)	2.0%	7.0%	10.3%	4.5%	5.8%	(D)	4.4%
Arts, entertainment, and recreation	9.5%	2.5%	10.9%	2.3%	2.1%	1.8%	1.3%	7.3%	2.7%	6.1%	0.7%	2.1%	0.9%
Accommodation and food services	17.0%	7.7%	16.0%	7.0%	7.6%	6.7%	6.7%	10.2%	8.0%	23.4%	5.4%	9.9%	7.7%
Other services, except public administration	5.5%	4.8%	4.1%	(D)	5.3%	5.8%	3.4%	5.4%	5.0%	4.1%	5.7%	4.6%	4.1%
Federal government	0.8%	1.4%	2.0%	3.8%	2.4%	2.8%	2.3%	1.0%	1.8%	0.6%	3.1%	3.5%	1.7%
State government	0.3%	1.4%	0.6%	2.1%	2.6%	3.0%	4.3%	0.7%	6.2%	0.6%	0.8%	5.7%	0.9%
Local government	7.0%	12.1%	10.4%	9.9%	7.2%	11.1%	18.3%	7.7%	7.2%	8.6%	12.2%	13.6%	13.6%
Categories for which data were not disclosed	1.1%	0.0%	1.4%	33.6%	0.0%	18.2%	6.0%	2.5%	0.0%	3.1%	3.5%	13.2%	4.7%

Source: US Department of Commerce 2012

[1] (D) Not shown to avoid disclosure of confidential information (US Bureau of Economic Analysis does not report data when there are three or fewer employers in a sector), but the estimates for this item are included in the totals.
[2] (L) Fewer than 10 jobs (US Bureau of Economic Analysis does not report specific data when there are fewer than 10 jobs in a sector), but the estimates for this item are included in the totals.
[3] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.
[4] "Related activities" includes hunting and trapping, as well as agricultural services such as custom tillage.

Table N.3
Labor Income Levels by Industry Sector and County and Non-Labor Income Levels by County in 2010, presented in 2010 dollars (millions)

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[1]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Population	52,064	56,139	14,791	1,390	146,307	13,819	6,625	23,451	300,552	28,082	32,435	15,834	43,623
Non-labor income[2]	$773.7	$672.7	$200.6	$24.7	$2,052.1	$144.8	$73.6	$458.4	$3,975.0	$473.1	$269.7	$231.5	$542.2
Dividends, interest, and rent	$631.4	$423.7	$136.9	$15.6	$1,042.5	$66.2	$36.8	$366.5	$2,360.9	$389.9	$124.7	$132.1	$320.2
Personal current transfer receipts[3]	$142.3	$249.1	$63.7	$9.1	$1,009.6	$78.6	$36.8	$91.9	$1,614.1	$83.2	$145.0	$99.4	$222.0
Adjustment for residence[4]	$34.3	$40.4	$43.2	$1.2	$86.1	$57.4	-$24.4	-$42.6	$649.1	-$58.6	-$23.6	-$6.9	-$135.9
Contributions for government social insurance[5]	$182.5	$155.1	$32.1	$2.8	$363.3	$32.5	$22.5	$82.3	$803.0	$91.2	$93.0	$53.3	$218.9
Total personal income by place of residence	$2,506.8	$2,092.7	$551.5	$57.7	$5,029.9	$505.5	$268.2	$1,142.5	$11,585.1	$1,210.0	$935.9	$615.4	$2,092.9
Earnings by place of work[6]	$1,881.3	$1,534.7	$339.8	$34.6	$3,255.0	$335.8	$241.6	$809.0	$7,764.0	$886.9	$782.9	$444.0	$1,905.5
Total earnings by place of work by sector[7, 8]													
Farm	$2.1	-$1.0	$4.2	$8.7	$4.1	$9.6	$1.9	$3.9	$20.9	-$0.2	-$0.9	$6.1	$1.9
Forestry, fishing, & related activities[9]	(D)	$1.7	$1.3	$1.5	$7.3	$2.0	(D)	$3.5	$7.9	(D)	$1.2	(D)	(D)
Mining (including oil and gas)	(D)	$183.1	$2.0	(L)	$235.7	$65.9	$76.8	$56.3	$23.1	(D)	$202.7	$35.7	$740.7
Utilities	$6.4	$24.4	(D)	(L)	$22.4	(D)	(D)	(D)	$22.8	(D)	$19.8	$6.3	(D)
Construction	$242.0	$241.7	$44.2	(D)	$269.5	$15.4	$24.0	$114.1	$609.7	$81.1	$69.4	$48.8	$153.1
Manufacturing	$12.6	$16.2	$5.9	(D)	$134.1	$2.9	$3.0	$3.6	$1,019.1	$2.8	$7.3	(D)	$134.9
Wholesale trade	$33.0	$55.2	(D)	(D)	$137.0	$14.6	(D)	(D)	$216.7	(D)	$42.1	$2.8	(D)
Retail trade	$144.3	$121.3	$24.7	$2.8	$269.0	$29.4	$16.9	$76.1	$541.2	$88.2	$49.5	$27.3	$84.7

[1] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.
[2] Non-labor income includes dividends, interest, and rent and personal current transfer receipts.
[3] Personal current transfer receipts are benefits received by persons for which no current services are performed. They are payments by government and business to individuals and institutions, such as retirement and disability insurance benefits.
[4] Residence adjustment represents the net inflow of the earnings of inter-area commuters. A positive number indicates that, on balance, area residents commute outside to find jobs; a negative number indicates that, on balance, people from outside the area commute in to find jobs.
[5] Contributions for government social insurance consist of payments by employers, employees, the self-employed, and other individuals who participate in the following government programs: Old-age, Survivors, and Disability Insurance; Medicare; unemployment insurance; railroad retirement; pension benefit guarantee; veterans' life insurance; publicly-administered workers' compensation; military medical insurance; and temporary disability insurance.
[6] Earnings by place of work differs from total personal income by the exclusion of dividends, interest, and rent, as well as adjustments to account for net transfer payments (e.g., unemployment benefits and Social Security taxes and payments) and the residential adjustment.
[7] (D) Not shown to avoid disclosure of confidential information (US Bureau of Economic Analysis does not report data when there are three or fewer employers in a sector), but the estimates for this item are included in the totals.
[8] (L) Less than $50,000 (therefore US Bureau of Economic Analysis does not disclose specific figures), but the estimates for this item are included in the totals.
[9] "Related activities" includes hunting and trapping, as well as agricultural services such as custom tillage.

Table N.3
Labor Income Levels by Industry Sector and County and Non-Labor Income Levels by County in 2010, presented in 2010 dollars (millions)

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[1]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Transportation and warehousing	$32.9	$51.8	$5.3	(D)	$191.4	(D)	$8.9	$16.3	$121.3	$14.6	$57.6	$37.5	$119.7
Information	$22.9	$10.4	$2.5	(D)	$52.4	$3.2	$0.7	$8.9	$174.3	(D)	$6.2	$3.2	$7.5
Finance and insurance	$54.3	$42.3	$6.6	(D)	$132.6	$7.6	$2.8	$33.7	$253.3	$22.2	$10.3	$8.6	$29.6
Real estate and rental and leasing	$258.8	$66.3	$23.7	(L)	$57.1	$3.4	$1.7	$35.1	$118.1	$69.2	$26.0	$3.8	$34.8
Professional and technical services	$111.3	$85.8	$20.5	(D)	$170.1	(D)	(D)	$56.8	$885.3	$73.6	$28.5	$9.9	$48.5
Management of companies and enterprises	$13.1	$10.1	$0.7	$0.0	$15.7	(D)	(D)	$5.9	$55.2	$6.1	(D)	$1.5	$6.1
Administrative and waste services	$71.5	$56.3	$8.5	(D)	$138.9	$5.1	$6.3	$24.4	$342.9	$34.8	(D)	$4.5	$20.5
Educational services	$13.8	$11.5	$0.6	$0.0	$10.2	(D)	(L)	$6.4	$50.1	$5.7	$0.9	(D)	$2.0
Health care and social assistance	$172.9	$137.5	$11.4	$0.6	$496.2	(D)	$2.1	$77.0	$992.4	$63.1	$39.0	(D)	$50.5
Arts, entertainment, and recreation	$160.9	$12.2	$35.8	$0.2	$19.8	$1.5	$0.7	$52.6	$57.2	$39.5	$0.5	$7.4	$3.1
Accommodation and food services	$246.5	$65.7	$40.0	$1.2	$130.5	$9.8	$10.6	$56.6	$298.0	$182.2	$16.9	$18.8	$45.3
Other services, except public administration	$78.7	$63.9	$20.5	(D)	$156.6	$13.6	$17.0	$41.2	$328.1	$35.3	$42.1	$13.5	$48.0
Federal government	$18.9	$37.8	$13.8	$3.4	$173.1	$17.3	$8.0	$13.8	$328.8	$9.2	$44.8	$23.2	$34.3
State government	$7.5	$31.2	$4.1	$1.2	$114.0	$10.1	$9.8	$7.8	$574.3	$7.3	$9.7	$34.1	$17.5
Local government	$165.3	$209.4	$53.6	$3.9	$317.2	$40.5	$39.7	$76.1	$723.4	$113.0	$94.4	$67.0	$218.3
Categories for which data were not disclosed	$11.9	$0.0	$10.2	$11.1	$0.0	$84.0	$10.9	$38.6	$0.0	$39.2	$14.8	$84.3	$104.6

Source: US Department of Commerce 2012

Table N.4
Labor Income Percentages by Industry Sector and County and Non-Labor Income Percentages by County in 2010

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[1]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Population	52,064	56,139	14,791	1,390	146,307	13,819	6,625	23,451	300,552	28,082	32,435	15,834	43,623
Non-labor income as a proportion of total personal income[2]	30.9%	32.1%	36.4%	42.8%	40.8%	28.6%	27.4%	40.1%	34.3%	39.1%	28.8%	37.6%	25.9%
Dividends, interest, and rent as a proportion of total personal income	25.2%	20.2%	24.8%	27.1%	20.7%	13.1%	13.7%	32.1%	20.4%	32.2%	13.3%	21.5%	15.3%
Personal current transfer receipts as a proportion of total personal income[3]	5.7%	11.9%	11.5%	15.7%	20.1%	15.5%	13.7%	8.0%	13.9%	6.9%	15.5%	16.1%	10.6%
Adjustment for residence as a proportion of total personal income[4]	1.4%	1.9%	7.8%	2.0%	1.7%	11.4%	-9.1%	-3.7%	5.6%	-4.8%	-2.5%	-1.1%	-6.5%
Contributions for government social insurance as a proportion of total personal income[5]	7.3%	7.4%	5.8%	4.9%	7.2%	6.4%	8.4%	7.2%	6.9%	7.5%	9.9%	8.7%	10.5%
Total personal income by place of residence ($ millions)	$2,506.8	$2,092.7	$551.5	$57.7	$5,029.9	$505.5	$268.2	$1,142.5	$11,585.1	$1,210.0	$935.9	$615.4	$2,092.9
Earnings by place of work ($ millions)[6]	$1,881.3	$1,534.7	$339.8	$34.6	$3,255.0	$335.8	$241.6	$809.0	$7,764.0	$886.9	$782.9	$444.0	$1,905.5
Total earnings by place of work by sector [7,8]													
Farm	0.1%	-0.1%	1.2%	25.1%	0.1%	2.8%	0.8%	0.5%	0.3%	0.0%	-0.1%	1.4%	0.1%
Forestry, fishing, & related activities[9]	(D)	0.1%	0.4%	4.3%	0.2%	0.6%	(D)	0.4%	0.1%	(D)	0.2%	(D)	(D)
Mining (including oil and gas)	(D)	11.9%	0.6%	(L)	7.2%	19.6%	31.8%	7.0%	0.3%	(D)	25.9%	8.0%	38.9%
Utilities	0.3%	1.6%	(D)	(L)	0.7%	(D)	(D)	(D)	0.3%	(D)	2.5%	1.4%	(D)
Construction	12.9%	15.8%	13.0%	(D)	8.3%	4.6%	9.9%	14.1%	7.9%	9.1%	8.9%	11.0%	8.0%
Manufacturing	0.7%	1.1%	1.7%	(D)	4.1%	0.8%	1.2%	0.4%	13.1%	0.3%	0.9%	(D)	7.1%

[1] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.
[2] Non-labor income includes dividends, interest, and rent and personal current transfer receipts.
[3] Personal current transfer receipts are benefits received by persons for which no current services are performed. They are payments by government and business to individuals and institutions, such as retirement and disability insurance benefits.
[4] Residence adjustment represents the net inflow of the earnings of inter-area commuters. A positive number indicates that, on balance, area residents commute outside to find jobs; a negative number indicates that, on balance, people from outside the area commute in to find jobs.
[5] Contributions for government social insurance consist of payments by employers, employees, the self-employed, and other individuals who participate in the following government programs: Old-age, Survivors, and Disability Insurance; Medicare; unemployment insurance; railroad retirement; pension benefit guarantee; veterans' life insurance; publicly-administered workers' compensation; military medical insurance; and temporary disability insurance.
[6] Earnings by place of work differs from total personal income by the exclusion of dividends, interest, and rent, as well as adjustments to account for net transfer payments (e.g., unemployment benefits and Social Security taxes and payments) and the residential adjustment.
[7] (D) Not shown to avoid disclosure of confidential information (US Bureau of Economic Analysis does not report data when there are three or fewer employers in a sector), but the estimates for this item are included in the totals.
[8] (L) Less than $50,000 (therefore US Bureau of Economic Analysis does not disclose specific figures), but the estimates for this item are included in the totals.
[9] "Related activities" includes hunting and trapping, as well as agricultural services such as custom tillage.

Table N.4
Labor Income Percentages by Industry Sector and County and Non-Labor Income Percentages by County in 2010

	Eagle, CO	Garfield, CO	Grand, CO	Jackson, CO	Mesa, CO	Moffat, CO	Rio Blanco, CO	Routt, CO	Larimer, CO[1]	Summit, CO	Uintah, UT	Carbon, WY	Sweetwater, WY
Wholesale trade	1.8%	3.6%	(D)	(D)	4.2%	4.4%	(D)	(D)	2.8%	(D)	5.4%	0.6%	(D)
Retail trade	7.7%	7.9%	7.3%	8.1%	8.3%	8.8%	7.0%	9.4%	7.0%	9.9%	6.3%	6.1%	4.4%
Transportation and warehousing	1.8%	3.4%	1.6%	(D)	5.9%	(D)	3.7%	2.0%	1.6%	1.6%	7.4%	8.4%	6.3%
Information	1.2%	0.7%	0.7%	(D)	1.6%	1.0%	0.3%	1.1%	2.2%	(D)	0.8%	0.7%	0.4%
Finance and insurance	2.9%	2.8%	1.9%	(D)	4.1%	2.3%	1.1%	4.2%	3.3%	2.5%	1.3%	1.9%	1.6%
Real estate and rental and leasing	13.8%	4.3%	7.0%	(L)	1.8%	1.0%	0.7%	4.3%	1.5%	7.8%	3.3%	0.8%	1.8%
Professional and technical services	5.9%	5.6%	6.0%	(D)	5.2%	(D)	(D)	7.0%	11.4%	8.3%	3.6%	2.2%	2.5%
Management of companies and enterprises	0.7%	0.7%	0.2%	0.0%	0.5%	(D)	(D)	0.7%	0.7%	0.7%	(D)	0.3%	0.3%
Administrative and waste services	3.8%	3.7%	2.5%	(D)	4.3%	1.5%	2.6%	3.0%	4.4%	3.9%	(D)	1.0%	1.1%
Educational services	0.7%	0.7%	0.2%	0.0%	0.3%	(D)	(L)	0.8%	0.6%	0.6%	0.1%	(D)	0.1%
Health care and social assistance	9.2%	9.0%	3.3%	1.8%	15.2%	(D)	0.9%	9.5%	12.8%	7.1%	5.0%	(D)	2.7%
Arts, entertainment, and recreation	8.6%	0.8%	10.5%	0.6%	0.6%	0.5%	0.3%	6.5%	0.7%	4.4%	0.1%	1.7%	0.2%
Accommodation and food services	13.1%	4.3%	11.8%	3.4%	4.0%	2.9%	4.4%	7.0%	3.8%	20.5%	2.2%	4.2%	2.4%
Other services, except public administration	4.2%	4.2%	6.0%	(D)	4.8%	4.1%	7.0%	5.1%	4.2%	4.0%	5.4%	3.0%	2.5%
Federal government	1.0%	2.5%	4.1%	9.9%	5.3%	5.2%	3.3%	1.7%	4.2%	1.0%	5.7%	5.2%	1.8%
State government	0.4%	2.0%	1.2%	3.5%	3.5%	3.0%	4.0%	1.0%	7.4%	0.8%	1.2%	7.7%	0.9%
Local government	8.8%	13.6%	15.8%	11.2%	9.7%	12.1%	16.4%	9.4%	9.3%	12.7%	12.1%	15.1%	11.5%
Categories for which data were not disclosed	0.6%	0.0%	3.0%	32.2%	0.0%	25.0%	4.5%	4.8%	0.0%	4.4%	1.9%	19.0%	5.5%

Source: US Department of Commerce 2012

Table N.5
Employment Trends by Select Industry Sector and County, 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mining										
Eagle, CO	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Garfield, CO	382	478	753	1,011	1,657	2,314	2,514	3,240	2,395	2,717
Grand, CO	(D)	22	27	(D)	(D)	(D)	(D)	83	88	125
Jackson, CO	(D)	(D)	(D)	(D)	(L)	10	11	44	63	95
Mesa, CO	652	665	799	1,125	1,519	2,363	3,462	4,884	3,874	3,752
Moffat, CO	533	578	553	552	608	672	688	755	684	671
Rio Blanco, CO	553	571	563	666	796	907	945	1,089	917	939
Routt, CO	572	586	619	652	670	(D)	(D)	(D)	732	674
Socioeconomic Study Area	**2,692**	**2,900**	**3,314**	**4,006**	**5,250**	**6,266**	**7,620**	**10,095**	**8,753**	**8,973**
Farming[1]										
Eagle, CO	166	152	162	160	163	165	181	185	181	183
Garfield, CO	701	677	699	672	672	670	737	741	726	739
Grand, CO	246	241	248	237	232	230	246	250	245	248
Jackson, CO	181	163	167	153	146	140	139	144	140	143
Mesa, CO	2,016	1,962	1,993	1,907	1,898	1,886	2,092	2,083	2,045	2,082
Moffat, CO	543	528	525	496	486	476	529	529	519	527
Rio Blanco, CO	345	333	334	318	314	311	340	341	333	339
Routt, CO	743	757	732	673	642	612	657	659	647	657
Socioeconomic Study Area	**4,941**	**4,813**	**4,860**	**4,616**	**4,553**	**4,490**	**4,921**	**4,932**	**4,836**	**4,918**
Retail trade										
Eagle, CO	3,537	3,392	3,582	3,730	3,718	3,870	4,118	4,079	3,713	3,590
Garfield, CO	3,714	3,667	3,724	3,969	4,042	4,379	4,584	4,384	3,990	3,682
Grand, CO	1,001	955	999	1,041	1,148	1,174	1,218	1,091	987	894
Jackson, CO	110	109	109	115	113	117	120	111	100	102
Mesa, CO	9,499	9,618	9,848	10,070	10,263	10,467	10,873	10,694	10,213	9,836
Moffat, CO	931	905	901	873	863	881	945	1,060	1,024	926
Rio Blanco, CO	353	334	372	324	321	334	341	326	342	304
Routt, CO	1,929	1,945	1,939	1,934	2,003	2,021	2,059	2,052	1,855	1,804

[1] Farming values sum data for "Farm" and "Agriculture and forestry support activities."

Table N.5
Employment Trends by Select Industry Sector and County, 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Socioeconomic Study Area	**21,074**	**20,925**	**21,474**	**22,056**	**22,471**	**23,243**	**24,258**	**23,797**	**22,224**	**21,138**
Accommodation and food services										
Eagle, CO	6,396	6,339	6,610	6,722	7,122	7,199	7,315	7,809	7,165	7,028
Garfield, CO	2,567	2,533	2,601	2,719	2,812	2,966	3,178	3,235	2,959	2,740
Grand, CO	1,728	1,771	1,790	1,808	1,734	1,768	1,869	1,882	1,697	1,668
Jackson, CO	67	66	73	95	101	96	87	90	87	84
Mesa, CO	5,297	5,841	5,850	6,070	6,081	6,245	6,570	6,902	6,571	6,267
Moffat, CO	571	574	566	572	566	579	545	573	575	523
Rio Blanco, CO	293	0	295	320	343	367	399	403	364	312
Routt, CO	2,305	2,316	2,306	2,337	2,336	2,380	2,394	2,317	2,162	2,111
Socioeconomic Study Area	**19,224**	**19,440**	**20,091**	**20,643**	**21,095**	**21,600**	**22,357**	**23,211**	**21,580**	**20,733**
Arts, entertainment, and recreation										
Eagle, CO	3,649	3,747	3,468	3,630	3,801	3,899	3,904	3,961	3,976	3,996
Garfield, CO	808	829	808	843	854	869	890	887	889	905
Grand, CO	1,241	1,139	1,243	1,065	1,039	1,052	1,110	1,151	1,136	1,135
Jackson, CO	24	27	28	24	26	30	28	30	26	29
Mesa, CO	1,261	1,316	1,328	1,567	1,742	1,800	1,865	1,873	1,815	1,842
Moffat, CO	76	(D)	83	98	117	130	147	175	143	132
Rio Blanco, CO	78	(D)	66	69	68	64	70	65	63	65
Routt, CO	1,430	1,428	1,418	1,395	1,483	1,423	1,494	1,489	1,404	1,493
Socioeconomic Study Area	**8,567**	**8,486**	**8,442**	**8,691**	**9,130**	**9,267**	**9,508**	**9,631**	**9,452**	**9,597**

Source: US Department of Commerce 2012

Table N.6
Labor Earnings Trends by Select Industry Sector and County, 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Mining										
Eagle, CO	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Garfield, CO	$29.4	$34.0	$52.4	$70.4	$123.8	$198.5	$216.1	$290.5	$196.6	$209.0
Grand, CO	$0.0	$0.7	$0.7	$0.0	$0.0	$0.0	$0.0	$4.0	$1.9	$2.0
Jackson, CO	$0.0	$0.0	$0.0	$0.0	$0.2	$0.3	$0.3	$0.0	$0.0	$0.0
Mesa, CO	$29.9	$29.8	$36.0	$71.9	$97.5	$178.4	$272.4	$384.9	$264.2	$254.1
Moffat, CO	$47.0	$50.0	$52.7	$59.6	$60.7	$72.5	$75.0	$100.8	$71.4	$88.4
Rio Blanco, CO	$40.0	$46.0	$48.1	$59.1	$69.2	$83.6	$79.9	$95.1	$78.4	$77.2
Routt, CO	$50.3	$51.1	$51.3	$59.3	$60.7	$0.0	$0.0	$0.0	$63.2	$53.9
Socioeconomic Study Area	**$196.6**	**$211.5**	**$241.2**	**$320.2**	**$412.1**	**$533.2**	**$643.7**	**$875.3**	**$675.8**	**$684.6**
Farming[1]										
Eagle, CO	$6.2	$10.2	$6.2	$6.3	$7.0	$5.0	$4.5	$4.4	$5.4	$3.1
Garfield, CO	$5.1	$8.2	$6.6	$11.1	$10.0	$6.1	$4.2	$2.8	$3.6	-$1.2
Grand, CO	$0.0	$1.3	$2.1	$7.9	$9.0	$11.7	$8.0	$7.5	$9.0	$5.3
Jackson, CO	-$1.7	$2.0	$2.9	$5.1	$9.8	$11.5	$12.3	$9.2	$10.2	$7.5
Mesa, CO	$17.3	$18.0	$11.4	$17.6	$22.4	$14.9	$18.9	$15.9	$14.7	$3.6
Moffat, CO	$5.1	$7.5	$11.8	$16.3	$19.5	$17.5	$22.4	$17.4	$20.8	$12.4
Rio Blanco, CO	$3.1	$4.0	$4.4	$7.0	$10.1	$7.3	$6.9	$3.1	$4.7	$2.7
Routt, CO	$1.0	$4.9	$6.9	$12.4	$13.1	$9.8	$10.3	$10.6	$10.0	$4.4
Socioeconomic Study Area	**$36.2**	**$56.1**	**$52.3**	**$83.6**	**$100.8**	**$83.8**	**$87.6**	**$70.8**	**$78.4**	**$37.8**
Retail trade										
Eagle, CO	$138.3	$137.5	$146.9	$150.8	$150.6	$161.2	$171.9	$165.3	$148.2	$138.5
Garfield, CO	$118.2	$118.1	$119.6	$129.5	$133.6	$148.8	$158.5	$154.3	$136.5	$118.1
Grand, CO	$26.2	$25.2	$25.5	$26.9	$30.3	$31.8	$33.3	$29.6	$26.9	$24.5
Jackson, CO	$2.3	$2.6	$2.5	$2.5	$2.5	$2.8	$2.5	$2.4	$2.7	$2.9
Mesa, CO	$267.4	$275.4	$281.8	$285.6	$290.0	$300.8	$310.6	$307.5	$281.1	$266.2
Moffat, CO	$26.8	$25.8	$28.3	$27.8	$28.1	$29.4	$31.3	$33.5	$30.8	$28.2
Rio Blanco, CO	$12.3	$15.0	$17.7	$18.7	$18.0	$18.1	$16.9	$16.4	$16.9	$13.0
Routt, CO	$90.3	$100.4	$86.8	$83.7	$87.5	$87.8	$87.9	$82.5	$77.7	$66.7

[1] Farming values sum data for "Farm" and "Agriculture and forestry support activities."

Table N.6
Labor Earnings Trends by Select Industry Sector and County, 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Socioeconomic Study Area	**$681.9**	**$700.0**	**$709.2**	**$725.6**	**$740.6**	**$780.8**	**$813.0**	**$791.5**	**$720.8**	**$658.2**
Accommodation and food services										
Eagle, CO	$207.9	$202.2	$217.5	$230.6	$237.5	$237.7	$259.9	$267.0	$236.4	$237.3
Garfield, CO	$57.3	$56.1	$57.3	$62.2	$64.4	$68.7	$78.6	$79.4	$69.1	$62.9
Grand, CO	$35.9	$38.8	$40.4	$44.6	$41.8	$41.7	$45.3	$43.2	$38.1	$38.4
Jackson, CO	$0.9	$0.8	$1.0	$1.2	$1.3	$1.3	$1.2	$1.3	$1.1	$1.1
Mesa, CO	$96.9	$103.7	$106.4	$113.2	$113.1	$118.8	$136.2	$140.9	$129.7	$125.1
Moffat, CO	$8.3	$8.3	$8.8	$9.1	$8.9	$9.4	$9.8	$10.1	$9.8	$9.3
Rio Blanco, CO	$4.3	$0.0	$5.3	$5.3	$5.8	$6.4	$9.5	$12.0	$11.0	$9.8
Routt, CO	$56.3	$57.0	$57.7	$59.9	$61.1	$62.6	$67.3	$63.1	$56.4	$54.2
Socioeconomic Study Area	**$467.8**	**$467.1**	**$494.3**	**$526.2**	**$533.8**	**$546.7**	**$608.0**	**$616.9**	**$551.6**	**$538.2**
Arts, entertainment, and recreation										
Eagle, CO	$138.5	$139.6	$163.9	$157.5	$187.1	$209.8	$179.5	$166.7	$152.4	$151.5
Garfield, CO	$12.6	$12.6	$11.1	$11.4	$12.1	$13.1	$12.3	$13.1	$12.0	$11.7
Grand, CO	$38.9	$37.0	$36.1	$34.0	$32.8	$34.5	$35.2	$36.1	$32.9	$33.4
Jackson, CO	$0.2	$0.3	$0.3	$0.3	$0.3	$0.4	$0.2	$0.2	$0.2	$0.2
Mesa, CO	$12.0	$15.8	$16.5	$19.2	$20.5	$22.0	$23.5	$20.7	$20.1	$19.6
Moffat, CO	$0.6	$0.0	$0.7	$0.8	$0.9	$1.4	$1.6	$1.9	$1.6	$1.4
Rio Blanco, CO	$0.8	$0.0	$0.7	$0.9	$0.9	$0.6	$0.5	$0.4	$0.7	$0.8
Routt, CO	$40.6	$44.4	$45.1	$49.2	$48.1	$49.5	$47.7	$51.1	$45.7	$49.2
Socioeconomic Study Area	**$244.3**	**$249.8**	**$274.4**	**$273.4**	**$302.7**	**$331.3**	**$300.4**	**$290.2**	**$265.5**	**$267.8**

Source: US Department of Commerce 2012
Values reported in 2001 dollars were converted to 2010 dollars using the Consumer Price Index (Bureau of Labor Statistics 2012a).

Table N.7
Annual Population by County, 2000-2010[1]

Geographic Area	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010[2]
Eagle County, CO	41,961	43,238	44,227	44,995	45,893	47,205	48,476	49,803	51,049	52,513	52,126
Garfield County, CO	44,257	45,636	46,925	47,622	48,193	49,579	51,594	53,534	55,449	57,089	56,139
Grand County, CO	12,496	12,743	13,158	13,324	13,596	13,627	14,003	14,306	14,622	14,902	14,796
Jackson County, CO	1,577	1,529	1,532	1,512	1,486	1,449	1,415	1,407	1,378	1,408	1,390
Mesa County, CO	117,631	119,496	122,440	124,994	127,678	130,194	134,665	139,434	143,155	147,851	146,313
Moffat County, CO	13,147	13,065	13,193	13,106	13,175	12,956	13,115	13,348	13,585	13,728	13,818
Rio Blanco County, CO	5,986	5,868	5,951	5,923	6,007	5,945	6,176	6,373	6,522	6,779	6,620
Routt County, CO	19,815	20,210	20,469	20,893	21,162	21,398	21,859	22,491	23,135	23,688	23,447
Socioeconomic Study Area	**256,870**	**261,785**	**267,895**	**272,369**	**277,190**	**282,353**	**291,303**	**300,696**	**308,895**	**317,958**	**314,649**
Colorado	**4,326,921**	**4,425,687**	**4,490,406**	**4,528,732**	**4,575,013**	**4,631,888**	**4,720,423**	**4,803,868**	**4,889,730**	**4,972,195**	**5,049,071**
Larimer County, CO[3]	253,072	260,541	265,372	268,448	271,510	275,116	280,713	286,112	291,650	296,696	300,637
Summit County, CO	23,700	24,716	25,006	25,408	25,313	25,487	26,019	26,603	27,144	27,678	28,081
Uintah County, UT	25,215	25,786	26,395	26,561	26,994	27,661	28,662	29,920	31,009	32,931	32,434
Carbon County, WY	15,582	15,217	15,256	15,240	15,236	15,077	15,136	15,494	15,658	15,977	15,853
Sweetwater County, WY	37,552	36,899	37,428	37,450	38,026	38,739	39,749	41,470	42,358	44,133	43,621

Source: US Census Bureau 2011

[1] Population values provided as of July 1 of each year.
[2] The values for July 1, 2010 were produced by applying estimates of change in the population between April 1 and July 1 of 2010 to the 2010 Census counts. Further details on this methodology are available at http://www.census.gov/popest/methodology/intercensal_nat_meth.pdf.
[3] Larimer County, Colorado; Summit County, Colorado; Uintah County, Utah; Carbon County, Wyoming; and Sweetwater County, Wyoming constitute a "secondary" Socioeconomic Study Area, as documented in the text.

NON-MARKET VALUATION METHODS

This section addresses economic valuation of three categories of non-market resources that are present in the study area and could potentially be affected by the alternatives. These three categories of non-market value are recreation, values of GRSG to households in the intermountain west, and value of the ranching tradition to the ranchers themselves, residents, and visitors to the region. Recreation is included because actions that promote the conservation of GRSG habitat may result in changes in recreation opportunities, such as increasing the amount of habitat for other wildlife species that may be hunted or viewed that depend on public lands, roads open or closed for recreation access, and the quality of the recreation experience.

The economic non-market values described in this appendix are not directly comparable to regional economic indicators commonly used to describe how natural resources on public lands contribute to the regional economic indicators such as output/sales, labor income, and employment. These indicators provide valuable information to the local public as well as to regional government agencies for purposes of public service and infrastructure planning. These impacts or contributions are often referred to as distributional effects as they describe the effects to the region. However, these indicators do not represent net economic value. For example, in economic terms, labor income associated with mineral production would actually be considered a cost to the producer. Similarly, expenditures by a recreation visitor associated with a visit to public lands would be viewed by the recreationist as a cost. One last example would be the total sales generated by the sale of minerals extracted from federally owned minerals: the total sales do not reflect the net economic value since the costs associated with the extraction are not accounted for (including labor income, supplies, and equipment, as well as potentially non-market costs such as those associated with pollution). This section considers the economic value of the non-market outputs, a concept describe below.

Total Non-Market Economic Value

Many of the multiple uses in the study area are not bought and sold in competitive markets. For instance, many recreational visitors to public lands pay no or low admission fees, and the presence of wild animals such as GRSG have no "market price," yet both have value to people. In some cases people gain value from using these non-market resources, such as recreation on public lands; in other cases, protection of some natural resources provides both a use value (e.g., wildlife viewing) as well as a non-use value (e.g., the value some people hold for knowing that a specific natural resource exists and is protected even if they never intend to "use" or visit it).

Economists call the sum of these two values Total Economic Value. Use values typically can be consumptive use (e.g., hunting) and/or non-consumptive, such as viewing or being present on site (e.g., camping and hiking). In contrast, non-use values occur off-site to people who derive enjoyment from knowing a natural

environment, habitat or species exists in its natural state, either for themselves (existence value) and/or future generations (bequest value). Krutilla (1967) documents the conceptual origins of these two elements of non-use value, and Freeman (2003) provides a rigorous theoretical treatment.

Non-use or existence values can potentially be enjoyed by millions if the good or service (e.g., the presence of a specific wild species such as wild salmon or rare bird species) is of widespread interest. Thus, while the non-use value per household may much lower than a value per day received by a visitor, in total, non-use values may be quite large.

Recreation Values

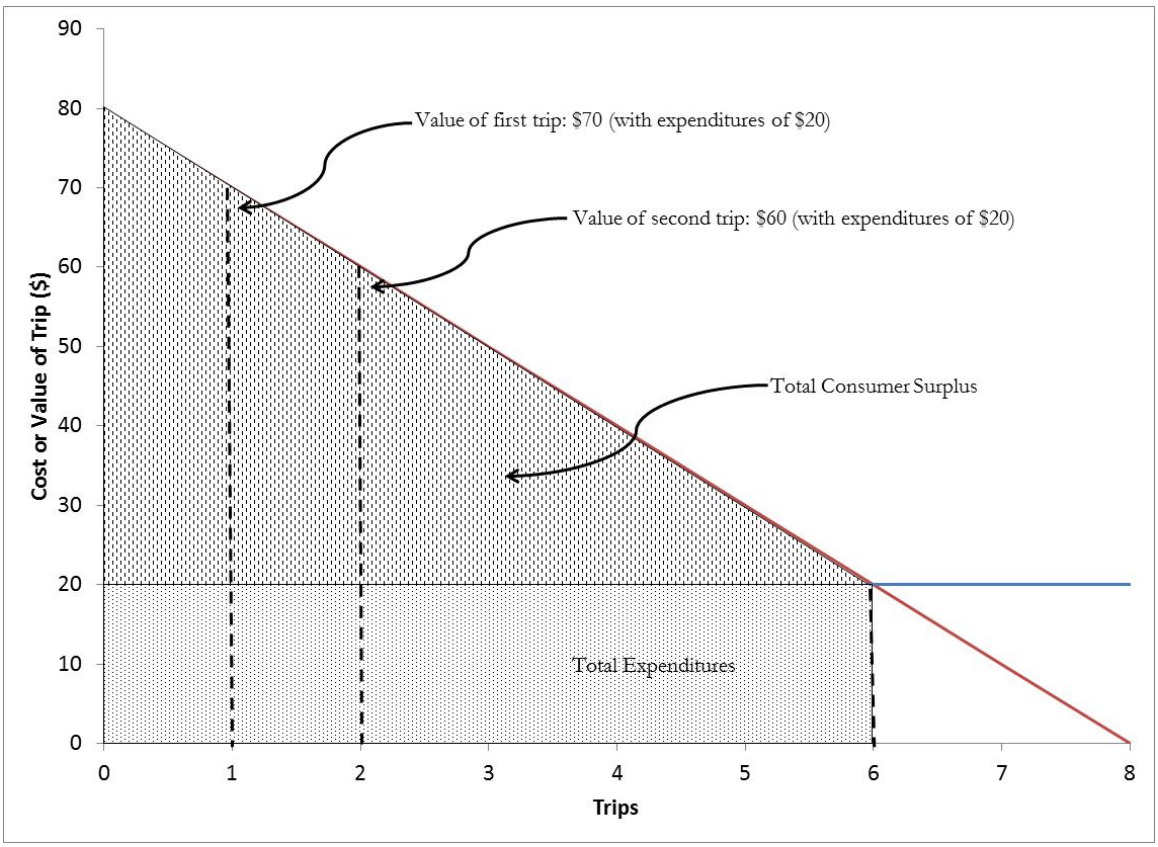
Economists measure the net economic use and non-use values as "Consumer Surplus." At its most basic level, consumer surplus is the maximum amount a person would pay minus the amount they actually have to pay. Consumer surplus, which is also sometimes referred to as "net willingness to pay," is a measure of benefit has been used by economists and federal agencies for decades (US Water Resources Council 1983; US Environmental Protection Agency 2009, 2010).

For public land recreation, especially on BLM and Forest Service recreation sites, entrance fees are typically very low or non-existent, so the value people place on these public land recreation opportunities is not fully measured simply by the entrance fees they pay. In economic terms, there is not a competitive market or a "market clearing price" for access to public recreation sites. Therefore, there can be a substantial difference between what people pay to visit a recreation site (e.g., entrance fees plus travel costs, including the value of time) and the maximum amount they would pay.

A common non-market valuation method used for recreation is the travel cost method. In this method, economists survey visitors to a recreation site and collect data on their frequency of trips, travel distance and costs incurred to access the site. Because the survey uses information from actual visitors, the travel cost method is a "revealed preference" method of valuation; economists use the travel costs as a proxy to determine the value that people gain from using the site. Variations in the travel cost across visitors, along with their respective number of trips, allow economists to statistically estimate a relationship between travel cost and quantity of trips – an aggregate demand curve for the recreation site, much like a demand curve for goods and services that are sold in competitive markets. This aggregate demand curve will tend to show that individuals with a relatively high travel cost take fewer trips on average, while individuals with a lower cost take more trips on average. From this aggregate demand curve, economists can calculate consumer surplus. Many of the consumer surplus values for recreation in the literature (Loomis 2005) and recently developed by the Forest Service (Bowker et al. 2009) rely upon the travel cost method.

Diagram N-1 provides an illustration of a demand curve for recreation on a particular site. In **Diagram N-1**, the aggregate demand is shown on an average basis, that is, for an average individual consumer. The downward-sloping diagonal line in **Diagram N-1** represents the relationship between the travel cost and quantity of trips demanded by this average consumer. In the diagram, the value of the first several trips is relatively high ($70 for the first and $60 for the second trip), while the value of the sixth trip is lower ($20 in the diagram). In a travel cost method study, these values are statistically derived from the aggregate demand calculated for the entire population. The downward slope of the demand curve corresponds to declining value associated with each trip, which is typical for most goods and services.[1] It also corresponds to the fact that visitors will take fewer trips to areas with a higher travel cost.

Diagram N-1. Consumer Demand Curve and Consumer Surplus for Recreation Trips



[1] Note that for some types of recreation use, users may gain increased value over a portion of the number of trips; for example, mountain bikers may experience increased enjoyment of subsequent trips to a single location as their trail-specific skills and knowledge increase with repeat visits. Climbers and other users may also experience similar gains over repeat visits. However, even these users will likely hit a point where the marginal value begins to decrease with more trips.

Each visitor receives a net benefit from each trip, which is measured by the difference between what they had to pay and the maximum amount they would pay for each trip. In **Diagram N-1** the net benefit for the average visitor is the difference between their actual expenditures of $20 per trip and the maximum amount they would pay for each trip. As shown, the first trip has a net benefit of $50 ($70 of value less $20 in expenditures), the second trip $40 ($60 less $20), and so on until the sixth trip. At the sixth trip the visitor's cost is the same as their benefit, and hence there is no net benefit from further trips. Thus, this gain to the visitor over and above what they spend is their "consumer surplus."

Given the large range and diversity of sites in the study area, the BLM and Forest Service did not perform original travel cost method analysis of visitation in the study area. Rather, they relied upon transferring existing recreation values from travel cost method studies such as Bowker et al. (2009) and other recreation values from the existing literature (Loomis 2005; Loomis and Richardson 2007; USFWS 2009) to the recreation activities in the study area, focusing on existing studies in the Rocky Mountain and Great Basin area (Colorado, Utah, Wyoming, Arizona, New Mexico, Idaho, Montana, and Nevada). This approach, known as "Benefit Transfer," is well-developed in academic and policy literature and has been used by federal agencies including the US Environmental Protection Agency (see Griffiths et al. 2012 for a recent listing of economic studies where benefit transfer was used), US Army Corps of Engineers, US Bureau of Reclamation, Forest Service (Forest Service 1991; also see Ervin et al. 2012 for a recent application of benefit transfer to the Mount Hood National Forest), and other agencies. Benefit transfer is widely used in academic applications as well; see Wilson and Hoehn (2006) for a series of journal articles on benefit transfer.

The BLM measures recreation activity in various units, including a "visitor hour," which represents the presence of one or more persons in an area for continuous or simultaneous periods of time aggregating 1 hour (i.e., one person for 1 hour or two persons for 30 minutes each). A "visitor day" as defined by BLM represents 12 visitor hours (BLM 2003). The BLM Recreation Management Information System provides data on recreation visitor days (RVDs); to be compatible with these units, BLM identified non-market values for various recreation activities in units of dollars per RVD. Values from economic literature, based on primary research conducted on various recreation sites, were matched to BLM and Forest Service recreation activity classifications. **Table N.8** provides a listing of the values per day representing Colorado.

Consistent with the description above of consumer surplus and the travel cost method, readers should interpret the values in **Table N.8** as the consumer surplus or the amount of value that the average visitor derives from a full day of recreation beyond their actual expenditures. Thus, a typical off-highway vehicle user would pay an average value of $51.35 more than their trip cost to have the opportunity to participate in a typical day of driving off-road vehicles.

Table N.8
Consumer Surplus for Recreation Activities

Recreation Activity Category	Consumer Surplus per Visitor Day (2012 dollars)
Backpacking	36.48
Camping	31.73
Cross Country Skiing	36.32
Fishing	49.00
Floatboating/Rafting/Canoeing	82.28
General Recreation	42.96
Hiking	107.16
Hunting	59.50
Motorboating	65.24
Mountain Biking	175.21
Off-Road Vehicle Driving/Off-Highway Vehicle	51.35
Other Recreation	47.69
Picnicking	52.27
Pleasure Driving	71.65
Rock Climbing	61.32
Sightseeing	41.33
Snowmobiling	51.75
Swimming	35.10
Waterskiing	69.23
Wildlife Viewing	38.00

Sources: Rosenberger 2012; Loomis 2005; Loomis and Richardson 2007; Bowker et al., 2009; USFWS 2009.

Table N.9 shows the total consumer surplus associated with recreation activities on BLM-administered and National Forest System lands for the Northwest Colorado sub-region, including the BLM Field Offices of Colorado River Valley, Grand Junction, Kremmling, Little Snake, and White River, as well as the Routt National Forest. RVDs on BLM lands presented in **Table N.9** is calculated directly from Report 26 from the BLM Recreation Management Information System (Report 26 provides RVDs based on recorded visitor hours – defined above – and dividing by 12). For this analysis, the BLM used average RVDs per year over the period 2008 to 2012. RVDs on National Forests are calculated from the most recent available data (Fiscal Year 2007) from the Forest Service National Visitor Use Monitoring report (Forest Service 2012). RVDs for National Forest System lands were calculated based on the total number of site visits, the "main activity" reported by recreators, and the number of hours per day reported engaging in that activity, with the number of RVDs equal to the number of hours divided by 12. Note that conservation measures for GRSG may only affect specific types and fractions of the public lands that contributed to the visitor days used to estimate the surplus values in **Table N.9**.

Table N.9
Total Consumer Surplus for Recreation in Northwest Colorado Sub-Region

Recreation Activity	Average RVDs Per Year	Total Consumer Surplus (millions of 2012 dollars)
Backpacking	147,444	$5.4
Big Game Hunting	1,050,200	$62.5
Camping	1,024,141	$32.5
Cross Country Skiing	14,828	$0.5
Fishing	63,003	$3.1
Floatboating/Rafting/Canoeing	88,881	$7.3
General Recreation	22,146	$1.0
Hiking	101,309	$10.9
Hunting – Other	122,642	$7.3
Motorboating	1,173	$0.1
Mountain Biking	101,493	$17.8
Off Road Vehicle Driving/Off-Highway Vehicle	420,761	$21.6
Other Recreation	122,373	$5.8
Picnicking	34,955	$1.8
Pleasure Driving	126,625	$9.1
Rock Climbing	4,507	$0.3
Sightseeing	66,201	$2.7
Small Game Hunting	27,927	$1.7
Snowmobiling	22,116	$1.1
Swimming	2,100	$0.1
Waterfowl Hunting	3,290	$0.2
Wildlife Viewing	29,326	$1.1
Total	**4,007,520**	**$193.8**

Source: BLM 2012; Forest Service 2012; consumer surplus per RVD shown in **Table N.8**, Consumer Surplus for Recreation Activities.

To estimate impacts on consumer surplus associated with changes in RVDs, BLM economists worked with BLM and Forest Service recreation specialists to project how RVDs for various activities would change under the alternatives. Initial projected growth rates (for Alternative A) are based on recent growth rates and projected trends, including growth rates predicted for the Rocky Mountain Region by Bowker et al. (1999). For the action alternatives, BLM and Forest Service recreational specialists projected changes in growth rates or initial shifts in RVDs based on their knowledge of local recreational facilities and the management actions that would occur under each alternative. Projected changes in consumer surplus are calculated as the product of projected changes in RVDs and the values of consumer surplus per RVD, as shown in **Table N.8**.

Values Associated with Greater Sage-Grouse Populations

Economists have long recognized that wildlife species, especially rare, threatened, and endangered species, have economic values beyond just viewing. This is supported by a series of legal decisions and technical analyses. The US Court of Appeals in 1989 first clarified that the US Department of the Interior,

in assessing damages in Natural Resource Damage Assessment cases, should include what it termed as "passive use values," that is, existence values provided to non-users of the species, as a compensable value in addition to any use value. These passive use values are also included in Oil Pollution Act damage assessments as well. The term passive values is interchangeable with the term non-use values defined previously. This ruling and subsequent analysis for Natural Resource Damage Assessment and Oil Pollution Act assessments are consistent with well-established economic theory showing that people derive value from passive use or non-use as well as active uses of resources (Krutilla 1967). Economists have devoted a great deal of conceptual and empirical work to refining concepts and developing methods to measure these passive use values.

The dominant methods are "stated preference" methods, of which the most prominent is the Contingent Valuation Method. The basic element of this method is to use a survey to construct or simulate a market or referendum for protection or improvement of a natural environment, habitat, or species, and then having the respondent indicate whether or not they would pay for an increment of protection, and if so, how much they would pay. While the method has developed a great deal of sophistication that has increased the validity of the willingness to pay responses, there is admittedly a degree of bias that can result in stated willingness to pay exceeding actual willingness to pay by a factor averaging two to three (Loomis 2011; Murphy et al. 2005; List and Gallet 2001). While not a perfect estimator of willingness to pay, the Contingent Valuation Method provides a useful means for estimating the public's passive use values.

Numerous academic papers and even entire books have been written on the Contingent Valuation Method. Mitchell and Carson (1989) was one of the first, while Alberini and Kahn (2006) is a more recent treatment. To date there have been about 7,500 Contingent Valuation Method studies in over 130 countries (Carson 2011). A number of federal agencies have used or referenced stated preference methods, including the US Bureau of Reclamation, US Environmental Protection Agency, National Park Service, and state agencies such as the California Department of Fish and Game, Idaho Fish and Game, and Montana Fish, Wildlife, and Parks. The USFWS commissioned an original Contingent Valuation Method study of the economic values the public receives from reintroduction of wolves in the areas of Idaho, Montana, and Wyoming, and used those values in an EIS on wolf reintroduction (USFWS 1994). The US Bureau of Reclamation, National Park Service, and Lower Elwha S'Klallam Tribe commissioned a Contingent Valuation Method study on the value of removal of the Elwha and Glines Canyon Dams (Meyer et al. 1995). The US Bureau of Reclamation also commissioned an original Contingent Valuation Method study on the values of providing stable river flows to benefit riparian vegetation, endangered species, and cultural resources. That study was cited by then-Secretary of the Interior Bruce Babbitt as a factor in selecting the more

protective flow regime from Glen Canyon Dam despite it having more foregone hydroelectricity (Babbitt 1996).

The BLM and Forest Service conducted a literature search to demonstrate the potential range of values that could be associated with species that are candidates for listing as threatened or endangered, such as GRSG populations. Analysts first verified there are no existing studies on Total Economic Value or non-use valuation specific to the GRSG. This is not an uncommon occurrence, as there are dozens of rare or potentially threatened species that have not been valued despite the very high policy relevance of the species and the large magnitude of economic value at stake in these policy decisions.

The BLM and Forest Service used three criteria to identify studies that are most applicable to the current analysis: (1) whether the species valuation study was located in the same geographic region as the GRSG habitat; (2) whether the species was listed or not listed as threatened or endangered; and (3) whether the species was hunted or not (implying a mix of use and non-use values).

The primary database of articles was the recent peer-reviewed journal article by Richardson and Loomis (2009), which is a compilation of the economic values of threatened, endangered, and rare species. A literature review was also conducted to determine if there had been any recent studies on GRSG or closely related species. Unfortunately, there is not a perfect match in the literature in terms of geographic region (intermountain) and a species that is both hunted and rare. **Table N.10** provides a summary of the studies with features most similar to the GRSG species.

As can be seen in **Table N.10** there is one study with a geographic region overlapping the sub-region (Mexican spotted owl), and one study on a species that was hunted at the time (wild turkey). At the time of the study, the Mexican spotted owl was a threatened species under the Endangered Species Act, and respondents were told in the survey that it was a threatened species. The whooping crane, red-cockaded woodpecker, and peregrine falcon studies involved an endangered species.

All of these studies used the Contingent Valuation Method in a mail survey. Households were asked whether they would pay a specific dollar amount, with that amount varying across individuals in the sample (i.e., the valuation questions were "closed-ended," although the wild turkey study and red-cockaded woodpecker also used an open-ended valuation question for some respondents). Researchers used the closed-ended valuation questions to generate a statistical valuation function. This valuation function exhibited internal validity: the higher the dollar amount households were asked to pay, the lower the percentage of them that would pay that dollar amount.

Table N.10
Existing Estimates of Annual Total Economic Value of Protecting Habitat for Species Similar to GRSG

Region	Species	Listed	Hunted	Annual Value per Household[b]	Change Valued
Four Corners (AZ, CO, NM, UT)	Mexican Spotted Owl	Yes	No	$58.49	Avoid extinction in 15 years in Four Corners region
New England	Wild Turkey	No	Yes	$16.72[a]	Avoid extinction in New England
Texas (also L.A., NYC, Chicago, Atlanta)	Whooping Crane	Yes	No	$43.69[a]	Avoid extinction
Maine	Peregrine Falcon	Yes	No	$32.37 (one time)	Restore self-sustaining population
South Carolina & Rest of US	Red-Cockaded Woodpecker	Yes	No	$14.69	Restore habitat to increase chance of survival to 99%

Sources: Loomis and Ekstrand 1997 (Mexican spotted owl); Stevens et al. 1991 (New England wild turkey); Bowker and Stoll 1988 (whooping crane); Kotchen and Reiling 2000 (peregrine falcon); Reaves et al. 1999 (red-cockaded woodpecker). All of these sources are as cited in Richardson and Loomis (2009).

Notes:

a. Average of estimates from the study.
b. As noted in the text, these stated preference values for household may have a degree of hypothetical bias that could overstate the actual monetary amount households would pay by a factor of two to three.

With the exception of the peregrine falcon study, which asked respondents to commit to a one-time payment, each survey asked respondents to pay annually to accomplish the stated goal (typically, preventing the species from going extinct in the region of interest, although this varied by study as the table shows). For the peregrine falcon and red-cockaded woodpecker, households were told that their payment would restore a self-sustaining population (i.e., one that would not go extinct).

The original wild turkey study provided an estimate of three values (in 1990 dollars) that were averaged and then adjusted to 2012 dollars using the Consumer Price Index, resulting in a value of $16.72 per household per year. The same procedure was used to update the 1996 dollar values of the Mexican spotted owl to 2012, resulting in values of $58.49 per household per year. The higher values for the Mexican spotted owl may be due to the large area of habitat (4.6 million acres stated in the survey and shown on a map) that would be protected in the Four Corners area by paying, and the fact the species was not a hunted species. The whooping crane values are fairly large at $43.69 per household per year; this value represents a Total Economic Value, including both use and non-use value, as some of the sample included people who actively "used" the species (as wildlife viewers).

The study values in **Table N.10** demonstrate that many people, or segments of the public, hold substantial value for protecting threatened and endangered species, which may carry over to the GRSG. However, additional studies would be needed to identify values specifically for GRSG protection. Given that protection is a public good available to all households in the intermountain west, the aggregate or intermountain regional value could be substantial.

Values Associated with Grazing Land

Public lands managed for livestock grazing provides both market values (e.g., forage for livestock) and non-market values. Many ranchers themselves value the ranching lifestyle in excess of the income generated by the ranching operations. This is evident in some ranch sales transaction data which suggests some ranch properties have sold for more than the market value of the public land forage (Bartlett et al. 2002; Taylor 2006). One of the primary reasons public lands ranchers indicate they own land is for the "tradition, values and culture" rather than primarily for profit (Tanaka et al. 2005). Many public land ranchers work elsewhere part-time and rely on the ranch for only 20 percent of their income (Hanus 2011), relying instead on outside jobs or other savings to support their ranching lifestyle. Land appreciation has also provided increased value and therefore served as an economic resource for ranchers (Tanaka et al. 2005; Torell et al. 2005). As several of these authors note, changes in public land grazing that reduce the profitability of grazing may not directly translate to withdrawal from ranching, due to the fact that economic factors are not necessarily the primary motivation for public land ranching.

Some studies have found non-market values of ranching associated with use values to residents (Mangun et al. 2005) and tourists in the form of open space and western ranch scenery (Ellingson et al. 2006). However, some others see non-market opportunity costs associated with livestock grazing that may, depending on management methods and other variables, reduce native plant species and forage for wildlife (Todres et al. 2003). The potential exists for other residents or visitors to prefer lifestyles or have lifestyle needs that are not consistent with grazing or ranching lifestyles or landscapes.

Methods available to measure the use values to residents and tourists associated with grazing land include stated preference methods similar to contingent valuation (Ellingson et al. 2006; Mangun et al. 2005). Methods for attempting to isolate any amenity values that ranchers themselves may hold include the hedonic price method. This method uses observed sale prices of ranch land as a function of the characteristics, including both conventional market factors (e.g., size of ranch and quantity of forage) but also amenity values (e.g., scenic views, presence of wildlife species, and on-site fishing or hunting opportunities) that may be provided by the ranch (Torell et al. 2005). The additional value that ranchers pay for the amenity values of the ranch provide some indication of how much they value these amenities. Using the hedonic price method to estimate a "lifestyle value" separate from the market and amenity values has yet

to be done in the literature. This may be due to the fact that lifestyle values attributed to living on a ranch or ranching is present on nearly all ranch properties sold. As such, statistically it is difficult to isolate the contribution of ranching lifestyle to differences in ranch property values as ranching lifestyle is a common feature of nearly all ranch properties sold.

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ECONOMIC IMPACT ANALYSIS METHODOLOGY

Introduction

This appendix describes the methods and data that underlie the economic impact modeling analysis. Input-output models such as the Impact Analysis for Planning (IMPLAN) model, an economic impact analysis model, provide a quantitative representation of the production relationships between individual economic sectors. Thus, the economic modeling analysis uses information about physical production quantities and the prices and costs for goods and services. The inputs required to run the IMPLAN model are described in the following narrative and tables. The resulting estimates from the IMPLAN model, by alternative, are in **Chapter 4**, Environmental Consequences, **Section 4.24**, Social and Economic Conditions. The first portion of the following information describes general aspects of the IMPLAN model and how it was used to estimate economic impacts. The remaining sections provide additional detailed data used in the analysis for livestock grazing, recreation, and oil and gas.

The IMPLAN Model

IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the ripple effect (also called the multiplier effect) of changes in economic sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple effects are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly impacted) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

This analysis used IMPLAN 2011; prior to running the model, cost and price data were converted to a consistent dollar year (2011) using sector-specific adjustment factors from the IMPLAN model. The values in this appendix are expressed in year 2011 dollars.

The current IMPLAN model has 440 economic sectors, of which 241 are represented in the Primary and 293 are represented in the Secondary Socioeconomic Study Area counties. This analysis involved direct changes in economic activity for 33 IMPLAN economic sectors, as well as changes in all other related sectors due to the ripple effect. The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the Primary and Secondary Socioeconomic Study Areas. As a result, the calibrated model does a better job of generating multipliers and the subsequent impacts that reflect the interaction between and among the sectors in the Primary and Secondary Socioeconomic Study Areas compared to a model using unadjusted national coefficients. Key variables used in the IMPLAN model were filled in using data specific to the Primary and Secondary Socioeconomic Study Areas, including employment estimates, labor earnings, and total industry output.

The trade data available in the current version of IMPLAN (Version 3.0) make it possible to do multi-region analysis to track how an impact on any of the IMPLAN sectors in the study area affects production in any of the sectors in any other region of the US. For this analysis, this feature allowed the estimation of how an impact in the primary study area disperses into the secondary study area, and how these effects in the secondary study area create additional local effects in the primary study area. As a result, it was possible to estimate not only the jobs and income generation in the primary study area, but to also estimate how the economic activity in the primary study area affected jobs and income generation in the secondary study area.

Livestock Grazing

Economic impacts from changes to livestock grazing are a function of the amount of forage available and the economic value of forage.

Forage availability was measured in Animal Unit Months (AUMs), with one AUM defined as the amount of forage needed to feed a cow, one horse, or five sheep for one month. For Forest Service data, measurements in AUMs were also obtained. Data were obtained from the BLM's Rangeland Administration System (BLM 2012) and from the Forest Service's INFRA range module (Forest Service 2013). Two types of AUM measures were used: Active AUMs and Billed AUMs. Active AUMs measure the amount of forage from land available for grazing. The Forest Service designates this measure "permitted" AUMs. Billed AUMs measure the amount of forage that the BLM and Forest Service bill for annually. The Forest Service uses the designation "authorized" AUMs. Impacts were estimated for the range between billed and active AUMs. Data were typically for 2011, except active AUMs on the Routt National Forest, for which 2013 data was used.

Forage availability was estimated for Alternatives A and C, where Alternative A used the current data (obtained as explained above), and where Alternative C discounted that data to remove all AUMs in GRSG habitat (all designated habitat [ADH]). The estimate of the share of AUMs in GRSG habitat was based on comparing 336,951 currently permitted AUMs in ADH (per **Chapter 4**, Environmental Consequences, **Section 4.13**, Range Management) with total active AUMs obtained as explained above (476,652)[1]. This generated a factor of 70.69 percent of AUMs in GRSG habitat. This factor was used to discount billed and active AUMs, as shown in **Table N.11** below. AUMs are distinguished between sheep AUMs and cattle and other animals to allow different valuation of forage, as explained further below.

Table N.11
Estimated Annual Animal Unit Months

	Alternative A					
	Active			Billed		
Item	**Cattle and Other**	**Sheep**	**Total**	**Cattle and Other**	**Sheep**	**Total**
Initial AUMs (Alternative A)	388,346	88,306	476,652	278,963	60,732	339,695
Share in ADH	70.69%	70.69%	70.69%	70.69%	70.69%	70.69%
AUMs in ADH	274,527	62,424	336,951	197,203	42,932	240,134
AUMs not in ADH (Alternative C)	113,820	25,881	139,701	81,761	17,800	99,561

Sources: Calculated based on data from BLM 2012, Forest Service 2013, and share of AUMs in ADH from **Chapter 4**, Environmental Consequences, **Section 4.13**, Range Management.

The economic value of forage is estimated based on the value of production associated with the forage. Values for cattle and sheep are estimated separately, with the value of forage for other animals considered equivalent to the value for cattle.

Due to price fluctuations, average per-AUM values for cattle and sheep are based on the 2002 to 2011 average value of production estimates from the (US Department of Agriculture, Economic Research Service 2012). The value for cattle is $51.19 per AUM, and the value for sheep is $58.01 per AUM in the Primary Socioeconomic Study Area (in 2011 dollars). Including indirect and induced impacts, the value of one AUM in the Primary Socioeconomic Study Area for cattle is $105.97 and for sheep is $132.61 (in 2011 dollars). **Table N.12** shows the economic impact assumptions for cattle and sheep. The direct economic impact is the estimated change in livestock output per AUM; IMPLAN generates the indirect and induced impacts.

[1] Because permitted AUMs include active and suspended AUMs (in BLM terminology), this comparison of total active AUMs with ADH permitted AUMs may overestimate the loss of AUMs under Alternative C.

Table N.12
Assumptions for Analysis of Impacts on Output for Livestock Grazing

Economic Impact	Primary Study Area	Primary and Secondary Study Area
Cattle		
Direct Economic Impact ($/AUM)	$51.19	$51.19
Indirect Economic Impact ($/AUM)[1]	$45.51	$45.69
Induced Economic Impact ($/AUM)[2]	$9.26	$9.34
Total Economic Impact ($/AUM)	$105.97	$106.21
Multiplier (Total Impact/Direct Impact)	2.07	2.07
Sheep		
Direct Economic Impact ($/AUM)	$58.01	$58.01
Indirect Economic Impact ($/AUM)[1]	$60.89	$61.22
Induced Economic Impact ($/AUM)[2]	$13.71	$13.82
Total Economic Impact ($/AUM)	$132.61	$133.05
Multiplier (Total Impact/Direct Impact)	2.29	2.29

Note: All dollar values are in 2011 dollars.
[1] Indirect impacts reflect increased demand in sectors that directly or indirectly provide supplies to the livestock industry.
[2] Induced impacts reflect increased demand in the consumer and government sectors.

Table N.13 provides a summary of the employment impacts that would result, according to IMPLAN, based on unit changes in livestock AUMs.

Table N.13
Assumptions for Analysis of Employment Impacts for Livestock Grazing

Employment Impact	Primary Study Area	Primary and Secondary Study Area
Cattle		
Direct Employment (Jobs/1,000 AUMs)	0.000559	0.000559
Indirect Employment (Jobs/1,000 AUMs)	0.000466	0.000466
Induced Employment (Jobs/1,000 AUMs)	0.000077	0.000077
Total Employment (Jobs/1,000 AUMs)	0.001101	0.001101
Multiplier (Total Impact/Direct Impact)	1.97	1.97
Average Earnings per Job (2011 dollars)	$34,465	$34,512
Sheep		
Direct Employment (Jobs/1,000 AUMs)	0.000980	0.000980
Indirect Employment (Jobs/1,000 AUMs)	0.001091	0.001091
Induced Employment (Jobs/1,000 AUMs)	0.000116	0.000116
Total Employment (Jobs/1,000 AUMs)	0.002187	0.002187
Multiplier (Total Impact/Direct Impact)	2.23	2.23
Average Earnings per Job (2011 dollars)	$18,732	$18,769

Note: Direct, indirect, and induced employment impacts and average earnings per job are calculated using IMPLAN.

The IMPLAN sectors used to model an exogenous change in demand for livestock grazing were the following (IMPLAN sector numbers are shown in brackets): grain farming (2), all other crop farming (10), support activities for

agriculture and forestry (19), residential structures maintenance and repairs (40), wholesale trade (319), truck transportation (335), banking (354), real estate (360), accounting (368), veterinary services (379), equipment repair and maintenance (417) and labor income (NA). Cattle grazing used the following additional sector: cattle ranching and farming (11). Sheep grazing used the following additional sectors: animal production except cattle and poultry and eggs (14), retail-food and beverages (324).

Recreation

Economic impacts from recreation are a function of visits to recreation areas and expenditures per visit. Average annual visits were estimated over a 20-year period (2015 to 2034) under each alternative for the primary study area. To do this, first, visits per field office or National Forest were obtained for the latest date available (Fiscal Year 2011 for field offices and Fiscal Year 2007 for the Routt National Forest), as shown in **Table 3-87**, Estimated Number of Annual Visits by Field Office and National Forest, of **Chapter 3**, **Section 3.24**, Social and Economic Conditions (Including Environmental Justice).

Second, projected growth rates were estimated for broad types of recreational activity (e.g., camping, fishing, and pleasure driving), based on current recreation visitor days (RVDs), recent growth rates, and projected trends. Estimates of current RVDs were based on data from the BLM's Recreation Management Information System and the Forest Service's National Visitor Use Monitoring (Round 2) for the latest year available. Recent growth rates were obtained for the Rocky Mountain Region from Bowker et al. (1999).

Third, BLM and Forest Service recreational specialists projected changes in growth rates or initial shifts in RVDs under each action alternative, based on knowledge of local recreational facilities and on management actions under each alternative. The resulting projections were then broken down by local and nonlocal, day and overnight trips, for each broad recreational category, based on the BLM's and Forest Service's recreational specialists' knowledge of local recreational activities.

Only the share of nonlocal RVDs was considered in the impact analysis. This was based on the assumption that expenditures of residents of the primary study area would occur in the region regardless of the BLM's or Forest Service's actions that impact recreational opportunities; however, changes in nonresident recreation patterns would alter the amount of money entering the primary study area. Information on the origin of visitors to recreational areas is typically not available. The BLM and Forest Service estimated instead that the share of visitors (participants) that would have come from over 60 miles away from the recreational area destination, based on the local knowledge of BLM and Forest Service recreational experts. The resulting impact should therefore be thought of as an upper bound, given that the estimated share of nonlocal visitors may still include some residents from the primary study area.

Fourth, projected RVDs by nonlocals per alternative were used to estimate visits by nonlocals per alternative by applying the ratio of visits to RVDs, by field office or National Forest.

Table N.14 shows the estimated nonlocal average annual visits over the 20-year period by alternative.

Table N.14
Estimated Nonlocal Visits, Average Annual (2015–2034)

	Nonlocal Day	Nonlocal Overnight	Total Nonlocal
		Alternative A	
BLM	339,247	1,336,212	1,675,459
Forest Service	107,371	876,446	983,817
Total	446,618	2,212,658	2,659,276
		Alternative B	
BLM	331,374	1,318,099	1,649,473
Forest Service	104,315	853,836	958,152
Total	435,690	2,171,935	2,607,625
		Alternative C	
BLM	325,782	1,299,593	1,625,375
Forest Service	101,361	825,505	926,866
Total	427,143	2,125,098	2,552,241
		Alternative D and E (Proposed LUPA)	
BLM	336,846	1,332,419	1,669,265
Forest Service	106,956	874,970	981,927
Total	443,803	2,207,389	2,651,192

Source: Calculated based on Recreation Management Information System, National Visitor Use Monitoring, and Bowker et al. (1999), as described in the text.

Expenditures per party per trip by type of expenditure (e.g., restaurants, groceries, camping, and motels) were obtained from White and Gooding (2012). Based on these expenditures and average party size, expenditures per visit per person were estimated. The individual sector price indices from the IMPLAN database were used to bring estimated expenditures to 2011 dollars, and each type of expenditure was allocated to an IMPLAN sector. IMPLAN was then used to generate output, employment, and earnings multipliers per million dollars of expenditures. These multipliers were then applied to the estimated visits by alternative to obtain the resulting impacts.

The estimates for average expenditure per visit, in 2011 dollars, are $25.45 for nonlocal day trips and $146.58 for nonlocal overnight trips. **Table N.15** shows the direct, indirect, and induced output per visit in 2011 dollars.

Table N.16 provides a summary of employment impacts according to IMPLAN results, based on unit changes in the number of visits.

Table N.15
Assumptions for Analysis of Impacts on Output for Recreation Activities

Economic Impact	Primary Study Area	Primary and Secondary Study Area
Nonlocal Day Trip		
Direct Economic Impact[1]	$25.45	$25.45
Indirect Economic Impact[2]	$2.66	$3.85
Induced Economic Impact[3]	$4.73	$4.96
Total Economic Impact	$32.84	$34.26
Multiplier (total impact/direct impact)	1.29	1.35
Nonlocal Overnight Trip		
Direct Economic Impact[1]	$146.58	$146.58
Indirect Economic Impact[2]	$28.59	$28.85
Induced Economic Impact[3]	$33.97	$34.25
Total Economic Impact	$209.14	$209.67
Multiplier (total impact/direct impact)	1.43	1.43

Notes: Overnight expenditures are the simple average of expenditures on and off National Forest System lands. Details may not add to total due to rounding.
[1]Direct economic impact is the average expenditure per visit.
[2]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide support for the recreation industry.
[3]Induced impacts from IMPLAN reflect increased demand in the consumer and government sectors.

Table N.16
Assumptions for Employment Impact Analysis for Recreation Activities

Employment Impact (annual number of jobs per visit)	Primary Study Area	Primary and Secondary Study Area
Nonlocal Day Trip		
Direct Employment	0.000193	0.000186
Indirect Employment	0.000023	0.000033
Induced Employment	0.000041	0.000043
Total Employment	0.000257	0.000262
Multiplier (Total Impact/Direct Impact)	1.33	1.41
Average Earnings per Job (2011 dollars)	$34,366	$35,432
Nonlocal Overnight Trip		
Direct Employment	0.001281	0.001281
Indirect Employment	0.000254	0.000254
Induced Employment	0.000293	0.000293
Total Employment	0.001828	0.001828
Multiplier (Total Impact/Direct Impact)	1.43	1.43
Average Earnings per Job (2011 dollars)	$34,792	$34,871

Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using IMPLAN.

The IMPLAN sectors used to model an exogenous change in demand for recreation were the following (IMPLAN sector numbers are shown in brackets): retail – food and beverage (324), retail – gasoline stations (326), retail – sporting goods, hobby, book and music (328), retail – miscellaneous (330), automotive equipment rental and leasing (362), other amusement and recreation industries

(410), hotels and motels (411), other accommodations (412), food services and drinking places (413), other federal government enterprises (429).

Oil and Gas

The economic impact of oil and gas reflects drilling, completion, and production activities. Estimation of drilling, completion, and production activities was done for a 20-year period (2015 to 2034).

The number of wells drilled and the number of wells completed under the No Action Alternative (Alternative A) were estimated under two scenarios. The first is based on the average number of wells expected to be drilled or completed per year in each BLM field office's current Reasonable Foreseeable Development Scenario. The second scenario adjusts Reasonable Foreseeable Development Scenario expectations to actual spud information from the Automated Fluid Minerals Support System. This second scenario projects a considerably lower number of wells drilled and lower production. The first scenario is referred to as the high scenario and the second as the low scenario. Typically, a 95-percent completion rate was assumed (with the exception of wells drilled in the LSFO planning area, where the assumed rate was 80 percent). Drilling and completion numbers were estimated for federal surface, as well as for all surface ownership.

The BLM oil and gas specialists estimated the share of oil and gas that would intersect with GRSG ADH and PHMA using GIS. Surface acres were classified as high, medium, or low potential for oil and gas based on the available geological information. The number of wells projected to be drilled and completed that would intersect with GRSG ADH or PHMA was projected based on the expected presence of wells in areas of high, medium, or low oil and gas potential (according to Reasonable Foreseeable Development Scenarios and currently available information) and the intersection of high, medium, and low oil and gas potential areas with GRSG habitat.

The number of wells completed or drilled that would be affected by each alternative is the number that intersects with ADH or PHMA, as appropriate for each alternative:

- Alternative A – Existing areas would be available for fluid mineral leasing
- Alternative B – All PHMA would be closed to fluid mineral leasing
- Alternative C – All ADH would be closed to fluid mineral leasing
- Alternative D – All PHMA would be NSO for fluid mineral leasing
- Proposed LUPA – All PHMA would be NSO for fluid mineral leasing. In addition, federal minerals within 1 mile of leks would not be leased, and there would be NSO within 2 miles of leks in GHMA.

Due to the lack of information on the extent to which horizontal drilling would allow reaching oil and gas under surface lands closed to exploration, a mid-range estimate between Alternatives A and B was used as an estimate for the number of wells drilled and completed under the high scenario for Alternative D. The low scenario for Alternative D was based on the high scenario and adjusted for information from the Automated Fluid Minerals Support System. Estimates for the Proposed LUPA are based on those for Alternative D, with additional adjustments for the added restrictions. This allows for comparison among alternatives of the potential estimate of impacts on output, employment, and earnings, when added to the impacts of other resource areas.

Table N.17 presents the total number of wells drilled and completed in the Primary Socioeconomic Study Area for each alternative.

Table N.17
Oil and Gas Well Numbers

Item	Primary Study Area	
	Low Scenario	High Scenario
Federal Minerals, All Surface[1]		
Alternative A – Wells Drilled	9,406	18,230
Alternative A – Wells Completed	8,936	17,052
Alternative B – Wells Drilled	8,882	16,422
Alternative B – Wells Completed	8,438	15,448
Alternative C – Wells Drilled	8,808	12,893
Alternative C – Wells Completed	8,368	12,164
Alternative D – Wells Drilled	8,882	17,326
Alternative D – Wells Completed	8,438	16,250
Proposed LUPA – Wells Drilled	8,756	17,200
Proposed LUPA – Well Completed	8,318	16,132
Federal, State, and Fee Minerals, All Surface		
Alternative A – Wells Drilled	22,632	37,013
Alternative A – Wells Completed	21,500	34,708
Alternative B – Wells Drilled	22,108	35,205
Alternative B – Wells Completed	21,002	33,104
Alternative C – Wells Drilled	22,034	31,676
Alternative C – Wells Completed	20,932	29,820
Alternative D – Wells Drilled	22,108	36,109
Alternative D – Wells Completed	21,002	33,906
Proposed LUPA – Wells Drilled	21,982	35,983
Proposed LUPA – Wells Completed	20,882	33,788

Sources: Elaborated by BLM staff based on field office Reasonable Foreseeable Development Scenarios and available information

[1] Estimates for federal minerals include a small area of fee minerals under federal surface (reverse split estate). This This area is approximately 0.9 percent of the total surface in ADH and 2.4 percent of the total surface in PHMA.

The production per new well was assumed based on the typical production of existing wells in the area. A linear decline in production of each new well was assumed at a 5-percent rate (20-year life for each well). Wells were assumed to start production on January 1 of each year of completion. Total oil and gas production under Alternative A was based on multiplying production per well and the number of wells drilled and completed (estimated as described above). Oil and gas production of existing wells was not included because they would not be affected by GRSG habitat management alternatives[1]. The production that would be affected by each alternative is proportional to the share of wells affected by GRSG habitat, whether ADH or PHMA, as appropriate for each alternative. **Table N.18** presents the projected quantity of oil and gas over the 20-year forecast period on federal minerals and on federal, state, and fee minerals.

Table N.18
Projected Oil and Gas Production, 20-Year Period

Alternative A		Alternative B		Alternative C		Alternative D		Proposed LUPA	
Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)	Gas (BCF)	Oil (MMBO)
Low Scenario									
Federal Minerals, All Surface									
14,338	22,363	13,403	16,461	13,143	14,054	13,474	18,904	13,283	18,635
Federal, State, and Fee Minerals, All Surface									
32,900	49,023	31,906	42,253	31,487	39,937	32,025	45,137	31,842	44,879
High Scenario									
Federal Minerals, All Surface									
27,360	42,674	24,539	30,136	19,105	20,430	25,949	36,405	25,761	36,141
Federal, State, and Fee Minerals, All Surface									
53,112	79,139	50,291	66,601	44,857	56,895	51,701	72,870	51,521	72,617

Sources: Elaborated by BLM staff based on field office Reasonable Foreseeable Development Scenarios and available information
BCF = billion cubic feet; MMBO = million barrels

The costs of drilling and completing wells and producing oil and gas also are relevant for the economic impact analysis. Cost of completion or drilling per well were obtained from 2009 data available for Southwest Wyoming.[2] Price indices from the IMPLAN database were used to bring estimated expenditures to 2011 dollars. IMPLAN was then used to generate output, employment, and earnings multipliers per million dollars of expenditures. These multipliers were then applied to the estimated expenditures with drilling and completion by alternative to obtain the resulting impacts. Multipliers for oil and gas drilling and completion are based not only on expenditures made directly with oil and gas

[1] News wells in existing leases would also not be affected. The current estimates may, therefore, overestimate the impacts of the action alternatives.
[2] Amendment 6 – Resource Management Plans in Support of Wyoming Sage Grouse Policy Project for BLM. Average for conventional wells in four BLM field offices, Kemmerer, Pinedale, Rawlins, and Rock Springs.

drilling and completion, but also on expenditures made directly by oil and gas companies with site preparation, consumables, tangibles, equipment rentals, engineering services, day labor, trucking, and communication associated with oil and gas well drilling and completion. These non-drilling and non-support activities expenditures make up nearly 50 percent of total well costs and impact the multipliers used in this EIS.

Table N.19 provides a summary of the costs of drilling and completion used for the economic analysis.

Table N.19
Assumptions for Analysis of Economic Impacts for Oil and Gas Well Drilling and Completion

Economic Impact	Primary Study Area	Primary and Secondary Study Area
	Drilling Impacts	
Total Drilling Costs	$1,508,072	$1,508,072
Total Local Drilling Costs[1]	$1,342,184	$1,342,184
Local Direct Impact ($/well)	$1,342,184	$1,342,184
Local Indirect Impact ($/well)	$304,672	$309,819
Local Induced Impact ($/well)	$412,742	$416,457
Local Total Impact ($/well)[2]	$2,059,598	$2,068,459
Multiplier (total impact/direct impact)	1.53	1.54
	Completion Impacts	
Total Completion Costs	$1,191,260	$1,191,260
Total Local Completion Costs[1]	$736,199	$736,199
Local Direct Impact ($/well)	$736,199	$736,199
Local Indirect Impact ($/well)	$191,775	$194,748
Local Induced Impact ($/well)	$233,518	$235,675
Local Total Impact ($/well)[2]	$1,161,492	$1,166,621
Multiplier (total impact/direct impact)	1.58	1.58

Source: Drilling and completion costs (the first row in each part of the table) are from Amendment 6 – Resource Management Plans in Support of Wyoming Sage Grouse Policy Project for BLM. Remaining data is from IMPLAN, as described in the text.
[1]The local cost shares were based on the percent of total drilling or completion costs that would be spent on goods and services purchased from the local economy, assuming similar local shares to those estimated for Southwest Wyoming in the source document.
[2] Total impacts estimated using IMPLAN include direct, indirect, and induced impacts.

Table N.20 provides the assumptions used to determine the economic impact associated with the production of oil and gas. For the analysis, the BLM estimated a nonlabor production cost (for gas) of $1.51 per thousand cubic feet and $7.44 per barrel of oil, in year 2011 dollars, based on data from the Energy Information Administration for the Rocky Mountain Region (Energy Information Administration 2013).

Table N.20
Assumptions for Analysis of Economic Impacts on Output for Oil and Gas Production

Economic Impact	Primary Study Area	Primary and Secondary Study Area
Oil Production (per million barrels)		
Direct Economic Impact[1]	$88,260[2]	$88,260[3]
Indirect Economic Impact[4]	$15,246	$15,423
Induced Economic Impact[5]	$4,554	$4,613
Total Economic Impact	$108,061	$108,296
Multiplier (total impact/direct impact)	1.22	1.23
Gas Production (per million cubic feet)		
Direct Economic Impact[1]	$3,960.00	$3,960.00
Indirect Economic Impact[4]	$684.07	$691.97
Induced Economic Impact[5]	$204.33	$206.98
Total Economic Impact	$4,848.40	$4,858.95
Multiplier (total impact/direct impact)	1.22	1.23

Note: All dollar values are in year 2011 dollars.
[1]Direct economic impact is the market value of output.
[2]Based on an oil price of $88.26 per barrel, which is the 2011 Colorado Crude Oil First Purchase Price reported by the US Energy Information Administration (2013).
[3]Based on a gas price of $3.96 per thousand cubic feet, which is the 2010 Colorado Natural Gas Wellhead Price reported by the US Energy Information Administration (2013).
[4]Indirect impacts from IMPLAN reflect increased demand in sectors that directly or indirectly provide supplies to the oil and gas industry.
[5]Induced impacts from IMPLAN reflect increased demand in the consumer sectors.

The forecasted number of wells and production used for estimating employment impacts is the same as for estimating impacts on labor earnings and output. **Table N.21** shows the direct and total employment impacts attributable to drilling and completion.

Table N.22 shows the direct and total employment impacts associated with production.

Table N.21
Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion

Employment Impact	Primary Study Area	Primary and Secondary Study Area
Drilling Impacts		
Direct Employment (jobs/well)	7.1	7.1
Indirect Employment (jobs/well)	2.5	2.5
Induced Employment (jobs/well)	3.5	3.6
Total Employment Impact (jobs/well)	13.1	13.2
Multiplier (Total Impact/Direct Impact)	1.85	1.86
Average Earnings per Job (2011 dollars)	$58,638	$58,573

Table N.21
Assumptions for Employment Impact Analysis for Oil and Gas Well Drilling and Completion

Employment Impact	Primary Study Area	Primary and Secondary Study Area
Completion Impacts		
Direct Employment (jobs/well)	4.6	4.6
Indirect Employment (jobs/well)	1.6	1.6
Induced Employment (jobs/well)	2.0	2.0
Total Employment Impact (jobs/well)	8.2	8.2
Multiplier (Total Impact/Direct Impact)	1.79	1.79
Average Earnings per Job (2011 dollars)	$53,015	$52,973

Note: Direct and total employment impact and average earnings per job are calculated using IMPLAN.

Table N.22
Assumptions for Employment Impact Analysis for Oil and Gas Production

Employment Impact (annual number of jobs per thousand barrels or million cubic feet)	Primary Study Area	Primary and Secondary Study Area
Oil Production (per thousand barrels)		
Direct Employment	0.017475	0.017475
Indirect Employment	0.101764	0.102558
Induced Employment	0.039011	0.039540
Total Employment	0.158250	0.159574
Multiplier (Total Impact/Direct Impact)	9.06	9.13
Average Earnings per Job (2011 dollars)	$53,016	$52,958
Gas Production (per million cubic feet)		
Direct Employment	0.000784	0.000784
Indirect Employment	0.004566	0.004602
Induced Employment	0.001750	0.001774
Total Employment	0.007100	0.007160
Multiplier (Total Impact/Direct Impact)	9.06	9.13
Average Earnings per Job (2011 dollars)	$53,016	$52,958

Note: Direct, indirect, and induced employment impact and average earnings per job are calculated using IMPLAN.

The analysis of potential changes in tax revenues is based on tax rates of 12.5 percent of taxable value for federal mineral royalties and 5 percent of taxable value for state severance taxes (Colorado severance tax rates depend on production value but are 5 percent for production valued over $300.00). Taxable value was assumed to be 87.5 percent of value of sales based on a report from the Colorado Oil and Gas Association (Colorado Oil and Gas Association 2011). **Table N.23** shows calculations of the impact of management alternatives on annual tax collection from oil and gas production.

Table N.23
Tax Collections from Oil and Gas Production Averaged Annually over 20-Year Period, Relative to Alternative A, 2011$

	Alternative B		Alternative C		Alternative D		Proposed LUPA	
	Gas (MMCF)	Oil (MBO)	Gas (MMCF)	Oil (MBO)	Gas (MMCF)	Oil (MBO)	Gas (MMCF)	Oil (MBO)
Low Scenario								
Total production	-934,279	-5,902	-1,195,121	-8,309	-863,321	-3,459	-1,054,946	-3,728
Prices	$3,960	$88,260	$3,960	$88,260	$3,960	$88,260	$3,960	$88,260
Assessed valuation	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%
Assessed value ($ thousands)	-$3,237,276	-$455,828	-$4,141,094	-$641,664	-$2,991,408	-$267,165	-$3,655,390	-$287,926
Federal royalties rate	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Federal royalty tax ($ thousands)	-$404,659	-$56,979	-$517,637	-$80,208	-$373,926	-$33,396	-$456,924	-$35,991
State severance rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
State severance tax ($ thousands)	-$161,864	-$22,791	-$207,055	-$32,083	-$149,570	-$13,358	-$182,769	-$14,396
Total taxes ($ thousands)	-$566,523	-$79,770	-$724,692	-$112,291	-$523,496	-$46,754	-$639,693	-$50,387
Annual average taxes ($ thousands)	-$28,326	-$3,988	-$36,235	-$5,615	-$26,175	-$2,338	-$31,985	-$2,519
High Scenario								
Total production	-2,821,203	-12,538	-8,255,266	-22,244	-1,410,601	-6,269	-1,599,033	-6,534
Prices	$3,960	$88,260	$3,960	$88,260	$3,960	$88,260	$3,960	$88,260
Assessed valuation	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%	87.5%
Assessed value ($ thousands)	-$9,775,468	-$968,311	-$28,604,496	-$1,717,867	-$4,887,734	-$484,155	-$5,540,649	-$504,571
Federal royalties rate	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
Federal royalty tax ($ thousands)	-$1,221,934	-$121,039	-$3,575,562	-$214,733	-$610,967	-$60,519	-$692,581	-$63,071
State severance rate	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
State severance tax ($ thousands)	-$488,773	-$48,416	-$1,430,225	-$85,893	-$244,387	-$24,208	-$277,032	-$25,229
Total taxes ($ thousands)	-$1,710,707	-$169,454	-$5,005,787	-$300,627	-$855,353	-$84,727	-$969,614	-$88,300
Annual average taxes ($ thousands)	-$85,535	-$8,473	-$250,289	-$15,031	-$42,768	-$4,236	-$48,481	-$4,415

Source: Production volumes elaborated by BLM staff based on field office Reasonable Foreseeable Development Scenarios and available information. Prices are from Energy Information Administration (2013). Assessed valuation percentage is from Colorado Oil and Gas Association (2011).
MMCF = million cubic feet; MBO = thousand barrels

The IMPLAN sectors used to model an exogenous change in demand for oil and gas well drilling were the following (IMPLAN sector numbers are shown in brackets): drilling oil and gas wells (28), support activities for oil and gas operations (29), construction of new manufacturing structures (35), construction of other new structures (36), wholesale trade (319), truck transportation (335), telecommunications (351), commercial and industrial equipment leasing (365), architectural and engineering services (369). In the case of oil and gas production, the sector used was oil and gas extraction (20).

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