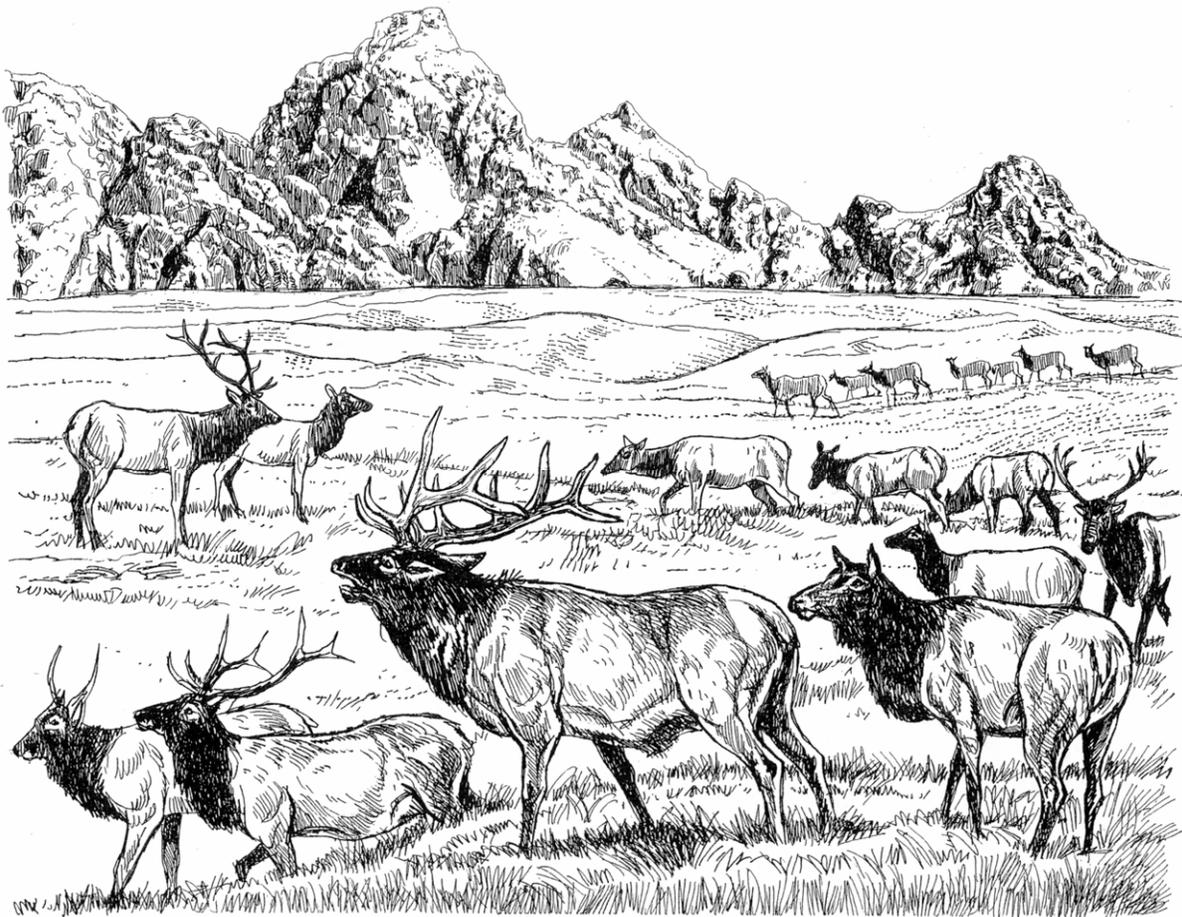




In Cooperation with Colorado State University

Economic Importance of Elk Hunting in Jackson Hole, Wyoming

By Lynne Koontz and John B. Loomis



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Introduction and Objective of Report

The U.S. Fish and Wildlife Service (FWS) and the National Park Service (NPS) are preparing a management plan for bison and elk inhabiting the National Elk Refuge (NER) and Grand Teton National Park (GTNP). These animals are part of the bison and elk herds in Jackson Hole, one of the largest concentrations of free-ranging bison and elk in the world. A range of alternatives for managing the bison and elk herds in the project area will be developed in an Environmental Impact Statement. The EIS will include an analysis of elk hunting programs related to the NER and GTNP. Management of the Jackson elk herd on the NER and GTNP can impact the number of hunters allowed and hunter harvest ratios on the NER, GTNP, and Bridger Teton National Forest (BTNF).

To assist the EIS planning effort, the U.S. Geological Survey (USGS) in cooperation with the Wyoming Game and Fish Department (WGFD) conducted a survey of elk hunters that hunted within the Jackson elk herd units during the 2001 hunting season. The objective of this survey and analysis was to quantify how much hunters spent in the local and regional economy and the associated economic impacts such as income and employment effects. Spending by elk hunters in the Jackson area generates considerable economic benefits for the local and regional economy. An elk hunter usually buys a wide range of goods and services during a hunting trip. Major expenditure categories include outfitter/guide fees, hunting licenses and supplies, game processing, lodging, food, and gasoline.

As more hunters come to an area, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from purchases by hunter at local businesses represent the *direct* effects of hunter spending within the economy. In order to increase supplies to local businesses, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the *indirect* effects of hunter spending within the local economy. The input supplier's new employees use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the *induced* effect associated with hunter spending. The indirect and induced effects are known as the secondary effects. Multipliers capture the size of the secondary effects, usually as a ratio of total effects to direct effects (Stynes, 1998). The sums of the direct and secondary effects describe the total economic impact of hunter spending in the local economy.

The survey results were used to estimate trip spending by local residents, non-local Wyoming residents, and nonresident hunters. Economic impacts are typically measured in terms of number of jobs lost or gained, and the associated result for employment income. Economic input-output models are commonly used to predict the total level of regional economic activity

that would result from a change in hunter spending. The IMPLAN modeling software was used to analyze the economic impacts associated with current Jackson elk herd hunter spending. IMPLAN is a computerized database and modeling system that provides a regional input-output analysis of economic activity in terms of 10 industrial groups involving as many as 528 sectors (Olson and Lindall, 1996).

A local region (and its economy) is typically defined as all counties within a 30-60 mile radius of the travel destination. Only spending that takes place within this local area is considered a stimulate of the change in economic activity. The size of the region influences both the amount of spending captured and the multiplier effects. The NER, GTNP, and the town of Jackson are located in Teton County, Wyoming. Jackson is the primary destination for hunter activities associated with the Jackson elk herd and is the gateway community to the NER, GTNP, and southern Yellowstone National Park. However, due to the high cost of living in Jackson, a large percentage of Jackson's tourism-based service and trade industry workforce live in Teton County, Idaho. To accurately portray the spending of elk hunters and the re-spending of local workers salaries, Teton County, Wyoming and Teton County, Idaho were chosen to represent the local economic impact region. For the *local* economic impact analysis, only spending by persons living outside the local impact area (Teton County, Wyoming and Idaho) was considered an infusion of new money into the local economy. The state of Wyoming was selected as the *regional* impact area to capture the spending by nonresident hunters in Jackson and in the state en route to the Jackson area. In order to only examine nonresident spending at the state level, Teton County, Idaho was not included in the regional model.

IMPLAN state and county data profiles for the year 2000 were used in this study. The IMPLAN county level employment data were adjusted with the US Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System (REIS) data at the 1-digit Standard Industrial Code (SIC) level for the year 2000. The IMPLAN state level employment data were adjusted with the 2000 REIS data at the 2-digit SIC level. Total value added and total industry output data were scaled proportionally with employment changes in the state and county models. U.S. Census Bureau's Census of Retail Trade data were used to further check personal income for the key industries in the state model. IMPLAN's regional purchase coefficients were adjusted to better reflect typical spending patterns between locals and non-locals. Budget data from GTNP, NER, and BTNF were used to adjust total industry output for the government sector in the local model.

Data Collection

The survey instrument was developed based on the key elk hunter social-economic information needed for the EIS. State and federal agency personnel reviewed the survey instrument, and comments and suggestions were incorporated. The survey was printed on one 11-inch by 17-inch sheet of light gray paper that was folded in half to form a booklet. The cover had a drawing of elk on the NER with the Grand Tetons in the background. The inside cover had a brief explanation of the survey and questions regarding the most recent elk hunting trip to the Jackson Hole area. The next page asked about preference for hunting on the different federal land areas, hunting trip expenditures in the Jackson Hole area and in Wyoming, and demographic questions. The back cover asked for comments regarding the survey or elk hunting in Wyoming. An example of the survey instrument is provided in Appendix A.

The 2001 WGFD annual big game harvest survey sampled 100% of limited quota license holders and 25% of general license holders. The elk hunter spending survey was sent out as a separate follow-up survey to all limited quota license holders in any Jackson hunt area and to the general license holders who responded in the WGFD annual big game harvest survey as having hunted in a Jackson hunt area. In all, 3,747 elk hunter spending surveys were mailed out on April 15, 2001. The survey was mailed with a first class postage paid return envelope for return of the survey. A total of 2,067 surveys were returned and 43 were undeliverable. Of the returned surveys, 2,056 were usable, seven were blank duplicate mailings, three were deceased, and one was a refusal. The overall survey response rate was 55.7%. A breakdown of surveys sent out to and received by local residents, non-local residents and nonresidents is presented in Table 1. The proportion of surveys returned closely matched the proportion mailed out.

Table 1. Survey sample distributions.

	Total surveys	Local resident		Non-local resident		Nonresident	
	Number	Number	Percent	Number	Percent	Number	Percent
Surveys mailed out	3,747	641	17.1	1,933	51.6	1,173	31.3
Surveys returned	2,056	334	16.2	1,067	51.9	655	31.9

Results

Not all individuals that purchase an elk hunting license actually hunted during the season. Of the 2,056 surveys that were returned, 5% or 103 hunters indicated that they did not hunt with their license purchased for the 2001 elk hunting season. Of the 103 hunters that did not hunt, 4.2% were local residents, 6.1% were non-local residents, and 3.2% were nonresidents.

Descriptive Statistics

Table 2 presents the average demographics by residential area. The average age ranged from 45 years for local residents to nearly 50 years for nonresidents. Ten percent of Wyoming resident hunters (local and non-local) were female, while only 2% of nonresidents were female. Non-local residents had the highest percentage of retired hunters (22%) while local residents had a substantially lower percentage (13%).

Table 2. Demographics comparison by residential area.

	Local residents mean	Non-local residents mean	Nonresidents mean
Age	45	47.3	49.4
% male	90	90	98
% female	10	10	2
% retired	13	22	19

Table 3 presents the average trip characteristics for each residential area. The basic trip

statistics for local hunters indicate that the average local hunter traveled less than an hour one way (30 miles), spent about three and a half days hunting each trip, and made almost eight elk hunting trips in the Jackson area during the 2001 season. The average non-local resident traveled 5.7 hours one way (284 miles), spent over six days hunting each trip, and made 2.4 elk hunting trips to the Jackson area. The typical nonresident traveled 1,090 miles one way (18.6 hours) and made fewer seasonal elk hunting trips to the Jackson area but stayed in the Jackson area longer per trip than Wyoming resident hunters. The size of non-local resident and nonresident hunting groups averaged 3.3 hunters. Two people were in the average local resident hunting group. Nonresidents would on average have to travel 888 miles to the next best hunting area if they did not hunt in the Jackson area.

Table 3. Trip characteristics.

	Local residents mean	Non-local residents mean	Nonresidents mean
Number of trips to Jackson Hole hunt areas during the season	7.9	2.4	1.5
Time spent hunting (days)	3.6	6.3	7.5
One-way travel time from home to hunt area	54 minutes	5.7 hours	18.6 hours
One-way travel distance from home to hunt area (miles)	28	284	1,090
Distance to next best hunt area outside of the Jackson area	80	135	888
Number of people in hunting group	2.0	3.3	3.3

As shown in Table 4, approximately 98% of all hunters used a firearm as their primary weapon during their most recent trip to the Jackson area. Approximately 2% were archery hunters, and less than half of a percent hunted with a muzzleloader.

Table 4. Primary weapon used on most recent trip.

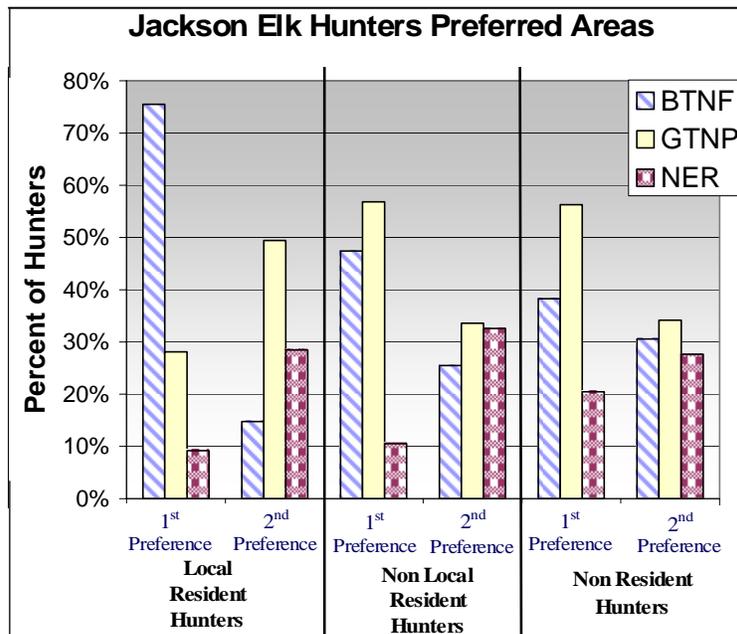
	Local residents	Non-local residents	Nonresidents
Firearm	98.4%	97.7%	98.3%
Archery	1.6%	2.1%	1.6%
Muzzleloader	0.0%	0.2%	0.2%

The survey asked if the hunter would apply for a permit if bison hunting were allowed on the National Elk Refuge. Results indicate that bison hunting on the NER is desirable, especially by Wyoming resident hunters; 76% of locals and 80% of non-locals stating they would apply for a bison tag. Tag application results are present in Table 5.

Table 5. Tag application for hunting bison on the NER.

	Local residents	Non-local residents	Nonresidents
Would apply for tag	76%	80%	61%
Would not apply for tag	24%	20%	39%

The survey asked hunters to rank their most preferred federal land area for elk hunting in the Jackson area. Over 75% of local hunters selected the BTNF as their most preferred hunting area with 28% selecting GTNP as their most preferred. Percentages total more than 100% because several hunters selected two areas as their most preferred. Almost 50% of local hunters chose GTNP as their second most preferred area. Approximately 56% of non-local residents and nonresidents stated that GTNP was their most preferred hunting area. Approximately 20% of nonresidents, 11% of non-local residents, and 10% of locals selected the NER as their most preferred hunting area. Comparisons of preferred hunting areas are presented in Figure 1.



Note: Percentages total more than 100% because several hunters selected more than one area as their most preferred.

Figure 1. Comparison of preferred federal land area hunting experience.

Trip Purpose

To account for the amounts of spending attributed to the purpose of elk hunting in the Jackson area, hunters were asked about the purpose for their trip. As shown in Table 6, over 95% of all hunters indicated that elk hunting was the primary purpose or sole destination of their trip. Less than 4% of all hunters indicated that elk hunting was one of many equally important reasons or destinations of the trip. Finally, less than one percent of all hunters indicated that elk hunting was just an incidental or spur of the moment stop on a trip taken for other purposes or to other

destinations. Typically, a tourist visits an area for several purposes and only a portion of their spending is attributed to a specific purpose, however, because the overwhelming majority of elk hunters reported coming to the Jackson area primarily or solely to hunt elk, all reported spending was attributed to the purpose of the elk hunting trip.

Table 6. Reported trip purpose.

	Local residents	Non-local residents	Nonresidents
Primary trip purpose	96.2%	97.9%	95.8%
Equal trip purpose	2.8%	2.1%	3.8%
Incidental trip purpose	0.7%	0.0%	0.3%

Trip Spending by Residential Group

The survey asked the hunter to “record the dollar amount you personally spent to hunt elk on this most recent trip” in the Jackson Hole area or Grand Teton National Park (the local spending area). They were also asked how much they spent elsewhere in Wyoming en route to the Jackson Hole area (the regional impact area) for the expenditure categories listed in Table 7. Because of the differences in travel costs and time spent in the local area, the trip spending expenditures are reported separately for local, non-local, and nonresident hunters. The average trip expenditures for local, non-local and nonresident elk hunters are reported in Table 7. Not every group had expenditures in every category, so these numbers represent an average across all hunters, including some who had no expenditures in that category.

Table 7 shows that, as expected, nonresident elk hunters had the highest spending per trip. On average nonresidents spent \$1,382 in the locally in Teton County Wyoming and Idaho and \$250 elsewhere in the state en route to the Jackson area. On average, nonresidents spent the most on local outfitters/guides, hotels, restaurants, and gasoline. Non-locals spent the most locally on hotels, gasoline, restaurants, and groceries. Local resident hunters spent the most on game processing, gasoline, outfitter/guides, and hunting supplies.

Besides the local and regional expenditures reported in Table 7, hunters also spent money purchasing WGFD hunting licenses. Fees for a 2001 WGFD hunting license were: \$38 for a resident bull elk tag, \$33 for a resident cow/calf tag, \$410 for a nonresident bull elk tag, and \$160 for a nonresident cow/calf tag. Survey results showed that average amount spent on a 2001 WGFD elk hunting license was \$37 for local residents, \$43 for non-local residents, and \$387 for nonresident hunters.

Hunter Spending Breakdowns by Federal Land Management Area

Changes in elk management on the NER and GTNP could impact the number and proportion of hunters allowed on the NER, GTNP, and the BTNF. To assist the FWS and the NPS in analyzing the economic impacts associated with possible management changes, hunters were further classified by the federal land area on which they hunted. A breakdown of surveys sent to and received by local residents, non-local residents and nonresidents by federal land area is presented in Table 8.

Table 7. Average spending by local, non-local and nonresident hunters per trip.

	Local residents	Non-local residents	Nonresidents
Travel expense	Amount spent in Jackson Hole area		
Gasoline/related automobile costs	\$54.16	\$81.79	\$113.90
Restaurants	\$20.94	\$78.18	\$172.37
Grocery stores	\$32.10	\$54.60	\$88.52
Hotel	\$1.99	\$109.94	\$232.19
Outfitter/guide fees	\$49.03	\$11.93	\$576.35
Hunting supplies (e.g. Ammo)	\$42.23	\$24.29	\$49.49
Horse feed (Hay/Pellets)	\$23.68	\$9.33	\$10.56
Horse rental	\$16.74	\$6.57	\$25.37
Game processing	\$70.26	\$15.50	\$61.94
Taxidermy	\$22.85	\$5.03	\$23.97
Access/trespass fee	\$0.69	\$0.08	\$0.49
Camping	\$3.36	\$4.45	\$7.69
Rental car	\$0.00	\$0.00	\$19.67
Local spending total	\$338.03	\$401.69	\$1,382.51
	Amount spent elsewhere in Wyoming en route to the Jackson Hole area		
Gasoline/related automobile costs	\$5.00	\$69.73	\$96.75
Restaurants	\$0.47	\$22.41	\$40.61
Grocery stores	\$1.20	\$46.09	\$19.47
Hotel	\$0.00	\$3.75	\$25.74
Outfitter/guide fees	\$0.00	\$0.20	\$8.45
Hunting supplies (e.g. Ammo)	\$5.05	\$46.41	\$19.56
Horse feed (Hay/Pellets)	\$0.62	\$15.77	\$14.13
Horse rental	\$1.25	\$7.28	\$2.73
Game processing	\$2.27	\$31.48	\$10.00
Taxidermy	\$2.02	\$23.79	\$6.60
Access/trespass fee	\$0.00	\$0.02	\$0.35
Camping	\$0.31	\$1.79	\$1.49
Rental car	\$0.00	\$2.23	\$4.65
Spending in rest of Wyoming total	\$18.19	\$270.95	\$250.53
	Local spending plus spending in the rest of Wyoming		
Total spending in Wyoming per trip	\$356.22	\$672.64	\$1,633.04

Table 8. Survey sample distribution by federal land area.

	Total number	BTNF		GTPN		NER	
		Number	Percent	Number	Percent	Number	Percent
Surveys mailed out	3,747	1551	41	2,061	55	135	4
Local	641	323		249		69	
Non-local	1933	839		1037		57	
Nonresident	1173	389		775		9	
Surveys returned	1,953*	800	41	1,044	53	109	6
Local	319	150		117		52	
Non-local	1067	432		519		50	
Nonresident	655	218		408		7	

*Excludes the 103 hunters that did not use their purchased 2001 license.

As shown in Table 8, of the 3,747 surveys mailed out, 55% were mailed to elk hunters that hunted on the GTNP, 41% to BTNF hunters, and only 4% to NER hunters. The reason for the disproportionate number of surveys sent out by federal land area was due to the type of hunting permits within each federal land area. As previously discussed, the 2001 WGFD annual big game harvest survey sampled 100% of limited quota license holders and 25% of general license holders. The elk hunter spending survey was sent out as a separate follow-up survey to all limited quota license holders in any Jackson hunt area and to the general license holders who responded in the WGFD annual big game harvest survey as having hunted in a Jackson hunt area. All hunting units in GTNP required limited quota licenses; therefore all hunters that purchased a license for a hunt unit within GTNP in 2001 were included in the sample for the elk hunter spending survey. The BTNF was open for general license holders but also contained a small percentage of limited quota licenses within units as well. By sampling all general license hunters that indicated hunting in a Jackson hunt unit as well as all limited quota license holders, a large sample (1,551 mailed out, 800 returned surveys) of BTNF hunters were captured.

Hunting regulations on the NER were more complicated. A NER Refuge Hunting Permit was required, which could only be obtained by participating in a weekly public drawing at the Jackson Rodeo Grounds. There were no pre-applications for permits; individuals wishing to draw for a NER Refuge Hunting Permit had to be present at the drawing and possess a valid Wyoming elk hunting license (general license or an unused limited quota license for any unit within the state). Because unused limited quota licenses from other hunting units were valid at the NER, identifying NER hunters through the WGFD license records was more difficult and, therefore, the sample size of NER hunters was much smaller than BTNF and GTNP hunters. Because general licenses were only permitted on the NER and BTNF in the Jackson hunt area, the NER hunters were separated from the BTNF hunters by a cross check of the general license survey sample with the NER Refuge Hunting Permit records which specified the name, city and state of each hunter.

Even though the sample sizes were disproportionate between the federal land areas, the application of the results to the current number of hunters in the Jackson elk herd units as well as the changes to the number of hunters for each EIS management alternative reflected the actual proportion of hunters by residency and federal land area. The average trip expenditures for elk hunters by residential group are reported in Table 9 for BTNF hunters, Table 10 for GTNP hunters, and Table 11 for NER hunters. As shown in Table 9, nonresident BTNF hunters spent on average \$2,225 locally in the Jackson area. They spent an additional \$227 elsewhere in the state en route to the Jackson area for an average total of \$2,452 spent per trip in the state of Wyoming. Almost \$1,500 of this amount was spent locally on outfitter/guide fees. On average, local and non-local resident hunters spent locally \$331 and \$301 respectively. Besides the spending reported in Table 9, survey results showed that the average amount spent on a 2001 WGFD elk hunting license by BTNF hunters was \$32 for local residents, \$51 for non-local residents, and \$495 for nonresidents.

As shown in Table 10, nonresident GTNP hunters spent, on average, \$937 locally in the Jackson area and an additional \$264 elsewhere in the state en route to the Jackson area for an average total of \$1,201 spent per trip in the state of Wyoming. On average, nonresident GTNP hunters spent the most on hotels and restaurants. Local and non-local resident GTNP hunters spent locally on average \$376 and \$454 respectively. Non-local resident GTNP hunters spent the

most on hotels, gasoline, and restaurants while local resident GTNP hunters spent the most on gasoline and game processing. Besides the spending reported in Table 10, survey results show the average amount spent on a 2001 WGFD elk hunting license by GTNP hunters was \$44 for local residents, \$37 for non-local residents, and \$329 for nonresidents.

Table 9. Average spending by BTNF hunters per trip.

BTNF hunter spending	Local residents	Non-local residents	Nonresidents
Travel expense	Amount spent in Jackson Hole Area		
Gasoline/related automobile costs	\$31.07	\$58.88	\$77.61
Restaurants	\$10.93	\$54.78	\$121.52
Grocery stores	\$28.44	\$40.88	\$78.49
Hotel	\$2.67	\$57.13	\$116.16
Outfitter/guide fees	\$84.00	\$25.41	\$1,497.59
Hunting supplies (e.g., ammo)	\$31.92	\$19.39	\$38.96
Horse feed (hay/pellets)	\$41.67	\$12.62	\$20.64
Horse rental	\$18.00	\$5.16	\$45.57
Game processing	\$66.00	\$15.79	\$125.80
Taxidermy	\$9.50	\$3.13	\$52.73
Access/trespass fee	\$0.07	\$0.16	\$0.28
Camping	\$6.60	\$7.52	\$11.48
Rental car	\$0.00	\$0.00	\$38.07
Local spending total	\$330.87	\$300.85	\$2,224.90
	Amount spent elsewhere in Wyoming en route to the Jackson Hole area		
Gasoline/related automobile costs	\$2.27	\$77.72	\$82.89
Restaurants	\$0.00	\$25.98	\$35.67
Grocery stores	\$0.50	\$65.90	\$23.28
Hotel	\$0.00	\$5.53	\$21.77
Outfitter/guide fees	\$0.00	\$0.00	\$8.49
Hunting supplies (e.g., ammo)	\$7.23	\$59.98	\$15.15
Horse feed (hay/pellets)	\$1.00	\$26.80	\$6.19
Horse rental	\$2.67	\$11.52	\$3.37
Game processing	\$3.47	\$37.87	\$11.61
Taxidermy	\$4.33	\$35.16	\$10.44
Access/trespass fee	\$0.00	\$0.01	\$0.00
Camping	\$0.00	\$3.11	\$1.22
Rental car	\$0.00	\$1.94	\$7.34
Spending in rest of Wyoming total	\$21.47	\$351.52	\$227.42
	Local spending plus spending in the rest of Wyoming		
Total Spending in Wyoming per Trip	\$352.34	\$652.37	\$2,452.32
Sample Size	150	432	218

Table 10. Average spending by GTNP hunters per trip.

GTNP hunter spending	Local residents	Non-local residents	Nonresidents
Travel expense	Amount spent in Jackson Hole area		
Gasoline/related automobile costs	\$91.70	\$96.32	\$132.13
Restaurants	\$33.06	\$93.07	\$198.81
Grocery stores	\$41.35	\$53.69	\$93.82
Hotel	\$2.05	\$145.05	\$290.50
Outfitter/guide fees	\$0.00	\$0.92	\$93.76
Hunting supplies (e.g., ammo)	\$55.55	\$26.39	\$55.22
Horse feed (hay/pellets)	\$11.02	\$6.80	\$5.35
Horse rental	\$18.80	\$7.24	\$15.01
Game processing	\$76.61	\$15.94	\$26.92
Taxidermy	\$43.38	\$6.73	\$9.01
Access/trespass fee	\$1.77	\$0.02	\$0.49
Camping	\$0.34	\$2.22	\$5.80
Rental car	\$0.00	\$0.00	\$10.17
Local spending total	\$375.63	\$454.39	\$936.99
	Amount spent elsewhere in Wyoming en route to the Jackson Hole area		
Gasoline/related automobile costs	\$7.23	\$65.37	\$104.67
Restaurants	\$0.43	\$19.57	\$43.11
Grocery stores	\$1.45	\$33.38	\$17.38
Hotel	\$0.00	\$1.73	\$28.02
Outfitter/guide fees	\$0.00	\$0.39	\$8.58
Hunting supplies (e.g., ammo)	\$3.68	\$37.13	\$22.25
Horse feed (hay/pellets)	\$0.43	\$7.21	\$18.61
Horse rental	\$0.00	\$4.47	\$2.43
Game processing	\$1.79	\$25.15	\$8.58
Taxidermy	\$0.00	\$14.15	\$4.66
Access/trespass fee	\$0.00	\$0.00	\$0.54
Camping	\$0.85	\$0.85	\$1.67
Rental car	\$0.00	\$2.70	\$3.30
Spending in rest of Wyoming total	\$15.86	\$212.10	\$263.80
	Local spending plus spending in the rest of Wyoming		
Total spending in Wyoming per trip	\$391.49	\$666.49	\$1,200.79
Sample Size	117	519	408

As shown in Table 11, nonresident NER hunters spent, on average, \$1,107 locally in the Jackson area. They spent an additional \$198 elsewhere in the state en route to the Jackson area for an average total of \$1,305 spent per trip in the state of Wyoming. On average, nonresident NER hunters spent the most on hotels, hotels and restaurants. Local and non-local resident NER hunters spent locally an average of \$228 and \$737, respectively. Non-local resident NER hunters spent the most on hotels, grocery stores, gasoline, and restaurants while local resident NER hunters spent the most on game processing and gasoline. Besides the spending reported in Table 11, survey results show the average spending on a 2001 WGFD elk hunting license by NER hunters was \$39 for local residents, \$48 for non-local residents, and \$367 for nonresidents.

Table 11. Average spending by NER hunters per trip.

NER hunter spending	Local residents	Non-local residents	Nonresidents
Travel expense	Amount spent in Jackson Hole area		
Gasoline/related automobile costs	\$38.38	\$130.50	\$181.19
Restaurants	\$23.33	\$127.36	\$215.00
Grocery stores	\$23.09	\$183.64	\$91.43
Hotel	\$0.00	\$203.97	\$447.14
Outfitter/guide fees	\$0.77	\$10.00	\$14.29
Hunting supplies (e.g., ammo)	\$43.63	\$45.28	\$43.57
Horse feed (hay/pellets)	\$1.15	\$7.30	\$0.00
Horse rental	\$9.13	\$12.00	\$0.00
Game processing	\$70.94	\$8.80	\$114.29
Taxidermy	\$16.06	\$4.00	\$0.00
Access/trespass fee	\$0.12	\$0.00	\$0.00
Camping	\$0.96	\$1.20	\$0.00
Rental car	\$0.00	\$0.00	\$0.00
Local spending total	\$227.56	\$734.05	\$1,106.91
	Amount spent elsewhere in Wyoming en route to the Jackson Hole area		
Gasoline/related automobile costs	\$8.08	\$47.43	\$67.14
Restaurants	\$1.92	\$21.46	\$48.57
Grocery stores	\$2.69	\$7.88	\$22.14
Hotel	\$0.00	\$9.40	\$17.14
Outfitter/guide fees	\$0.00	\$0.00	\$0.00
Hunting supplies (e.g., ammo)	\$2.02	\$26.46	\$0.00
Horse feed (hay/pellets)	\$0.00	\$9.54	\$0.00
Horse rental	\$0.00	\$0.00	\$0.00
Game processing	\$0.00	\$42.70	\$42.86
Taxidermy	\$0.00	\$26.00	\$0.00
Access/trespass fee	\$0.00	\$0.40	\$0.00
Camping	\$0.00	\$0.20	\$0.00
Rental car	\$0.00	\$0.00	\$0.00
Spending in rest of Wyoming total	\$14.71	\$191.47	\$197.85
	Local spending plus spending in the rest of Wyoming		
Total spending in Wyoming per trip	\$242.27	\$925.52	\$1,304.76
<i>Sample size</i>	52	50	7

The most noticeable difference between hunter spending in the federal land hunt areas was that in the local impact region, nonresident BTNF hunters spent an average of \$2,225 per trip while nonresident GTNP and NER hunters only spent an average of \$937 and \$1,107, respectively, per trip. This difference was due to nonresident BTNF hunters spending an average of almost \$1,500 per trip on outfitter/guide fees. The state of Wyoming hunting regulations require nonresident hunters to be accompanied by a hunting/outfitting guide on national forest wilderness areas. Even though the sample size for NER hunters was small, the NER spending profiles were similar to the GTNP profiles with the exception of local NER hunters spending less on gasoline and taxidermy and non-local hunters spending more on groceries.

Determining the Economic Impacts by Federal Land Area

For the EIS draft and final alternatives, the FWS and NPS will need to determine the economic impacts associated with more or less hunters allowed on the BTNF, GTNP, and NER. To provide results that can be used to determine current and proposed EIS elk management changes, the economic impacts on elk hunter spending will be calculated on an average per hunter basis. This average per hunter will account for: 1) average number of trips per season; and 2) the proportion of local, non-local, and nonresident hunters for each federal land management area.

Survey results indicate that on average, local visitors took more elk hunting trips in the Jackson area than non-local and nonresident elk hunters. Local GTNP elk hunters took on average 10 trips, NER hunters took 9 trips, and BTNF hunters took almost 6 trips each season. Non-local resident NER hunters take almost 2 trips per season, while GTNP non-local hunters took 2.6 per season. All nonresident hunters took on average less than two trips each season. Table 12 presents the breakdown of number of trips for each federal land area.

Table 12. Average number of trips per hunter by federal land area.

	Local	Non-local	Nonresident
BTNF	5.8	2.3	1.2
GTNP	10.4	2.6	1.7
NER	9.1	1.9	1.2

In order to properly estimate the economic impacts of hunter spending, the proportion of local, non-local, and nonresident hunters for each federal land area must be identified. Because of the difficulties with obtaining a sample of NER hunters by WGFD license records, the NER Refuge Hunting Permit records were used to determine the average annual number of hunters by residential group. Because all GTNP and a large sample of BTNF hunters were included in the WGFD records, the proportions of hunter surveys mailed out by residential group (Table 8) were used to determine the percentages of GTNP and BTNF hunters. Table 13 presents the percentages of hunters by federal land area for each residential group. The small percentage of nonresident NER hunters was expected because the NER Refuge Hunting Permit were awarded during a local weekly drawing, making it difficult for individuals not living in the area to participate.

Table 13. Percentage on hunters by federal land area.

	Local residents	Non-local residents	Nonresidents
BTNF	21%	54%	25%
GTNP	12%	50%	38%
NER	42%	44%	14%

Local Economic Impacts

For the *local* impact analysis, only the spending of non-local residents and nonresident hunters was included. The reason for excluding the spending of local hunters was two fold. First, Teton County, Wyoming and Teton County, Idaho were the main focus of our impact analysis. It was the impact area. Money flowing into these counties from outside was considered new money injected into the local economy. Second, if residents of Teton County, Wyoming and Idaho elk hunt more or less due to the EIS management changes, they will correspondingly change their spending of their money elsewhere in Teton County, Wyoming and Idaho, resulting in no net change to the local economy. These are standard assumptions made in most regional economic analyses at the local level.

In order to determine the local economic impacts associated with non-local residents and nonresident hunters on a basis that is useful to the FWS and NPS planning needs, the economic impacts associated with 100 hunters for each federal land area were calculated. This basis will account for the average number of hunting trips taken to the Jackson area (Table 12) and the proportion of hunters by residential group (Table 13). It was assumed that the proportion of hunters by residential group and number of trips taken would stay the same. The proportion of local hunters (Table 13) was included in the 100 hunter basis, but their spending was not counted. For example, of GTNP hunters 12% were local, 50% non-local, and 38% were nonresident hunters. To determine the amount of spending and the resulting economic impacts associated with 100 GTNP hunters, the following equation was used:

$$\text{Local spending of 100 GTNP Hunters} = .50 * (\text{average non-local hunter spending} * \# \text{ trips taken}) + .38 * (\text{average nonresident hunter spending} * \# \text{ trips taken})$$

The IMPLAN modeling system was used to derive the multipliers that captured the secondary (indirect and induced) effects of hunter spending. It should be noted that IMPLAN, like nearly all input-output models assumes constant returns to scale, implying proportionate changes in all inputs for a given change in final demand.

Table 14 presents the economic impacts for the local Jackson area economy associated with 100 hunters for each of the federal land areas. The table shows the direct impact and total impact (e.g., the multiplier effect) on personal income and jobs associated with spending in Teton County Wyoming and Idaho by 100 hunters for each federal land area.

Table 14. Economic impacts associated with 100 hunters for each federal land area for Teton County WY and ID.

Teton County WY and ID local impact area	100 BTNF hunters	100 GTNP hunters	100 NER hunters
Direct effects			
Income	\$33,746	\$39,067	\$23,650
Jobs	2.42	2.08	1.20
Total effects			
Income	\$49,366	\$61,054	\$37,166
Jobs	2.97	2.83	1.66

As shown in Table 14, elk hunter spending was economically important for local personal income and employment. Spending by the non-local resident and nonresident proportion of 100

elk hunters that hunt on the BTNF directly generated \$33,746 in personal income and 2.4 jobs in the local economy. Accounting for the multiplier effect, the non-local resident and nonresident proportion of 100 BTNF hunters generated a total \$49,366 in personal income and almost three jobs locally. Personal income and jobs generated by 100 NER hunters was lower than that of GTNP and BTNF hunters due to the higher proportion of local resident NER hunters (42%) whose spending was not included in the impact analysis. The amount of personal income and jobs generated by non-local resident and nonresident GTNP hunters was similar to BTNF hunters. GTNP hunters, however, generated more in personal income than BTNF hunters due a lower proportion of local resident GTNP hunters and a higher proportion of nonresident hunters as compared to the BTNF.

Regional Economic Impacts

For the *regional* (e.g., state of Wyoming) economic impact analysis, only the spending of nonresidents was included. Regional spending included all spending by nonresident elk hunters in Teton County, Wyoming and the amount spent in Wyoming en route to the Jackson area, but excluded spending by non-local Wyoming hunters in the Jackson area. The rationale was the same as excluding local resident hunters from the local impact analysis. When estimating the spending by elk hunters within the state of Wyoming, spending by Wyoming residents was not considered as new money being injected into the state economy. It is likely Wyoming residents will spend their money elk hunting elsewhere within the state even if they decide to elk hunt in the Jackson area less often due to EIS management changes.

Table 15 shows the direct impact and total impact (e.g., the multiplier effect) on personal income and jobs associated with spending in Wyoming by 100 hunters for each federal land area. Since spending by non-local Wyoming hunters was included in the local impact analysis but was not included in the regional impact analysis, the total spending impacts within the local economy by non-local and nonresident hunters was more than spending impacts regionally by nonresidents.

Table 15. Economic impacts associated with 100 hunters for each federal land area for the state of Wyoming.

State of Wyoming regional impact area	100 BTNF hunters	100 GTNP hunters	100 NER hunters
Direct Effects			
Income	\$30,205	\$23,288	\$6,049
Jobs	2.45	1.71	0.41
Total Effects			
Income	\$47,442	\$42,500	\$11,472
Jobs	3.13	2.41	0.62

Economic Impacts Associated with the Current Level of Jackson Elk Herd Hunters

In order to estimate the economic impacts associated with the current level of Jackson elk herd hunters, annual estimates of the number of hunters by federal land area must be determined. The EIS planning team in consultation with the WGFD provided the five year annual average numbers of hunters by federal land area. Between 1997 and 2001, there were on average, 6,173

BTNF, 2,484 GTNP, and 975 NER elk hunters annually. These hunter number estimates were used along with the economic impacts per 100 hunters provided in Tables 14 and 15 to estimate the economic impacts associated with the current level of Jackson elk herd hunters.

The current number of annual hunters by federal land area and the local economic impact estimates for 100 hunters were used to determine the local economic impacts associated with current hunting levels. Table 16 presents the economic impacts for Teton County, Wyoming and Teton County, Idaho associated with the spending by the non-local resident and nonresident proportion of the current level of hunters for each of the federal land areas. The table shows the direct and the total impact (e.g., the multiplier effect) of income and jobs by federal land management area.

Table 16. Local economic impacts associated with current hunting levels by federal land area.

Teton County WY and ID local impact area	BTNF hunters	GTNP hunters	NER hunters	Total	% county total
Direct effects					
Income	\$2,083,141	\$970,424	\$230,588	\$3,284,152	0.4%
Jobs	149.5	51.6	11.7	212.8	0.9%
Total effects					
Income	\$3,047,363	\$1,516,581	\$362,369	\$4,926,313	0.6%
Jobs	183.3	70.3	16.2	269.8	1.2%

As shown in Table 16, spending by the non-local resident and nonresident proportion of the current level of BTNF, GTNP, and NER hunters directly generated over \$3.2 million in personal income and 212 jobs in the local economy. Accounting for the multiplier effect, the non-local resident and nonresident proportion of the current level of hunters generated an annual total of over \$4.9 million in personal income and 269 jobs locally. According to U.S. Department of Commerce (2002), personal income totaled about \$1 billion and total employment was 25,607 in Teton County, Wyoming and Teton County, Idaho for the year 2000. Therefore, economic impacts associated with the current hunting levels account for 0.6% of total personal income and 1.2% of total employment in Teton County, Wyoming and Teton County, Idaho economy. As shown in Table 16, due to the larger amount of hunters, the BTNF hunters accounted for the largest proportion of income and jobs generated. Of the 183.3 jobs generated by BTNF hunters, 59% (108 jobs) were in the Amusement and Recreation Services industry which primarily represents jobs for outfitters and hunting guides.

The regional economic impact estimates for 100 hunters were used to determine the regional economic impacts associated with current hunting levels. Regional spending included all spending by nonresident elk hunters in Teton County Wyoming and the amount spent in Wyoming en route to the Jackson area but excluded spending by non-local Wyoming hunters in the Jackson area. Since spending by non-local Wyoming hunters was included in the local impact analysis but was not included in the regional impact analysis, the overall spending impacts within the local economy by non-local and nonresident hunters was greater than spending impacts regionally by nonresidents. Table 17 shows the estimated regional economic impacts for the current number of hunters by federal land area.

Table 17. Economic impacts associated with current nonresident hunting levels by federal land area.

State of Wyoming regional impact area	BTNF hunters	GTNP hunters	NER hunters	Total	% state total
Direct Effects					
Income	\$1,864,555	\$578,474	\$58,978	\$2,502,006	0.02%
Jobs	151.5	42.4	4.0	198.0	0.05%
Total Effects					
Income	\$2,928,595	\$1,055,700	\$111,852	\$4,096,147	0.03%
Jobs	193.3	60.0	6.0	259.3	0.07%

As shown in Table 17, spending in the state of Wyoming by the nonresident proportion of the current level of BTNF, GTNP, and NER hunters directly generated \$2.5 million in personal income and 98 jobs in the state of Wyoming. Accounting for the multiplier effect, the nonresident proportion of the current level of hunters generated an annual total of almost \$4.1 million in personal income and 259 jobs in the state of Wyoming. According to U.S. Department of Commerce (2002), personal income totaled over \$12.6 billion and total employment was 326,873 in the state of Wyoming for the year 2000. Therefore, economic impacts associated with the current hunting levels account for less than one tenth of one percent of total personal income and total employment in Wyoming.

Conclusions

To estimate the economic impacts associated with Jackson elk herd hunters, an elk hunter spending survey was developed. In order to determine the economic impacts associated with hunters on a basis that is useful to the FWS and NPS planning needs, the economic impacts associated with 100 hunters for each federal land area was calculated. This basis accounted for the average number of hunting trips taken to the Jackson area (Table 12) and the proportion of hunters by residential group (Table 13). This basis could be used by the FWS and NPS to estimate how local income and employment would be affected by changes in the number of hunters allowed for each possible management alternative.

The non-local resident and nonresident proportion of the current level of hunters generate an annual total of over \$4.9 million in personal income and 269 jobs, accounting for 0.6% of total personal income and 1.2% of total employment in Teton County Wyoming and Idaho. Spending in the state of Wyoming by the nonresident proportion of the current level of Jackson elk herd hunters directly generates almost \$4.1 million in personal income and 259 jobs in the state of Wyoming annually.

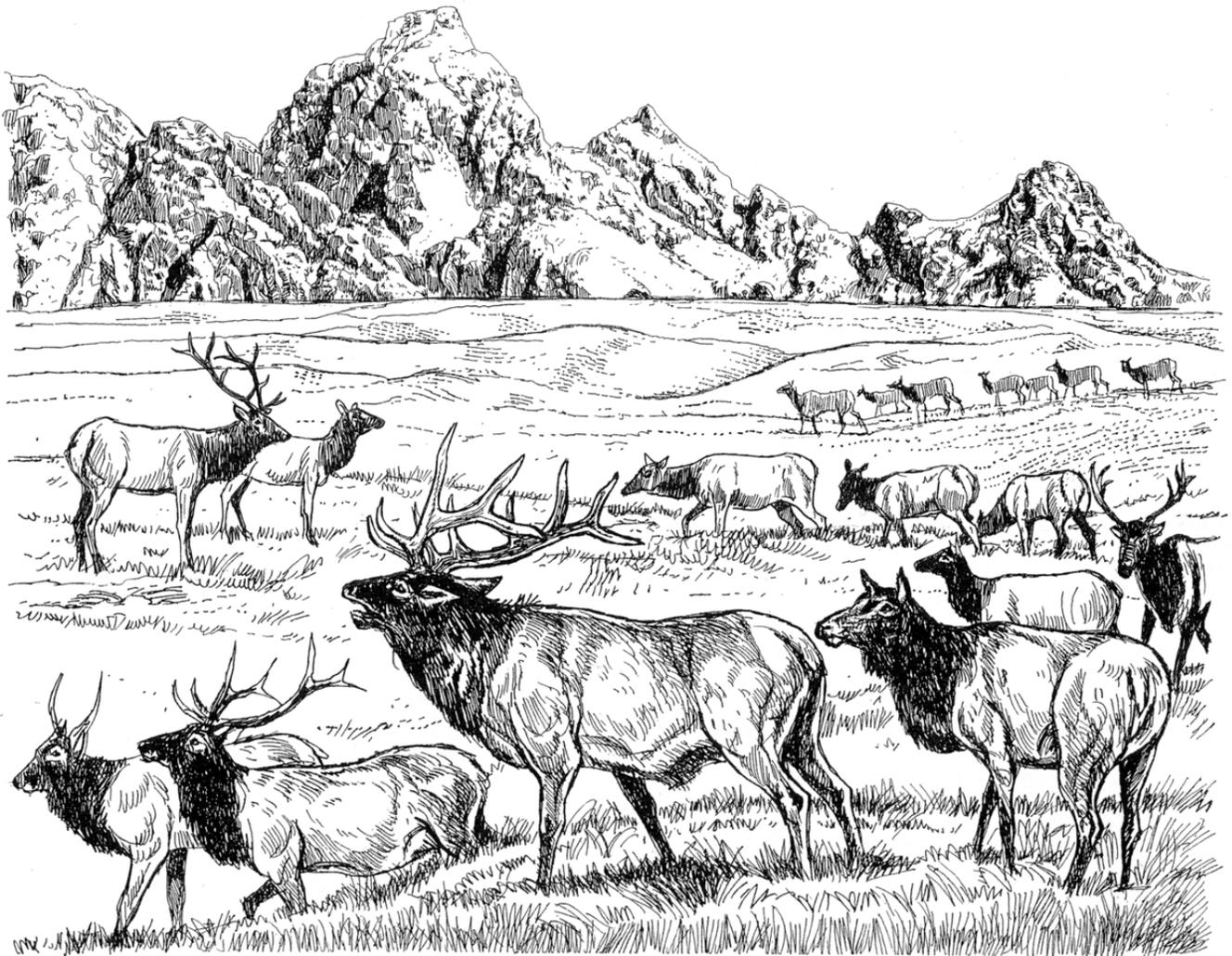
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Appendix A. Example Elk Hunter Spending Survey

Wyoming Game and Fish Department

Jackson Elk Herd Hunter Survey



Jackson Elk Herd Hunter Survey

Dear Hunter:

This is a special survey being sent to you because you had a permit to hunt elk in the Jackson Hole area in 2001. This information will be used by U.S. Fish and Wildlife Service and the National Park Service, along with participating "partners" including the Wyoming Game and Fish Department, in evaluating the economic importance of elk hunting for the *National Elk Refuge/Grand Teton National Park Bison and Elk Management Plan and Environmental Impact Statement*. Even though you may have answered the regular Wyoming Game and Fish Survey, this one has questions about your hunting expenditures that were not contained in the previous survey. Thus it is very important to us that you take a few minutes to tell us about your elk hunting trip expenditures to the Jackson Hole area this year. Your answers are completely confidential, you will not be identified in any way.

Thank you!

This survey asks about your most recent elk hunting trip to the Jackson Hole area. It includes hunt areas 70-83.

Section I. Trip Information

1. Did you hunt Elk in Wyoming with your 2001 license(s)? Yes No (Go to Section III)

- 1a. How many trips for the primary purpose of hunting elk did you take to Jackson Hole hunt areas during this hunting season?

_____ # Elk Hunting Trips to Jackson Hole Hunt Areas this season

2. Was your **most recent elk hunting trip** from home to a Jackson Hole hunt area (**check only one**):
 - 2a. **the sole destination** (you went to the Hunt Area and then back home)?
 - 2b. **the primary purpose** (but not sole purpose of your trip from home)?
 - 2c. **one of many equally important reasons or destinations** for your trip from home?
 - 2d. **just an incidental or spur of the moment stop** on a trip taken for other purposes or to other destinations?

3. What was the amount of time you spent hunting elk in the Jackson Hole hunt area on this **most recent trip** from home?

_____ # of hours or _____ # of days

4. What was the one-way **travel time** of your trip from home to the Jackson Hole Hunt Area visited on this **most recent trip**?

_____ # minutes _____ # hours

5. What was your one-way **travel distance** from home to the Jackson Hole Hunt Area on this most recent trip?

_____ # one-way miles

6. What is the distance from your home to the next best Hunt Area outside of Jackson Hole you would go to if you could not hunt elk in this Hunt Area?

_____ # one way miles

7. Including yourself, what was the number of people in your group that traveled on this most recent elk hunting trip?

_____ # of persons in your group

8. What was the primary type of weapon you used to hunt elk in the Jackson Area on this **most recent trip**?

(check one) Firearm Archery Muzzleloader

9. If bison hunting was allowed on the National Elk Refuge, would you apply for a tag? Yes No

THANK YOU!

Thank you for your help with this important study.

COMMENTS?

Please feel free to write down any comments you have regarding this survey or elk hunting in Wyoming.

Please fold here for mailing

Please fold here for mailing

**Wyoming Game & Fish Department
5400 Bishop Boulevard
Cheyenne, WY 82006**