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Economic Analysis of Alternative Bison and Elk Management Practices on the National Elk Refuge and Grand Teton National Park: A Comparison of Visitor and Household Responses

By John Loomis and Lynne Caughlan

Open-File Report 2004-1305

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Suggested citation:

Loomis, J., and Caughlan, L., 2004, Economic analysis of alternative bison and elk management practices on the national elk refuge and Grand Teton National Park: A comparison of visitor and household responses: U.S. Geological Survey, Biological Resources Discipline, Open File Report 2004-1305, 110 p.

Contents

Figures

Tables

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Chapter 1. Introduction, Purpose and Methods

Purposes of Report and Analysis

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 likely include such issues as habitat management, disease management, winter-feeding and hunting programs related to the NER and GTNP. The purposes of this study are to determine how the current management and EIS alternatives for bison and elk inhabiting the NER and GTNP would change:

- Visitor use
- Total visitor expenditures in the local and regional economy
- Local area employment and income in the local and regional economy
- Visitor net economic benefits
- Acceptability of individual elk and bison management practices to visitors and household living in Teton County, rest of Wyoming, and rest of the United States.

Assessing public attitudes and economic effects for different EIS alternatives can provide managers with valuable information regarding the advantages and disadvantages of these alternatives. Economic issues such as local job and income effects are often raised by interest groups opposed to changes in current agency management actions. Having objective data on what the job and income impacts are can help to defuse that issue. Survey data on visitor and public preferences is also useful to supplement the traditional public involvement process conducted as part of the EIS process. This is because the survey reaches visitors and a broad geographic array of residents who may not typically participate in the traditional EIS public involvement process. That is, the survey reflects the effort of the EIS planning team reaching out to the public, rather than requiring the public to come to the EIS meeting locations. Attendance at public meetings is often inconvenient for occasional visitors to the NER and GTNP who frequently live long distances from the relevant FWS and NPS offices. It is also inconvenient for residents of states outside the state where the resource is located.

Study Motivation and Background

In 1998 the Fund for Animals (FFA) sued the U.S. government for pending management actions (i.e., public hunting) for the 400 wild, free-ranging bison that inhabited Grand Teton National Park, the Bridger-Teton National Forest, and the National Elk Refuge (the “Jackson Bison Herd”). The FFA claimed that the 1996

interagency *Jackson Bison Herd Long Term Management Plan and Environmental Assessment* had failed to adequately address the effects of winter-feeding of elk at the NER on the Jackson bison herd. The Washington DC district court judge agreed and enjoined fatal management actions of bison on federal lands, while ordering additional NEPA compliance on bison management activities on the DOI lands. The NPS and FWS withdrew its original finding of no significant impact of 1997 and began planning for additional NEPA compliance needs in the form of an EIS.

The FWS and NPS, as joint lead agencies, published a Notice of Intent for a bison and elk management plan/EIS on July 18, 2001. Overall planning for elk management, through the Comprehensive Conservation Planning (CCP) process directed by the Refuge System Improvement Act of 1997, was scheduled to begin about 2003. Since DOI bison management had been enjoined and were required to analyze the winter elk feeding program on the NER, the most significant FWS management action besides hunting, the FWS and NPS chose to address both issues, bison and elk management, together in a single, comprehensive plan for management of both species. A range of alternatives for managing the bison and elk herds in the project area will be developed in an Environmental Impact Statement (EIS). A general map of the management planning area is shown in Figure 1. The Department of Justice filed the DOI's schedule for that process with the Washington DC district court last August. The latest schedule calls for release of a draft EIS to the public on November 1, 2003, and a final on January 2005.

Study Objectives

As part of the preparation of the EIS, social and economic issues must be addressed. Therefore, the objective of this survey and analysis was to quantify visitor and household attitudes, recreation use values, and the regional economic impacts such as local income and employment effects of alternatives for managing the bison and elk inhabiting the NER and GTNP.

Objective #1(A): Determine How Visitors and Households Would Change Their Trips to GTNP and the NER with Different Management Alternatives

The purpose of this objective was to determine what percentage of visitors were viewing elk as their primary activity for winter visitation at the NER and how important of a part elk and bison viewing was for the overall experience for summer visitation at GTNP. To minimize double counting of GTNP and NER visitors, we surveyed summer GTNP and winter NER visitors. Visitor respondents were asked to provide information on the purpose of their trip in order to evaluate the role that specific wildlife species play in the visitors' decision to go to the Park or Refuge. We obtained the current annual number of trips from the Park and Refuge. Using information on the environmental effects or consequences of the potential management alternatives provided by NPS and FWS, we asked visitors and households to report how the number of visits would change with each of the alternatives. This approach is known as the contingent visitation or intended behavior approach. Research indicates the method is reliable in test-retest studies (Loomis, 1993) and has shown to be valid (Grijalva and others, 2002).

Objective #1(B): Calculate Net Economic Benefits to Visitors for Each Alternative

The net willingness to pay or net benefits to the visitors was calculated. A dichotomous choice contingent valuation question was used to make the contingent valuation question more market like. The change in visits from Objective 1A times the net economic value per visitor provides an estimate of the total recreation use value for each potential management alternative. This information aids in comparing benefits of different management plans to their costs.

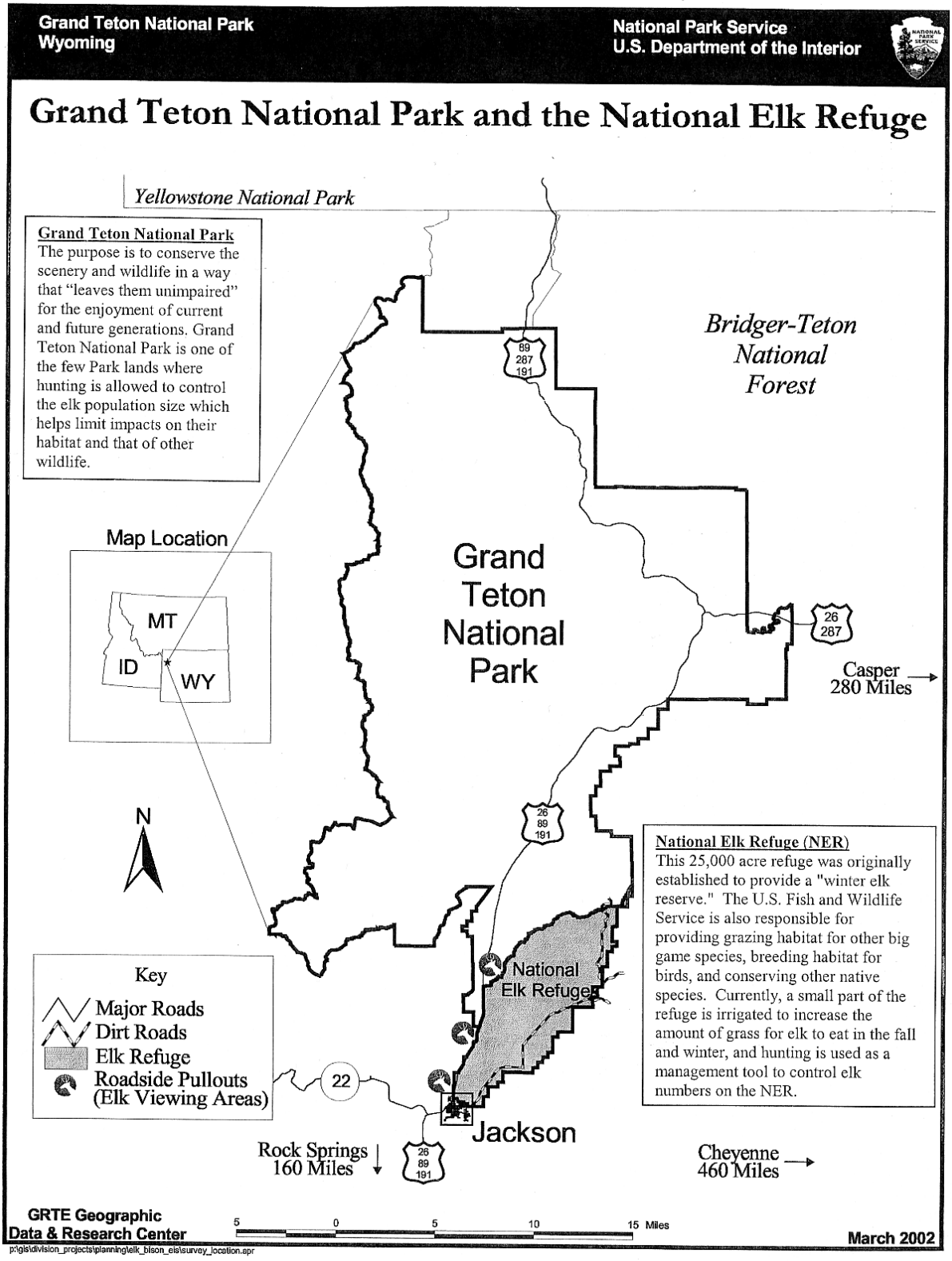

Figure 1. Map of the elk and bison EIS management planning area.

Objective #1(C): Quantify Support for Each Management Alternative

Using the household and visitor (Grand Teton National Park and the National Elk Refuge visitors) survey results, we quantified the percentage of people that favored each management alternative.

Objective 1(D): Responses by Geographic Location

The attitude, change in visitor use/spending and economic values were related to respondents geographic location (Teton County residents, Wyoming residents and rest of U.S. residents), and visitor status to characterize those supporting and opposing different management options or individual management actions (e.g., feeding, bison hunting, etc.).

Objective #2: Regional Economic Impact Analysis

Spending associated with recreational and tourism activities generate considerable economic benefits for the local and regional economy. Activities related to the management of the elk and bison can impact local and regional spending by winter and summer visitors, hunters, and outfitters. A tourist usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, food, supplies, and recreational equipment rental. As more visitors 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 visitor purchases from local businesses represent the *direct* effects of visitor 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 visitor spending within the county. 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 of visitor spending. The indirect and induced effects are known as the secondary effects of visitor spending. 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 visitor spending in the local economy.

The visitor survey results were used to estimate NER and GTNP visitor spending per day and the anticipated change in trips (and associated days) associated with each management option. 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 visitor spending. The IMPLAN modeling software was used to analyze the economic impacts associated with current NER and GTNP visitor spending and the affects of changes in visitor spending for each proposed management alternative. 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 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 included as stimulating the changes 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 visitor activities associated with the Jackson elk and bison herds as 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 tourists and the respending of local workers salaries, Teton County Wyoming and Teton County Idaho were chosen to represent the local economic impact region. For the *local* analysis only spending by persons living outside Teton County WY and ID is considered an infusion of new money into the local economy. The State of Wyoming was selected for the *regional* economic impact area to capture the non resident visitor spending in the State en route to the Jackson Hole area as well as the local visitor spending in Teton County Wyoming. The State model does not include Teton County Idaho.

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 U.S. 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, 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 Bridger Teton National Forest were used to adjust total industry output for the government sector in the local model.

Management of the bison and elk on GTNP and the NER can impact the number of hunters allowed and hunter harvest ratios on GTNP, the NER, and Bridger Teton National Forest (BTNF). The USGS and Wyoming Game and Fish Department (WGFD) conducted a separate elk hunter spending survey of resident and nonresident hunters that hunted in the Jackson elk herd units during the 2001 hunting season.

Chapter 2. Data Collection

Survey Development

In order to develop a survey that reflected the policy relevant management issues to be addressed in the EIS, we assembled and read the background planning documents and technical elk modeling analysis (Hobbs and others, 2001). Detailed discussions were held with individual federal and state agency personnel individually and in a formal one-day workshop held in Jackson Hole on October 22, 2001. In attendance were personnel from the NPS, USFWS, BLM, USFS, Wyoming Game and Fish, and USDA APHIS.

We developed a preliminary survey instrument based on the identification of the key issues to be decided in the EIS, the range of possible management actions, and the social-economic information needed for the EIS. This survey instrument was reviewed by state and federal agency participants and comments and suggestions were incorporated.

Focus Groups

To obtain feedback on the clarity of the issues, management practices, survey layout and survey wording, four focus groups were performed, one for each separate survey subsample. Households were randomly recruited from the phone books by Decision Data Inc., in Seattle, Washington. These focus groups and related samples were:

1. Visitors to Grand Teton National Park (summer use) and National Elk Refuge (winter use).
2. Since the time schedule required this focus group to be conducted in late fall after the main Grand Teton NP recreation season and before the winter NER sleigh rides, we relied upon a sample of Jackson Hole residents that were active visitors, and included in the Cheyenne, Wyoming and Denver, Colorado focus groups several people that had visited GTNP and NER.
3. Residents of Jackson Hole area. This focus group included 9 residents of Jackson Hole that infrequently visited Grand Teton National Park and did not visit the National Elk Refuge. This focus group was held November 14, 2001 and reflected revisions from the focus group from the night before.
4. Wyoming residents. This focus group included 12 people. A few had visited Grand Teton National Park and only a couple had visited the National Elk Refuge. The focus group was held in Cheyenne on December 3rd and reflected revisions from the first two focus groups.
5. Residents of the rest of U.S. focus group was proxied by Denver residents. This was done for cost-effectiveness. This focus group was held December 6, 2001 and reflected changes to the survey and inclusion of the survey map. There were 8 people in attendance.

The purpose of the focus groups were to assess the understandability of each alternative way of managing the Jackson elk and bison herds, the clarity of the visual aids such as maps and a sample of survey questions. We solicited feedback on each aspect via one-page worksheets and allowed respondents to "mark-up" the visual aids, text descriptions, survey questions, etc. Responses from group discussion would be recorded on flip charts and then summarized in memo form after the focus group to aid in revisions for the next focus group.

Revisions and Pretests

It was clear from the focus groups that at least three different survey formats would be necessary: (a) one for visitors with detailed questions on their expenditures; (b) one for residents of Teton County that would omit detailed questions on expenditures as they generally have few; (c) one for Wyoming and U.S. residents. Following the focus groups, the draft survey booklet was extensively revised and then reviewed by FWS and the NPS. This survey was further refined with agency comments.

In addition, the agencies added another alternative so there were now a total of five alternatives. Three alternatives are common to all survey versions were: no change; increase feeding; reduce wildlife concentrations by reduced feeding; the one alternative that switches between survey versions is current feeding plus bison hunting and no active management.

The revised survey and map was then pre-tested with people drawn from each geographic area that would be sampled. The visitor pretest involved in-person interviews with National Elk Refuge sleigh ride visitors on January 7, 2002. In-person pretests were conducted one-on-one with seven Jackson Hole residents on January 9, 2002 in Jackson Hole. While several minor suggestions were received, most respondents found the survey quite clear and understandable. Following these revisions, the survey was pre-tested on six Cheyenne, Wyoming residents selected at random and eight Denver residents selected at random. These focus groups provided additional survey wording refinement, especially on the recreation section (e.g., the multiple destination trip question) and on ordering the visitation questions. Specifically, it was decided to move the questions about whether you had visited to just prior to the contingent visitation questions so that people had their past behavior responses clearly visible when answering the contingent behavior questions. Refinement to the matrix including explaining why the Bridger Teton National Forest (BTNF) was mentioned in the contingent behavior matrix when the management actions were not directly affecting the area (the explanation was that NER feeding had an indirect effect on BTNF elk and bison populations). Minor refinements were also made to the survey in discussions with Office of Management and Budget during survey approval process.

Final Visitor Survey Versions

V1 for locals with the no active management alternative; V2 for locals with the current feeding plus bison hunting alternative; V1 for non-locals with the no active management alternative; and V2 for non-locals with the current feeding plus bison hunting alternative. The two versions for locals excluded expenditure questions which were included in the two versions for non-locals.

Appendix A provides an example of the non-local visitor survey. While the order of the individual sections was tailored to whether it was a visitor survey versus a household survey, the basic format of the survey is as follows:

- Page 1: Background information on Wildlife Controversies in Jackson Hole, Wyoming. This describes wildlife management issues and why the survey is being conducted.
- Page 2. Map of Grand Teton National Park and the National Elk Refuge
- Page 3. Questions regarding most recent visit (e.g., activities, travel time, travel mode, etc.)
- Page 4. Expenditures in the Jackson Hole area and in Wyoming (only non-locals received this)
- Page 5. Importance of Different Natural Resources to Your Recreation Trips to the Jackson Hole Area. This asked about the importance of wildlife viewing, hunting, fishing, rafting, biking and other recreation activities in a person's decision to visit Jackson Hole.
- Page 6. Desirability of Different Wildlife Management Practices in GTNP and NER.
- This page asked respondents to indicate whether specific individual current and proposed management components were desirable or not at GTNP and NER.
- Page 7. Table comparing management actions and resulting effects of each management option. There were four displayed on the page.
- Page 8. Questions that asked which management option they preferred, and contingent visitation behavior questions for each proposed management option (the question was not asked for current management as existing visitation reflects current management). The questions asked whether the changes proposed in the management option would change their visits, and if so, whether they would visit more or less often.

- Page 9. Demographic Questions were asked on the inside back cover of last page.

Overall this was a 12 page survey booklet that was printed on light gray paper. The cover had a drawing of elk and bison on the NER with the Tetons in the background. See Appendix A for an example of the full non-local survey. Local surveys and national surveys were identical except it was shorter, at eight pages. This was accomplished by dropping the visitor expenditure page, making the map a separate insert, and reducing the font and condensing the most recent trip questions to fit on the same page as the importance questions.

National Elk Refuge Visitor Survey Implementation

Due to the pretests having to be conducted after the Christmas holiday season, and time for Office of Management and Budget approval of the survey, the printed surveys were not available to hand out when we initiated the NER sleigh ride visitor intercepts. Therefore, in order to sample over the President's holiday weekend we decided to collect names and addresses of visitors at the Wildlife Museum where they boarded the buses to drive to the actual sleigh rides rather then hand out the surveys themselves. Specifically, we randomly sampled individuals in the Wildlife Museum movie theater where sleigh ride visitors watch an orientation presentation prior to boarding the busses. By dividing the theater into a nine cell grid plus one cell for people standing, we could use a random number table to select visitors during each movie showing. The individuals were approached by the interviewer who explained the purpose of the survey. Then they were asked to provide their name and addresses so that a survey could be mailed to them. They were also given a postcard with a photo of the sleigh ride on one side and a further elaboration of the survey purpose on the back. As a token of appreciation, each visitor agreeing to complete the survey was given a souvenir NER badge.

The name and address cards were mailed back to Fort Collins, Colorado where they were entered into a database. From this, personalized cover letters were generated that followed the basic Dillman (1978) cover letter format. The letter explained in detail the purpose of the survey, confidentiality, etc. The cover letter along with the survey and a postage paid return envelope was mailed to the respondent. About six days later a reminder postcard was sent. If after about 20 days a survey had not been returned a second survey with a new cover letter was mailed to non-respondents. After another month, a third mailing of the survey and a new cover letter were mailed to any remaining non-respondents to further increase our response rate.

Visitor intercepts were conducted beginning February 17 through March 30, 2002. We sampled one weekend day of President's weekend. The sleigh rides do not typically start until late January and continue to the end of March. Thus even with the delayed start, we were able to sample the majority of the sleigh ride season, including the spring break period. In total, there were 18 days of sampling that balanced week days and weekend days. There were 648 surveys handed out. Sampling days began with the 10am sleigh ride and went through the 4pm sleigh ride. Only two out of the 650 people contacted refused to participate in the survey by not wanting to provide their name and address.

Grand Teton National Park Visitor Survey Implementation

In GTNP, we were able to hand out the survey with a general cover letter and postage paid return envelope. The visitors name and address were collected to facilitate follow up mailings. As a token of appreciation, each visitor agreeing to complete the survey was given a souvenir GTNP lapel pin.

Sampling Design for Grand Teton National Park Visitors June–July 2002

GTNP personnel have had problems capturing active park users with past entrance station intercept surveys. Since this survey was directed at GTNP wildlife management issues, the NPS especially wanted to know the opinions of visitors who spent a significant amount of time in GTNP such as hikers and campers. Both main entrances (Moose and Moran Junction) serve as a southern entrance to Yellowstone. The NPS wanted to make sure we sampled visitors that were actively using park resources as well as those just stopping by the visitor center and not those that were just driving through to Yellowstone NP. In cooperation with the NPS, we selected four different types of visitor intercept locations that reflected the four major types of Grand Teton National Park visitor activities. These included trailhead locations, overnight lodging and campground locations, the two main visitor centers, and

other visitor activity locations. Entrance stations were not used as sampling sites in order to not intercept Yellowstone visitors only passing through Grand Teton on the way to Yellowstone.

We sampled 20 days during the summer visitor season starting June 7. Sampling had to end July 15th in order to have the results ready to meet the EIS timeline. Given there are 5 weekdays and 2 weekend days each week, we sampled three week days and two weekend days at each location for a total of 12 weekday and 8 weekend sample days. The eight weekend days were balanced between Saturday and Sunday. The 12 weekdays were balanced across the days of the week. The target was to distribute 50 surveys each day.

The number of sampling days was divided equally between the four users types (20 days total = five days each user group). Within each user group, the sampling sites were chosen to obtain a representative user sample that was proportional to estimated use. For example, the number of available camping sites vs. lodge rooms was used to determine the sampling days for campgrounds and lodge visitors. GTNP visitation estimates for the different activity use rates were used to determine the sampling divisions for hiking trail sampling sites as well as for other activity sampling and the visitor center sampling.

Trail Head Locations

Taggart Lake and South Jenny Lake Junction Trail Heads: We intercepted visitors as they were finishing their hike and returning to their cars. Sampling time was late morning to early evening (11am to 6pm). The adult from each group with the most recent birthday was selected to receive the survey packet and have their name and address recorded.

Visitor Centers

Moose and Colter Bay Visitor Centers: We intercepted every fifth visitor group as they exited the visitor center. The adult with the most recent birthday was selected to receive the survey packet and have their name and address recorded. We sampled from 8am to 3pm on two days, 12pm to 7pm on two days and 10am to 5pm one day to make sure we captured morning, afternoon, and evening visitors.

Overnight Accommodations

Of the overnight accommodations available in Grand Teton, approximately 60% are campground sites and 40% are lodge rooms or cabins. For the five overnight accommodations sampling days, we sampled campground sites 3 ½ days and lodge/cabin guests 1 ½ days.

1. Campgrounds: We sampled the five campground locations within the Park. On the campground sampling days, a different campground was sampled at morning and at night. A random number generator was used to select the sample sites within each campground. If no one was at the selected site, the campsite with the next highest number was sampled instead. The adult at each site with the most recent birthday was selected to receive the survey packet and have their name and address recorded.
2. Lodges: We sampled three of the lodging/cabin facilities within the Park. Grand Teton Lodging Company and Signal Mountain Lodging Company were willing to help us with the sampling process but were unable to provide us with the names and addresses of their guests to protect their privacy. We worked with the lodging companies to select the best locations to intercept guests as they are exiting the lodging and cabin facilities. The adult from each group with the most recent birthday was selected to receive the survey packet and have their name and address recorded.

Other Visitor Activity Locations

Other important visitor activity locations we sampled include:

1. Lake Recreation Activities: We intercepted visitors as they finished their lake recreation activities and returned to their cars. Sampling time was late morning to early evening (11am to 6pm). The adult from each group with the most recent birthday was selected to receive the survey packet and have their name and address recorded. We sampled one day at Leeks Marina and one day at Signal Mountain Marina.

2. River Recreation Activities: We intercepted visitors as they finished their river recreation activities. Sampling time was late morning to early evening (11am to 6pm). The adult from each group with the most recent birthday was selected to receive the survey packet and have their name and address recorded. We sampled 1 ½ days at the Moose Junction Boat Launch.
3. Signal Mountain Resort Area: We intercepted visitors as they returned to the parking lot from the resort area. The resort area includes a popular restaurant, gas station, and gift shops. (1 day)

Household Survey Implementation

Three household samples, one for each geographic region were employed. The household sample was a random sample of 800 Teton County, Wyoming households, a random sample of 800 of rest of Wyoming households, and, per OMB's instructions a random sample of 2,000 U.S. households. The household sample was drawn by Survey Sampling, Inc. This company has been used on several previous surveys and they provide names, addresses and mailing labels in a very timely manner to geographic specifications down to the county level.

The mailing procedure for local residents, Wyoming residents and rest of U.S. residents followed a repeat mailing approach with a first mailing, with personalized cover letter, first class postage paid return envelope for return the survey and a respondent incentive of $1. This was followed a week later by a reminder postcard. Then about three weeks later a second mailing of the entire survey packet with a new, more emphatic cover letter. Finally, about a month later, a third mailing sent U.S. Postal Priority mail was sent. This included the survey packet, a new cover letter and a separate "cover note" from the Superintendent of Grand Teton National Park encouraging response. See Appendix B for an example of the Wyoming resident household survey.

Data Entry

All data was entered into a spreadsheet based on a code sheet. Frequent meetings were held with the supervisor of the people doing the coding to address questions that arose during coding. Once the data was entered it was rechecked by the supervisor against the original surveys to verify accuracy in coding.

Chapter 3. Results

Survey Response Rates

Table 1 presents the response rates of visitors and households to the surveys after the three mailings. Locals are defined as residents of Teton County, Wyoming and Teton County, Idaho.

Table 1. Visitor and household survey response rates.

	# Sent out	Total received	Refusal	Deceased	Undeliverable	Ineligible	Response rate
NER Visitors							
Local	54	**43**					79.6%
Non Local	594	**457**	2		3	6	78.2%
NER Total	*648*	***500***	*2*		*3*	*6*	*78.2%*
GTNP Visitors							
Local	76	**57**			4		79.2%
Nonlocal	887	**765**	3		6	2	87.0%
GTNP Total	*963*	***822***	*3*	*0*	*10*	*2*	*86.4%*
Household							
Local	800	**535**	6	4	58	6	73.1%
Wyoming	800	**438**	17	4	115	3	64.6%
National	2,000	**965**	89	28	108	3	51.9%

The response rate is calculated by taking by dividing number received by the number sent/handed out minus deceased, undeliverable and ineligible (e.g., Canadian citizens). Using our three mailings, we achieved very good survey response rates. The NER and GTNP visitor surveys had overall (local plus non-local) response rates of 78% and 87% respectively. The primary ineligible responses were visitors from Canada and other countries. Due to providing postage paid return envelopes, we could only have mail backs from within U.S.

The household surveys had reasonably good response rates given the length of the surveys (8–12 pages) and the detailed questions asked. These response rates are on a par with past general household surveys of this length (Loomis, 1996a, 2000). We obtained responses from nearly three out of four households sampled in the Teton County, and nearly two out of three households sampled in Wyoming. These response rates are above typical voter participation rates. For the U.S. sample, we obtained responses from slightly more than half of those mailed surveys. The lower response rate is likely due to the lower salience to some U.S. residents of elk and bison management in the Jackson Hole, Wyoming area.

Descriptive Statistics

Table 2 presents the demographics of the seven samples. Non-Local visitors and Teton county households have the highest incomes. Local visitors and Teton County households have the highest percentage of members in environmental organizations (33%). Interestingly, Teton County and Wyoming households also have the highest percentage of members of hunting organizations (about 25%). The average age of non local visitors is nearly 48 years for summer Grand Teton National Park visitors and 45 years old for winter, NER sleigh ride visitors. Responding households in our Rest of U.S.A. household sample is substantially older than responding households in Wyoming. This is a different pattern than the 2000 census which shows Wyoming has a slightly older by one year median age than the U.S.

Table 2. Comparison of demographics across the seven samples.

Variables	NER on-site visitor survey		GTNP on-site visitor survey		Household surveys		
	Non locals	Locals	Non locals	Locals	Teton County	Wyoming	Rest of USA.
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Age	44.93	39.49	47.8	44.6	49.67	42.68	51.4
Work full time	89%	81%	86%	80%	77.6%	88.9	69.9
Percent env. organization member	24%	20%	26%	33%	33%	14%	14%
Percent hunting org. Member	22%	9%	11%	18%	25%	24%	13%
Years of Education	15.79	15.69	16.6	16.02	15.61	14.6	14.6
# in Household	2.91	2.57	2.9	2.31	2.54	2.70	2.71
# Working	1.70	1.94	1.7	1.72	1.67	1.59	1.67
Income	$103,771	$73,529	$101,739	$70,343	$91,119	$54,193	$70,607
Sample size (n)	***457***	***43***	***765***	***57***	***535***	***438***	***965***

Non Response Analysis

The household response rates were below the 80% target set by U.S. Office of Management and Budget, and therefore required us to conduct a non-response check of households not responding. We phoned a subsample of non-respondents in each of the sample strata. To keep this phone interview as short as possible, we asked only four questions that would serve as a check on the respresentativeness of our respondents. This brevity was needed since non-respondents had ignored three past mailings of the survey and no doubt no longer had the survey booklet. As such, we were dealing with what is sometimes called a "reluctant" respondent and also needed to keep questions sufficiently simple to be asked and answered over the phone. The four questions chosen were whether they had visited the area (and if so, the number of trips in the last 12 months), and demographics such as age, education and gender. As shown in Table 3, the comparison of demographics indicates that the age of respondents and non-

respondents is quite similar. That is, Wyoming respondents had an average age of 42.68 while non respondents were 42.56. Similarly, U.S. respondents average age was 51.4 while non respondents were 51.94. In terms of years of education, Teton County respondents and non-respondents have similar education levels of 15.61 versus 15.31, respectively. This was not a statistically significant difference ($P = .41$). For rest of Wyoming households and rest of the U.S. household samples, respondents had, on average, about one more year of education than non respondents, 14.6 versus 13.5 years, a statistically significant difference at the 1% level for both samples, using a t-test.

Another point of comparison is the percent of respondents versus non-respondents that have ever visited the Jackson Hole area (including GTNP or NER). Nearly 80% of responding Wyoming households had visited while 55% of non-responding Wyoming households had visited. Since the response category is visit versus non visit, a chi-square test was used to determine if the differences in visitation rates were significantly different from each other. The calculated chi-square was statistically significant at the 1% level. With respect to the U.S. sample, 21% of responding households had visited, while 15% of non responding households had visited. Using a chi-square test, this is a statistically significant difference at 1% level.

Table 3. Characteristics of non-respondents to the household survey.

		% visit	# of trips	Age	EDUC	% Female
Teton	Non resp.	100%	46.79	47.12	15.31	32.5%
	respondents	97%	22	49.67	15.61	32.3%
Wyoming	Non resp.	55%	2.41	42.56	13.55	32.5%
	respondents	35%	2.13	42.68	14.6	42.4%
Rest of USA	Non resp.	15%	0.333	51.94	13.53	36%
	respondents	21%	0.189	51.4	14.6	31.6%

Thus, the reader should keep these differences in mind when reviewing the remainder of the report. However, *a priori,* it is not clear if there is any systematic or directional bias in the answers that follow from respondents, as compared to non-respondents. Since survey non-respondents tended to visit less, our changes in visitation figures may be minimally affected by omitting these less frequent visitors.

Recreation Activities Participated in by Visitors

Recreation activities participated in by Non-Locals and Locals intercepted during the winter National Elk Refuge sleigh ride survey are shown in Table 4. Elk viewing was the most frequent activity of these visitors, although this is to be expected given the sample design. Sightseeing and snow skiing were the next most popular activities.

Recreation activities participated in by non-locals and locals during the summer at Grand Teton National Park are shown in Table 5. For non-local visitors, bison viewing, hiking and driving for pleasure were tied as the second most frequent activities participated in, with elk viewing being the next most frequent. For locals hiking and boating were the most popular activities.

The basic trip statistics for National Elk Refuge indicate the average visitor drove 500 miles one way and spent about 4.4 days in the Jackson Hole area. The most common mode of transportation was driving automobiles. NER personnel estimate sleigh ride visitors spend 2–3 hours during their visit by watching the wildlife video while waiting to go board the bus to take them to the sleighs, actually going on the sleigh ride, and then milling around the museum before and after their ride. Visitors can also view the elk on the NER from several highway pull offs outside the refuge boundaries. For Grand Teton National Park, the typical visitor traveled about 1,300 miles by car, and stayed 4.5 days in the Jackson Hole area, with about 3.3 days of that spent visiting Grand Teton National Park.

Table 4. Percent of National Elk Refuge sleigh ride visitors participating in different recreation activities on their most recent visit to Jackson Hole.

Activity	Non locals Mean	Locals Mean
Hiking	7.3%	30.8%
Picnicking	4.9%	10.3%
Driving for pleasure	36.4%	41.0%
Hunting	0.4%	15.4%
Sightseeing	68.0%	64.1%
Bird watching	5.6%	20.5%
Horseback riding	0.7%	10.3%
Snowshoeing	9.3%	15.4%
Snomobiling	26.0%	7.7%
Mtn climbing	0.2%	7.7%
Snow skiing	47.8%	41.0%
Bison viewing	24.0%	35.9%
Elk viewing	82.0%	64.1%
Sleigh ride	90.0%	76.9%
Wildlife art museum	58.2%	64.1%
Sample size	***457***	***43***

Table 5. Recreation activities of non locals and locals at Grand Teton National Park, summer 2002.

Activity	Non Locals Mean	Locals Mean
Hiking	70.0%	56.6%
Picnicking	47%	31.1%
Driving for Pleasure	70%	23.6%
Sightseeing	93%	56%
Bird watching	32%	14.5%
Horseback riding	16.3%	2%
Boating	39.6%	54.5%
Camping	43.6%	N/A
Mtn climbing	7.3%	9.1%
Bison viewing	70.0%	22.2%
Elk viewing	66.7%	18.2%
Rodeo	13.6%	N/A
Wildlife art museum	18.1%	N/A
Sample size	***765***	***57***

Table 6 displays the relative importance of different recreation activities for visitors decisions regarding whether to take a trip to the Jackson Hole area. The numbers reflect the average importance on an ordinal scale where one is not important, two is somewhat important, three is important and four is very important. Thus the relative magnitude of the numbers provides a useful indicator of the relative importance of a recreation activity in terms of attracting people to the Jackson Hole area. Viewing the mountains was the highest rated recreation activity of both winter visitors participating in the sleigh ride and summer visitors. Viewing wildlife in general, and elk and bison where the next most important reasons for recreation trips in the Jackson Hole area.

Table 6. Relative Importance of different recreation activities to the decision to visit Jackson Hole.

	National Elk Refuge Visitors		Grand Teton Visitors	
	Non Locals Winter	Locals Winter	Non Locals Summer	Locals Summer
Viewing elk	3.11	3.40	3.06	3.08
Viewing bison	2.80	3.18	3.07	3.07
Viewing birds and other wildlife	3.01	3.38	3.26	3.15
View mountains	3.41	3.65	3.81	3.56
Hiking, mtn climbing	2.09	3.00	2.93	3.09
Hunting elk	1.49	1.64	1.15	1.62
Hunting bison	1.30	1.16	1.10	1.34
Other hunting	1.43	1.53	1.12	1.54
Rafting/canoeing	2.02	2.51	2.40	3.22
Fishing	1.99	2.61	1.81	2.67
Snow skiing	2.78	2.79	1.51	2.83
Snowmobiling	2.17	1.36	1.24	1.79
Sleigh ride	2.98	2.64	1.55	2.12
Festivals	2.11	2.16	1.87	1.80
Horseback riding	1.66	1.82	1.75	1.69
Bike/mtn biking	1.54	2.50	1.54	2.31
Sample size	***457***	***43***	***765***	***57***

Note the numbers reflect a four point scale, where one is not important and four is very important.

Responses to Desirability of Individual Management Options

The NPS and USFWS were interested in how people viewed the acceptability of different individual management actions they might take at GTNP and the NER. We positioned these questions prior to asking respondents about the four major groups of management actions in the survey. This allowed respondents to think about each of the possible individual actions prior to having to determine which was the best overall management option and how it would affect their visitation. For each management action, the respondent could check one of five categories. These are Not Desirable, No Opinion, Somewhat Desirable, Generally Desirable, or Very Desirable.

The following graphs compare how the five main sample groups (e.g., non-local visitors to NER and to GTNP, Teton County residents, Wyoming residents and rest of US residents) felt about each of these management actions. The reader should be aware that the response categories are not symmetrical between the number of positive and negative categories. While typically it is better to use balanced categories we did not do this. Instead, we had one negative, one neutral, one weak positive (somewhat desirable category) and then two strong positives (generally or very desirable). We had finer resolution on the desirable category because the federal land management agencies believed that the majority of the public would find many of these management options desirable, and they wanted to distinguish the strength or intensity of that preference. This does make the interpretation more difficult since the categories are not balanced. As can be seen in Figure 2 and Figure 3 most respondents find it generally desirable or very desirable to feed bison and elk, respectively.

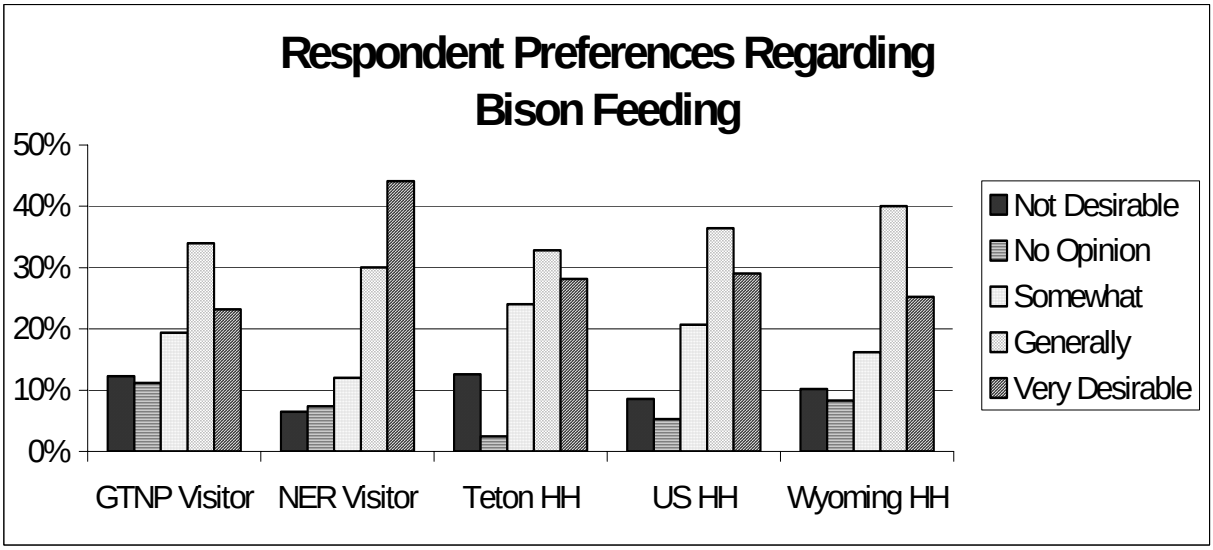

Figure 2. Comparison of visitor and household preferences for bison feeding.

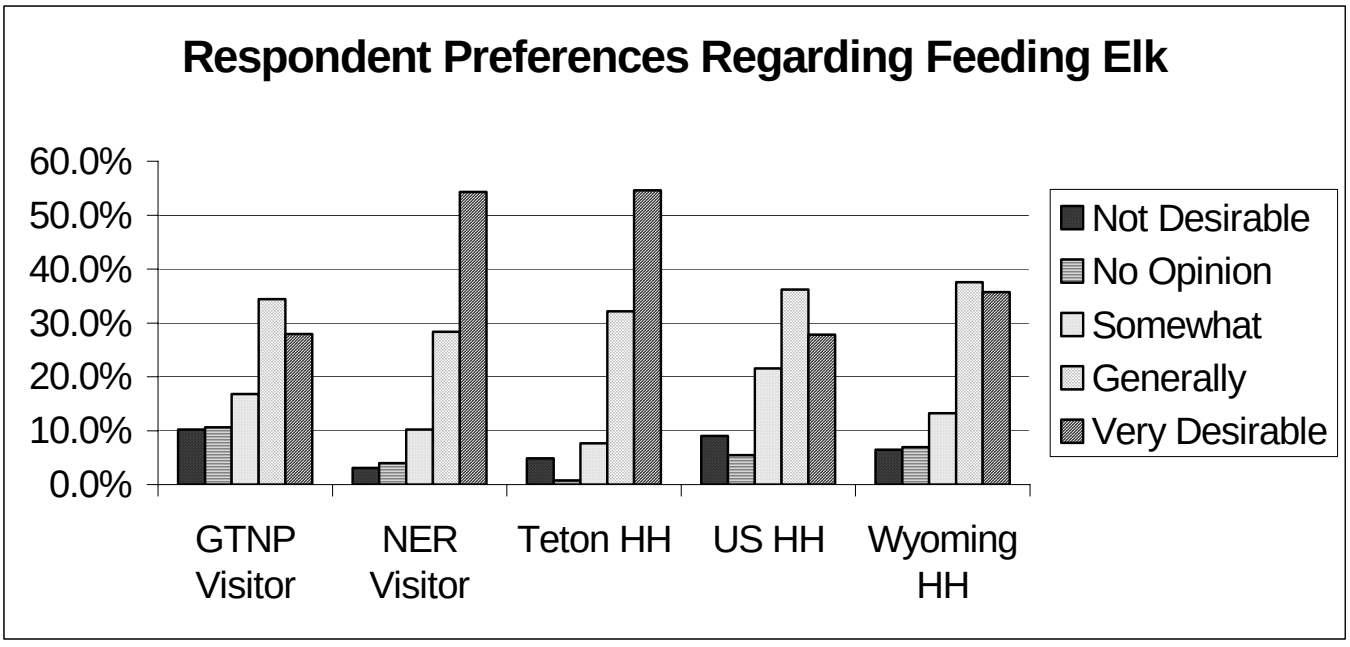

Figure 3. Comparison of visitor and household preferences for elk feeding.

As shown in Figure 4, 30–40% of respondents thought that hunting bison on the NER was not desirable. However, 40–45% of Wyoming and Teton county households thought hunting bison on the NER was generally or very desirable.

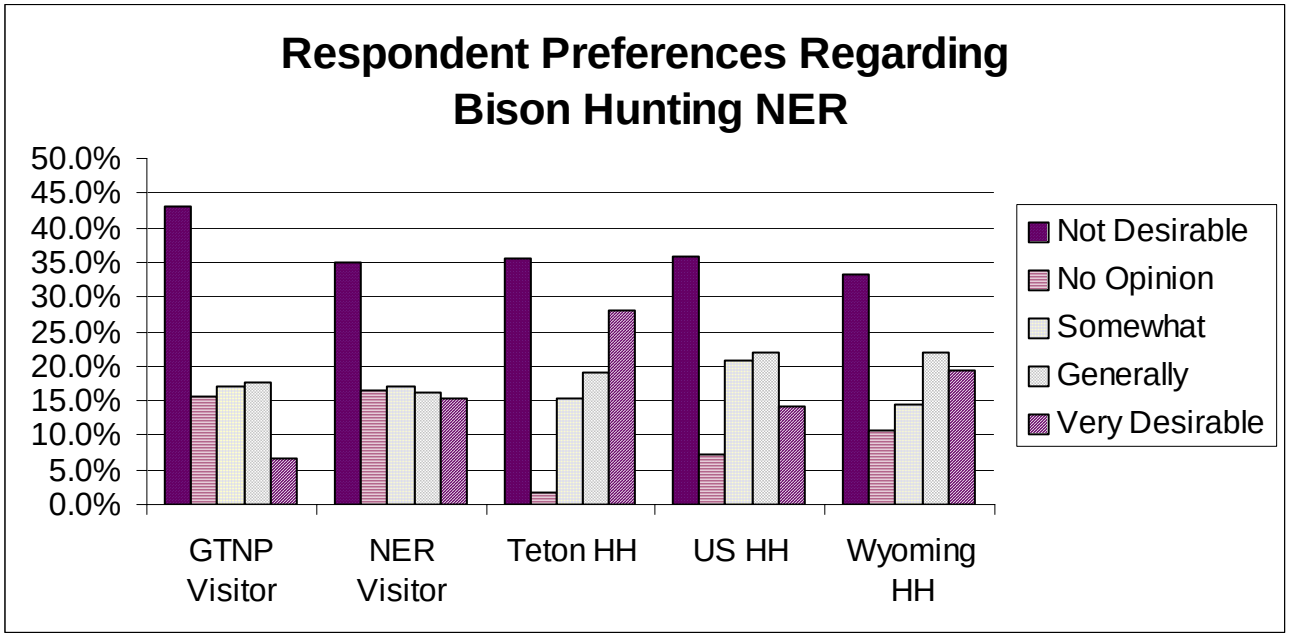

Figure 4. Comparison of visitor and household preferences for bison hunting at NER.

With regard to elk hunting in Grand Teton National Park, Figure 5 indicates 50% or more of Teton County and Wyoming residents find this generally or very desirable. Only GTNP summer visitors had a majority that responded that elk hunting in the Park was not desirable. Figure 6 indicates that a majority of visitors and households find restoration of native habitats damaged by large concentrations of elk and bison on the NER to be generally or very desirable.

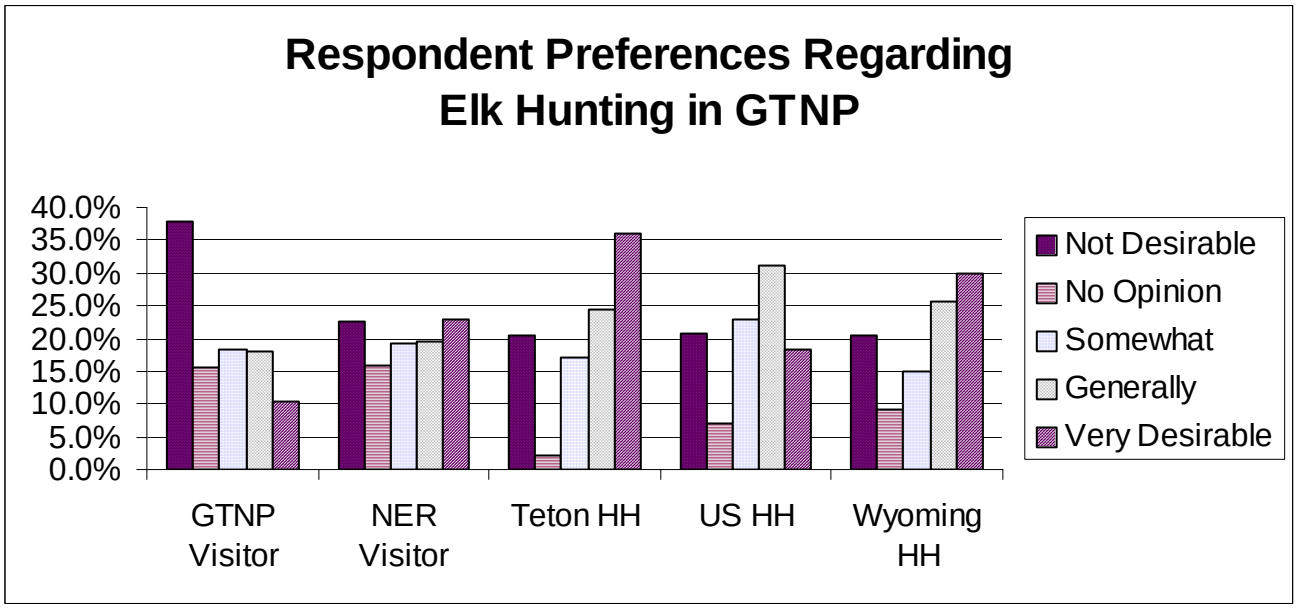

Figure 5. Comparison of visitor and household preferences for elk hunting in Grand Teton National Park.

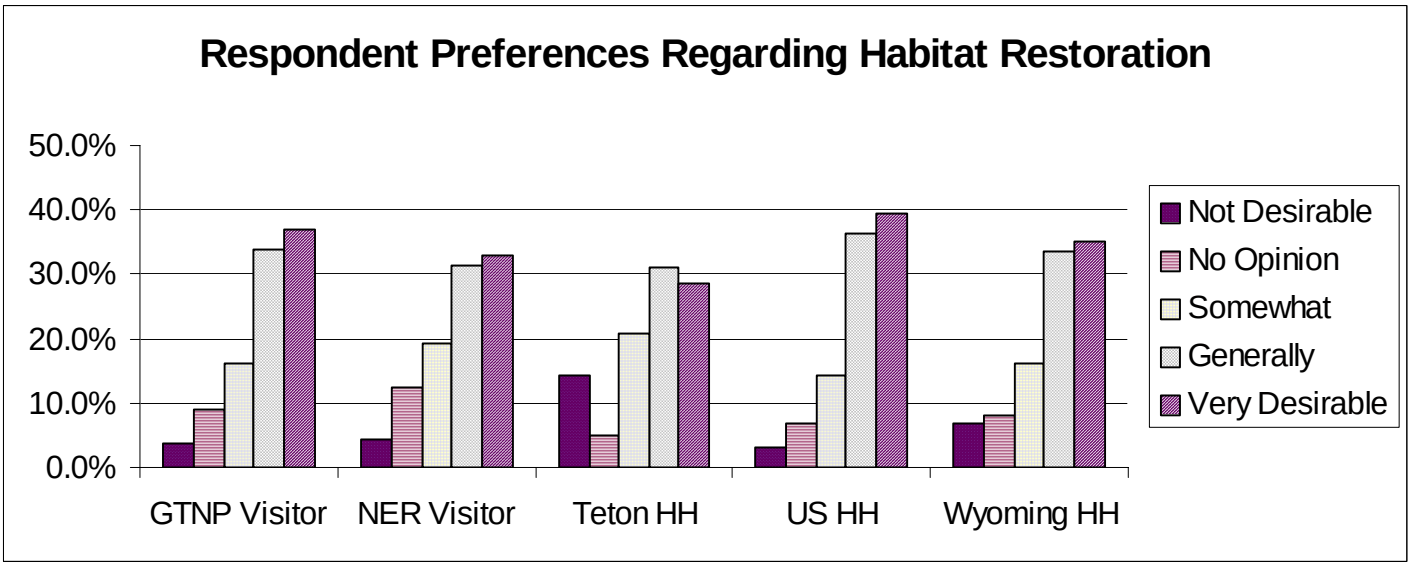

Figure 6. Comparison of visitor and household preferences for restoration of native habitats.

Figure 7 indicates that a majority of visitors and households outside of Teton County found restoring natural winter migration patterns to allow elk and bison to migrate out of the Jackson Hole area to be generally or very desirable.

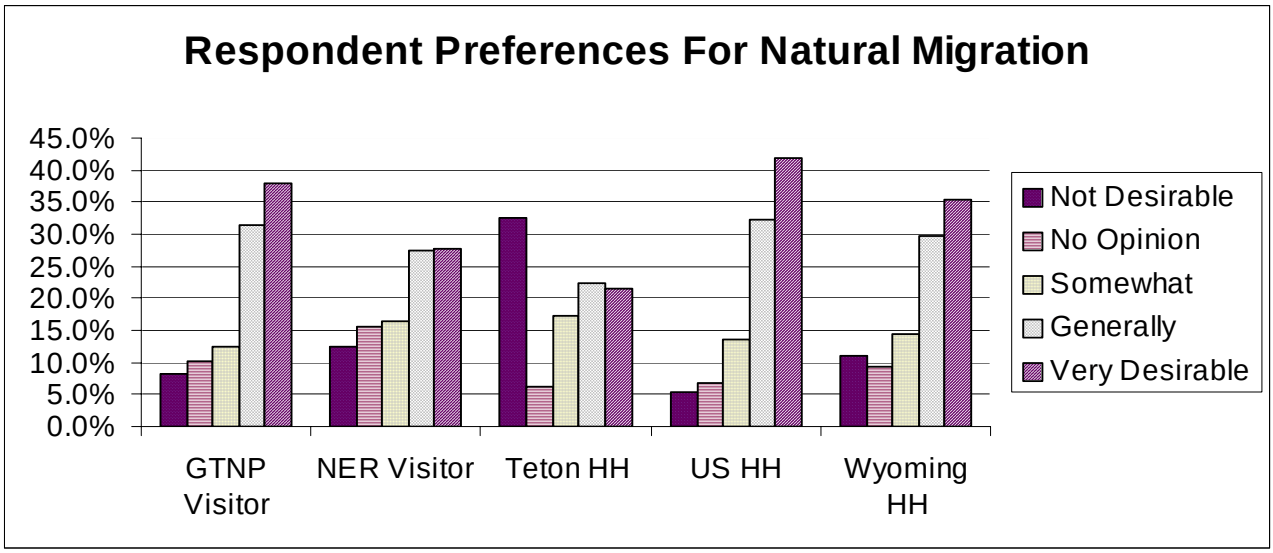

Figure 7. Visitor and household preferences for restoring natural migratory patterns for elk and bison.

As can be seen in Figure 8, the majority of visitors and households find expanding sprinkler irrigation to increase vegetation for elk and bison to be very desirable, followed by generally desirable.

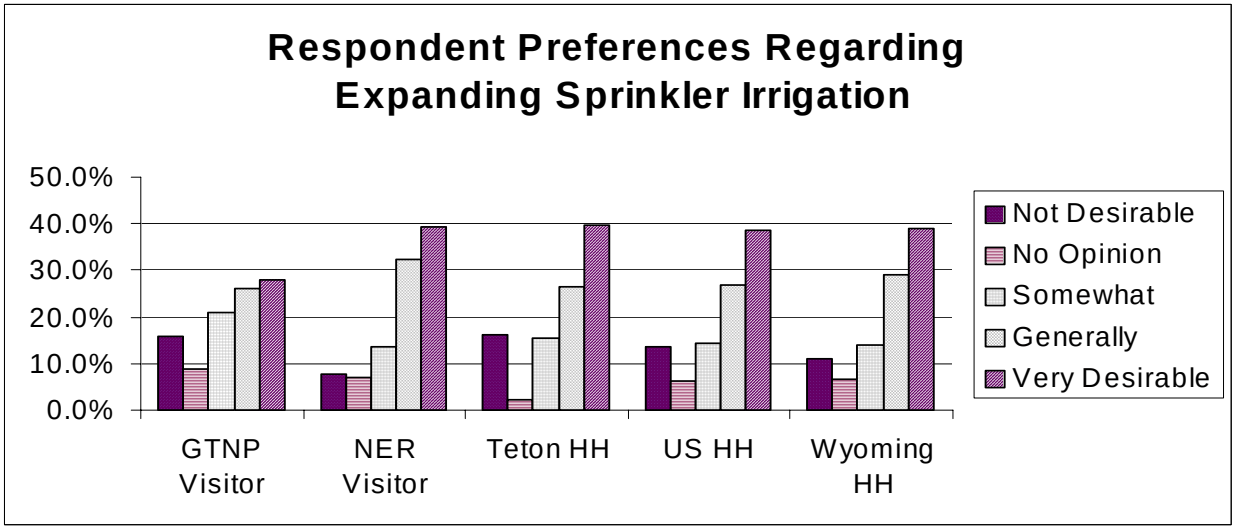

Figure 8. Visitor and household preferences for increasing vegetation for elk and bison.

As can be seen in Figures 9 and 10, the majority of visitors and households view vaccinating bison and elk against diseases such as brucellosis to be generally or very desirable.

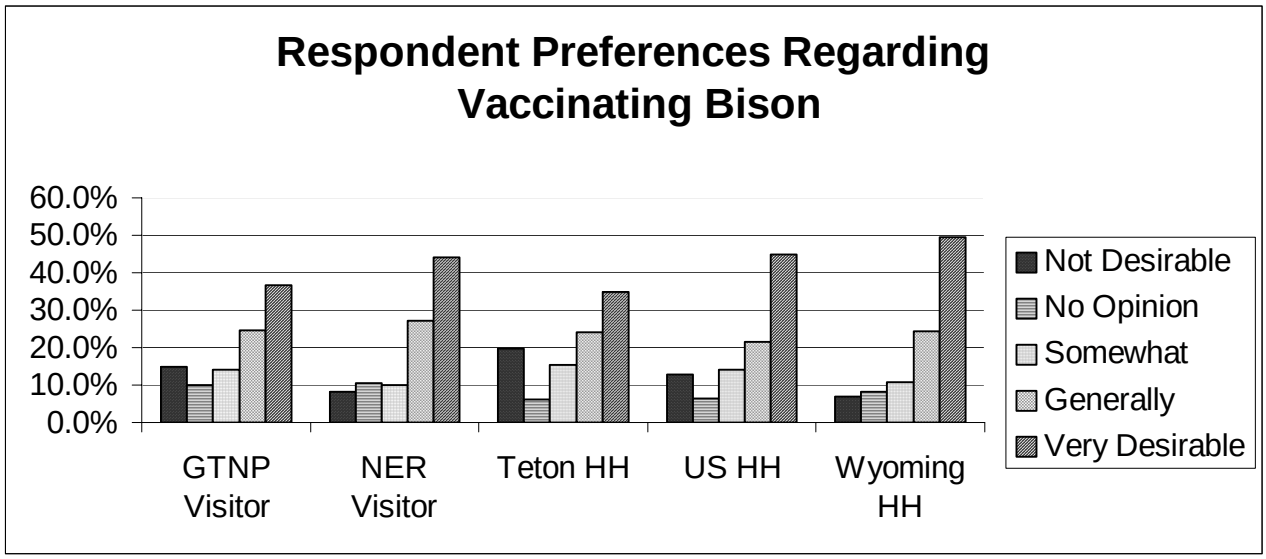

Figure 9. Visitor and household preferences regarding vaccinating bison against brucellosis.

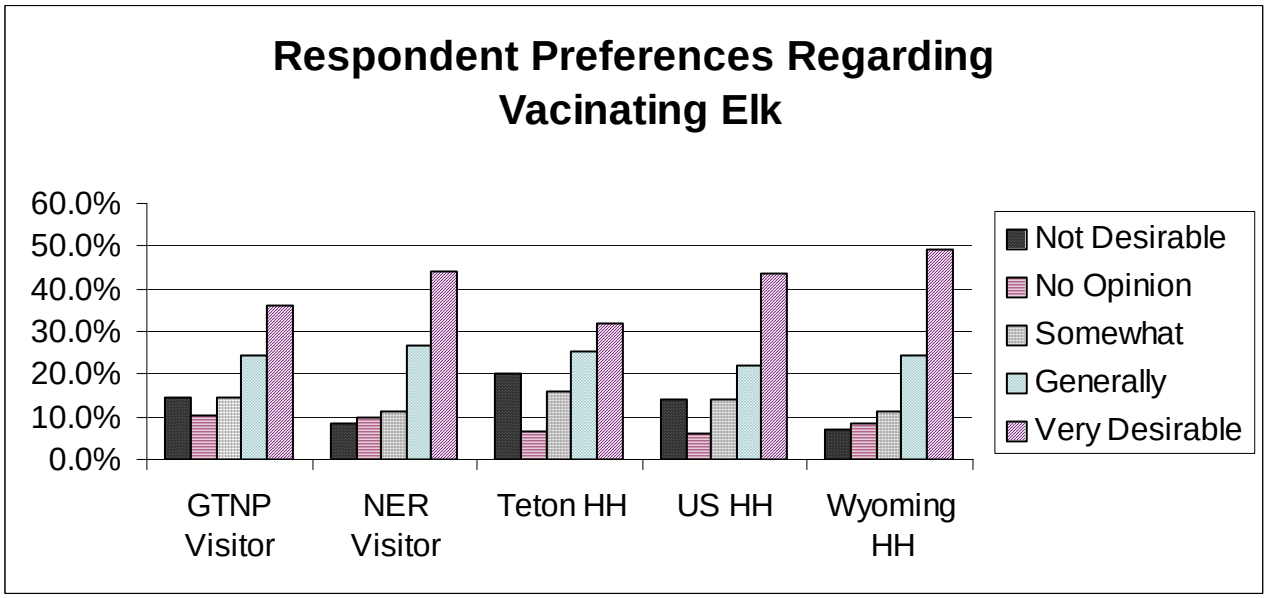

Figure 10. Visitor and household preferences regarding vaccinating elk against brucellosis.

Management Options Portrayed in the Two Versions of the Survey

To elicit visitor preference for different management options and to ascertain whether visitors would change their number of annual trips with changes in each management option, each survey contained four management options. The first one was the current situation and it served as the baseline or reference case. No change in visitation was asked for current management, since visitation would correspond to existing visitation to the NER or GTNP. Each survey version contained three changes in management. Since there were a total of four possible changes in management, but only three change options could be displayed in the survey due to space and to not over load the respondent, there were two versions of the survey. Both Version 1 and Version 2 had in common the first three management options: (#1) current situation; (#2) Reduce Wildlife Concentrations by Reducing Feeding; and (3) Increase Elk Population by Increased Feeding. Survey version 1 contained No Active Management as the 4th management option. Survey version 2 contained Current Feeding and Bison Hunting (on the NER) as the 4th management option.

Figures 11 and 12 display the layout and details presented to the respondent for Survey version 1 and 2. The layout and wording of these tables balanced factual information from managers with considerations of clarity and understandability as reflected in the four focus groups and four pretests.

Table 7 displays the percentage of each respective sample that selected a particular alternative as what they viewed as the best option for managing elk and bison in Grand Teton National Park and the National Elk Refuge.

As can be seen from Table 7, current management receives the most support, especially in survey version #1. The support for current management is reduced in survey version #2 when management option #4V2 involves current feeding plus Bison hunting at the NER. Note, that current management and management option #4V2 are quite similar with the only difference being the addition of bison hunting to current management in #4V2. Thus there appears to be overall support for management options similar to the current situation. Management Option #4V2 is also preferred to Management Option #3 which involves increased feeding and Bison Hunting. Management Option #4V1 that involves no feeding and no hunting receives the lowest level of support across all of the samples.

Visitor Economic Impact Analysis

Local and Regional Economic Impact Areas

In order to capture tourist spending in Jackson and the respending of the large percentage of tourism industry workers' salaries that live in Driggs Idaho, Teton County Wyoming and Teton County Idaho were chosen to represent the local economy. The 2000 Census estimated total population for the local economy (Teton County WY and ID) at 24,250 persons. Seventy five percent (18,251 persons) lived in Teton County WY, and 25% (5,999 persons) lived in Teton County ID. In 2000, total full and part-time employment for the local economy was estimated at 25,607 jobs, 89% (22,828 jobs) were in Teton County WY and 11% (2,779 jobs) were in Teton County ID (BEA, 2002). Given that there are more jobs in Teton County WY than there are people, and that Teton County Idaho accounts for 25% of the local population but for only 11% of the local jobs, we feel that it is reasonable to include Teton County Idaho as part of the local Jackson economy. The State of Wyoming was selected as the regional impact area to capture the nonresident visitors spending 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.

Survey Version A: Comparison of wildlife management options.

	Management Option #1 Current Situation – *"No Change"*	Management Option #2 Reduce Wildlife Concentrations by Reducing Feeding	Management Option #3 Increase Elk Populations by Increased Feeding	Management Option #4 No Active Management
Number of Days Elk and Bison are fed on the National Elk Refuge	65 Days in an average winter January 25 to April 1	0 Days in an average year (30–60 days emergency feeding only in severe winters)	80 Days in an average year January 10 to April 1	0 Days Never Feed
Elk Hunting on the National Elk Refuge and Grand Teton National Park	3,250 Hunters	4,500 Hunters during first 5 years 2,500 Hunters from year 6 on.	A maximum of 4,500 Hunters	None
Bison Hunting on the National Elk Refuge	None	75 Hunters during first 5 years 50 Hunters from year 6 on	20 Hunters (USFWS employees would also reduce populations through harvest)	None
Expected Effects on:				
Number of Bison on Grand Teton NP and the National Elk Refuge (Each bison symbol represents about 300 bison)	600 Bison  Increasing to 750–900 by 2004	350–400 Bison 	200–250 Bison 	200 average Depends on snow cover and available forage on the NER
Number of Elk Wintering on the NER (Each elk symbol represents about 2,500 elk)	5,000–7,000 Elk 	5,000 Elk 	8,500 Elk 	2,000–6,000 Elk: Depends on snow cover and available forage on the NER
NER Winter Elk Viewing Sleigh Rides Elk likely to be seen up close on sleigh ride (Dates of sleigh ride)	1,000–2,000 Elk (December 15–April 1)	0–2,400 Elk (700 avg.) On some days, there would be a low chance of seeing any elk (December 15–April 1)	1,000 – 2,000 Elk (December 15–April 1)	0 –2,400 Elk (700 avg) On some days, there would be a low chance of seeing any elk (December 15–April 1)
Natural Winter Elk Mortality on the NER	1% – 2%	.5% –5%	1.5% average	.5% –20%
# of Elk Hunters on Bridger Teton National Forest*	Current Level: 5,750 Hunters	4,500–5,750 Hunters	Increased Level: 7,000–8,000 Hunters	3,750 Hunters
# of Bison Hunters on Bridger Teton National Forest*	Current Level: 100 Hunters	75 Hunters during first 5 years, 50 Hunters from Year 6 on	30 Hunters	50 Hunters

*Even though the management plan will not apply to the Bridger Teton National Forest, changes in the management of elk and bison on the National Elk Refuge and Grand Teton National Park will effect hunting on the Bridger Teton National Forest.

Figure 11. Survey version 1 possible changes in elk and bison management.

Survey Version B: Comparison of wildlife management options.

	Management Option #1 Current Situation – *"No Change"*	**Management Option #2 Reduce Wildlife Concentrations by Reducing Feeding**	**Management Option #3 Increase Elk Populations by Increased Feeding**	**Management Option #4 Current feeding and Bison Hunting**
Number of Days Elk and Bison are fed on the National Elk Refuge	65 Days in an average winter January 25 to April 1	0 Days in an average year (30–60 days emergency feeding only in severe winters)	80 Days in an average year January 10 to April 1	65 Days in an average winter January 25 to April 1
Elk Hunting on the National Elk Refuge and Grand Teton National Park	3,250 Hunters	4,500 Hunters during first 5 years 2,500 Hunters from year 6 on	A maximum of 4,500 Hunters	3,250 Hunters
Bison Hunting on the National Elk Refuge	None	75 Hunters during first 5 years 50 Hunters from year 6 on	20 Hunters (USFWS employees would also reduce populations through harvest)	100 Hunters
Expected Effects on:				
Number of Bison on Grand Teton NP and the National Elk Refuge (Each bison symbol represents about 300 bison)	600 Bison  Increasing to 750–900 by 2004	350–400 Bison 	200–250 Bison 	750–1,000 Bison 
Number of Elk Wintering on the NER (Each elk symbol represents about 2,500 elk)	5,000–7,000 Elk 	5,000 Elk 	8,500 Elk 	5,000–7,500 Elk 
NER Winter Elk Viewing Sleigh Rides Elk likely to be seen up close on sleigh ride (Dates of sleigh ride)	1,000 – 2,000 Elk (December 15–April 1)	0 – 2,400 Elk (700 avg.) On some days, there would be a low chance of seeing any elk (December 15–April 1)	1,000 – 2,000 Elk (December 15–April 1)	1,000–2,000 Elk (December 15–April 1)
Natural Winter Elk Mortality on the NER	1% –2%	.5% –5%	1.5% average	1.5% average
# of Elk Hunters on Bridger Teton National Forest*	Current Level: 5,750 Hunters	4,500–5,750 Hunters	Increased Level: 7,000–8,000 Hunters	5,750 Hunters
# of Bison Hunters on Bridger Teton National Forest*	Current Level: 100 Hunters	75 Hunters during first 5 years, 50 Hunters from Year 6 on	30 Hunters	125 Hunters

*Even though the management plan will not apply to the Bridger Teton National Forest, changes in the management of elk and bison on the National Elk Refuge and Grand Teton National Park will effect hunting on the Bridger Teton National Forest.

Figure 12. Survey Version 2 possible changes in elk and bison management.

Table 7. Percent selecting each management option as the best.

Sample	Mgmt opt 1 No change	Mgmt opt 2 Reduce feeding and bison hunt	Mgmt opt 3 Increase feeding and bison hunt	Mgtm opt4v1 No active mgmt (no feed/no hunt)	Mgmt opt 4v2 Current feeding and bison hunt
	(%)	(%)	(%)	(%)	(%)
Ner non local visitors V1	63.6	15.3	16.7	4.3	N/A
Ner non local visitors V2	53.6	6.2	13.4	N/A	26.8
Gtnp non local visitors V1	52.6	33.6	6.4	7.3	N/A
Gtnp non local visitors V2	47.6	18.5	7.3	N/A	26.5
Teton county households V1	54.1	21.3	19.7	5	N/A
Teton county households V2	36.4	10.9	12.4	N/A	40.3
Wyoming households V1	45.5	26.5	25.1	3	N/A
Wyoming households V2	33.3	19	15.4	N/A	32.3
Rest of US households V1	47.5	29	16.4	7.1	N/A
Rest of US households V2	38.1	21.3	13.8	N/A	26.8

Note: Bison Hunt refers to Bison hunting on the NER

Local and Regional Employment for 2000 is shown in Table 8. Most jobs pertaining to the recreation and tourism industry are found in the retail trade (spending on supplies, souvenirs, restaurants, and grocery stores) and service (spending on hotels, gas stations, amusement, and recreation activities) sectors in an economy. Over 55% of the jobs in Teton County WY and ID are retail trade or service based, thus the local economy is highly dependent on tourism for its job base. Employment in the State of Wyoming has more diversity with more jobs in the mining, manufacturing, and transportation industries, leading to less dependence on tourism than the local economy.

Table 8. Industry breakdown of full time and part time employment for Teton County , Wyoming and Idaho, and Wyoming, 2000.

Industry	Teton County WY and ID		State of Wyoming	
	# jobs	% of county total	# jobs	% of state total
Total farm	610	2.4%	12,624	3.8%
Total nonfarm	24,997	97.6%	315,982	96.2%
Private	22,486	87.8%	251,876	76.6%
Ag. services, forestry, fishing	580	2.3%	5,769	1.8%
Mining	D*	---	19,385	5.9%
Construction	3,534	13.8%	24,878	7.6%
Manufacturing	639	2.5%	13,583	4.1%
Transport/utilities	659	2.6%	17,158	5.2%
Wholesale trade	D*	---	8,812	2.7%
Retail trade	4,737	18.5%	57,825	17.6%
Insurance/real estate	2,566	10.0%	21,305	6.5%
Services	9,382	36.6%	83,161	25.3%
Government	2,511	9.8%	64,106	19.5%
Total full-time and part time employment	25,607		328,606	

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, 2002. *(D) not shown to avoid disclosure of confidential information, but the estimates for this are included in the totals.

Table 9 shows the percent allocation of local and regional income by major industry. While service and retail trade accounted for over 55% of total local employment in 2000, these industries only account for 32% of local income. This is due to the lower salaries associated with tourism based service and retail trade jobs. Income for the State is more diversified, with government income accounting for more than service industry income.

Changes in Visitation Behavior to NER and GTNP

For each management option visitors were asked " Would your decision to visit Grand Teton National Park or the National Elk Refuge Change if these areas were as described in Management Option #X instead of current management (#1)? Visitors were given the option of saying Yes, or No change in visits. If they selected Yes, they were asked if they would visit more or less often, and then asked to provide the estimated number of added yearly visits or fewer yearly visits, corresponding to their choice. This was repeated for each of the three changes in management.

Table 9. Percent allocation of income by major industry for Teton County, Wyoming and Idaho and Wyoming, 2000.

Industry	Teton County WY and ID	State of Wyoming
Ag. services, forestry, fishing	1.0%	0.5%
Mining	D	9.8%
Construction	12.2%	5.6%
Manufacturing	1.6%	3.5%
Transport/utilities	2.3%	5.7%
Wholesale trade	D	2.2%
Retail trade	9.2%	6.2%
Insurance/real estate	6.6%	3.3%
Services	23.0%	13.0%
Government	8.7%	15.5%
Total personal income	**$1, 027,012,000**	**$ 13,521,575,000**

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, 2002. *(D) not shown to avoid disclosure of confidential information, but the estimates for this are included in the totals.

To facilitate the *local* economic impact analysis, the NER and GTNP visitors were first split between locals (e.g., residents of Teton County WY and ID) and those living outside of Teton County WY and ID (hereafter referred to as non-locals). The reason for this split is two fold. First, Teton county WY and ID is the main focus of our impact analysis. It is the impact area. Money flowing into Teton county WY and ID from outside is considered new money injected into that economy. Second, if Teton county WY and ID residents visit the NER more or less due to the management changes, they will correspondingly change their spending of their money elsewhere in Teton county WY and ID, resulting in no net change to the local economy. These are standard assumptions made in most regional economic analyses at the local level.

For the *regional* (e.g., State of Wyoming) economic impact analysis, the NER and GTNP visitors were split between Wyoming residents and visitors that did not reside in the State of Wyoming (hereafter referred to as nonresidents). The rationale is the same as the local analysis split. When estimating the spending by visitors within the State of Wyoming, spending by Wyoming residents is not considered being new money injected into the state economy. It is likely Wyoming residents will spend their money else where in the state even if they decide to visit the NER or GTNP less often due to management changes. Table 10 shows the split between local and non-locals (for the local impact analysis) and the split of non residents for the regional analysis.

Table 10. Visitor breakdown by locals, non-locals, and nonresidents.

	NER sleigh ride visitors	GTNP summer visitors
Locals (spending not included in local impact analysis)	8.3%	7.9%
Non-locals	91.6%	92.1%
% Non-local WY residents (spending not included in regional impact analysis)	11.6%	1.8%
% Non-local nonresidents	80%	90.2%

It should be kept in mind by the reader in reviewing the results that follow, that 25% to 50% of NER visitors and only 10% to 20% GTNP visitors indicated they would change their current number of visits with changes in wildlife management options presented in the survey. Given the large base visitation at GTNP, a 20% change can result in sizeable changes in overall visitor spending, which is especially important in a tourism dependent economy like Jackson Hole.

Economic Impact Results for NER

The NER averaged 905,767 visitors per year from 1998 to 2002 with an average of 24,367 sleigh riders. Nearly all of the difference between 905,767 visitors to the NER and the 24,367 sleigh riders, is due to most NER visitors only going to the visitor center. The visitor center is located on NER land (just outside the refuge boundary fence) but is actually operated as a joint federal, state, and local general information visitor center where people obtain information for all activities in the Jackson Hole area. The average length of stay is quite short (often in minutes), multiple purpose in nature and not always directly wildlife related (e.g., to buy maps, obtain area information). We concentrated on sleigh ride visitors as these people clearly made wildlife viewing a significant part of their trip. We used the five year average annual sleigh ride visitation estimate as the base to net out visitation variations from year to year caused by weather and unusual events (e.g., September 11th).

In order to better specify the amounts of sleigh ride visitor spending that would be affected by changes in management alternatives, we stratified visitors by their primary trip purpose. As shown in Table 11, 16.1% of the non-local NER sleigh ride visitors indicated that visiting the NER was the primary purpose or sole destination of their trip. The majority of visitors (43.7%) indicated that visiting the NER was one of many equally important reasons or destinations of the trip. Finally, 40.2% of the visitors indicated visiting the NER was just an incidental or spur of the moment stop on a trip taken for other purposes or to other destinations. Table 11 presents the responses of National Elk Refuge sleigh ride visitors.

As shown in Table 11, management option #2 which involves reducing feeding to zero in average years, and only 30–60 days of emergency feeding, would reduce non local visitation to the National Elk Refuge by 6,488 visitors. This represents a 29.1% reduction in the 5 year average annual 24,367 sleigh ride visitors, although less than a 1% reduction of the 905,767 average annual total visitors to the NER. The no active management has the largest reduction in sleigh ride visitors, cutting visitation by 41%. Interestingly, maintaining current feeding but allowing for Bison hunting on the NER during the Fall, results in a 14% increase in non-local visitors. In terms of response of non local sleigh ride visitors to management options (Table 11), it is not surprising, that across all four management options, those visitors that had the NER as their primary or sole destination were more likely to change their number of trips than those for which visiting the NER was one of many equally important reasons or just an incidental stop on a trip taken for other purposes or to other destinations.

Table 11. Change in number of trips by non local sleigh ride visitors to the NE.

Management option	Primary trip purpose visitors	Equal trip purpose visitors	Incidental trip visitors	Total change	Percent change
	16.1% of visitors	43.7% of visitors	40.2% of visitors		
#2 reduced feeding	-1,661	-2,907	-1,921	-6,488	-29.1%
#3 increased feeding	374	526	526	1,427	6.4%
#4V1 no active management	-1,638	-4,710	-2,867	-9,215	-41.3%
#4V2 current feeding and bison hunting	1,073	1,610	537	3,219	14.4%

Table 12 illustrates the average amount spent locally in Teton County by non-local visitors and total spent within the State of Wyoming by non resident visitors coming in February and March for the NER sleigh rides. The amounts of local spending in Teton County are the average expenditures non-local visitors (living outside Teton County WY and ID) reported spending in the Jackson Hole area. The amounts of spending in the State of Wyoming are the summed expenditures that non resident visitors reported spending in the Jackson Hole area and the amount spent in rest of Wyoming en route to the Jackson Hole area. Not every group had expenditures in every category, so these numbers represent an average across all visitors, including some who had no expenditure in that category. It should be noted that all expenditure categories asked in the survey were included in the regional economic analysis, not just the major categories shown in the table below. The average expenditures reported in each category were divided by the average number of persons in each group sharing the expenses as shown in Table 13 and then divided by the average number of days spent in the Jackson Hole area to determine the average spending per person per day for each trip purpose. Because purchasing a ticket for the sleigh ride is an all or nothing event that can not be split up as a daily average, the daily per person spending reported for the elk viewing sleigh ride/museum fees are the total average per person expenditures.

Table 12 shows that equal and incidental purpose visitors have similar spending profiles, spending the most on hotels followed by restaurants. On average, primary purpose visitors spent the most on supplies and souvenirs followed by restaurants. Spending on hotels by primary purpose group visitors was on average considerably less that what was spent by equal and incidental purpose visitors. These differences in spending patterns can be explained by the differences in visitor characteristics by trip purpose.

Survey results reported in Table 13 show that on average, visitors with the primary purpose of visiting the NER spent fewer days (1.8 days) than those visiting the NER as an equally important (4.64 days) or incidental stop (5.2 days) during their visit to Jackson Hole. Equal and incidental visitors had on average more people in their group than primary purpose visitors. While equal and incidental purpose visitors spent more per group than primary purpose visitors, the average primary purpose visitor spent more per day per person than the average equal and incidental purpose visitor.

NER Visitor Spending Allocation

The NER winter elk viewing sleigh ride is one of several winter visitor activities available in the Jackson Hole area. As Table 6 indicates, 47.8% of the NER non local visitors also went snow skiing and 26.0% went snowmobiling on their most recent trip to the Jackson Hole area. When determining the economic impacts associated with NER sleigh ride visitation, it is important to account for the differing motivations visitors have for coming to Jackson Hole and the importance of the NER sleigh ride in relation to the overall trip purpose. To allocate spending associated with the NER sleigh ride, we attributed 100% of the trip expenditures of non-local visitors who indicated the NER was the primary purpose or sole destination of their trip. As shown in Table 13, visitors with the primary purpose of visiting the NER sleigh ride spent an average of 1.8 days in Jackson Hole. We attributed one days worth of spending for individuals who indicated that visiting NER was an equally important reason for the trip. For individuals on spur of the moment stops at the NER, we only attributed a third of a day of their expenditures, since this is about the time spent in the museum viewing the pre-sleigh ride slide show, and then on the sleigh ride itself. It is of course possible, that incidental visitors would not reduce their length of stay in the Jackson Hole area if

Table 12. Average NER visitor spending.

	Primary purpose trip visitor spending		Equal purpose trip visitor spending		Incidental purpose trip visitor spending	
	$ per group	$ per person per day	$ per group	$ per person per day	$ per group	$ per person per day
Non-Local Spending in Teton County WY and ID						
Hotel	88.73	18.33	672.74	34.75	665.91	35.36
Restaurants	121.71	25.14	319.97	16.53	312.63	16.60
Grocery stores	42.29	8.73	71.26	3.68	76.57	4.07
Supplies and souvenirs	134.89	27.86	164.53	8.50	181.92	9.66
Equipment rental and lift tickets	12.60	2.60	230.86	11.93	246.29	13.08
Elk viewing sleigh ride/museum fee	42.34	15.55	42.37	10.14	34.93	9.65
Gasoline/related automobile costs	39.99	8.26	37.77	1.95	29.50	1.57
Other expenses	35.15	7.26	134.76	6.96	95.78	5.09
Total spending	**517.70**	**113.73**	**1,674.26**	**94.44**	**1,643.53**	**95.08**
Nonresident spending in Wyoming						
Hotel	139.09	27.80	750.79	36.82	741.70	36.12
Restaurants	167.35	33.44	360.28	17.67	356.52	17.36
Grocery stores	53.49	10.69	87.29	4.28	85.02	4.14
Supplies and souvenirs	166.81	33.34	182.37	8.94	195.30	9.51
Equipment rental and lift tickets	27.48	5.49	270.85	13.28	293.69	14.30
Elk viewing sleigh ride/museum fee	44.04	15.84	41.84	9.84	34.95	9.27
Gasoline/related automobile costs	65.91	13.17	65.88	3.23	41.26	2.01
Other expenses	48.83	9.76	158.78	7.79	111.53	5.43
Total spending	713.00	149.53	1918.08	101.85	1859.97	98.14

Note averages for average length of stay and group size are in Table 13. The daily per person spending reported for the elk viewing sleigh ride/museum fees are the total average per person expenditures.

Table 13. NER non-local visitor trip characteristics by trip purpose.

	Primary purpose visitors	Equal purpose visitors	Incidental purpose visitors
Average number of persons in group sharing expenses	2.69	4.18	3.62
Average number of days spent in Jackson Hole	1.84	4.64	5.20
Time attributed in the economic impact analysis	Full trip	1 day	1/3 day

elk feeding were stopped, but instead would substitute a second best activity in the area for that portion of their stay. To the extent this substitution behavior occurs for these incidental trip visitors, our regional economic analysis slightly overstates, the effect on Teton counties. We believe it is a slight effect since these short NER visits represent only about 17% of current spending in Table 14.

Table 14 shows the current level of spending and the changes in spending for each management alternative for non-local visitors in Teton County WY and ID, and nonresident visitor spending in State of Wyoming. It is important to keep in mind that local spending includes all spending by visitors living outside Teton County WY and ID. Regional spending includes all spending by nonresidents in Teton County WY and the amount spent in Wyoming en route to the Jackson area but excludes spending by Wyoming residents in the Jackson area. Since spending by Wyoming residents was included in the local impact analysis but was not included in the regional impact analysis, the total spending within the local economy by non-local visitors is more than what is spent regionally by non residents.

As shown in Table 14, alternative 4V1 would have the largest overall reduction in spending with visitors spending 45% less in the local economy and 41% less in the regional economy than the current level of spending. Alternative 4V2 will have the largest overall increase in spending with visitors spending approximately 19% more in the local and the regional economy than the level of current spending.

Table 14. NER sleigh ride visitor spending by trip purpose.

	Primary purpose visitors		**Equal purpose visitors**		**Incidental purpose visitors**		**Total**	
Spending in Teton County WY and ID by non-locals								
Current Spending	$691,665		$921,168		$342,589		$1,955,422	
Change in Spending	$	%	$	%	$	%	$	%
Alt 2	-319,659	-46.2%	-274,537	-29.8%	-73,344	-21.4%	-667,540	-34.1%
Alt 3	71,976	10.4%	49,675	5.4%	20,083	5.9%	141,734	7.2%
Alt 4v1	-315,233	-45.6%	-444,812	-48.3%	-109,462	-32.0%	-869,508	-44.5%
Alt 4v2	206,499	29.9%	152,048	16.5%	20,503	6.0%	379,050	19.4%
	Primary purpose visitors		**Equal purpose visitors**		**Incidental purpose visitors**		**Total**	
Spending in the State of Wyoming by Nonresidents								
Current Spending	$654,793		$813,047		$285,153		$1,752,993	
Change in Spending	$	%	$	%	$	%	$	%
Alt 2	-322,139	-49.2%	-213,193	-26.2%	-61,580	-21.6%	-596,912	-34.1%
Alt 3	48,218	7.4%	4,787	0.6%	15,268	5.4%	68,274	3.9%
Alt 4v1	-311,880	-47.6%	-333,286	-41.0%	-80,120	-28.1%	-725,286	-41.4%
Alt 4v2	168,764	25.8%	143,623	17.7%	14,645	5.1%	327,032	18.7%

Economic Impacts Associated with Current NER Visitation and Changes by Management Option

The economic impacts associated with spending by NER sleigh ride visitors are estimated by the following equation:

Number of NER sleigh ride visitors*average spending* regional multiplier = Economic Impact

The 5-year average annual NER visitor statistics were used to determine the number of NER sleigh ride visitors. According to NER personnel, there were on average 24,367 annual sleigh ride visitors between 1998 and 2002. From our survey results we estimated 22,320 of the sleigh ride visitors (91.6%) are non local. Of the non local visitors we estimated that 16.1% were primary purpose visitors, 43.7% equal purpose visitors, and 40.2% visited the NER as an incidental trip purpose. As previously discussed, for the average spending we attributed the entire trip spending (1.8 days) for primary purpose visitors, one day of spending for equal purpose visitors, and one-third of a day spending for incidental trip purpose visitors. The results of the contingent trip behavior responses by alternative from Table 11 were used to determine the economic impacts associated with each management alternative. The IMPLAN modeling system was used to derive the multipliers that capture the secondary (indirect and induced) effects of visitor spending. It should be kept in mind 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. Further, that prices and wages are fixed and do not respond to changes in local demand. The net effect is often to somewhat over-stating the changes in income and employment from a given change in final demand. That is, all changes in final demand are reflected in IMPLAN and changes in employment numbers, rather than also being reflected in changes in wage rates, prices, etc.

Local Income and Employment Impacts associated with Non-local NER Visitation

Table 15 shows the economic impacts associated with current NER visitation and the changes in economic impacts by management alternative for Teton County WY and ID. The table shows the direct change and the total change (e.g., the multiplier effect) of income and jobs by visitor trip purpose. Current NER sleigh ride visitation accounted for $1,006,019 in personal income and 48.9 jobs in Teton County WY and ID, representing less than 1% of total local income and employment. Equal purpose visitors accounted for the largest proportion of income and jobs generated. Management option 4V1 would have the largest loss of jobs and income followed by management option 2.

Because the economic impacts associated with current NER sleigh ride visitation represent such a small impact on the local economy, even a substantial change from the current visitation will only have minor economic impacts. For example, Table 12 shows that total visitation will decrease by 41.3% for management option 4V1 (no active management). This results in a $446,049 reduction in local income and a reduction in employment by 22 jobs. However, since the current level of visitors, accounts for less than 1% of total local income and jobs, economic impacts from a 41.3% reduction in visitors under management option 4v1, are not significant to the economy of Teton County. While any specific individual losing their job is significant to them, even an economy as small as Teton County has 25,607 jobs. Given the normal turn over of employees in an economy of 25,607 jobs, 22 workers represents less than one-tenth of 1% and they can likely be re-employed in the normal turn-over of employees coming and going through this economy. A breakdown of the distribution of NER visitor spending income and job impacts by economic sector and key industry is presented in Appendix D.

Regional Income and Employment Impacts associated with NER Nonresident Visitation

Table 16 presents a similar economic impact analysis for current NER nonresident visitation and the changes in economic impacts by management options for the State of Wyoming. From our survey results we estimated that 17,856 of the total NER sleigh ride visitors (80%) were nonresidents. The economic impacts in the State of Wyoming are the summed expenditures that nonresident visitors reported spending in the Jackson Hole and the amount spent in rest of Wyoming en route to the Jackson Hole area. The table shows the direct change and the total change (e.g., the multiplier effect) of income and jobs by visitor trip purpose. Current NER nonresident visitors accounted for $956,831 in personal income and 54.5 jobs in the State of Wyoming.

Table 15. Changes in local income and employment from changing NER sleigh ride visitation.

Teton County WY and ID	Primary purpose visitors	Equal purpose visitors	Incidental purpose visitors	Total	% county total
Current NER visitor impacts					
Direct Effects					
Income	$205,042	$333,996	$128,817	$667,855	0.07%
Jobs	11.2	18.6	7.5	37.3	0.15%
Total Effects					
Income	$307,415	$506,402	$192,202	$1,006,019	0.10%
Jobs	14.7	24.5	9.7	48.9	0.19%
				Change in total	% change in county total
Change in NER visitor impacts by alternative					
Alternative 2: Reduced feeding					
Direct Effects					
Income	-$94,762	-$99,541	-$27,578	-$221,881	-0.02%
Jobs	-5.2	-5.5	-1.6	-12.3	-0.05%
Total Effects					
Income	-$142,075	$150,924	-$41,148	-$32,299	0.00%
Jobs	-6.8	-7.3	-2.1	-16.2	-0.06%
Alternative 3: Increased feeding					
Direct Effects					
Income	$21,337	$18,011	$7,551	$46,899	0.00%
Jobs	1.2	1	0.4	2.6	0.01%
Total Effects					
Income	$31,990	$27,309	$11,267	$70,566	0.01%
Jobs	1.5	1.3	0.6	3.4	0.01%
Alternative 4 V1: No active management					
Direct Effects					
Income	-$93,450	-$161,279	-$41,159	-$295,888	-0.03%
Jobs	-5.1	-9	-2.4	-16.5	-0.06%
Total Effects					
Income	-$140,107	-$244,531	-$61,411	-$446,049	-0.04%
Jobs	-6.7	-11.8	-3.1	-21.6	-0.08%
Alternative 4 V2: Current feeding and bison hunting					
Direct Effects					
Income	$61,216	$55,129	$7,709	$124,054	0.01%
Jobs	3.3	3.1	0.4	6.8	0.03%
Total Effects					
Income	$91,780	$83,587	$11,503	$186,870	0.02%
Jobs	4.4	4	0.6	9	0.04%

Table 16. Changes in regional income and employment from changing NER sleigh ride nonresident visitation.

State of Wyoming	Primary purpose visitors	Equal purpose visitors	Incidental purpose visitors	Total	% state total
Current NER visitor impacts					
Direct Effects					
Income	$185,571	$281,232	$106,422	$573,225	0.004%
Jobs	13	19.4	7.4	39.8	0.012%
Total Effects					
Income	$316,071	$468,843	$171,917	$956,831	0.007%
Jobs	17.9	26.7	9.9	54.5	0.017%
				Change in total	% change in state total
Change in NER Visitor Impacts by Alternative					
Alternative 2: Reduced feeding					
Direct Effects					
Income	-$91,295	-$73,743	-$22,982	-$188,020	-0.001%
Jobs	-6.4	-5.1	-1.6	-13.1	-0.004%
Total Effects					
Income	-$155,498	-$122,938	-$37,126	-$315,562	-0.002%
Jobs	-8.8	-7	-2.1	-17.9	-0.005%
Alternative 3: Increased feeding					
Direct Effects					
Income	$13,665	$1,658	$5,698	$21,021	0.000%
Jobs	1	0.1	0.4	1.5	0.000%
Total Effects					
Income	$23,275	$2,761	$9,205	$35,241	0.000%
Jobs	1.3	0.2	0.5	2	0.001%
Alternative 4 V1: No Active Management					
Direct Effects					
Income	-$88,388	-$115,283	-$29,902	-$233,573	-0.002%
Jobs	-6.2	-8	-2.1	-16.3	-0.005%
Total Effects					
Income	-$150,545	-$192,189	-$48,304	-$391,038	-0.003%
Jobs	-8.5	-11	-2.8	-22.3	-0.007%
Alternative 4 V2: Current Feeding and Bison Hunting					
Direct Effects					
Income	$47,828	$49,679	$5,466	$102,973	0.001%
Jobs	3.3	3.4	0.4	7.1	0.002%
Total Effects					
Income	$81,463	$82,820	$8,830	$173,113	0.001%
Jobs	4.6	4.7	0.5	9.8	0.003%

As might be expected in the larger Wyoming economy, while the absolute employment effects are slightly larger than the local economy, the percent of total employment changes are much smaller due to the larger job base and significant employment in non-tourism sectors of Wyoming. Specifically, losses of 22.3 jobs in Wyoming associated with management option 4V1 accounts for less than one-hundredth of 1% of employment in Wyoming. By comparing employment changes in Teton County WY and ID to employment changes in Wyoming, one can observe that there are only a few additional jobs lost due to broader multiplier effects in Wyoming. A breakdown of

the distribution of NER visitor spending income and job impacts by economic sector and key industry is presented in Appendix D.

Economic Impact Results for Grand Teton National Park

The same procedures explained for the NER visitor spending results were followed to derive GTNP visitor spending. According to GTNP statistics, there were on average 2,644,316 annual GTNP recreation visitors between 1997 and 2001. However, since our survey focused on summer/fall type visits, we used the five year average visitation from May through October. This totaled 2,349,069. From our survey results we estimated 2,163,493 of the visitors (92.1%) are non local. Of the non local visitors we estimated that 23.8% were primary purpose visitors, 71.6% equal purpose visitors, and 4.6% visited GTNP as an incidental trip purpose. Only about 10–20% of GTNP visitors indicated they would change their current number of trips with changes in wildlife management proposed in the survey.

Table 17 presents the responses of Grand Teton National Park summer visitors to possible changes in management. While the percentage change in visitation is smaller than for the NER, the total change in visitation is much larger due to Grand Teton National Park having a much larger baseline summer visitation than NER sleigh rides. Appendix D presents the 90% confidence intervals around these estimates to provide both a likely range of change in visitor use estimates.

Table 17. Results of contingent trip behavior responses of non local visitors to Grand Teton National Park.

Management option	Primary trip purpose visitors	Equal trip purpose visitors	Incidental trip visitors	Total change	Percent change
	(23.8% of visitors)	(71.6% of visitors)	(4.6% of visitors)		
#2 reduced feeding	-48,767	-156,646	-13,891	-219,305	-10.14%
#3 increased feeding	-43,032	-86,065	-30,865	-159,962	-7.39%
#4V1 no active management	-107,883	-291,576	-33,240	-432,699	-20.00%
#4V2 current feeding and bison hunting	17,929	-53,789	47,812	11,953	0.55%

Table 18 illustrates the amount spent by non-locals in the local economy and total spent by nonresidents within the State of Wyoming by summer GTNP visitors. Because GTNP shares an entrance station with Yellowstone NP (and most equal and incidental visitors reported going to Yellowstone), spending reported on Park entrance fees were excluded for equal and incidental visitors.

Table 18 shows that primary, equal and incidental purpose visitors spend the most on hotels, restaurants, followed by supplies and souvenirs. Equal purpose visitors spend on average almost twenty dollars less per day than primary and incidental visitors in Teton County. Primary purpose visitors spend significantly more per group than equal and incidental purpose visitors. The differences in spending patterns can be explained by the differences in visitor characteristics by trip purpose. Survey results reported in Table 19 show that on average, visitors with the primary purpose of visiting GTNP spent more days (6.85 days) than those visiting GTNP as an equally important (3.92 days) or incidental stop (2.27 days) during their visit to Jackson Hole. Equal and incidental visitors had on average more people in their group than primary purpose visitors. These results are opposite those of NER visitors where equal and incidental purpose visitors spent more per group and more days in Jackson Hole than primary purpose visitors.

GTNP Visitor Spending Allocation

Similar to the allocation of the NER sleigh ride visitor spending, it is important to account for the differing motivations visitors have for coming to Jackson Hole and the importance of GTNP in relation to the overall trip purpose. To allocate spending associated with GTNP visits, we attributed 100% of the trip expenditures of non-local visitors who indicated GTNP was the primary purpose or sole destination of their trip. As shown in Table 19,

Table 18. Average GTNP visitor spending.

	Primary purpose trip visitor spending		Equal purpose trip visitor spending		Incidental purpose trip visitor spending	
	$ per group	$ per person per day	$ per group	$ per person per day	$ per group	$ per person per day
Spending by non-locals in Teton County WY and ID						
Hotel	840.78	46.00	381.06	29.65	196.46	38.02
Restaurants	233.05	12.75	154.60	12.03	94.50	18.29
Grocery stores	100.43	5.50	59.24	4.61	15.43	2.99
Supplies and souvenirs	230.77	12.63	123.54	9.61	54.77	10.60
Equipment rental and tram tickets	24.64	1.35	19.56	1.52	11.86	2.29
Camping	42.10	2.30	31.79	6.31	10.03	1.94
Guide/horseback riding fees	99.70	5.46	47.00	3.66	39.51	7.65
Gasoline/related automobile costs	89.13	4.88	52.24	4.06	32.43	6.28
Other expenses	110.85	6.06	77.04	5.99	22.05	6.64
Total spending in Teton County	**1,771.45**	**96.93**	**946.07**	**77.44**	**477.04**	**94.70**
Spending by nonresidents in the State of Wyoming						
Hotel	917.20	50.12	516.34	39.95	232.89	43.25
Restaurants	283.95	15.52	240.03	18.57	148.35	27.55
Grocery stores	117.74	6.43	99.07	7.66	36.82	6.84
Supplies and souvenirs	255.96	13.99	170.34	13.18	100.06	18.58
Equipment rental and tram tickets	27.20	1.49	22.32	1.73	23.71	4.40
Camping	51.76	2.83	47.63	3.69	16.84	3.13
Guide/horseback riding fees	101.48	5.55	56.17	4.35	46.12	8.56
Gasoline/related automobile costs	147.34	8.05	111.74	8.64	75.32	13.99
Other expenses	129.75	7.09	140.94	10.90	38.93	7.23
Total spending in Wyoming	**2032.38**	**111.07**	**1404.58**	**108.67**	**719.04**	**133.53**

Note averages for average length of stay and group size are in Table 19.

Table 19. GTNP non-local visitor trip characteristics by trip purpose.

	Primary purpose visitors	Equal purpose visitors	Incidental purpose visitors
Average number of persons in group sharing expenses	2.67	3.28	2.28
Average number of days spent in Jackson Hole	6.85	3.92	2.27
Average number of days spent in Grand Teton	5.81	2.6	1.13
Time attributed in the economic impact analysis	Full trip	2 days	1 day

visitors with the primary purpose of visiting the GTNP spent an average of 6.85 days in Jackson Hole, with most of this time being spent in the Park. Because equal purpose visitors spend an average of 2.6 days in GTNP (as shown in Table 19), to be conservative we only allocated two days worth of their spending towards their GTNP visit. For individuals on spur of the moment stops at GTNP, we attributed a days worth of their spending, since this was approximately how much time they spent in the Park as shown in Table 19. We used one day to be conservative, since most would just be spending the day in GTNP.

Table 20 shows the current level of spending and the changes in spending for each management alternative for non-local visitors in Teton County WY and ID, and nonresident visitors in the State of Wyoming. On average, current GTNP non-local visitors spend $589.9 million in the local economy each year. Current GTNP nonresident visitors spend $729.8 million in the State of Wyoming each year. Alternative 4V1 would have the largest overall reduction in spending with non-local visitors spending 20.3% less in Teton County WY and ID and nonresident visitors spending 19.7% less in Wyoming than the current levels of spending. Spending decreases in all management options except 4V2 which has a slight increase in spending.

Table 20. Visitor spending in Teton County by trip purpose.

	Primary purpose visitors		Equal purpose visitors		Incidental purpose visitors		Total	
Non-local spending in Teton County WY and ID								
Current spending	$341,664,835		$238,903,294		$9,340,035		$589,908,163	
Change in spending								
	$	%	$	%	$	%	$	%
Alt 2	-32,372,683	-9.5%	-24,148,547	-10.1%	-1,309,366	-14.0%	-57,830,596	-9.8%
Alt 3	-28,565,502	-8.4%	-13,267,780	-5.6%	-2,909,335	-31.1%	-44,742,618	-7.6%
Alt 4v1	-71,614,893	-21.0%	-44,949,356	-18.8%	-3,133,202	-33.5%	-119,697,452	-20.3%
Alt 4v2	11,902,293	3.5%	-8,292,035	-3.5%	4,506,759	48.3%	8,117,017	1.4%
	Primary purpose visitors		Equal purpose visitors		Incidental purpose visitors		Total	
Nonresident Spending in the State of Wyoming								
Current spending	$383,752,923		$333,036,714		$13,032,335		$729,821,971	
Change in spending								
	$	%	$	%	$	%	$	%
Alt 2	-35,156,283	-9.2%	-30,142,802	-9.1%	-1,848,851	-14.2%	-67,147,936	-9.2%
Alt 3	-32,978,406	-8.6%	-20,549,855	-6.2%	-4,102,402	-31.5%	-57,630,663	-7.9%
Alt 4v1	-78,509,053	-20.5%	-60,794,373	-18.3%	-4,435,134	-34.0%	-143,738,560	-19.7%
Alt 4v2	13,722,398	3.6%	-11,621,939	-3.5%	6,346,740	48.7%	8,447,199	1.2%

Local Income and Employment Impacts associated with Non-local GTNP Visitation

The economic impacts associated with GTNP spending are estimated as described in the NER visitor impact section. As previously discussed, for the average spending we attributed the entire trip spending (6.85 days) for primary purpose visitors, two days of spending for equal purpose visitors, and one day of spending for incidental trip purpose visitors. The results of the contingent trip behavior responses by alternative from Table 17 were used to determine the economic impacts associated with each management alternative. The IMPLAN modeling system was used to derive the multipliers that capture the secondary (indirect and induced) effects of visitor spending.

Table 21 shows the economic impacts associated with current GTNP visitation and the changes in economic impacts by management alternative for Teton County WY and ID. The table shows the direct change and

Table 21. Economic impacts associated with current non-local GTNP Visitation and the changes in economic impacts by management alternative for Teton County WY and ID.

	Primary purpose visitors	Equal purpose visitors	Incidental purpose visitors	Total	% county total
Current non-local GTNP visitor impacts					
Direct Effects					
Income	$115,851,965	$81,576,798	$3,291,310	$200,720,073	19.54%
Jobs	6073.6	4408.2	176.5	10658.3	41.62%
Total Effects					
Income	$177,080,091	$124,366,469	$5,019,819	$306,466,379	29.84%
Jobs	8169.7	5859.8	235.9	14265.4	55.71%
				Change in total	% change in county total
Change in non-local GTNP visitor impacts by management option					
Option 2: Reduced feeding					
Direct Effects					
Income	-$10,976,895	-$8,245,852	-$461,404	-$19,684,151	-1.92%
Jobs	-575.5	-445.6	-24.7	-1045.8	-4.08%
Total Effects					
Income	-$16,778,218	-$12,571,068	-$703,721	-$30,053,007	-2.93%
Jobs	-774.1	-592.3	-33.1	-1399.5	-5.47%
Option 3: Increased feeding					
Direct Effects					
Income	-$9,686,012	-$4,530,466	-$1,025,213	-$15,241,691	-1.48%
Jobs	-507.8	-244.8	-55	-807.6	-3.15%
Total Effects					
Income	-$14,805,099	-$6,906,841	-$1,563,627	-$23,275,567	-2.27%
Jobs	-683	-325.4	-73.5	-1081.9	-4.23%
Option 4 V1: No active management					
Direct Effects					
Income	-$24,283,231	-$15,348,574	-$1,104,101	-$40,735,906	-3.97%
Jobs	-1273.1	-829.4	-59.2	-2161.7	-8.44%
Total Effects					
Income	-$37,116,993	-$23,399,397	-$1,683,945	-$62,200,335	-6.06%
Jobs	-1712.4	-1102.5	-79.1	-2894	-11.30%
Option 4 V2: Current feeding and bison hunting					
Direct Effects					
Income	$4,035,726	-$2,831,455	$1,588,125	$2,792,396	0.27%
Jobs	211.6	-153	85.2	143.8	0.56%
Total Effects					
Income	$6,168,619	-$4,316,645	$2,422,166	$4,274,140	0.42%
Jobs	284.6	-203.4	113.8	195	0.76%

the total change (e.g., the multiplier effect) of income and jobs by visitor trip purpose. Current GTNP summer visitation has a substantial role in the local economy, accounting for almost 30% of personal income and 56% of employment. Primary purpose visitors accounted for the largest proportion of income and jobs generated. Changes by GTNP in management options will have noticeable impacts on county income and employment.

Management option 4V1 would have the largest loss of jobs (over 11% of county total) and income (over 6% of county total). Employment impacts are more significant than income impacts because most of the jobs lost are the lower paid jobs associated with tourism activities in the service and trade sectors of the economy. A breakdown of the distribution of GTNP visitor spending income and job impacts by economic sector and key industry is presented in Appendix E.

Regional Income and Employment Impacts associated with Nonresident GTNP Visitation

Table 22 presents a similar economic impact analysis for current GTNP nonresident visitation and the changes in economic impacts by management options for the State of Wyoming. From our survey results we estimated that 2,121,209 of the total summer GTNP visitors (90.3%) were nonresidents. The economic impacts in the State of Wyoming are the summed expenditures that nonresident visitors reported spending in the Jackson Hole area and the amount spent in rest of Wyoming en route to the Jackson Hole area. The table shows the direct change and the total change (e.g., the multiplier effect) of income and jobs by visitor trip purpose. On average, current GTNP nonresident visitors accounted for $391,767,251 in personal income (2.9%) and 21,588 of jobs (6.57%) in the State of Wyoming. A breakdown of the distribution of GTNP visitor spending income and job impacts by economic sector and key industry is presented in Appendix E.

While the absolute and total job losses in Wyoming are larger than Teton County, the relative impact of these job losses on the larger and more diversified Wyoming economy is much smaller than the relative effect on Teton County WY and ID.

Total (NER and GTNP) Visitor Local and Regional Economic Impacts

Table 23 summarizes the current total level of spending of NER sleigh ride visitors and GTNP summer visitors and the changes in spending for each management alternative for non-local visitors in Teton County WY and ID, and nonresident visitors in the State of Wyoming. NER sleigh ride visitors account for less than one half of a percent of total non-local spending in Teton County WY and ID and nonresident spending in Wyoming. It is important to note that while the alternatives (Figures 11 and 12) show the number of hunters on BTNF, NER, and GTNP changing across the alternatives, the number of hunters or the amount of their expenditures are not included in this study.

Table 24 summarizes the total economic impacts associated with non-local NER sleigh ride visitors and GTNP non-local summer visitors and the changes in total economic impacts by management alternative for Teton County WY and ID. The table shows the direct change and the total change (e.g., the multiplier effect) of income and jobs by visitor trip purpose. Given that GTNP summer visitors account for over 99% of the total visitation impacts, the total local impact percentage results presented in Table 24 are similar to the results the total GTNP impact percentage results presented in Table 22.

Table 25 summarizes the total economic impacts associated with nonresident NER sleigh ride visitors and GTNP summer nonresident visitors and the changes in total economic impacts by management alternative for the State of Wyoming. Similar to the previous table, the total regional impact percentage results presented in Table 25 are almost identical to the results the total GTNP impact percentage results presented in Table 23.

Table 22. Changes in State of Wyoming income and employment from changing GTNP summer nonresident visitation.

Wyoming	Primary purpose visitors	Equal purpose visitors	Incidental purpose visitors	Total	% state total
Current nonresident GTNP visitor impacts					
Direct Effects					
Income	$123,326,004	$101,512,422	$3,840,443	**$228,678,869**	*1.69%*
Jobs	8135.5	6941.2	265.2	**15341.9**	*4.67%*
Total Effects					
Income	$210,063,010	$175,096,111	$6,608,130	**$391,767,251**	*2.90%*
Jobs	11470.9	9746.2	370.8	**21587.9**	*6.57%*
				Change in total	% change in state total
Change in nonresident GTNP visitor impacts by alternative					
Alternative 2: Reduced feeding					
Direct Effects					
Income	-$11,298,113	-$9,218,644	-$557,113	**-$21,073,870**	*-0.16%*
Jobs	-745.3	-630.3	-38.5	**-1414.1**	*-0.43%*
Total Effects					
Income	-$19,244,244	-$15,900,995	-$958,606	-$36,103,845	*-0.27%*
Jobs	-1050.9	-885.1	-53.8	-1989.8	*-0.61%*
Alternative 3: Increased feeding					
Direct Effects					
Income	-$10,598,213	-$6,284,811	-$1,236,173	**-$18,119,197**	*-0.13%*
Jobs	-699.1	-429.7	-85.4	**-1214.2**	*-0.37%*
Total Effects					
Income	-$18,052,094	-$10,840,504	-$2,127,043	**-$31,019,641**	*-0.23%*
Jobs	-985.8	-603.4	-119.3	**-1708.5**	*-0.52%*
Alternative 4 V1: No active management					
Direct Effects					
Income	-$25,230,316	-$18,592,885	-$1,336,434	**-$45,159,635**	*-0.33%*
Jobs	-1664.4	-1271.3	-92.3	**-3028**	*-0.92%*
Total Effects					
Income	-$42,975,171	-$32,070,380	-$2,299,561	**-$77,345,112**	*-0.57%*
Jobs	-2346.7	-1785.1	-129	**-4260.8**	*-1.30%*
Alternative 4 V2: Current feeding and bison hunting					
Direct Effects					
Income	$4,409,943	-$3,554,365	$1,912,457	**$2,768,035**	*0.02%*
Jobs	290.9	-243	132.1	**180**	*0.05%*
Total Effects					
Income	$7,511,521	-$6,130,830	$3,290,704	**$4,671,395**	*0.03%*
Jobs	410.2	-341.3	184.6	**253.5**	*0.08%*

Table 23. Current and change in total visitor spending by management option.

Non-local visitor spending in Teton County WY and ID				
	NER visitation	**GTNP visitation**	**Total visitation**	
Current spending				
	$1,955,422	$589,908,163	$591,863,585	
Change in spending				
	$	$	$	%
Alt 2	-667,540	-57,830,596	-58,498,136	-9.9%
Alt 3	141,734	-44,742,618	-44,600,884	-7.5%
Alt 4v1	-869,508	-119,697,452	-120,566,960	-20.4%
Alt 4v2	379,050	8,117,017	8,496,067	1.4%
Nonresident spending in the State of Wyoming				
	NER visitation	**GTNP visitation**	**Total visitation**	
Current spendin*g*				
	$1,752,993	$729,821,971	$731,574,964	
Change in Spending				
	$	$	$	%
Alt 2	-596,912	-67,147,936	-67,744,848	-9.3%
Alt 3	68,274	-57,630,663	-57,562,389	-7.9%
Alt 4v1	-725,286	-143,738,560	-144,463,846	-19.7%
Alt 4v2	327,032	8,447,199	8,774,231	1.2%

Table 24. Current and change in total economic impacts in Teton County WY and ID by management option.

Teton County WY and ID	NER visitation	GTNP visitation	Total visitation	% county total
Current visitor impacts in Teton County WY and ID				
Direct Effects				
Income	$667,855	$200,720,073	**201,387,928**	*19.6%*
Jobs	37.3	10,658.3	**10,695.6**	*41.8%*
Total Effects				
Income	$1,006,019	$306,466,379	**307,472,398**	*29.9%*
Jobs	48.9	14265.4	**14,314.3**	*55.9%*
			Change in total visitation	% change in county total
Change in visitor impacts by management option				
Option 2: Reduced feeding				
Direct Effects				
Income	-$221,881	-$19,684,151	**-$19,906,032**	*-1.9%*
Jobs	-12.3	-1,045.8	**-1,058.1**	*-4.1%*
Total Effects				
Income	-$32,299	-$30,053,007	**-30,085,306**	*-2.9%*
Jobs	-16.2	-1,399.5	**-1,415.7**	*-5.5%*
Option 3: Increased feeding				
Direct Effects				
Income	$46,899	-$15,241,691	**-$15,194,792**	*-1.5%*
Jobs	2.6	-807.6	**-805.0**	*-3.1%*
Total Effects				
Income	$70,566	-$23,275,567	**-$23,205,001**	*-2.3%*
Jobs	3.4	-1,081.9	**-1,078.5**	*-4.2%*
Option 4 V1: No active management				
Direct Effects				
Income	-$295,888	-$40,735,906	**-$41,031,794**	*-4.0%*
Jobs	-16.5	-2,161.7	**-2,178.2**	*-8.5%*
Total Effects				
Income	-$446,049	-$62,200,335	**-$62,646,384**	*-6.1%*
Jobs	-21.6	-2,894.0	**-2,915.6**	*-11.4%*
Option 4 V2: Current feeding and bison hunting				
Direct Effects				
Income	$124,054	$2,792,396	**$2,916,450**	*0.3%*
Jobs	6.8	143.8	**150.6**	*0.6%*
Total Effects				
Income	$186,870	$4,274,140	**$4,461,010**	*0.4%*
Jobs	9.0	195.0	**204.0**	*0.8%*

Table 25. Current and change in total economic impacts in Wyoming by management option.

State	NER visitation	GTNP visitation	Total visitation	% state total
Current nonresident visitor impacts in Wyoming				
Direct Effects				
Income	$573,225	$228,678,869	**$229,252,094**	*1.7%*
Jobs	39.8	15,341.9	**15,381.7**	*4.7%*
Total Effects				
Income	$956,831	$391,767,251	**$392,724,082**	*2.9%*
Jobs	54.5	21587.9	**21642.4**	*6.6%*
			Change in total visitation	% change in state total
Change in nonresident visitor impacts by management option				
Option 2: Reduced feeding				
Direct Effects				
Income	-$188,020	-$21,073,870	**-$21,261,890**	*-0.2%*
Jobs	-13.1	-1,414.1	**-1,427.2**	*-0.4%*
Total Effects				
Income	-$315,562	-$36,103,845	**-36,419,407**	*-0.3%*
Jobs	-17.9	-1,989.8	**-2,007.7**	*-0.6%*
Option 3: Increased feeding				
Direct Effects				
Income	$21,021	-$18,119,197	**-$18,098,176**	*-0.1%*
Jobs	1.5	-1,214.2	**-1,212.7**	*-0.4%*
Total Effects				
Income	$35,241	-$31,019,641	**-$30,984,400**	*-0.2%*
Jobs	2.0	-1,708.5	**-1,706.5**	*-0.5%*
Option 4 V1: No active management				
Direct Effects				
Income	-$233,573	-$45,159,635	**-$45,393,208**	*-0.3%*
Jobs	-16.3	-3,028.0	**-3,044.3**	*-0.9%*
Total Effects				
Income	-$391,038	-$77,345,112	**-$77,736,150**	*-0.6%*
Jobs	-22.3	-4,260.8	**-4,283.1**	*-1.3%*
Option 4 V2: Current feeding and bison hunting				
Direct Effects				
Income	$102,973	$2,768,035	**$2,871,008**	*0.0%*
Jobs	7.1	180.0	**187.1**	*0.1%*
Total Effects				
Income	$173,113	$4,671,395	**$4,844,508**	*0.0%*
Jobs	9.8	253.5	**263.3**	*0.1%*

Effects of Wildlife Management Options on Local Visitation

Based on our visitor intercept sampling, local visitors take about 8% of the sleigh ride trips. Changes in local visitation with each management action are shown in Table 26. As noted above, spending by locals on the sleigh ride in the Jackson Hole area does not represent new money to the Jackson Hole economy, so a regional economic analysis is not appropriate. Thus, if there are 657 fewer sleigh ride trips by locals, they would likely spend this money on other recreational activities within the Jackson Hole area. There would be no net change in Jackson Hole spending.

Table 26. Change in local visitation to NER by management option.

Wildlife Mgmt Option	Net Change in Local Visitors	Percent change
#2 reduced feeding	-657	-33.30%
#3 increased feeding	-99	-5.00%
#4v1 no active management	-831	-42.10%
#4v2 current feeding and bison hunting	0	no net change

There are similarities in visitor response pattern between non locals and locals. As shown above the largest decrease in visitation occurs with Management Option #4V1, the no active management, followed by the reduced feeding option. The percent reductions in visitation are quite similar, with a 42% reduction for the No Active management, and 33% reduction with reduced feeding. Table 27 presents the change in local GTNP visitors by wildlife management option.

Table 27. Change in local visitation to GTNP by management option.

Wildlife Mgmt Option	Net Change in Local Visitors	Percent change
#2 reduced feeding	-37,115	-20.0%
#3 increased feeding	6,748	3.6%
#4v1 no active management	-48,112	-25.9%
#4v2 current feeding and bison hunting	-7,423	-4.0%

Management options #2 (reduced feeding) and #4V1 (no active management) results in a reduction of 20% and 26%, respectively of local visitors to Grand Teton National Park. Alternatively, management options #3 (increased feeding) and #4V2 (current feeding plus bison hunting at NER) result in a small increase and decrease in local visitors, respectively.

Statistical Analysis of Net Economic Benefits of Visiting the NER and GTNP

While changes in visitor spending and associated employment represent local economic effects, they do not measure the change in benefits to the visitors themselves. The benefits to the visitors are measured by how much the visitor would pay over and above their existing costs. This net willingness to pay is the standard measure of benefits in benefit cost analysis (Sassone and Shaefer, 1978; Loomis and Walsh, 1997).

To estimate the visitor's personal benefits from the NER sleigh ride and/or visit to Grand Teton National Park, a dichotomous choice contingent valuation question was used. Contingent Valuation is a method that uses a simulated or hypothetical market to determine how much more than the current costs visitors would pay for their trip experience. The method is recommended for use by federal agencies performing benefit cost analysis (U.S. Water Resources Council, 1983). As suggested by the NOAA panel on contingent valuation (Arrow and others, 1993), we asked a dichotomous choice format question. In this case, the visitor must only decide whether the trip was worth more than the added cost written into the question. The specific question asked was:

"As you know, some of the costs of travel such as gasoline often changes. If the **total cost** of this most recent trip to the National Elk Refuge or Grand Teton National Park had been $____**higher**, would you have made this trip to the Park or Refuge?

Circle one: YES NO"

The blank was filled in with one of fifteen different dollar amounts. The dollar amounts ranged from a low of $4 more to $375 more. The range was picked based on past visitor surveys. Specifically, the bid design drew upon a successful CVM dichotomous choice survey conducted in Rocky Mountain National Park, the previous summer. We believed these natural resources were similar enough to use essentially the same bid design. The goal was to have a dollar amount low enough that nearly all visitors would answer yes, and a dollar amount high enough that nearly all visitors would answer no to. The remaining dollar amounts were $7, 10, 15, 20, 30, 40, 50, 60, 70, 90, 125, 175, and 250. The CVM question was pretested in 21 one-on-one pretests. These pretests did not indicate any confusion with this question.

Since respondents simply answer "Yes" or "No" to a single dollar amount, it is necessary to estimate a statistical model to infer what their maximum willingness to pay is for each management strategy. Specifically, if a respondent answers Yes to $10, we know their WTP is greater than $10. How much more they might pay must be determined evaluating the percentage of Yes responses at each dollar amount across the full range of dollar amounts asked of the sample. This involves estimating a multiple regression, with a particular distribution known as the logistic distribution. The logistic distribution is chosen because it limits the range of the dependent variable of the regression to between zero and one. Since our responses (and the estimated probabilities that a respondent will pay) must be between zero and one, this is an appropriate statistical distribution to use. The logistic distribution is the most commonly used statistical distribution for estimating willingness to pay from a dichotomous choice CVM question. The basic format of the simple logistic regression is:

(1) log(Yes/1-Yes)= Bo-B1(Dollar Bid Amount)

where Bo is the intercept or constant term and B1 is the slope coefficient on the dollar amount visitors were asked to pay. We expect as the dollar amount visitors were asked to pay increases, that the probability they would pay that amount would decrease, hence the negative sign on the B1 coefficient. Using the logit coefficients, the mean net willingness to pay is calculated as:

(2) Mean WTP= (natural log(1+exp(Bo)))/B1.

Appendix F presents the response proportions at each bid level for the Grand Teton National Park samples used in the logit analysis as these represent by far the vast majority of visitors.

National Elk Refuge Recreation Valuation

Table 28 presents the results of the simple logit regressions as well as the mean WTP of NER visitors. The T-statistics indicate whether the coefficients are significantly different from zero. T-statistics larger than 1.965 indicate significance at the 5% level, while T-statistics larger than 2.56 indicate statistical significance at the 1% level. As can be seen in this table, the coefficients on the bid amount are negative and statistically significant at the 5% to 1% level. This indicates the higher the dollar amount respondents were asked to pay, the lower the probability they would pay. This demonstrates that respondents seriously considered the amount of money they were asked to pay, as those asked to pay the higher dollar amounts were less likely to continue to visit.

Table 28 displays the logistic regression results, and the mean WTP per person per day for the locals and non-locals participating in the winter elk viewing sleigh ride at the NER. Non local group size averaged 2 people, while it was three for locals. The length of trip was one day for locals and slightly more than 4 days for visitors.

Table 28. Logistic regression coefficients and mean net willingness to pay (WTP) of NER visitors.

	Non local visitors			Local visitors		
Variable	**Coefficient**	**T-statistic**	**Probability**	**Coefficient**	**T-statistic**	**Probability**
Constant	1.7245	10.42	0	1.833	3.058	0.002
Bid	-0.00429	3.97	0.0001	-0.02617	2.51	0.012
Likelihood ratio statistic	15.28		0	10.12		0.001
Mean WTP per group trip	$440			$76		
Mean WTP per person per day	$51.78			$25.24		
N=	*430*			*37*		

Note: while sample size was 457 for non locals and 43 for locals, the N reports the number of respondents that answered the question

These figures indicate that the typical non local visitor would pay about $52 more per day for their trip to the National Elk Refuge, while locals would pay about $25 more per day. The difference is plausible, given that locals have the opportunity to see elk much of the winter in Jackson Hole, while for non-locals, seeing large herds of elk is a rare opportunity. Applying the respective net WTP to the change in visitor days associated with each alternative results in the following change in benefits for NER visitors.

Table 29. Overall change in NER sleigh ride visitation and viewer recreation benefits.

	Non local visitors		Local visitors		Change in total recreation value
Management option	**Change in visits**	**Change in value**	**Change in visits**	**Change in value**	
#2 reduced feeding	-6488	-$335,946	-658	-$16,608	-$352,554
#3 increased feeding	1427	$73,869	-98	-$2,474	$71,395
#4v1 no active management	-9215	-$477,136	-831	-$20,974	-$498,110
#4v2 current feeding and bison hunting	3219	$166,692	0	$0	$166,692

To provide some perspective on the significance of the changes in economic benefits of the NER sleigh rides with each management option, we note that estimated current benefits are $1.175 million for non local visitors and $49,798 for local visitors, for a total of $1.225 million annually. Thus changes associated with management option #2 represent a loss of about 30% reduction in NER sleigh ride value. Changes associated with management option 4V1, no active management represent a reduction of 41% of recreation value to NER sleigh ride visitors. Alternatively, current feeding plus allowing bison hunting on NER would increase the value by about 15%.

The same type of referendum contingent valuation willingness to pay question asked of National Elk Refuge Visitors was asked of Grand Teton National Park visitors.

Grand Teton National Park Recreation Valuation

Table 30 presents the results of the dichotomous choice CVM logit model for summer visitors to Grand Teton National Park. For both non locals and locals, the intercept and bid slope coefficients are statistically significant at the 1% level. The negative sign on the bid slope coefficient indicates the higher the dollar amount the visitor was asked to pay, the lower the probability they would pay that amount for their most recent visit to Grand Teton National Park. The overall trip mean is $718. The mean WTP per non local group trip composed of an average group size of 4.74 with an average length of stay of 3.3 days was $45.88 per person per day. On a per person, per trip basis the net WTP is $151.42. For local visitors, their day trips with an average group size of 3.3 were $29.29 per day.

Table 30. Logistic regression coefficients and mean net willingness to pay (WTP) for summer Grand Teton National Park visitors.

	Non local visitors			Local visitors		
Variable	**Coefficient**	**T-statistic**	**Probability**	**Coefficient**	**T-statistic**	**Probability**
Constant	2.702	10.42	0	1.5237	3.268	0.001
Bid	-0.003855	3.97	0.0001	-0.017802	2.51	0.012
Likelihood ratio statistic	84.27		0	7.625		0.005
Mean wtp per group trip	$718			$97		
Mean WTP per person per day	$45.88			$29.29		
N =	***745***			***53***		

Note: while sample size was 765 for non locals and 57 for locals, the N reports the number of respondents that answered the question.

Table 31 presents the overall change in recreation benefits to locals and non-locals for each management option. With annual recreation benefits of $333 million, the management options result in a change in benefits ranging from -20% for management option #4V1 (no active management) to +.5% for management option #4V2 (current feeding plus bison hunting in NER).

Table 31. Overall change in GTNP visitation and recreation benefits.

	Non local visitors		Local visitors		Chg. total recreation value
Management option	**Change in visits**	**Change in value**	**Change in visits**	**Change in value**	
#2 reduced feeding	-219,305	-$33,207,949	-37,115	-$1,087,189	-$34,295,138
#3 increased feeding	-159,962	-$24,222,019	6,748	$197,655	-$24,024,354
#4v1 no active management	-432,699	-$65,520,834	-48,221	-$1,412,511	-$66,933,345
#4v2 current feeding and bison hunting	11,953	$1,809,966	-7,423	-$217,438	$1,592,528

Chapter 4. Comparison of Survey Results to Historic Park Visitation Data

An alternative to relying on survey responses of intended behavior is to statistically test whether historic aggregate Park visitation is associated with elk and bison populations. In principle, the advantage of this approach is that it is based on actual behavior. The drawback is that this approach does not track the same individual's responses to changes in elk and bison population, so it may be less sensitive. The regressions also do not consider a host of other relevant changes in management that are outside the available data (e.g., allowing bison hunting on the NER).

Regression Model Specification

Following Weiler and others (2003) statistical visitation model for Rocky Mountain National Park, we specified Peak Season (June through September) visitation as a function of U.S. population and income, energy prices as a proxy for gasoline travel costs, inflation adjusted entrance fees, weather, and elk and bison populations. In addition to account for the Yellowstone fire, we included an intercept shifter variable for the initial summer of the fires and the year after (due to damage to facilities). Specifically our model is:

PSVisits = Bo+B1(USPop)+B2(PCIncome)+B3(Penergy)+B4(RealEFee)+B5(NERElkNum)+

B6(Bison)+ B7(Temp)+B8(Precip)+B9(YNPFire) +B10 (YNPVisits)

where:

PSVisits = is peak season visits to GTNP (June through September) from 1984–2001.

USPop is U.S. population

PCIncome is inflation adjusted per capita income

Penergy is price index of energy prices to reflect cost of travel

RealEFee is the inflation adjusted entrance fee to GTNP

NERElkNum: the NER elk population estimate as a proxy for GTNP summer elk

Bison: The number of bison

Temp: Average Temperature in August

Precip: Monthly Precipitation in August

YNPFires: a dummy variable equal to one for summer 1998 and 1999 due to Yellowstone fires and damage to visitor facilities.

YNPVisits: Visits to Yellowstone National Park

YNPFires and YNPVisits are included due to the proximity of Grand Teton National Park to Yellowstone, and the remoteness of both parks from major population centers on the east and west coast. It is believed that visitation to Yellowstone National Park might influence visitation to Grand Teton National Park. In particular, that when people are either in the region visiting Yellowstone National Park or on the way to Yellowstone, they may as part of the same trip in the region visit Grand Teton National Park.

Our purpose is to determine whether GTNP visitation is related or associated with NERElkNum and Bison populations. The other variables such as income or energy prices are simply to account for other factors that may influence visitation. Due to Grand Teton National Park changing the method it used for counting visitors in 1984–1991, we also included a dummy variable to account for this effect (GTNPCHGCNT). Temperature and precipitation in August were used because July had two years with missing data.

To evaluate the robustness of any results, we estimated both a linear model and a double log model. Variables with the letter **L** in front indicate the natural log of that variable. The advantage of the double log model is that the coefficients can be interpreted as a relative measure, called elasticities. An elasticity expresses the regression slope coefficient as the percentage change in the dependent variable (e.g., visits) for every 1% change in the independent variable. This allows for accurate comparisons across models, regardless of the particular units of the

independent or dependent variables. In addition, a non-linear model allows for diminishing marginal effect of variables on visitation. However, the linear model has the attraction of the coefficient being interpreted as the absolute change in visits with a one unit change in the independent variable.

To determine whether the independent variables such as NERElkNum and Bison are significantly different from zero, we rely upon a t-test of their respective coefficients. If the t-statistic is greater than 1.64 this means there is only a 10% chance of error in concluding that the independent variable has a statistically significant relationship with the dependent variable (e.g., GTNP visitation).

Regression Data Sources

Data on June–September visitation was provided by GTNP. Data on the number of elk and bison were provided by the U.S. Fish and Wildlife Service. Population, income and energy price index were obtained from the Statistical Abstract of the U.S. and U.S. Census Bureau. Weather data came from Western Regional Climate Center website. Our data series covers the years 1984 to 2001.

Regression Statistical Results

Prior to initiating the regressions, we tested for correlation among the independent variables by using a correlation matrix. It was determined that U.S. Population was highly correlated with real price of energy and several other variables A solution to this problem was to model the dependent variable as total visits divided by US population, i.e., visits per capita. This is a typical specification in many travel cost method demand models (Loomis and Walsh, 1997).

Regression Results

Tables 32 and 33 below provide the results. Original model variables not appearing in these table were statistically insignificant (e.g., energy prices, per capita income). That is, their effect was not different from zero and therefore was dropped. Only variables that were significantly different from zero were retained. Thus elk (but not bison) was statistically different from zero. The higher the temperature in August, the greater monthly visitation. The higher the real entrance fee, the lower visitation, although the effect is quite small. GTNP visitation is positively influenced by the number of visitors going to Yellowstone National Park. Note, the relationship is not proportionate, as GTNP changes by about .5% for every 1% change in Yellowstone National Park visitation in the LVCAP model in Table 33. Both models have excellent explanatory power with over 90% of the variation in annual visits to Grand Teton National Park explained by the independent variables.

In both the linear and log model specifications, the number of elk has a statistically significant association with visitation to GTNP at the 1% significance level. To ascertain how much additional explanatory power is provided by the inclusion of the elk population variable, the linear regression model was run without this variable. The difference in the R Square or explanatory power from including elk population was only 2% in the linear model. Thus the contribution to explaining the year to year variation in visitation is quite small. Nonetheless, the elk populations association is statistically different from zero (i.e., no effect). The effect is just smaller than other factors. This can be seen by comparing the coefficients in Table 33. Since this is a double log model, the coefficients are standardized to elasticities and are therefore comparable. You can see that LYNPVISITS (log of Yellowstone National Park Visits) has an elasticity of .48, while LNERELKNUM (elk numbers) is .13. Thus, a 1% change in visits to Yellowstone is associated with a .48% change in visits to Grand Teton National Park, while a 1% change in elk is only associated with a .13% change in visits to Grand Teton National Park.

Table 32. Linear regression model of Grand Teton National Park peak season (June–September) visitation.

Dependent variable: visits per capita; n = 18				
Variable	**Coefficient**	**Std. Error**	**t-statistic**	**Probability**
C	1.091883	1.620841	0.673	0.5144
NERELKNUM	0.000161	4.87E-05	3.301	0.0071
AUGTEMP	0.062935	0.028186	2.232	0.0473
GTNPCHGCNT	-1.663735	0.173292	-9.600	0.0000
YNPFIRES	-0.936943	0.257059	-3.644	0.0039
REALEFEE	-0.048983	0.022969	-2.132	0.0563
YNPVISITS	1.64E-06	4.16E-07	3.949	0.0023
R-squared	0.986	Mean dependent var 8.655		
Adjusted R-squared	0.978	F-statistic 129.668		
Durbin-Watson stat	1.849	Prob(F-statistic) 0.000		

Table 33. Log regression model of Grand Teton National Park peak season (June–September) visitation.

Dependent variable: Log visits per capita; n = 18				
Variable	**Coefficient**	**Std. Error**	**t-statistic**	**Probability**
C	-7.764005	1.430242	-5.428	0.0002
LNERELKNUM	0.130695	0.040289	3.243	0.0078
LTEMP	0.439261	0.186575	2.354	0.0382
GTNPCHGCNT	-0.189775	0.018903	-10.03	0.0000
YNPFIRES	-0.122657	0.031333	-3.914	0.0024
LREALEFEE	-0.035878	0.016905	-2.122	0.0573
LYNPVISITS	0.485738	0.106894	4.544	0.0008
R-squared	0.987	Mean dependent var 2.143		
Adjusted R-squared	0.980	F-statistic 146.577		
Durbin-Watson stat	1.825	Prob(F-statistic) 0.000		

Discussion of Regression Results

Using these two regression models, there are several ways to compare how visitation changes with the number of elk. One is to compare the responsiveness by means of an elasticity measure. The elasticity is a relative measure that indicates the percentage change in visitation with a 1% change in elk populations. The elk elasticities are .146 for the linear model and .13 for the log of visits per capita. This means that a 1% change in elk populations is associated with a .146% and .13% change in visitation using the respective models. Thus there is less than a proportionate relationship between the change in number of elk and visitation.

With the linear model, a given increase or decrease of 1,000 elk and has the same absolute effect on visitation regardless of the level of the elk population. This effect is given by the slope coefficient on NERElkNum in the linear regression model. Using the linear regression model (Table 32), each additional elk is associated with an average increase of .000161 more visits per capita to GTNP from during the peak season of June through

September. Multiplying this slope coefficient by the US population in thousands (285,024) yields an estimate of 45.8 more visits per elk.

With the non-linear models, the absolute change in visitation with a change in elk numbers depends on the level of elk. Since the elasticities are less than one, as populations increase, each additional animal is associated with a smaller and smaller increase in visitation. Table 34 presents the change in visitation associated with 1000 more elk at different levels of elk populations, relevant for the EIS alternatives, holding all other variables constant at their mean.

To allow for comparison of the regression results which were based on data provided by the National Park Service and U.S. Fish and Wildlife Service for the peak season (June through September) with the survey results which were based on a peak season of May through October, it was necessary to scale up the regression results by the additional two months. Using the five year average May and October visitation, relative to June through September, required scaling up the regression estimates of change in visits by 15%. The effect of changes in elk populations on visits are compared in Table 34.

The predicted change in visitation associated with an increase of 1000 more elk is similar for the linear and log models in the range of 7,000 to 9,000 elk. The models predict about 50,000 more visitors associated with another 1,000 elk, when elk populations are in the range of 7,000 to 9,000 elk.

Table 34. Change in May–October Grand Teton NP visits per 1,000 elk.

Number of elk	Linear model	Log visits per capita
4,000	52,670	104,454
5,000	52,670	83,769
6,000	52,670	70,281
7,000	52,670	60,743
8,000	52,670	53,616
9,000	52,670	48,076
10,000	52,670	43,637

Comparison of Regression Results to Survey Responses

It is interesting to compare the results of the historic change in visitation associated with different elk populations to that of responses to our survey scenarios. The general pattern of regression results are consistent with the survey responses for Management Option #2 (reduced feeding), Management Option 4V1 no active management, and Management Option 4V2. For Management Option #2, the survey scenarios involved a reduction in the number of elk from a midpoint of 6,000 elk currently to 5,000 elk. The corresponding estimate of reduced visitation from the survey responses was 219,300 fewer visits for Management Option #2. Using the regression results in Table 33, the regression equation would suggest a reduction of between 52,670 to 70,281 fewer visits due to the drop in elk numbers. These regression results would suggest the survey respondents' visitation is more sensitive to the number of elk and bison than past visitation would suggest. However, the differences between the regression approach and the survey may also be due to the survey scenarios including changes in other factors not included in the regression (e.g., the number of bison, the number of elk seen from the sleigh rides, number of hunters, winter elk mortality, etc.). If it was possible to account for these in the regression, the estimates from the two approaches might be much closer.

For Management Option 4V1, there is a reduction from the current midpoint of 6,000 elk to a midpoint of 4,000 elk. The survey results indicate this would result in a reduction of 432,700 visits with Management Option #4V1. The reduction in visitation related to elk in the regression model ranges from 105,340 with the linear regression (52,670 *2 since it is a 2,000 elk reduction) to 154,050 visits with the log of visits per capita. While the survey respondents appear more sensitive to the number of elk than past visitors, the survey scenario contained other factors than just changes in elk populations. Management Option 4V1 also has a reduction from the current 600 bison to 200 bison, higher winter elk mortality, and changes in hunting opportunities. If these factors could be accounted for in the regression, the estimates from the two approaches might be much closer.

Management Option #3 would result in the elk population in a typical year increasing from 6,000 to 8,500 for an increase of 2,500 elk. Survey respondents indicated their visitation would decrease by about 160,000 visits annually to GTNP with Management Option #3. Using the elk linear regression and log visits per capita coefficients, the regression equation predicts that visitation would rise by 131,675 with the linear model to 138,397 visits with the non linear model with an increase from 6,000 to 8,500 elk. Here the direction of change is different between the regression equation and the survey. However, Management Option #3, also involves a reduction in bison from current 600 to the range of 200–250. To the extent that visitation is influenced by bison numbers, the combined effect of elk gains and bison reductions on visitation could net each other out. There are also additional differences between the survey scenario and the variables in the regression equation that might be considered. Management Option #3 included a substantial increase in the number of elk hunters on the Bridger Teton National Forest as well as allowing limited bison hunting on the National Elk Refuge. The bison hunting on the refuge variable is not included in the regression analysis, because no bison hunting is currently allowed on the refuge. This makes it is difficult to determine if this difference between this survey scenario and the regression are the cause of the differences in results for the survey and the regression or if there are behavioral differences between historic visitors and year 2002 visitors.

Because Management Option #4V2 maintains the current number of days of elk feeding, it has essentially the same number of elk. The primary difference from current management is Management Option #4V2 allows for bison hunting, although the bison population to be maintained is similar to what is expected in 2004 for current management (i.e. 750–900). Given that there is essentially no difference between current management in terms of number of elk, the regression estimates of the change in visitation would essentially be zero. The survey respondents indicated that Management Option #4V2 would result in less than a 1% increase in visitation (+11,953 visits). Thus there is fairly good agreement between the regression approach and the survey approach for Management Option #4V2 as well. The differences between the survey responses and the regressions are summarized in Table 35.

Table 35. Comparison of change in GTNP visitation using survey responses and regression results.

Management option	Survey	Linear regression	Log regression
Option #2	-219,300	-52,670	-70,281
Option #3	-160,000	131,675	138,397
Option #4V1 no active mgmt	-432,700	-105,340	-154,050
Option #4V2	+11,953	0	0

In order to compare the local and regional economic effects of the regression results to the survey results, the regression visitor estimates had to be split up by local, non locals, and non residents. The survey results for the GTNP visitor breakdown between locals, non locals, and nonresidents (Table 10) as well as the split of visitors by trip purpose (Table 17) and associated spending profiles were applied to the regression visitation estimates in Table 34.

Table 36 presents a comparison of the economic impacts between the survey responses and regressions for non local GTNP summer visitors. The table shows the direct and total change (e.g., the multiplier effect) of income and jobs for the survey and regression results by management alternative. The survey results predict a larger decrease in visitation for Management Options #2 and #4V1 and therefore have a greater negative effect on the local economy than the regression results.

Table 37 presents a similar comparison of the economic impacts between the survey responses and regressions for nonresident GTNP summer visitors on the State of Wyoming. The economic impact in the State of Wyoming are the summed expenditures that nonresidents reported spending in the Jackson Hole area and the amount spent in the rest of the state en route to the Jackson Hole area. As might be expected in the larger Wyoming economy, while the absolute employment effects are larger than the local economy, the percent of total employment changes are much smaller due to the larger job base and significant employment in non-tourism sectors of Wyoming. Therefore, there is not a significant a difference between the survey results and regression results at the regional level as compared to the local level.

Table 36. Comparison of change in GTNP non local visitor impacts using survey and regression results.

Teton County WY and ID	Survey results		Linear regression		Log regression	
	Change in total	*% change in county total*	Change in total	*% change in county total*	Change in total	*% change in county total*
Option 2: Reduced feeding						
Direct Effects						
Income	**-$19,684,151**	*-1.92%*	**-$4,501,047**	*-0.4%*	**-$6,006,061**	*-0.6%*
Jobs	**-1045.8**	*-4.08%*	**-239**	*-0.9%*	**-318.9**	*-1.2%*
Total Effects						
Income	**-$30,053,007**	*-2.93%*	**-$6,872,357**	*-0.7%*	**-$9,170,268**	*-0.9%*
Jobs	**-1399.5**	*-5.47%*	**-319.9**	*-1.2%*	**-426.8**	*-1.7%*
Option 3: Increased feeding						
Direct Effects						
Income	**-$15,241,691**	*-1.48%*	**$11,252,832**	*1.1%*	**$11,827,174**	*1.2%*
Jobs	**-807.6**	*-3.15%*	**597.5**	*2.3%*	**628**	*2.5%*
Total Effects						
Income	**-$23,275,567**	*-2.27%*	**$17,181,221**	*1.7%*	**$18,058,148**	*1.8%*
Jobs	**-1081.9**	*-4.23%*	**799.7**	*3.1%*	**840.6**	*3.3%*
Option 4 V1: No active management						
Direct Effects						
Income	**-$40,735,906**	*-3.97%*	**-$9,002,179**	*-0.9%*	**-$13,164,825**	*-1.3%*
Jobs	**-2161.7**	*-8.44%*	**-478.1**	*-1.9%*	**-699.1**	*-2.7%*
Total Effects						
Income	**-$62,200,335**	*-6.06%*	**-$13,744,845**	*-1.3%*	**-$20,100,522**	*-2.0%*
Jobs	**-2894**	*-11.30%*	**-639.8**	*-2.5%*	**-935.5**	*-3.7%*
Option 4 V2: Current feeding and bison hunting						
Direct Effects						
Income	**$2,792,396**	*0.27%*	**$0**		**$0**	
Jobs	**143.8**	*0.56%*	**0**		**0**	
Total Effects						
Income	**$4,274,140**	*0.42%*	**$0**		**$0**	
Jobs	**195**	*0.76%*	**0**		**0**	

Table 37. Comparison of change in GTNP non resident visitor impacts using survey and regression results.

Wyoming	Survey results		Linear regression		Log regression	
	Change in total	*% change in state total*	Change in total	*% change in state total*	Change in total	*% change in state total*
Option 2: Reduced feeding						
Direct Effects						
Income	**-$21,073,870**	*-0.16%*	**-$5,146,212**	*0.0%*	**-$6,867,040**	*-0.1%*
Jobs	**-1414.1**	*-0.43%*	**-345.2**	*-0.1%*	**-460.6**	*-0.1%*
Total Effects						
Income	**-$36,103,845**	*-0.27%*	**-$8,815,888**	*-0.1%*	**-$11,763,809**	*-0.1%*
Jobs	**-1989.8**	*-0.61%*	**-485.8**	*-0.1%*	**-648.2**	*-0.2%*
Option 3: Increased feeding						
Direct Effects						
Income	**-$18,119,197**	*-0.13%*	**$12,865,426**	*0.1%*	**$13,522,430**	*0.1%*
Jobs	**-1214.2**	*-0.37%*	**863**	*0.3%*	**907.1**	*0.3%*
Total Effects						
Income	**-$31,019,641**	*-0.23%*	**$22,039,543**	*0.2%*	**$23,165,044**	*0.2%*
Jobs	**-1708.5**	*-0.52%*	**1214.4**	*0.4%*	**1276.4**	*0.4%*
Option 4 V1: No active management						
Direct Effects						
Income	**-$45,159,635**	*-0.33%*	**-$10,292,464**	*-0.1%*	**-$15,051,764**	*-0.1%*
Jobs	**-3028**	*-0.92%*	**-690.4**	*-0.2%*	**-1009.7**	*-0.3%*
Total Effects						
Income	**-$77,345,112**	*-0.57%*	**-$17,631,844**	*-0.1%*	**-$25,784,920**	*-0.2%*
Jobs	**-4260.8**	*-1.30%*	**-971.5**	*-0.3%*	**-1420.7**	*-0.4%*
Option 4 V2: Current feeding and bison hunting						
Direct Effects						
Income	**$2,768,035**	*0.02%*	**$0**		**$0**	
Jobs	**180**	*0.05%*	**0**		**0**	
Total Effects						
Income	**$4,671,395**	*0.03%*	**$0**		**$0**	
Jobs	**253.5**	*0.08%*	**0**		**0**	

Chapter 5. Conclusions

Viewing wildlife, and especially elk, is the second most important reason people had for visiting the Jackson Hole area. Only viewing the mountains was more important than wildlife viewing. Nonetheless, at the most only 10–20% of Grand Teton National Park visitors would change their visitation to the Jackson Hole if wildlife management in the Park and Refuge were changed. Eliminating elk feeding (except for emergency feedings during severe winters) and allowing bison hunting on the NER would result in a **decrease** in visitation and visitor spending of about 10%. The total (direct, indirect and induced) decrease in jobs in Teton counties of Wyoming and Idaho (our local impact area) is estimated at 1,416 or a 5.5% decrease in employment in these counties. Increasing feeding from the current average of 65 days to 80 days and allowing bison hunting on the NER would result in a **decrease** in visitation and visitor spending of about 7–8%. The total decrease in jobs in Teton counties of Wyoming and Idaho is estimated at 1,078 or a 4.2% decrease in employment in these counties. Adopting a "no active management" option

of never feeding and no bison or elk hunting on the NER, results in the largest decrease in visitation and visitor spending of 20%. The total decrease in jobs in Teton counties from the no active management approach is estimated at 2,916 or a 11.4% decrease in employment in these counties. While the absolute decrease in jobs for the no active management option in the Wyoming impact area is a larger decrease (4,283 jobs) than at the local impact area (2,916 jobs), the percentage decrease in employment in Wyoming's larger and more diversified economy is much smaller at 1.3%. Maintaining the current feeding program but allowing bison hunting on the NER results in a very slight positive overall effect on visitor spending of +1%, with a corresponding 1% increase in jobs in Teton counties (204 jobs) and .1% in Wyoming (263 jobs).

A similar pattern of economic benefits emerges from comparing the wildlife management options. The current feeding program with the addition of bison hunting at the NER results in a slight gain in economic benefits to visitors of $1.6 million annually. Alternatively, the no active management option of never feed and no hunting of bison or elk on the NER results in a loss in visitor benefits of $67 million per year.

These economic impact and valuation results are consistent with the survey responses as to which of the five management options respondents would prefer. The majority of respondents (visitors and households) preferred continuation of existing management. Continuation of existing feeding along with bison hunting on the NER was the second most preferred management option of sampled households and visitors.

Nonetheless, when respondents were asked about the individual management actions, there was less consensus about the desirability of bison hunting on the NER. Thirty-five to 40% of respondents felt bison hunting on the NER was not desirable, while 30%–40% felt it was generally or very desirable. There was greater agreement about the desirability of vaccinating elk and bison, with 60% to 70% of respondents indicating this was generally or very desirable. There was also strong agreement on the desirability of expanding sprinkler irrigation to increase production of vegetation for elk and bison.

We also compared the results of the historic change in GTNP visitation associated with different elk populations to that of responses to our survey scenarios. The general pattern of regression results are consistent with the survey responses for Management Option #2 (reduced feeding), Management Option 4V1 no active management, and Management Option 4V2. The regression results would suggest the survey respondents' visitation is more sensitive to the number of elk and bison than past visitation would suggest. However, the differences between the regression approach and the survey may also be due to the survey scenarios including changes in other factors not included in the regression (e.g., the number of bison, the number of elk seen from the sleigh rides, number of hunters, winter elk mortality, etc.).

Acknowledgments

We would like to thank Don DeLong and Dan Huff, USFWS and Robert Schiller, NPS for guidance on the design of this project. Roger Coupal and Tex Taylor, University of Wyoming and Susan Winter, USDA Forest Service provided valuable suggestions on the regional economic impact analysis. Assistance in conducting the on-site interviews by Michelle Good is greatly appreciated. Laura Taylor, Nathan Preuss, Sara Peters, Brian Hoag, Heather Lambert, and Michelle Burns assisted in the mailings and data entry. None of these individuals are responsible for the content of this report, which is the sole responsibility of the authors.

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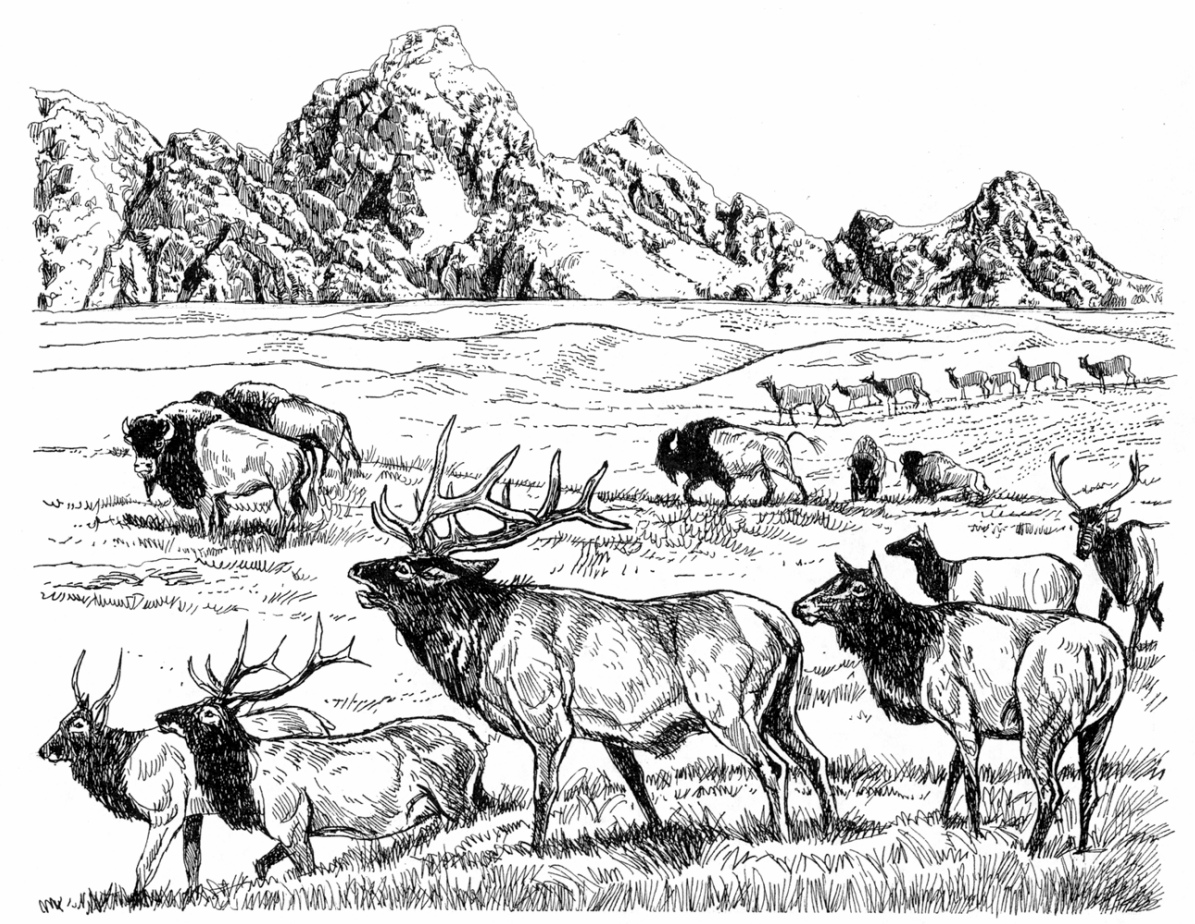
Appendix A. Example of Non-Local Visitor Survey Used at the National Elk Refuge and Grand Teton National Park

How Would Differences in Elk & Bison Management at Grand Teton National Park & the National Elk Refuge Affect Your Visits?

We need your opinion



Wildlife Management Controversies in Jackson Hole, Wyoming

Elk and bison in Grand Teton National Park and the National Elk Refuge are part of our national heritage and are symbols of the West. The chance to see one of the largest concentrations of free-ranging elk and bison herds in North America is one reason many people visit or live in Jackson Hole. (**See map for location of the Park and Refuge).**

Several areas of controversy exist regarding the management of elk and bison in Jackson Hole. The controversies include:

- Should hunting of bison be allowed on the National Elk Refuge to control bison populations?
- Should the winter feeding of elk and bison on the Refuge continue, or should the numbers of elk and bison be reduced to levels sustainable by vegetation on the Refuge?
- If the elk population is significantly reduced, should hunting on the Park and Refuge be discontinued?
- Should the National Park Service and U.S. Fish and Wildlife Service work with other federal and state land managers, private landowners, and tribal representatives to restore more natural conditions of 19th century elk migrations out of Jackson Hole in the winter?

Why Your Opinions on Wildlife Management Are Important

The U.S. Fish and Wildlife Service and the National Park Service are two federal agencies required to develop a management plan for elk and bison on the National Elk Refuge and Grand Teton National Park.

To choose the best plan the agencies need to know how you feel about management issues such as feeding or hunting elk and bison. They also need to know whether any changes in management of elk and bison would affect the number of visits you would make to the Jackson Hole area.

Your opinions on potential alternative management options will be used by these agencies in making crucial decisions about the Refuge and the National Park. Thus it is important that you take a few minutes to fill out the survey and mail it back in the enclosed postage paid envelope.

Before we start, we wish to provide you with a description of the key natural resources in Grand Teton National Park (GTNP) and the National Elk Refuge (NER).

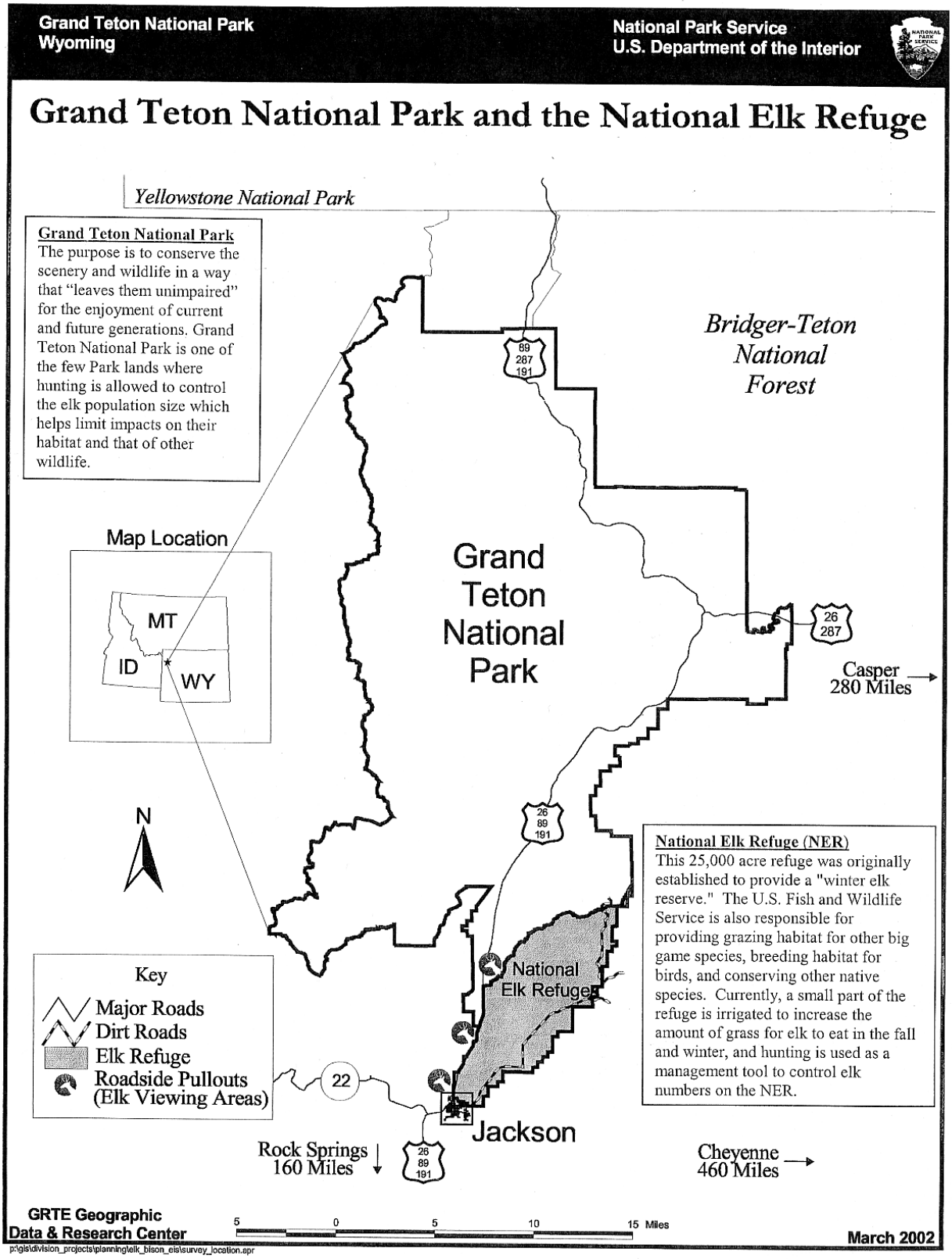
Elk: At present, there are about 13,500 elk in the Jackson Hole elk herd, with about 6,300 animals wintering on the National Elk Refuge where they were fed. In addition, about 3,000 animals in the herd were fed during winter on the Bridger Teton National Forest by the Wyoming Game and Fish Department. The remaining elk forage on native grasslands in the Jackson Hole area.

Why and When do they feed the elk? The winter feeding of elk began before the refuge was established, after the elk's migrations to traditional winter habitat were abandoned due to over-hunting, competition with cattle, and the introduction of an abundant hay supply in Jackson Hole. When deep snows cover the vegetation or the vegetation has been eaten by the elk, then the U.S. Fish and Wildlife Service provides supplemental feed in the form of alfalfa hay pellets on the Refuge. Without any supplemental feeding, natural winter mortality of elk would increase beyond the current 1%-2%.

Disease Concerns During Winter Feeding: The transmission of infectious disease among animals increases when they become concentrated. Winter feeding at the NER artificially concentrates bison and elk, thereby increasing the transmission and frequency of several diseases. Of particular concern is a disease called "brucellosis". Though highly unlikely, this disease may spread from the wildlife to cattle. This disease can cause pregnant cows to abort their fetuses, and therefore is of concern to the ranching industry. No vaccine has yet been proven satisfactorily effective for protecting bison and elk from brucellosis.

Bison: There are currently 600 bison in the Jackson Hole area. Most of these animals spend part of the winter on the National Elk Refuge where they receive alfalfa hay pellets as supplemental feed. The population of bison has been increasing rapidly, from 50 animals in 1980 to about 600 today, as the herd discovered the hay pellets placed for elk on the National Elk Refuge. In the summer the bison migrate to GTNP and the BTNF.

Hunting: Many of the elk that winter on the National Elk Refuge migrate to the Bridger Teton National Forest where they are hunted in the fall, as well as being hunted on the Grand Teton National Park and National Elk Refuge. All hunts are managed cooperatively by the Wyoming Game and Fish Department (WGFD). The WGFD also manages a bison hunt on the National Forest. However, bison hunting on the GTNP and NER have been legally banned until the issue is addressed in this management plan.


Grand Teton National Park
Wyoming
National Park Service
U.S. Department of the Interior
Grand Teton National Park and the National Elk Refuge
Yellowstone National Park
Grand Teton National Park
The purpose is to conserve the scenery and wildlife in a way that "leaves them unimpaired" for the enjoyment of current and future generations. Grand Teton National Park is one of the few Park lands where hunting is allowed to control the elk population size which helps limit impacts on their habitat and that of other wildlife.
Bridger-Teton National Forest
89
287
191
Map Location
MT
ID
WY
Grand Teton National Park
26
287
Casper
280 Miles
N
26
89
191
National Elk Refuge
National Elk Refuge (NER)
This 25,000 acre refuge was originally established to provide a "winter elk reserve." The U.S. Fish and Wildlife Service is also responsible for providing grazing habitat for other big game species, breeding habitat for birds, and conserving other native species. Currently, a small part of the refuge is irrigated to increase the amount of grass for elk to eat in the fall and winter, and hunting is used as a management tool to control elk numbers on the NER.
Key
Major Roads
Dirt Roads
Elk Refuge
Roadside Pullouts
(Elk Viewing Areas)
22
Jackson
Rock Springs
160 Miles
26
89
191
Cheyenne
460 Miles
GRTE Geographic
Data & Research Center
5 0 5 10 15 Miles
March 2002
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I. Please tell us about your visit to Grand Teton National Park, where you were contacted by our interviewer.

Check which areas you visited on your most recent trip.

☐ Grand Teton NP ☐ National Elk Refuge ☐ Bridger Teton National Forest ☐ Yellowstone NP

1. Please check the activities you participated in during this **most recent trip** in the Jackson Hole Area (**check all that apply**):

___ Hiking/backpacking	___ Bicycling/Mtn biking	___ Fishing
___ Picnicking	___ Driving for pleasure	___ Hunting
___ Sightseeing/photography	___ Birdwatching	___ Horseback riding
___ Bison viewing	___ Elk viewing	___ Boating (rafting, kayaking, jet ski)
___ Camping	___ Mountain/rock climbing	___ ATV's
___ Festivals/Rodeos	___ Wildlife Art Museum	

___ Other, please describe_____

1a. Which of the activities that you checked above was the most important reason for your trip to the Jackson Hole Area?

Most Important Activity_____

1b. Which of the activities that you checked above was the most important reason for your trip to Grand Teton National Park?

Most Important Activity_____

2. When you visited Grand Teton National Park was it: (**check only one**):
   2a. ____ the primary purpose or sole destination of your trip?
   2b. ____ one of many equally important reasons or destinations for your trip?
   2c. ____ 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 in the Jackson Hole area, Grand Teton National Park or the National Elk Refuge on this most recent trip?

_____# of hours or _____ # of days

3a. How much of this time was spent in Grand Teton National Park?

_____# of hours or _____ # of days

4. What was your method of travel (circle all that apply): Car RV Bus Airplane Other_____

5. What was the one-way **travel time** from your home to Grand Teton National Park on this most recent trip?

_____ # hours _____ # minutes

6. What was your one-way **travel distance** from your home to Grand Teton National Park on this most recent trip? (See Map) _____# one-way miles

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

II. Trip Expenditures

This information is needed by the National Park Service and U.S. Fish and Wildlife Service so they can meet their legal obligation to consider the effect of their management decisions on the local economy and tourism related businesses in the Jackson Hole area.

Therefore it is important that you indicate the amount you and members of your group with whom you shared expenses (e.g., other family members, traveling companions) spent on **your most recent visit** to Grand Teton National Park.

Trip Expense	**Amount Spent in Jackson Hole Area or Grand Teton National Park**	**Amount Spent Elsewhere in Wyoming En Route to Jackson Hole Area**
Gasoline/related automobile costs	$	$
Entrance fee: Annual Pass	$	$
Entrance fee: Daily	$	$
Hotel/motel	$	$
Camping outside GTNP	$	$
Camping inside GTNP	$	$
Food/drink: restaurants	$	$
Food/drink: grocery stores	$	$
Supplies/souvenirs/other retail	$	$
Equipment rental/tram tickets	$	$
Guide/horseback riding fees	$	$
Rental car	$	$
Airline ticket/flightseeing	$	$

1. Including yourself, how many people in your group shared these expenses on this most recent trip?

   _____# of persons in your group

2. As you know, some of the costs of travel such as gasoline often change. If the **total cost** of this most recent trip to Grand Teton National Park had been $_____ **higher**, would you have made this trip to the Park?

   Circle one: YES NO

A. III. Importance of Different Natural Resources to Your Recreation Trips to the Jackson Hole Area

Please tell us how important the following activities and natural resources are in terms of your decision to take recreation trips to the Jackson Hole area during the year.

Please circle one number for each item	Importance for your recreation to the Jackson Hole area			
	Not Important	Somewhat Important	Important	Very Important
Viewing elk	1	2	3	4
Viewing bison	1	2	3	4
Viewing other wildlife (e.g., birds, moose)	1	2	3	4
Viewing scenery such as mountains	1	2	3	4
Hiking/backpacking/mountain climbing	1	2	3	4
Hunting elk	1	2	3	4
Hunting bison	1	2	3	4
Hunting other animals (e.g., deer)	1	2	3	4
River rafting/canoeing/other boating	1	2	3	4
Fishing	1	2	3	4
Snow Skiing (downhill and cross country)	1	2	3	4
Snowmobiling	1	2	3	4
Winter elk viewing sleigh rides	1	2	3	4
Festivals, rodeos, shopping	1	2	3	4
Horseback riding	1	2	3	4
Biking/mountain biking	1	2	3	4
Other activities- Please list	1	2	3	4
Other activities- Please list	1	2	3	4

IV. Desirability of Different Wildlife Management Practices at Grand Teton National Park and the National Elk Refuge

These next few questions ask your opinions about possible management actions at Grand Teton National Park and the National Elk Refuge. Check the box that best reflects your opinion.

Management Option	Not Desirable	Somewhat Desirable	Generally Desirable	Very Desirable	No Opinion
Winter feeding of elk on the National Elk Refuge	☐	☐	☐	☐	☐
Winter feeding of bison on the National Elk Refuge	☐	☐	☐	☐	☐
Hunting elk in the Fall on the National Elk Refuge	☐	☐	☐	☐	☐
Hunting bison in the Fall on the National Elk Refuge	☐	☐	☐	☐	☐
Hunting elk in selected areas of Grand Teton National Park during the Fall	☐	☐	☐	☐	☐
Vaccinating elk against diseases such as brucellosis	☐	☐	☐	☐	☐
Vaccinating bison against diseases such as brucellosis	☐	☐	☐	☐	☐
Expanding sprinkler irrigation on selected areas of the National Elk Refuge to increase production of vegetation for elk and bison to eat	☐	☐	☐	☐	☐
Restore natural migratory patterns by facilitating elk and bison movement out of Jackson Hole in the winter to more suitable habitat	☐	☐	☐	☐	☐
Allow for the restoration of native habitats damaged by large concentrations of elk and bison on the National Elk Refuge	☐	☐	☐	☐	☐

V. Possible Changes in Elk and Bison Management: What Do You Think?

The U.S. Fish and Wildlife Service and National Park Service are interested in whether you prefer continuation of existing management or possible changes in management described below. These possible elk and bison management options may also affect your decision to visit the Jackson Hole area. So please compare the Management Options in Section A, and respond to the questions in Sections B and C on the next page.

Section A. Comparison of Wildlife Management Options

	Management Option #1 Current Situation – *"No Change"*	**Management Option #2 Reduce Wildlife Concentrations by Reducing Feeding**	**Management Option #3 Increase Elk Populations by Increased Feeding**	**Management Option #4 No Active Management**
Number of Days Elk and Bison are fed on the National Elk Refuge	65 Days in an average winter January 25 to April 1	0 Days in an average year (30–60 days emergency feeding only in severe winters)	80 Days in an average year January 10 to April 1	0 Days Never Feed
Elk Hunting on the National Elk Refuge and Grand Teton National Park	3,250 Hunters	4,500 Hunters during first 5 years 2,500 Hunters from year 6 on.	A maximum of 4,500 Hunters	None
Bison Hunting on the National Elk Refuge	None	75 Hunters during first 5 years 50 Hunters from year 6 on	20 Hunters (USFWS employees would also reduce populations through harvest)	None
Expected Effects on:				
Number of Bison on Grand Teton NP and the National Elk Refuge (Each bison symbol represents about 300 bison)	600 Bison  Increasing to 750–900 by 2004	350– 400 Bison 	200 – 250 Bison 	200 average Depends on snow cover and available forage on the NER
Number of Elk Wintering on the NER (Each elk symbol represents about 2,500 elk)	5,000 – 7,000 Elk 	5,000 Elk 	8,500 Elk 	2,000 – 6,000 Elk: Depends on snow cover and available forage on the NER
NER Winter Elk Viewing Sleigh Rides Elk likely to be seen up close on sleigh ride (Dates of sleigh ride)	1,000 – 2,000 Elk (December 15 – April 1)	0 – 2,400 Elk (700 avg.) On some days, there would be a low chance of seeing any elk (December 15 – April 1)	1,000 – 2,000 Elk (December 15 – April 1)	0 –2,400 Elk (700 avg) On some days, there would be a low chance of seeing any elk (December 15– April 1)
Natural Winter Elk Mortality on the NER	1% – 2%	.5% – 5%	1.5% average	.5% – 20%
# of Elk Hunters on Bridger Teton National Forest* 	Current Level: 5,750 Hunters	4,500 – 5,750 Hunters	Increased Level: 7,000 – 8,000 Hunters	3,750 Hunters
# of Bison Hunters on Bridger Teton National Forest* 	Current Level: 100 Hunters	75 Hunters during first 5 years, 50 Hunters from Year 6 on	30 Hunters	50 Hunters

*Even though the management plan will not apply to the Bridger Teton National Forest, changes in the management of elk and bison on the National Elk Refuge and Grand Teton National Park will affect hunting on the Bridger Teton National Forest.

Section B. Which of the Management Options Presented Do You Think is Best for Grand Teton National Park and the National Elk Refuge?

1. What do you think is the best option for managing elk and bison in Grand Teton National Park and the National Elk Refuge. Please check the Management Option that you think would be the best (check one only):
   - ☐ Management Option #1
   - ☐ Management Option #2
   - ☐ Management Option #3
   - ☐ Management Option #4

Section C. How Would These Three Possible Management Options Affect Your Decision to Visit?

1. How many trips did you make to Grand Teton National Park and the National Elk Refuge in the last 12 months? _____ # Trips

   1a. How many of these trips were to the National Elk Refuge *for elk or bison viewing?*
   ____ # of Trips to NER

   1b. How many of these trips were to Grand Teton National Park *for elk or bison viewing?*
   ____# of Trips to GTNP

2. Would your decision to visit Grand Teton National Park or the National Elk Refuge change if these areas were as described in Management Option #2 instead of the current management (#1)?

☐ YES → ☐ I would visit ***more*** often→ Estimated Number of **added** yearly trips_____
→ ☐ I would visit ***less*** often→ Estimated Number of **fewer** yearly trips _____

☐ NO change in visits

3. Would your decision to visit Grand Teton National Park and the National Elk Refuge change if these areas were as described in Management Option #3 instead of current management (#1)?

☐ YES → ☐ I would visit ***more*** often→ Number of **added** yearly trips _____
→ ☐ I would visit ***less*** often→ Number of **fewer** yearly trips _____

☐ NO change in visits

4. Would your decision to visit Grand Teton National Park and the National Elk Refuge change if these areas were as described in Management Option #4 instead of the current management (#1)?

☐ YES → ☐ I would visit ***more*** often→ Estimated Number of **added** yearly trips_____
→ ☐ I would visit ***less*** often→ Estimated Number of **fewer** yearly trips _____

☐ NO change in visits

VI. Please tell us something about yourself.

These last few questions will help us in evaluating how well our sample represents visitors to the area. **Your answers will be kept strictly confidential and will only be used for the analysis of this study and will not be passed onto anyone. You will not be identified in any way.**

1. Are you? _____ Male _____ Female

2. Age _____ Years

3. Are you employed? _____ Yes→ (check one) __Full time __ Part time

   _____ No→ Are you retired? __ Yes __ No

4. What is your zip code? _____

5. Are you a member of a conservation or environmental organization? ___ Yes ___ No

6. Are you a member of a hunting or sportsman's organization? ___Yes ___No

7. Your highest level of formal education? (Please circle one)

   1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+
   (elementary) (jr. high or middle) (high school) (college or technical school) (graduate or professional school)

8. Do you take time off from work to participate in outdoor recreation?
   _____ Yes _____ No

9. How many weeks of paid vacation do you receive each year? _____ weeks

10. How many members are in your household? _____ persons

11. How many household members contribute to paying the household expenses? _____ persons

12. Including these people, what was your approximate household income from all sources (before taxes) last year?

_____ less than $10,000	_____ $25,000–$34,999	_____ $75,000–$99,999
_____ $10,000–$14,999	_____ $35,000–$49,999	_____ $100,000–$149,999
_____ $15,000–$24,999	_____ $50,000–$74,999	_____ over $150,000

Thank you for completing the survey!

If you have any additional comments on the resources or management of elk and bison in the Jackson Hole area, please feel free to write them on the next page. When you are finished, please place the survey in the stamped return envelope and mail it back to us.

COMMENTS?

Please feel free to write any comments you have about wildlife management in the Jackson Hole Area

OMB Control Number: 1018-0114

GRAND TETON NATIONAL PARK SURVEY

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please fold here for mailing

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please fold here for mailing

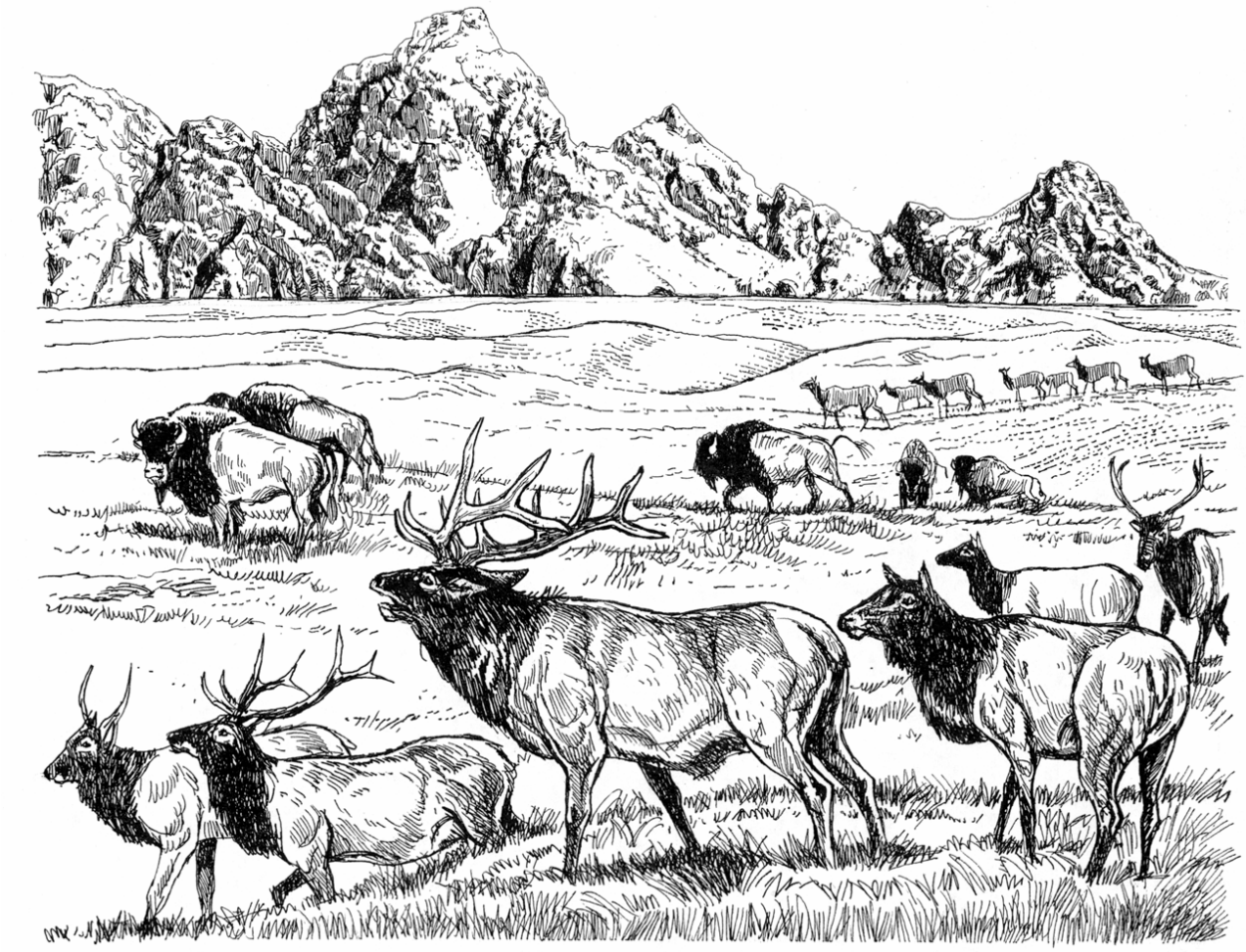
U.S. Geological Survey
Fort Collins Science Center
2150 Centre Avenue, Bldg C
Fort Collins, CO 80526-8118

NLV1

Appendix B. Example of Non-Local Household Survey Mailed to Wyoming Residents

How Should Elk & Bison Be Managed at Grand Teton National Park & the National Elk Refuge?

We need your opinion



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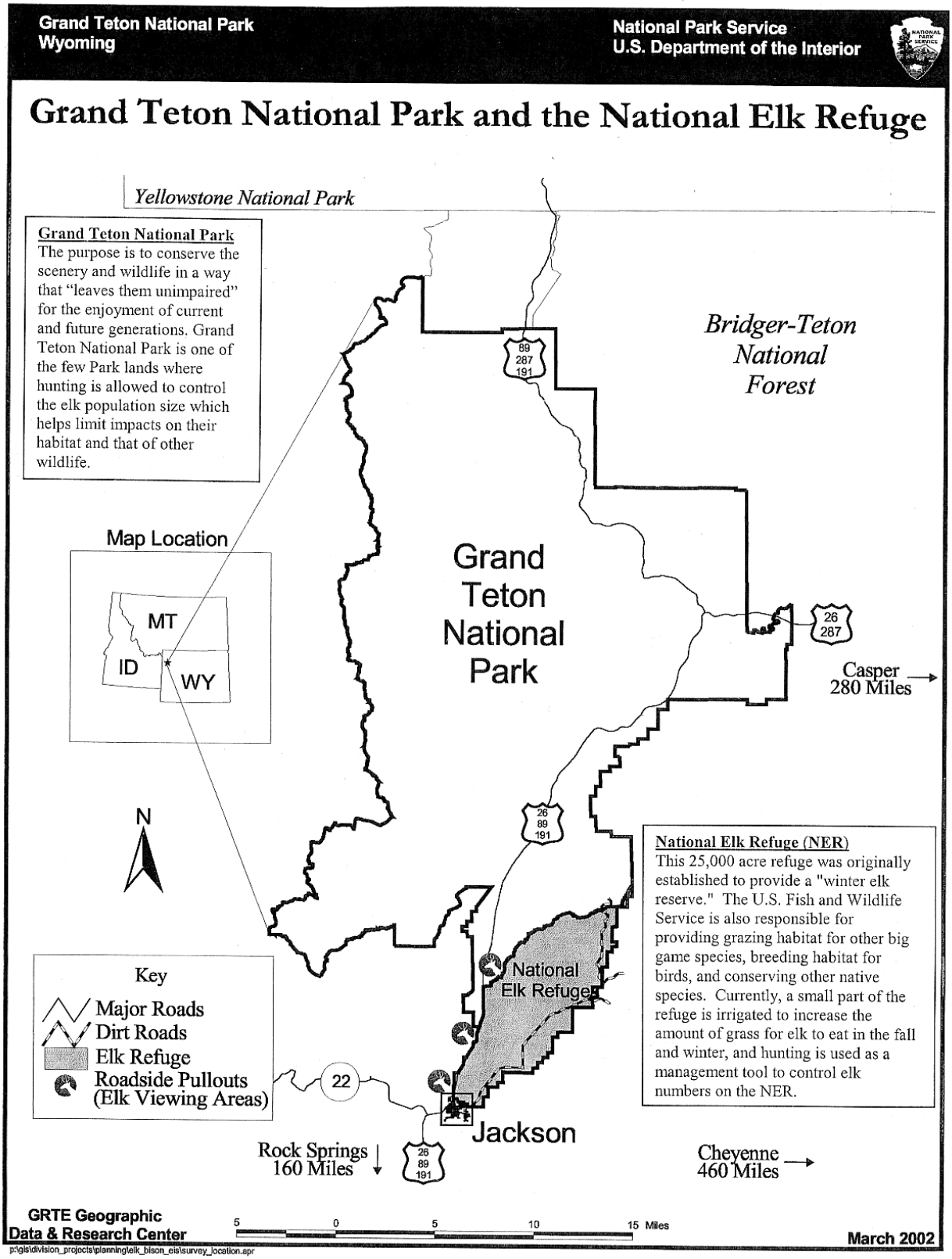
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Key
Major Roads
Dirt Roads
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Roadside Pullouts
(Elk Viewing Areas)
22
Jackson
Rock Springs
160 Miles
26
89
191
Cheyenne
460 Miles
GRTE Geographic
Data & Research Center
5 0 5 10 15 Miles
March 2002
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I. How Important Are Different Natural Resources to Your Decisions About Visiting the Jackson Hole Area

Please tell us how important the following activities and natural resources are in terms of your decision of whether to visit the Jackson Hole area.

Please circle one number for each item	Importance for your recreation to the Jackson Hole area			
	Not Important	Somewhat Important	Important	Very Important
Viewing elk	1	2	3	4
Viewing bison	1	2	3	4
Viewing other wildlife (e.g., birds, moose)	1	2	3	4
Viewing scenery such as mountains	1	2	3	4
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Horseback riding	1	2	3	4
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Other activities- Please list	1	2	3	4
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C. II. Desirability of Different Wildlife Management Practices at Grand Teton National Park and the National Elk Refuge

These next few questions ask your opinions about possible management actions at Grand Teton National Park and the National Elk Refuge. Check the box that best reflects your opinion.

Management Option	Not Desirable	Somewhat Desirable	Generally Desirable	Very Desirable	No Opinion
Winter feeding of elk on the National Elk Refuge	☐	☐	☐	☐	☐
Winter feeding of bison on the National Elk Refuge	☐	☐	☐	☐	☐
Hunting elk in the Fall on the National Elk Refuge	☐	☐	☐	☐	☐
Hunting bison in the Fall on the National Elk Refuge	☐	☐	☐	☐	☐
Hunting elk in selected areas of Grand Teton National Park during the Fall	☐	☐	☐	☐	☐
Vaccinating elk against diseases such as brucellosis	☐	☐	☐	☐	☐
Vaccinating bison against diseases such as brucellosis	☐	☐	☐	☐	☐
Expanding sprinkler irrigation on selected areas of the National Elk Refuge to increase production of vegetation for elk and bison to eat	☐	☐	☐	☐	☐
Restore natural migratory patterns by facilitating elk and bison movement out of Jackson Hole in the winter to more suitable habitat	☐	☐	☐	☐	☐
Allow for the restoration of native habitats damaged by large concentrations of elk and bison on the National Elk Refuge	☐	☐	☐	☐	☐

III. Possible Changes in Elk and Bison Management: What Do You Think?

The U.S. Fish and Wildlife Service and National Park Service are interested in whether you prefer continuation of existing management or possible changes in management described below. These possible elk and bison management options may also affect your decision to visit the Jackson Hole area. So please compare the Management Options in Section A, and respond to the questions in Sections B and C on the next page.

D. Section A. Comparison of Wildlife Management Options

	Management Option #1 Current Situation – *"No Change"*	**Management Option #2** Reduce Wildlife Concentrations by Reducing Feeding	**Management Option #3** Increase Elk Populations by Increased Feeding	**Management Option #4** Current feeding and Bison Hunting
Number of Days Elk and Bison are fed on the National Elk Refuge	65 Days in an average winter January 25 to April 1	0 Days in an average year (30–60 days emergency feeding only in severe winters)	80 Days in an average year January 10 to April 1	65 Days in an average winter January 25 to April 1
Elk Hunting on the National Elk Refuge and Grand Teton National Park	3,250 Hunters	4,500 Hunters during first 5 years 2,500 Hunters from year 6 on.	A maximum of 4,500 Hunters	3,250 Hunters
Bison Hunting on the National Elk Refuge	None	75 Hunters during first 5 years 50 Hunters from year 6 on	20 Hunters (USFWS employees would also reduce populations through harvest)	100 Hunters
Expected Effects on:				
Number of Bison on Grand Teton NP and the National Elk Refuge (Each bison symbol represents about 300 bison)	600 Bison  Increasing to 750–900 by 2004	350– 400 Bison 	200 – 250 Bison 	750–1,000 Bison 
Number of Elk Wintering on the NER (Each elk symbol represents about 2,500 elk)	5,000 – 7,000 Elk 	5,000 Elk 	8,500 Elk 	5,000 – 7,500 Elk 
NER Winter Elk Viewing Sleigh Rides Elk likely to be seen up close on sleigh ride (Dates of sleigh ride)	1,000 – 2,000 Elk (December 15 – April 1)	0 – 2,400 Elk (700 avg.) On some days, there would be a low chance of seeing any elk (December 15 – April 1)	1,000 – 2,000 Elk (December 15 – April 1)	1,000 – 2,000 Elk (December 15 – April 1)
Natural Winter Elk Mortality on the NER	1% – 2%	.5% – 5%	1.5% average	1.5% average
# of Elk Hunters on Bridger Teton National Forest* 	Current Level: 5,750 Hunters	4,500 – 5,750 Hunters	Increased Level: 7,000 – 8,000 Hunters	5,750 Hunters
# of Bison Hunters on Bridger Teton National Forest* 	Current Level: 100 Hunters	75 Hunters during first 5 years, 50 Hunters from Year 6 on	30 Hunters	125 Hunters

*Even though the management plan will not apply to the Bridger Teton National Forest, changes in the management of elk and bison on the National Elk Refuge and Grand Teton National Park will affect hunting on the Bridger Teton National Forest.

Section C. How Would These Three Possible Management Options Affect Your Decision to Visit?

1. Have you ever visited the Jackson Hole area including Grand Teton National Park or the National Elk Refuge? (Circle one) Yes (go to #1a) No (go to #3)

1a. What was the year of your most recent visit to the Jackson Hole Area? _____

2. Have you taken any outdoor recreation trips in the Jackson Hole area in the last 12 months?

Yes → ____# of Trips (go to 2a) No (go to #3)

2a. How many trips did you make to Grand Teton National Park and the National Elk Refuge in the last 12 months? ____ # Trips

2b. How many of these trips were to the National Elk Refuge *for elk or bison viewing?* ____ # of Trips to NER

2c. How many of these trips were to Grand Teton National Park *for elk or bison viewing?* ____# of Trips to GTNP

3. Would your decision to visit Grand Teton National Park or the National Elk Refuge change if these areas were as described in Management Option #2 instead of the current management (#1)?

☐ YES → ☐ I would visit ***more*** often→ Estimated Number of **added** yearly trips_____
→ ☐ I would visit ***less*** often→ Estimated Number of **fewer** yearly trips _____
☐ NO change in visits

4. Would your decision to visit Grand Teton National Park and the National Elk Refuge change if these areas were as described in Management Option #3 instead of current management (#1)?

☐ YES → ☐ I would visit ***more*** often→ Number of **added** yearly trips _____
→ ☐ I would visit ***less*** often→ Number of **fewer** yearly trips _____
☐ NO change in visits

5. Would your decision to visit Grand Teton National Park and the National Elk Refuge change if these areas were as described in Management Option #4 instead of the current management (#1)?

☐ YES → ☐ I would visit ***more*** often→ Estimated Number of **added** yearly trips_____
→ ☐ I would visit ***less*** often→ Estimated Number of **fewer** yearly trips _____
☐ NO change in visits

IV. If you have visited Grand Teton National Park or the National Elk Refuge, please tell us about your most recent visit.

If you have not visited please skip to Section VI.

1. Check which areas you visited on your most recent trip.

☐ Grand Teton NP ☐ National Elk Refuge ☐ Bridger Teton National Forest ☐ Yellowstone NP

2. Please check the activities you participated in during this **most recent trip** in the Jackson Hole Area (**check all that apply**):

___ Hiking/backpacking	___ Bicycling/Mtn Biking	___ Fishing
___ Picnicking	___ Driving for pleasure	___ Hunting
___ Sightseeing /photography	___ Birdwatching	___ Horseback riding
___ Snowshoeing	___ Snowmobiling	___ Boating (rafting, kayaking, jet ski)
___ Camping	___ Mountain/rock climbing	___ Snowskiing (XC or downhill)
___ Bison viewing	___ Elk viewing	___ Winter Elk Viewing Sleigh Rides
___ ATV's	___ Festivals/Rodeos	___ Wildlife Art Museum

___ Other, please describe_____

2a. Which of the activities that you checked above was the most important reason for your trip to the Jackson Hole Area?

Most Important Activity_____

2b. Which of the activities that you checked above was the most important reason for your trip to Grand Teton National Park or the National Elk Refuge?

Most Important Activity_____

3. Was purpose the of your most recent visit to Grand Teton National Park or the National Elk Refuge (**check only one**):
   3a. ___ the primary purpose or sole destination of the trip?
   3b. ___ one of many equally important reasons or destinations for your trip?
   3c. ___ just an incidental or spur of the moment stop on a trip taken for other purposes or to other destinations?

4. What was the amount of time you spent in the Jackson Hole area, Grand Teton National Park or the National Elk Refuge on this most recent trip?

_____# of hours or _____ # of days

5. What was your method of travel (circle all that apply): Car RV Bus Airplane
   Other_____

6. What was the one-way **travel time** and **travel distance** from your home to Grand Teton National Park or the National Elk Refuge on this most recent trip?

Travel Time: _____ # hours _____ # minutes Distance: _____# one-way miles

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

_____# of people in your group

V. Trip Expenditures

INSTRUCTIONS: If you visited Grand Teton National Park or the National Elk Refuge in the last 12 months please fill out this page, if you have not visited in the last 12 months please skip to the next page.

This information is needed by the National Park Service and U.S. Fish and Wildlife Service so they can meet their legal obligation to consider the effect of their management decisions on the local economy and tourism related businesses in the Jackson Hole area.

Therefore it is important that you indicate the amount you and members of your group with whom you shared expenses (e.g., other family members, traveling companions) spent on **your most recent visit** to Grand Teton National Park.

Trip Expense	**Amount Spent in Jackson Hole Area or Grand Teton National Park**	**Amount Spent Elsewhere in Wyoming En Route to Jackson Hole Area**
Gasoline/related automobile costs	$	$
Entrance fee: Annual Pass	$	$
Entrance fee: Daily	$	$
Hotel/motel	$	$
Camping outside GTNP	$	$
Camping inside GTNP	$	$
Food/drink: restaurants	$	$
Food/drink: grocery stores	$	$
Supplies/souvenirs/other retail	$	$
Equipment rental/lift tickets	$	$
Guide/horseback riding fees	$	$
Elk viewing sleigh ride fee	$	Not Applicable
Rental car	$	$
Airline ticket/flightseeing	$	$

1. Including yourself, how many people in your group shared these expenses on this most recent trip?

_____# of persons in your group

1. As you know, some of the costs of travel such as gasoline often change. If the **total cost** of this most recent trip to Grand Teton National Park or the National Elk Refuge had been $_____ **higher**, would you have made this trip to the Park or Refuge?

Circle one: YES NO

VI. Please tell us something about yourself.

These last few questions will help us in evaluating how well our sample represents households living in the area. **Your answers will be kept strictly confidential and will only be used for the analysis of this study and will not be passed onto anyone. You will not be identified in any way.**

1. Are you? _____ Male _____ Female

2. Age _____ Years

3. Are you employed? _____ Yes→ (check one) __Full time __ Part time

   _____ No→ Are you retired? __ Yes __ No

4. What is your zip code? _____

5. Are you a member of a conservation or environmental organization? ___ Yes ___ No

6. Are you a member of a hunting or sportsman's organization? ___Yes ___No

7. Your highest level of formal education? (Please circle one)

   1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20+
   (elementary) (jr. high or middle) (high school) (college or technical school) (graduate or professional school)

8. Do you take time off from work to participate in outdoor recreation?
   _____ Yes _____ No

9. How many weeks of paid vacation do you receive each year? _____ weeks

10. How many members are in your household? _____ persons

11. How many household members contribute to paying the household expenses? _____ persons

12. Including these people, what was your approximate household income from all sources (before taxes) last year?

_____ less than $10,000	_____ $25,000-$34,999	_____ $75,000-$99,999
_____ $10,000-$14,999	_____ $35,000-$49,999	_____ $100,000-$149,999
_____ $15,000-$24,999	_____ $50,000-$74,999	_____ over $150,000

Thank you for completing the survey!

If you have any additional comments on the resources or management of elk and bison in the Jackson Hole area, please feel free to write them on the next page. When you are finished, please place the survey in the stamped return envelope and mail it back to us.

COMMENTS?

Please feel free to write any comments you have about wildlife management in the Jackson Hole Area

OMB Control Number: 1018-0116

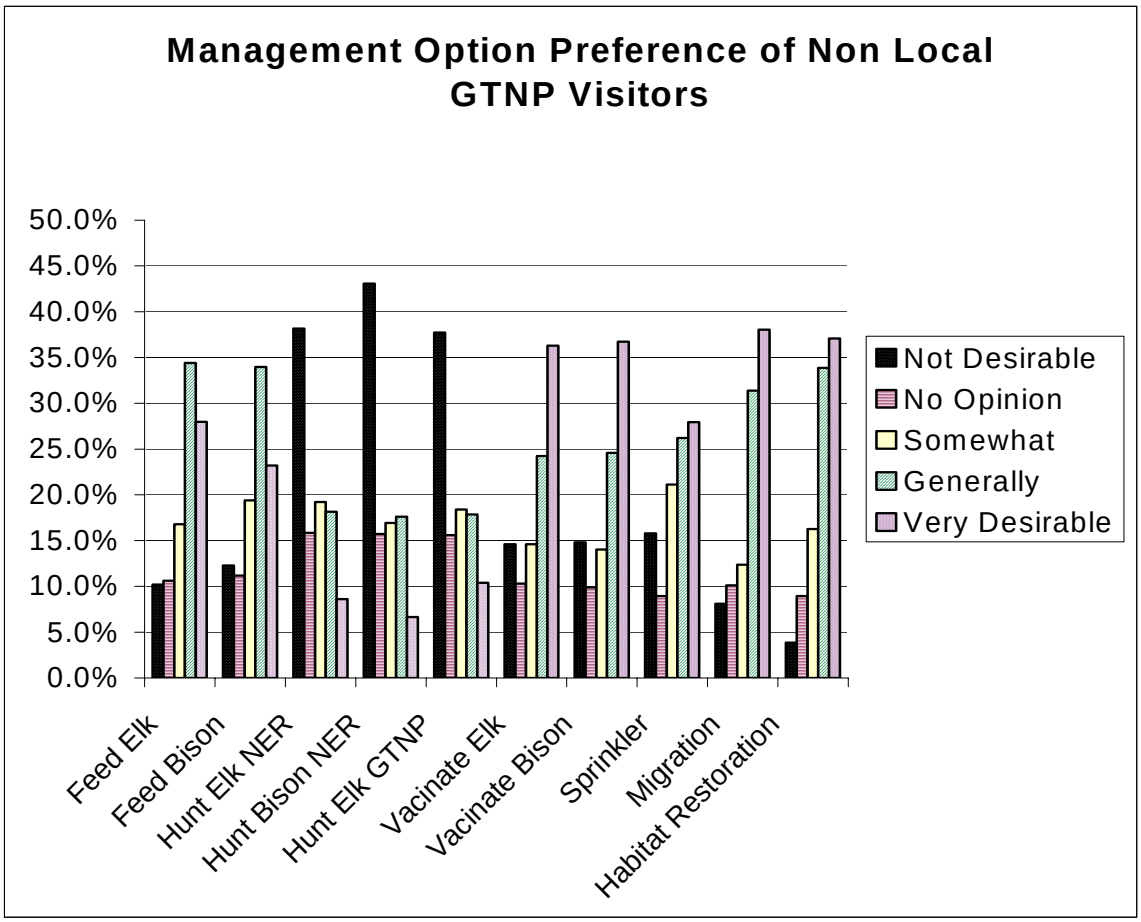
Appendix C. How Different Respondent Samples Rate the Desirability of Different Management Options

This appendix provides a different way to view how each sample (e.g., GTNP visitors, Wyoming households) view the desirability of various individual wildlife management actions. In contrast to the main text, where the graph compared different samples on the same individual management action (e.g., vaccination of elk), these graphs compare a given sample of respondents on the entire range of wildlife management practices.

Grand Teton National Park Visitors

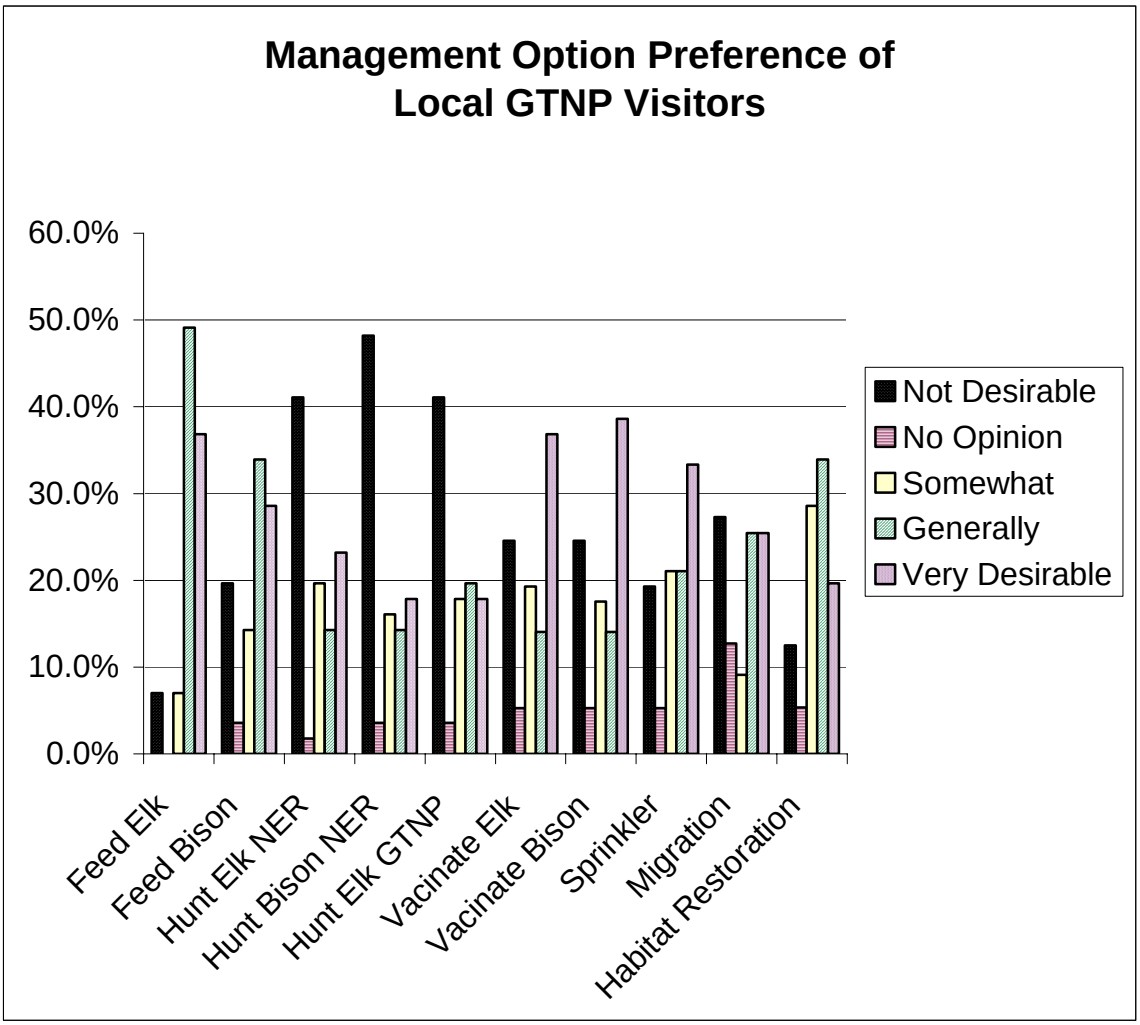
A. Non-Local Park Visitors

Generally the majority of non-local Park visitors view hunting bison on the NER as not desirable, but they view vaccination and restoration of native wildlife habitats damaged by concentrations of elk and bison on the NER as very or generally desirable.



Local Grand Teton National Park Visitors

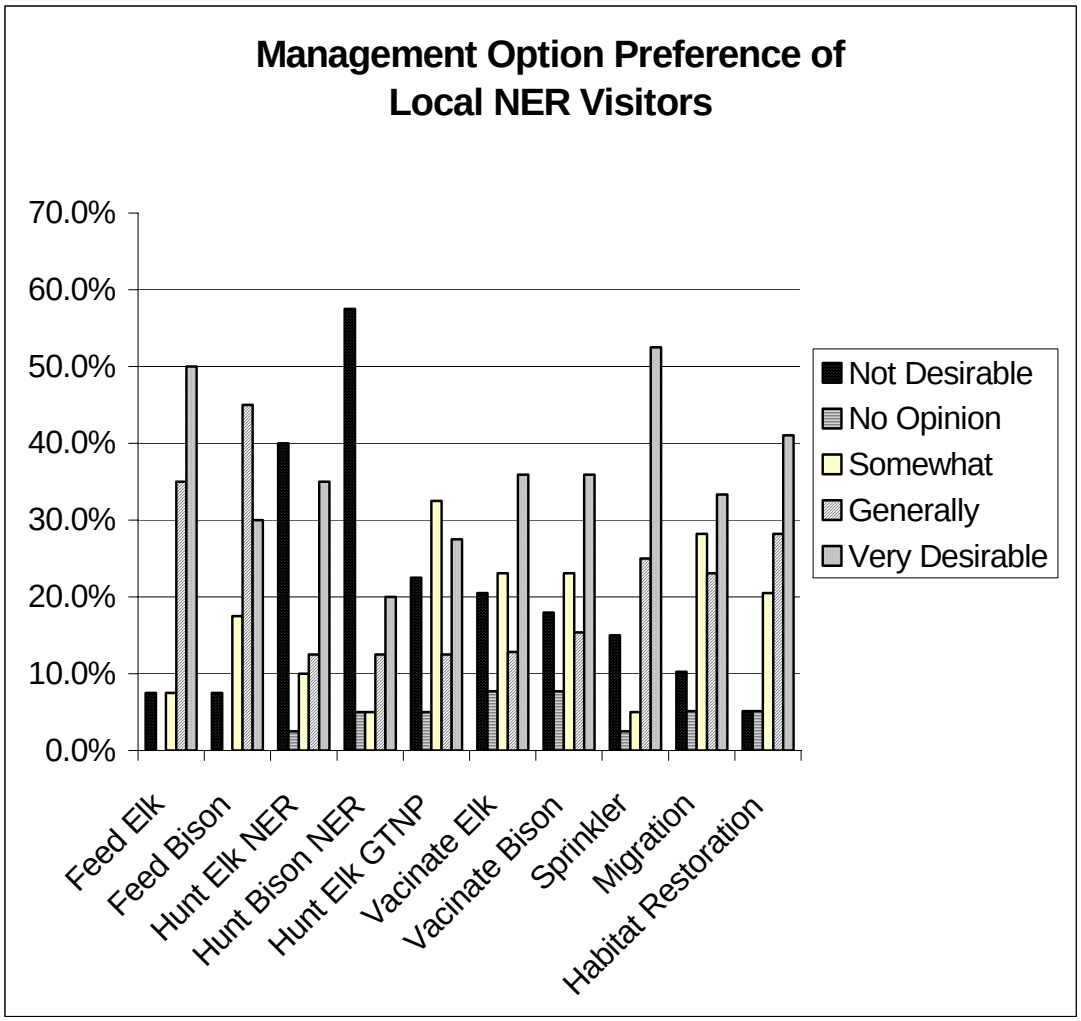
Most local Grand Teton National Park visitors view bison hunting on the NER as not desirable, but strongly support feeding elk as desirable.



National Elk Refuge Visitors

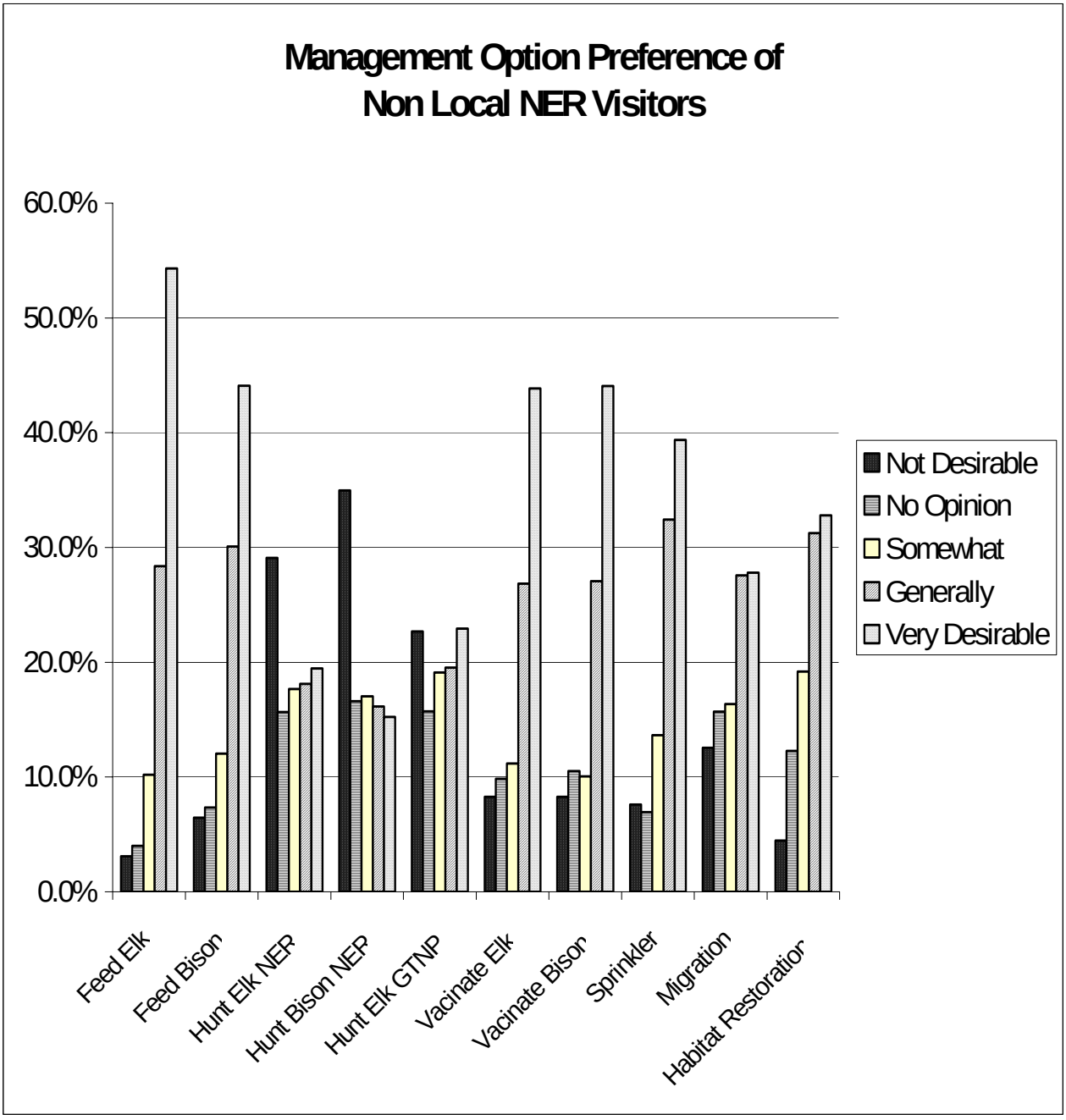
A. Local NER Visitors

The majority of local visitors thought feeding elk and sprinkler irrigation on the NER to increase vegetation production for elk and bison was very desirable. The majority though bison hunting on the NER was not desirable.



B. Non Local Visitors to the National Elk Refuge

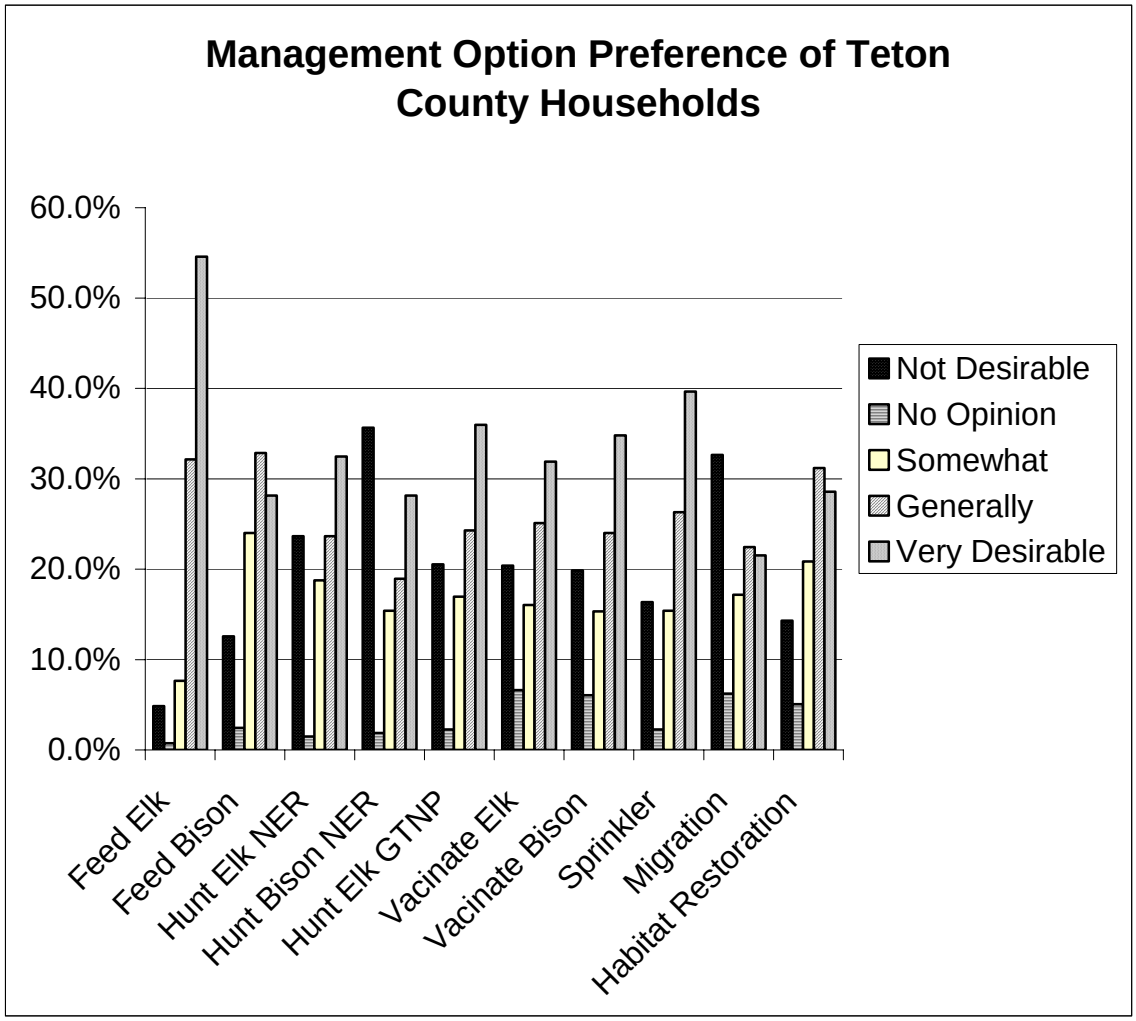
The vast majority of local visitors to the NER thought feeding elk, and vaccinating both elk and bison, as well as sprinkler irrigation to increase vegetation for elk and bison were generally or very desirable.



Households View of Different Management Options

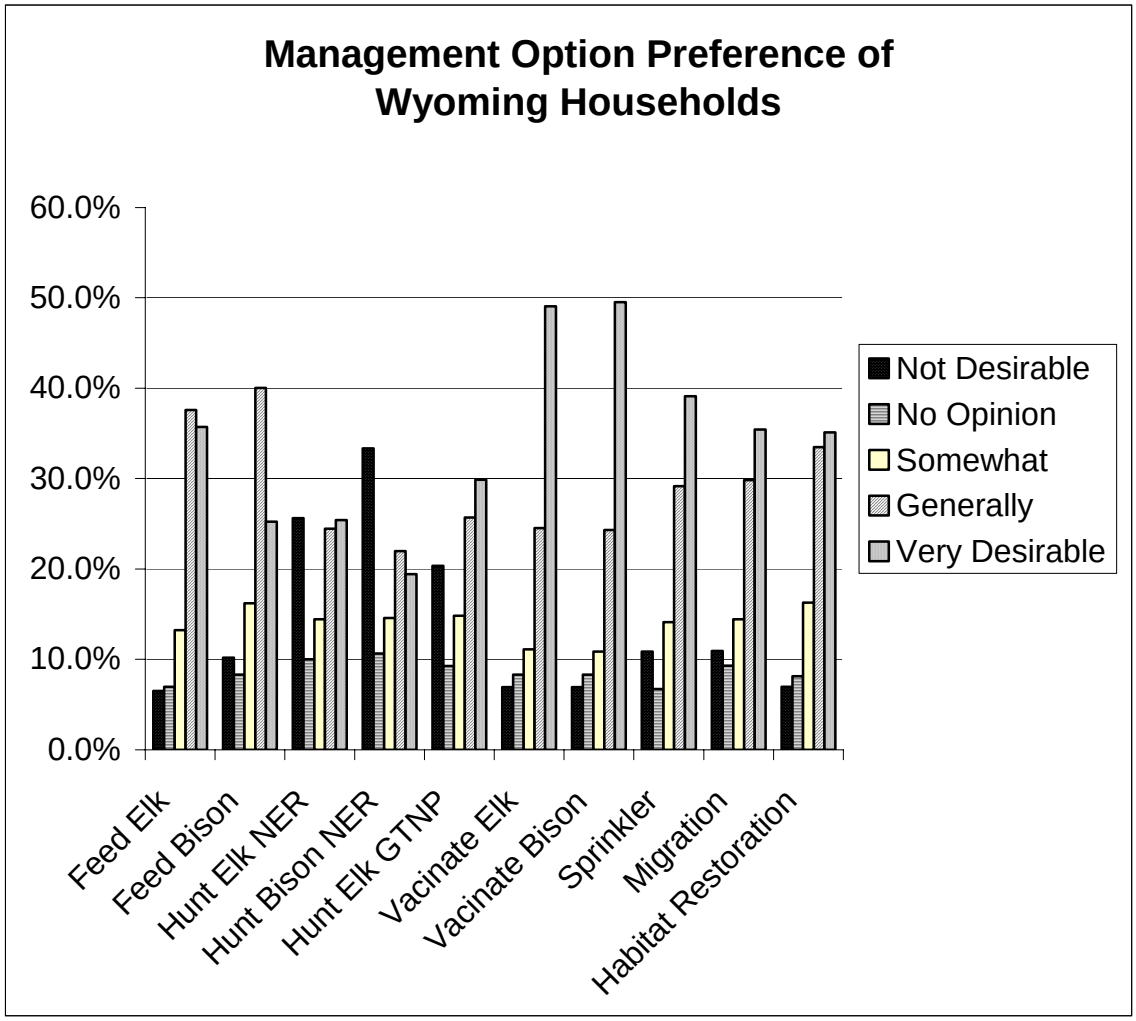
A. Teton County Households

While most Teton county households reported elk feeding as very desirable, there is a bimodal distribution for several other management practices. Specifically, there are a substantial proportion of Teton county households that feel bison hunting on the NER and restoring migration corridors is undesirable, while an equivalent proportion view these management practices as either generally desirable or very desirable.



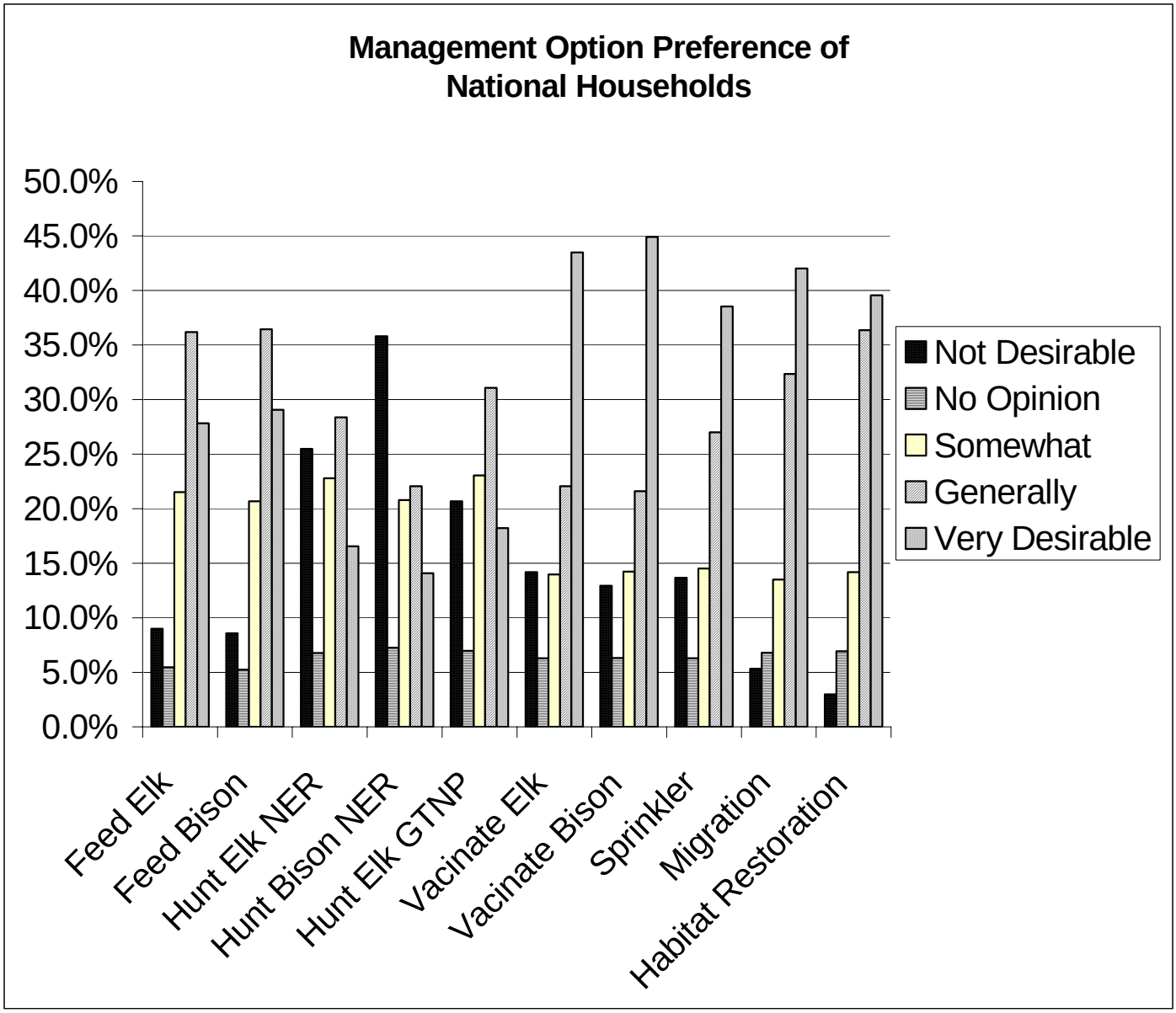
B. Wyoming Households

The vast majority of Wyoming households view vaccinating elk and bison as very desirable. They are almost evenly split on bison hunting on the NER, with about equal proportions reporting this as undesirable, while other Wyoming residents believe it to be desirable or very desirable.



C. National Household Management Preferences

The highest levels of support are for vaccinating elk and bison, as well as restoration of elk migration corridor and habitat for native species. There is substantial support for feeding elk and bison as well. There is a bimodal pattern with regard to bison hunting on the NER. About 40% find bison hunting on the NER somewhat or generally desirable, lower than for most other samples, while about 35% find bison hunting on the NER undesirable. Very few people find it very desirable.



Appendix D. 90% Confidence Intervals for Contingent Trip Behavior Responses for Non Local Visitors to Grand Teton National Park

This table was developed by calculating the standard errors from take more trip and less trip responses. This was done separately for primary purpose trip visitors, equal trip purpose visitors and incidental trip visitors. A 90% confidence interval was created around each group's estimate of the additional trips and fewer trips taken. The overall lower limit of the 90% confidence interval reflects the low end for both added trips (smallest increase) and the high end for fewer trips (largest decrease). Conversely, the upper end of the 90% confidence interval was calculated by using the largest increase and smallest decrease. Tying these two together yields wider confidence intervals than would be arrived at individually.

Appendix Table D1. 90% confidence intervals for contingent trip behavior responses of non local visitors to Grand Teton National Park..

Management option	Primary trip purpose visitors	Equal trip purpose visitors	Incidental trip visitors	Total change	Percent change
	23.8% of visitors	71.6% of visitors	4.6% of visitors		
#2 reduced feeding (mean)	-48,767	-156,646	-13,891	-219,305	-10.14%
90% upper	-17,359	-121,931	8,960	-130,330	-6.02%
90% lower	-80,175	-191,359	36,742	-308,277	14.25%
#3 increased feeding (mean)	-43,032	-86,065	-30,865	-159,962	-7.39%
90% upper	-17,794	-46,906	-13,680	-78,380	-3.62%
90% lower	-68,274	-125,213	-48,049	-241,536	-11.16%
#4v1 no active mgmt (mean)	-107,883	-291,576	-33,240	-432,699	-20.00%
90% upper	-29,032	-259,344	-4,461	-292,837	-13.54%
90% lower	-186,739	-323,808	-62,018	-572,565	-26.46%
#4v2 current feeding and bison hunting (mean)	17,929	-53,789	47,812	11,953	0.55%
90% upper	40,032	-26,654	83,211	96,589	4.46%
90% lower	-4,209	-80,923	14,425	-72,707	-3.36%

Appendix Table D2. Associated economic impacts for the 90% confidence intervals for contingent trip behavior responses of non local visitors to Grand Teton National Park.

Management option	Total change in visitation	Total change in local income	Total change in local employment
	# visitors	$	# Jobs
#2 reduced feeding (mean)	-219,305	-$30,053,007	-1400
90% upper	-130,330	-$17,860,096	-832
90% lower	-308,277	-$42,245,507	-1967
#3 increased feeding (mean)	-159,962	-$23,275,567	-1082
90% upper	-78,380	-$11,404,827	-530
90% lower	-241,536	-$35,145,143	-1634
#4v1 no active mgmt (mean)	-432,699	-$62,200,355	-2894
90% upper	-292,837	-$42,095,233	-1959
90% lower	-572,565	-$82,306,052	-3829
#4v2 current feeding and bison hunting (mean)	11,953	$4,274,140	195
90% upper	96,589	$34,538,184	1576
90% lower	-72,707	-$25,998,485	-1186

Appendix E. Descriptive Statistics, Sample Sizes and Relevant Standard Errors of Variables

Grand Teton National Park, Non Local Visitors 6-Mar-03

	Mean	Count
Visit NER	0.255	762
Visit BTNF	0.181	762
Visit Yellowstone	0.677	762
HIKE	0.701	762
BIKE	0.063	762
FISH	0.176	762
PICNIC	0.466	762
DRIVE	0.699	762
HUNT	0.003	762
SIGHTSEE	0.928	762
BIRDVW	0.318	762
HORSE	0.163	762
BISONVIEW	0.702	762
ELKVIEW	0.667	762
BOAT	0.396	762
CAMP	0.436	762
Mountain Climbing	0.073	762
ATV	0.008	762
RODEO	0.136	762
WLART	0.181	762

	Mean	Count	Std. Error
GAS Jackson Hole	$60.43	761	3.77
GAS WY	$57.72	761	3.81
Annual Fee JH	$14.02	759	0.86
Annual Fee WY	$2.27	761	0.37
Daily Fee JH	$5.67	761	0.39
Daily Fee WY	$1.74	761	0.41
HOTEL JH	$484.52	761	54.32
HOTEL WY	$109.08	761	14.69
Camp out GTNP-JH	$13.66	761	3.63
Camp out GTNP-WY	$11.47	761	2.05
Camp in GTNP-JH	$19.76	761	1.71
Camp In GTNP WY	$2.17	761	0.56
Food Restaurants JH	$171.41	761	9.84
Food Restaurants WY	$73.58	761	5.03
Food Grocery JH	$67.39	761	4.09
Food Grocery WY	$32.91	761	2.99
SUPPLY JH	$146.67	761	17.50
SUPPLY WY	$40.06	761	3.32
Equip rental JH	$20.52	761	2.10
Equip rental WY	$2.84	761	0.91
GUIDE JH	$59.51	761	10.57
GUIDE WY	$6.63	761	1.49
Rental Car JH	$77.99	761	8.16
Rental Car WY	$31.61	761	4.87
TIMESPENT	36.40	753	1.58
TIMESPENTGTNP	26.47	756	1.06
TRAVEL TIME	1391.62	692	78.39
TRAVEL DIST	1312.29	602	35.07
# IN GROUP	4.74	762	0.29
GENDER	0.461538	741	N/A
AGE	47.76662	737	0.479
WORK	0.735978	731	0.016
WORKFULL	0.860595	538	0.015
RETIRE	0.775401	187	0.031
ENVORG	0.257104	739	0.016
HUNTORG	0.107191	737	0.011
EDUC	16.60135	740	0.091
RECOFF	0.814327	684	0.015
PAIDVAC	13.43888	634	0.779
NUMHOUSE	2.916103	739	0.051
NUMPAY	1.703297	728	0.019
INC	101739.1	690	2146.699

Appendix E. Descriptive statistics, sample sizes and relevant standard errors of variables (continued).

Grand Teton National Park Local Visitors

	Mean	Count
Visit NER	0.15	55
Visit BTNF	0.18	55
Visit Yellowstone	0.15	55
HIKE	0.56	55
BIKE	0.05	55
FISH	0.27	55
PICNIC	0.31	55
DRIVE	0.24	55
HUNT	0.00	55
SIGHTSEE	0.56	55
BIRDVW	0.15	55
HORSE	0.02	55
BISONVIEW	0.22	54
ELKVIEW	0.18	55
BOAT	0.55	55
CAMP	0.38	55
Mountain Climbing	0.09	55

	Mean	Count	Std. Error
TIMESPENT	14.52	52	2.37
TRAVEL TIME	34.83	54	2.49
TRAVEL DIST	25.56	52	2.05
# IN GROUP	3.33	54	0.34
GENDER	0.56	55	0.07
AGE	44.62	55	1.93
WORK	0.84	55	0.05
WORKFULL	0.80	46	0.06
RETIRE	0.67	9	0.17
ENVORG	0.33	55	0.06
HUNTORG	0.18	55	0.05
EDUC	16.02	55	0.25
RECOFF	0.92	53	0.04
PAIDVAC	8.33	50	2.34
NUMHOUSE	2.31	54	0.16
NUMPAY	1.72	54	0.10
INC	70343.14	51	7684.66

NER Non Locals

Visit GTNP	0.290	448
HIKE	0.073	450
BIKE	0.004	450
FISH	0.022	450
PICNIC	0.049	450
DRIVE	0.364	450
HUNT	0.004	450
SIGHTSEE	0.680	450
BIRDVW	0.056	450
HORSE	0.007	450
SHOSHOE	0.093	450
SNOMOB	0.260	450
BOAT	0.002	450
CAMP	0.004	450
MTNCL	0.002	450
SNOSKI	0.478	450
BISONVIEW	0.240	450
ELKVIEW	0.820	450
SLEIGH	0.900	450
ATV	0.009	450
RODEO	0.013	450
WLART	0.582	450

GAS Jackson Hole	$34.69	455	2.96
GAS WY	$20.81	455	2.61
Annual Fee JH	$3.18	455	0.62
Annual Fee WY	$0.79	455	0.75
Daily Fee JH	$7.28	455	1.00
Daily Fee WY	$0.62	455	0.23
HOTEL JH	$573.35	455	63.94
HOTEL WY	$35.31	455	7.51
Food Restaurants JH	$283.90	455	21.73
Food Restaurants WY	$27.47	455	4.45
Food Grocery JH	$68.42	455	6.46
Food Grocery WY	$8.08	455	1.88
SUPPLY JH	$166.01	455	16.37
SUPPLY WY	$10.46	455	2.46
Equip rental JH	$201.00	455	19.55
Equip rental WY	$20.96	455	6.28
GUIDE JH	$13.80	455	3.75
GUIDE WY	$0.00	455	0.00
Sleigh Ride Fees	$39.41	455	1.98
Rental Car JH	$78.33	455	8.74
Rental Car WY	$8.92	454	3.23
Air flights JH	$333.14	455	36.63
Air flights WY	$45.86	455	10.47
Tour Group Expenses	$86.39	455	31.01
Group size for Expenses	$3.71	430	0.23
TIMESPENT	35.06	448	1.53
TRAVTIME	367.36	415	38.50

Appendix E. Descriptive Statistics, Sample Sizes and Relevant Standard Errors of Variables (Continued)

TRAVDIST	499.00	350	35.85
NUMGROUP	5.91	449	0.53
GENDER	0.49	441	0.02
AGE	44.93	437	0.60
WORK	0.83	440	0.02
WORKFULL	0.89	359	0.02
RETIRE	0.61	77	0.06
ENVORG	0.24	436	0.02
HUNTORG	0.22	437	0.02
EDUC	15.79	439	0.13
RECOFF	0.86	425	0.02
PAIDVAC	3.66	371	0.27
NUMHOUSE	2.91	438	0.07
NUMPAY	1.70	434	0.03
INCOME	$103,771	411	3044

NER Locals

	Mean	Count	
Visit GTNP	0.44	41	
HIKE	0.29	41	
BIKE	0.17	41	
FISH	0.20	41	
PICNIC	0.10	41	
DRIVE	0.39	41	
HUNT	0.15	41	
SIGHTSEE	0.63	41	
BIRDVW	0.20	41	
HORSE	0.10	41	
SHOSHOE	0.15	41	
SNOMOB	0.07	41	
BOAT	0.10	41	
CAMP	0.17	41	
MTNCL	0.07	41	
SNOSKI	0.39	41	
BISONVIEW	0.34	41	
ELKVIEW	0.63	41	
SLEIGH	0.76	41	
ATV	0.05	41	
RODEO	0.10	41	
WLART	0.63	41	

	Mean	Count	Std. Error
TRAVTIME	25.58	38	9.29
TRAVDIST	20.89	38	10.38
NUMGROUP	4.45	38	0.78
GENDER	0.57	37	0.08
AGE	39.14	37	2.34
WORK	0.89	37	0.05
WORKFULL	0.82	33	0.07
RETIRE	0.60	5	0.24
ENVORG	0.22	37	0.07
HUNTORG	0.08	37	0.05
EDUC	15.89	37	0.30
RECOFF	0.89	37	0.05
PAIDVAC	1.73	33	0.29
NUMHOUSE	2.51	37	0.24
NUMPAY	1.92	37	0.17
INCOME	$76,736	36	10192

Appendix F. Grand Teton National Park Contingent Valuation Bid Response Distribution for Locals and Non Locals

Grand Teton NP local visitors		Grand Teton NP non local visitors	
Bid amount ($)	Percent yes	Bid amount ($)	Percent yes
2	100	5	98
4	100	10	96
6	80	30	94
10	66	40	92
15	50	50	97
20	25	70	90
30	100	90	94
40	66	125	83
50	66	195	78
60	100	250	89
70	40	350	72
90	75	450	70
125	33	550	56
175	33	750	58

Appendix G. Distribution of NER Sleigh Ride Visitor Spending Impacts by Sector and Key Industries

A. Distribution of the total current level of non-local NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	$1,163	$3,335	$4,498
Mining	$5,818	$1,369	$7,186
Construction	$0	$26,125	$26,125
Manufacturing	$1,971	$6,825	$8,797
Transport/utilities	$687	$16,984	$17,671
Trade	$205,431	$44,065	$249,496
Insurance/real estate	$21,763	$39,028	$60,791
Services	$399,777	$113,629	$513,406
Government	$31,246	$86,595	$117,843
Other	$0	$204	$204
Total	**$667,855**	**$338,165**	**$1,006,019**
Key Industries			
Eating and drinking	$149,383	$5,075	$158,253
Hotels and lodging places	$221,050	$658	$221,708
Amusement and recreation	$128,563	$1,156	$129,718
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0	0.1	0.2
Mining	0.1	0.1	0.2
Construction	0	0.5	0.6
Manufacturing	0	0.3	0.3
Transport/utilities	0	0.4	0.4
Trade	11.4	2	13.3
Insurance/real estate	1.8	1.7	3.1
Services	23	3.9	27.2
Government	0.8	2	3.4
Other	0	0	0
Total	**37.3**	**11.6**	**48.9**
Key Industries			
Eating and drinking	9	0.4	9.5
Hotels and lodging places	10.8	0	10.9
Amusement and recreation	10.5	0	10.6

B. Distribution of the total economic impacts associated with Alternative 2 (Reduced Feeding) of non-local NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$423	-$1,111	-$1,533
Mining	-$2,366	-$543	-$2,908
Construction	$0	-$8,740	-$8,740
Manufacturing	-$787	-$2,272	-$3,059
Transport/utilities	-$274	-$5,581	-$5,853
Trade	-$75,485	-$14,748	-$90,233
Insurance/real estate	-$7,225	-$12,896	-$20,121
Services	-$125,000	-$37,292	-$162,292
Government	-$10,323	-$29,018	-$39,341
Other	$0	-$68	-$68
Total	**-$221,881**	**-$112,266**	**-$334,147**
Key Industries			
Eating and drinking	-$53,526	-$2,958	-$56,485
Hotels and lodging places	-$70,024	-$220	-$70,244
Amusement and recreation	-$39,497	-$384	-$39,880
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0	0	0
Mining	-0.1	0	-0.1
Construction	0	-0.2	-0.2
Manufacturing	0	0	0
Transport/utilities	0	0	-0.1
Trade	-4.2	-0.5	-4.7
Insurance/real estate	-0.6	-0.5	-1
Services	-7.2	-1.3	-8.5
Government	-0.2	-0.8	-1.1
Other	0	0	0
Total	**-12.3**	**-3.9**	**-16.2**
Key Industries			
Eating and drinking	-3.3	-0.2	-2.8
Hotels and lodging places	-3.4	0	-3.5
Amusement and recreation	-3.3	0	-3.3

C. Distribution of the total economic impacts associated with Alternative 3 (Increased Feeding) of non-local NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	$92	$235	$326
Mining	$517	$117	$635
Construction	$0	$1,844	$1,844
Manufacturing	$171	$481	$652
Transport/utilities	$59	$1,171	$1,231
Trade	$16,198	$3,120	$19,318
Insurance/real estate	$1,498	$2,705	$4,205
Services	$26,109	$7,847	$33,955
Government	$2,253	$6,131	$8,385
Other	$0	$15	$15
Total	**$46,899**	**$23,667**	**$70,566**
Key Industries			
Eating and drinking	$11,409	$625	$12,035
Hotels and lodging places	$14,447	$46	$14,494
Amusement and recreation	$8,449	$81	$8,530
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0	0	0
Mining	0	0	0
Construction	0	0	0
Manufacturing	0	0	0
Transport/utilities	0	0	0
Trade	0.9	0.1	1
Insurance/real estate	0.2	0	0.2
Services	1.5	0.3	1.8
Government	0	0.2	0.2
Other	0	0	0
Total	**2.6**	**0.8**	**3.4**
Key Industries			
Eating and drinking	0.7	0	0.7
Hotels and lodging places	0.7	0	0.7
Amusement and recreation	0.7	0	0.7

D. Distribution of the total economic impacts associated with Alternative 4V1 (No Active Management) of non-local NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$517	-$1,479	-$1,997
Mining	-$2,642	-$621	-$3,262
Construction	$0	-$11,616	-$11,616
Manufacturing	-$893	-$3,022	-$3,914
Transport/utilities	-$310	-$7,548	-$7,859
Trade	-$92,379	-$19,549	-$111,929
Insurance/real estate	-$9,805	-$17,384	-$2,147,929
Services	-$175,935	-$50,376	-$182,125
Government	-$13,405	-$38,473	-$86,628
Other	$0	-$90	-$17,474
Total	**-$295,888**	**-$150,161**	**-$305,970**
Key Industries			
Eating and drinking	-$67,123	-$3,938	-$71,060
Hotels and lodging places	-$98,688	-$292	-$98,979
Amusement and recreation	-$55,137	-$512	-$55,650
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0	0	-0.1
Mining	-0.1	0	-0.1
Construction	0	-0.3	-0.3
Manufacturing	0	0	-0.2
Transport/utilities	0	-0.1	-0.2
Trade	-5.2	-0.8	-5.9
Insurance/real estate	-0.8	-0.6	-1.4
Services	-10.1	-1.9	-11.8
Government	-0.3	-1.1	-1.5
Other	0	0	0
Total	**-16.5**	**-5.1**	**-21.6**
Key Industries			
Eating and drinking	-4.1	-0.2	-4.3
Hotels and lodging places	-4.9	0	-4.9
Amusement and recreation	-3.6	0	-3.6

E. Distribution of the total economic impacts associated with Alternative 4V2 (Current Feeding and Bison Hunting) of non-local NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	$248	$621	$868
Mining	$1,461	$332	$1,793
Construction	$0	$4,913	$4,913
Manufacturing	$482	$1,271	$1,752
Transport/utilities	$167	$3,106	$3,274
Trade	$44,577	$8,284	$52,860
Insurance/real estate	$4,072	$7,210	$11,282
Services	$67,384	$20,724	$88,109
Government	$5,664	$16,318	$21,981
Other	$0	$38	$38
Total	**$124,054**	**$62,815**	**$186,870**
Key Industries			
Eating and drinking	$31,247	$1,659	$32,906
Hotels and lodging places	$38,322	$123	$38,445
Amusement and recreation	$20,774	$215	$20,990
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0	0	0
Mining	0	0	0
Construction	0	0	0.1
Manufacturing	0	0	0
Transport/utilities	0	0	0
Trade	2.5	0.2	2.8
Insurance/real estate	0.4	0.2	0.6
Services	3.8	0.6	4.6
Government	0.2	0.4	0.6
Other	0	0	0
Total	**6.8**	**2.2**	**9**
Key Industries			
Eating and drinking	1.9	0	2
Hotels and lodging places	1.9	0	1.9
Amusement and recreation	1.8	0	1.8

F. Distribution of the total current level of non-resident NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	$1,564	$2,519	$4,083
Mining	$1,645	$9,393	$11,039
Construction	$0	$24,792	$24,792
Manufacturing	$1,949	$6,520	$8,470
Transport/utilities	$968	$32,192	$33,158
Trade	$165,008	$256,873	$221,881
Insurance/real estate	$23,322	$33,264	$56,585
Services	$340,646	$102,007	$442,653
Government	$38,126	$115,087	$153,213
Other	$0	$957	$957
Total	$573,225	$383,608	$956,831
Key Industries			
Eating and drinking	$113,620	$9,182	$122,802
Hotels and lodging places	$187,631	$1,316	$188,948
Amusement and recreation	$112,784	$2,551	$115,334
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0.1	0.1	0.2
Mining	0	0	2.1
Construction	0	0.6	0.3
Manufacturing	0	0.2	0.5
Transport/utilities	0	0.8	0.5
Trade	13.3	3.3	10
Insurance/real estate	2.2	1.5	8.4
Services	23.2	4.6	14.8
Government	1	3.4	17.1
Other	0	0.1	2.1
Total	**39.8**	**14.9**	**27.9**
Key Industries			
Eating and drinking	10.3	0.8	11.3
Hotels and lodging places	12	0	12
Amusement and recreation	9.6	0.2	9.8

G. Distribution of the total economic impacts associated with Alternative 2 (Reduced Feeding) of nonresident NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$501	-$1,232	-$1,318
Mining	-$677	-$4,242	-$4,188
Construction	$0	-$10,198	-$8,225
Manufacturing	-$789	-$2,836	-$2,980
Transport/utilities	-$393	-$13,416	-$11,018
Trade	-$61,569	-$36,712	-$80,518
Insurance/real estate	-$7,735	-$16,958	-$18,685
Services	-$104,241	-$88,475	-$137,704
Government	-$12,115	-$43,340	-$50,611
Other	$0	-$316	-$316
Total	**-$188,020**	**-$217,725**	**-$315,562**
Key Industries			
Eating and drinking	-$41,030	-$3,046	-$44,076
Hotels and lodging places	-$58,495	-$336	-$58,932
Amusement and recreation	-$33,546	-$842	-$34,389
Employment Effects (Jobs)			
Economic sectors	Direct effects	Secondary effects	Total effects
Agriculture	0	0	-0.1
Mining	0	0	0
Construction	0	-0.2	-0.2
Manufacturing	0	-0.1	-0.1
Transport/utilities	0	-0.2	-0.2
Trade	-4.9	-1.1	-6
Insurance/real estate	-0.8	-0.4	-1.2
Services	-7.1	-1.5	-8.6
Government	-0.3	-1.1	-1.4
Other	0	0	0
Total	**-13.1**	**-5**	**-17.9**
Key Industries			
Eating and drinking	-3.7	-0.2	-4
Hotels and lodging places	-3.7	0	-3.7
Amusement and recreation	-2.9	0	-2.928

H. Distribution of the total economic impacts associated with Alternative 3 (Increased Feeding) of nonresident NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	Direct effects	Secondary effects	Total effects
Agriculture	$59	$91	$150
Mining	$88	$429	$516
Construction	$0	$912	$912
Manufacturing	$101	$247	$349
Transport/utilities	$50	$1,168	$1,218
Trade	$7,515	$2,129	$9,645
Insurance/real estate	$808	$1,191	$1,999
Services	$10,902	$3,689	$14,589
Government	$1,587	$4,333	$3,828
Other	$0	$35	$35
Total	**$21,019**	**$14,221**	**$35,241**
Key Industries			
Eating and drinking	$4,860	$341	$5,200
Hotels and lodging places	$5,838	$49	$5,887
Amusement and recreation	$3,825	$93	$3,919

Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0	0	0
Mining	0	0	0
Construction	0	0	0
Manufacturing	0	0	0
Transport/utilities	0	0	0
Trade	0.6	0.1	0.7
Insurance/real estate	0.1	0	0.1
Services	0.8	0.1	0.9
Government	0	0.1	0.1
Other	0	0	0
Total	**1.5**	**0.5**	**2**
Key Industries			
Eating and drinking	0.4	0	0.5
Hotels and lodging places	0.3	0	0.3
Amusement and recreation	0.2	0	0.3

I. Distribution of the total economic impacts associated with Alternative 4V1 (No Active Management) of nonresident NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$644	-$1,023	-$1,646
Mining	-$735	-$4,033	-$4,768
Construction	$0	-$10,175	-$10,177
Manufacturing	-$864	-$2,686	-$3,547
Transport/utilities	-$39,870	-$17,457	-$57,326
Trade	-$70,765	-$23,341	-$94,105
Insurance/real estate	-$9,665	-$13,639	-$23,304
Services	-$135,470	-$41,668	-$177,138
Government	-$15,020	-$47,314	-$62,334
Other	$0	-$391	-$391
Total	**-$233,573**	**-$157,467**	**-$829,038**
Key Industries			
Eating and drinking	-$48,168	-$3,762	-$51,931
Hotels and lodging places	-$75,845	-$540	-$76,385
Amusement and recreation	-$43,629	-$1,043	-$44,672

Employment Effects (Jobs)			
Economic Sectors	**Direct Effects**	**Secondary Effects**	**Total Effects**
Agriculture	0	0	-0.2
Mining	0	0	0
Construction	0	-0.3	-0.2
Manufacturing	0	0	-0.2
Transport/utilities	0	-0.3	-0.3
Trade	-5.6	-1.3	-7
Insurance/real estate	-0.9	-0.5	-1.6
Services	-9.2	-1.8	-11.1
Government	-0.4	-1.4	-1.7
Other	0	0	0
Total	**-16.3**	**-5.1**	**-22.3**
Key Industries			
Eating and drinking	-4.5	-0.2	-3.1
Hotels and lodging places	-4.8	0	-4.8
Amusement and recreation	-3.8	0	-3.8

J. Distribution of the total economic impacts associated with Alternative 4V2 (Current Feeding and Bison Hunting) of nonresident NER visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	Direct effects	Secondary effects	Total effects
Agriculture	$267	$447	$715
Mining	$368	$1,917	$2,284
Construction	$0	$4,532	$4,531
Manufacturing	$428	$1,201	$1,629
Transport/utilities	$212	$5,863	$6,076
Trade	$33,568	$10,398	$43,965
Insurance/real estate	$4,349	$6,060	$10,408
Services	$57,446	$18,420	$75,869
Government	$6,333	$21,128	$27,461
Other	$0	$174	$174
Total	**$102,973**	**$70,139**	**$173,113**
Key Industries			
Eating and drinking	$22,477	$1,673	$24,149
Hotels and lodging places	$32,885	$240	$33,125
Amusement and recreation	$17,789	$461	$18,251
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0	0	0
Mining	0	0	0
Construction	0	0	0.2
Manufacturing	0	0	0
Transport/utilities	0	0	0.2
Trade	2.7	0.4	3.2
Insurance/real estate	0.4	0.2	0.6
Services	3.9	0.8	4.7
Government	0.2	0.6	0.8
Other	0	0	0
Total	**7.1**	**2.7**	**9.8**
Key Industries			
Eating and drinking	2.1	0.2	2.2
Hotels and lodging places	2.1	0	2.1
Amusement and recreation	1.4	0	1.5

Appendix H. Distribution of GTNP Summer Visitor Spending Impacts by Sector and Key Industries

A. Distribution of the total current level of non-local GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	$315,110	$1,012,349	$1,327,459
Mining	$2,293,820	$521,649	$2,815,469
Construction	$0	$8,791,761	$8,791,760
Manufacturing	$681,412	$1,927,128	$2,608,540
Transport/utilities	$245,583	$5,862,428	$6,108,011
Trade	$50,168,721	$13,125,130	$63,293,851
Insurance/real estate	$9,094,819	$13,686,286	$22,781,105
Services	$128,721,341	$33,766,992	$162,488,340
Government	$9,199,267	$26,990,306	$36,189,574
Other	$0	$62,269	$62,269
Total	**$200,720,074**	**$105,746,297**	**$306,466,378**
Key Industries			
Eating and drinking	$33,602,119	$2,668,481	$36,272,600
Hotels and lodging places	$102,722,024	$204,842	$102,926,871
Amusement and recreation	$19,166,772	$354,839	$19,521,611
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	10.8	59.1	69.9
Mining	66.1	15.0	81.1
Construction	0.0	219.2	219.2
Manufacturing	16.2	76.0	92.2
Transport/utilities	8.6	150.4	159.0
Trade	2719.0	551.9	3270.9
Insurance/real estate	752.4	486.1	1238.6
Services	6850.5	1246.6	8097.0
Government	234.8	798.4	1033.1
Other	0.0	4.5	4.5
Total	**10658.4**	**3607.1**	**14265.4**
Key Industries			
Eating and drinking	2017	160.3	2177.5
Hotels and lodging places	5049.9	10.2	5060
Amusement and recreation	1568.2	29	1597.3

B. Distribution of the total economic impacts associated with Alternative 2 (Reduced Feeding) of all non-local GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$30,862	-$99,267	-$130,130
Mining	-$225,487	-$51,268	-$276,755
Construction	$0	-$861,538	-$861,537
Manufacturing	-$66,893	-$189,075	-$255,969
Transport/utilities	-$24,107	-$574,179	-$598,286
Trade	-$4,934,332	-$1,287,550	-$6,221,882
Insurance/real estate	-$895,984	-$1,342,809	-$2,238,792
Services	-$12,601,795	-$3,310,735	-$15,912,530
Government	-$904,692	-$2,646,330	-$3,551,022
Other	$0	-$6,106	-$6,106
Total	**-$19,684,151**	**-$10,368,857**	**-$30,053,008**
Key industries			
Eating and drinking	-$3,311,071	-$261,919	-$3,572,991
Hotels and lodging places	-$10,036,158	-$20,097	-$10,056,256
Amusement and recreation	-$1,892,048	-$34,808	-$1,926,857
Employment effects (jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-1.1	-5.8	-6.9
Mining	-6.5	-1.5	-8.0
Construction	0.0	-21.5	-21.5
Manufacturing	-1.6	-7.5	-9.0
Transport/utilities	-0.8	-14.7	-15.6
Trade	-267.5	-54.1	-321.6
Insurance/real estate	-74.1	-47.7	-121.8
Services	-671.1	-122.2	-793.3
Government	-23.1	-78.3	-101.4
Other	0.0	-0.4	-0.4
Total	**-1045.8**	**-353.7**	**-1399.5**
Key industries			
Eating and drinking	-198.7	-15.7	-208.8
Hotels and lodging places	-493.4	-0.9	-494.4
Amusement and recreation	-554.4	-2.9	-225896.7

C. Distribution of the total economic impacts associated with Alternative 3 (Increased Feeding) of non-local GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$23,394	-$77,091	-$100,485
Mining	-$175,800	-$39,918	-$215,717
Construction	$0	-$670,904	-$670,905
Manufacturing	-$51,920	-$146,299	-$198,220
Transport/utilities	-$18,667	-$446,954	-$465,621
Trade	-$3,808,717	-$996,819	-$4,805,536
Insurance/real estate	-$653,981	-$1,031,854	-$1,685,835
Services	-$9,813,657	-$2,566,970	-$12,380,628
Government	-$695,554	-$2,052,338	-$2,747,892
Other	$0	-$4,729	-$4,729
Total	**-$15,241,690**	**-$8,033,877**	**-$23,275,567**
Key Industries			
Eating and drinking	-$2,556,160	-$202,877	-$2,759,037
Hotels and lodging places	-$7,883,171	-$15,657	-$7,898,828
Amusement and recreation	-$1,430,680	-$26,876	-$1,457,556
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-0.8	-4.5	-5.3
Mining	-5.1	-1.2	-6.2
Construction	0.0	-16.7	-16.7
Manufacturing	-1.2	-5.8	-7.0
Transport/utilities	-0.7	-11.5	-12.1
Trade	-206.5	-41.9	-248.4
Insurance/real estate	-54.1	-37.0	-91.1
Services	-521.5	-94.8	-616.3
Government	-17.7	-60.7	-78.5
Other	0.0	-0.3	-0.3
Total	**-807.6**	**-274.4**	**-1082.0**
Key Industries			
Eating and drinking	-153.5	-12.2	-165.6
Hotels and lodging places	-387.5	-0.7	-388.3
Amusement and recreation	-117.1	-2.2	-119.3

D. Distribution of the total economic impacts associated with Alternative 4V1 (No Active Management) of non-local GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$63,624	-$205,602	-$269,226
Mining	-$466,315	-$106,012	-$572,327
Construction	$0	-$1,786,755	-$1,786,754
Manufacturing	-$138,373	-$391,041	-$529,414
Transport/utilities	-$49,841	-$1,191,307	-$1,241,149
Trade	-$10,173,941	-$2,663,636	-$12,837,578
Insurance/real estate	-$1,819,870	-$2,772,471	-$4,592,341
Services	-$26,160,180	-$6,855,202	-$33,015,381
Government	-$1,863,761	-$5,479,767	-$7,343,528
Other	$0	-$12,638	-$12,638
Total	**-$40,735,905**	**-$21,464,430**	**-$62,200,334**
Key Industries			
Eating and drinking	-$6,814,616	-$542,017	-$7,356,632
Hotels and lodging places	-$20,920,140	-$41,635	-$20,961,775
Amusement and recreation	-$3,867,549	-$71,965	-$3,939,528

Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-2.2	-12.0	-14.2
Mining	-13.4	-3.1	-16.5
Construction	0.0	-44.5	-44.5
Manufacturing	-3.3	-15.4	-18.7
Transport/utilities	-1.7	-30.6	-32.3
Trade	-551.4	-112.0	-663.4
Insurance/real estate	-150.6	-98.7	-249.3
Services	-1391.5	-253.1	-1644.6
Government	-47.6	-162.1	-209.7
Other	0.0	-0.9	-0.9
Total	**-2161.7**	**-732.4**	**-2894.1**
Key Industries			
Eating and drinking	-409.1	-32.5	-441.6
Hotels and lodging places	-1028.5	-1.9	-1030.5
Amusement and recreation	-316.5	-5.9	-322.4

E. Distribution of the total economic impacts associated with Alternative 4V2 (Current Feeding and Bison Hunting) of non-local GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for Teton County WY and ID.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	$3,256	$14,577	$17,833
Mining	$34,831	$7,799	$42,630
Construction	$0	$130,376	$130,376
Manufacturing	$9,787	$26,624	$36,412
Transport/utilities	$3,429	$86,394	$89,822
Trade	$678,688	$182,470	$861,158
Insurance/real estate	$40,818	$173,296	$214,114
Services	$1,903,272	$476,960	$2,380,232
Government	$118,313	$382,381	$500,694
Other	$0	$868	$868
Total	**$2,792,395**	**$1,481,744**	**$4,274,139**
Key Industries			
Eating and drinking	$458,515	$37,319	$495,835
Hotels and lodging places	$1,657,349	$3,063	$1,660,414
Amusement and recreation	$197,091	$4,773	$201,863
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0.1	0.9	1.0
Mining	1.0	0.2	1.2
Construction	0.0	3.2	3.3
Manufacturing	0.2	1.1	1.2
Transport/utilities	0.1	2.2	2.3
Trade	36.8	7.7	44.5
Insurance/real estate	3.4	6.9	10.3
Services	99.1	17.7	116.8
Government	3.0	11.3	14.3
Other	0.0	0.1	0.1
Total	**143.7**	**51.3**	**195.0**
Key Industries			
Eating and drinking	27.5	2.3	29.8
Hotels and lodging places	81.4	0.1	81.6
Amusement and recreation	16.1	0.4	16.5

F. Distribution of the total current level of non-resident GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	$378,933	$996,183	$1,375,115
Mining	$992,297	$4,858,268	$5,850,565
Construction	$0	$11,199,847	$11,199,847
Manufacturing	$1,048,607	$2,620,445	$3,669,052
Transport/utilities	$546,484	$14,508,337	$15,054,821
Trade	$61,043,519	$23,042,474	$84,085,991
Insurance/real estate	$12,988,450	$15,475,948	$28,464,397
Services	$138,175,509	$42,076,941	$180,252,450
Government	$13,505,074	$47,918,063	$61,423,139
Other	$0	$391,879	$391,879
Total	**$228,678,872**	**$163,088,383**	**$391,767,254**
Key Industries			
Eating and drinking	$38,065,716	$3,740,816	$41,806,531
Hotels and lodging places	$112,841,655	$553,844	$113,395,498
Amusement and recreation	$18,007,678	$1,042,445	$19,050,123
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	27.0	90.5	117.5
Mining	10.2	50.2	60.3
Construction	0	319.1	319.0
Manufacturing	31.5	99.8	131.4
Transport/utilities	14.7	356.2	370.8
Trade	4685.8	1294.9	5980.7
Insurance/real estate	1227.8	678.5	1906.3
Services	8998.6	1892.4	10891.1
Government	346.4	1419.3	1765.7
Other	0	45.0	45.0
Total	**15341.9**	**6245.9**	**21587.9**
Key Industries			
Eating and drinking	3479.9	342.1	3822
Hotels and lodging places	7149.5	29.1	7184.6
Amusement and recreation	1526.1	88.3	1614.4

G. Distribution of the total economic impacts associated with Alternative 2 (Reduced Feeding) of nonresident GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$34,994	-$91,823	-$126,817
Mining	-$91,801	-$448,803	-$540,604
Construction	$0	-$1,032,268	-$1,032,268
Manufacturing	-$96,931	-$241,635	-$338,566
Transport/utilities	-$50,512	-$1,336,878	-$1,387,390
Trade	-$5,640,692	-$2,124,111	-$7,764,803
Insurance/real estate	-$1,189,749	-$1,424,104	-$2,613,853
Services	-$12,727,703	-$3,877,459	-$16,605,162
Government	-$1,241,487	-$4,416,780	-$5,658,268
Other	$0	-$36,114	-$36,114
Total	**-$21,073,869**	**-$15,029,976**	**-$36,103,846**
Key Industries			
Eating and drinking	-$3,519,365	-$344,794	-$3,864,161
Hotels and lodging places	-$10,383,547	-$51,044	-$10,434,591
Amusement and recreation	-$1,669,368	-$96,071	-$1,765,439
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-2.5	-8.3	-10.8
Mining	-0.9	-4.6	-5.6
Construction	0.0	-29.4	-29.4
Manufacturing	-2.9	-9.2	-12.1
Transport/utilities	-1.4	-32.8	-34.2
Trade	-433.0	-119.4	-552.4
Insurance/real estate	-112.5	-62.5	-174.9
Services	-829.1	-174.4	-1003.5
Government	-31.8	-130.8	-162.7
Other	0.0	-4.2	-4.2
Total	-1414.1	-575.6	-1989.7
Key industries			
Eating and drinking	-321.8	-31.5	-353.3
Hotels and lodging places	-657.8	-3.2	-661.1
Amusement and recreation	-141.5	-8.1	-285373.6

H. Distribution of the total economic impacts associated with Alternative 3 (Increased Feeding) of nonresident GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$30,262	-$79,077	-$109,339
Mining	-$79,566	-$387,534	-$467,099
Construction	$0	-$888,492	-$888,492
Manufacturing	-$83,768	-$207,686	-$291,454
Transport/utilities	-$43,597	-$1,149,097	-$1,192,693
Trade	-$4,848,133	-$1,824,808	-$6,672,941
Insurance/real estate	-$963,066	-$1,208,527	-$2,171,593
Services	-$10,985,334	-$3,329,985	-$14,315,319
Government	-$1,085,471	-$3,794,211	-$4,879,683
Other	$0	-$31,027	-$31,027
Total	**-$18,119,196**	**-$12,900,445**	**-$31,019,641**
Key industries			
Eating and drinking	-$3,021,123	-$296,209	-$3,317,334
Hotels and lodging places	-$8,938,354	-$43,839	-$8,982,192
Amusement and recreation	-$1,482,397	-$82,539	-$1,564,936
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-2.2	-7.2	-9.4
Mining	-0.8	-4.0	-4.8
Construction	0.0	-25.3	-25.3
Manufacturing	-2.5	-7.9	-10.4
Transport/utilities	-1.2	-28.2	-29.4
Trade	-372.1	-102.5	-474.6
Insurance/real estate	-91.0	-53.4	-144.4
Services	-716.6	-149.8	-866.4
Government	-27.8	-112.4	-140.2
Other	0.0	-3.6	-3.6
Total	**-1214.3**	**-494.3**	**-1708.5**
Key industries			
Eating and drinking	-276.2	-27.0	-303.3
Hotels and lodging places	-3766.3	-2.8	-569.1
Amusement and recreation	-125.6	-6.9	-132.6

I. Distribution of the total economic impacts associated with Alternative 4V1 (No Active Management) of nonresident GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-$74,947	-$196,833	-$271,781
Mining	-$196,323	-$960,250	-$1,156,573
Construction	$0	-$2,212,552	-$2,212,552
Manufacturing	-$207,285	-$517,324	-$724,609
Transport/utilities	-$107,977	-$2,864,881	-$2,972,858
Trade	-$12,043,250	-$4,548,619	-$16,591,870
Insurance/real estate	-$2,513,405	-$3,042,609	-$5,556,014
Services	-$27,330,457	-$8,305,863	-$35,636,321
Government	-$2,685,992	-$9,459,179	-$12,145,171
Other	$0	-$77,366	-$77,366
Total	**-$45,159,636**	**-$32,185,476**	**-$77,345,113**
Key Industries			
Eating and drinking	-$7,505,176	-$738,469	-$8,243,646
Hotels and lodging places	-$142,304,182	-$82,323	-$22,413,505
Amusement and recreation	-$3,593,935	-$205,801	-$3,799,735
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	-5.4	-17.9	-23.3
Mining	-2.0	-9.9	-11.9
Construction	0.0	-63.0	-63.0
Manufacturing	-6.2	-19.7	-25.9
Transport/utilities	-2.9	-70.3	-73.2
Trade	-924.3	-255.6	-1180.0
Insurance/real estate	-237.6	-133.7	-371.3
Services	-1780.7	-373.6	-2154.3
Government	-68.9	-280.2	-349.0
Other	0.0	-8.9	-8.9
Total	**-3028.0**	**-1232.9**	**-4260.9**
Key Industries			
Eating and drinking	-686.1	-67.5	-753.6
Hotels and lodging places	-1413.2	-6.9	-1420.1
Amusement and recreation	-304.6	-17.5	-321.9

J. Distribution of the total economic impacts associated with Alternative 4V2 (Current Feeding and Bison Hunting) of nonresident GTNP visitors (primary, equal, and incidental trip purpose) trip spending by major sector and key industry for the state of Wyoming.

Income Effects			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	$4,951	$12,407	$17,358
Mining	$13,130	$61,316	$74,446
Construction	$0	$138,182	$138,182
Manufacturing	$13,303	$31,142	$44,446
Transport/utilities	$6,768	$174,872	$181,640
Trade	$696,628	$272,730	$969,357
Insurance/real estate	-$11,852	$142,810	$130,958
Services	$1,817,954	$497,708	$2,315,663
Government	$227,151	$567,524	$794,675
Other	$0	$4,669	$4,669
Total	**$2,768,035**	**$1,903,360**	**$4,671,394**
Key Industries			
Eating and drinking	$418,067	$44,374	$462,443
Hotels and lodging places	$1,436,301	$6,538	$1,442,840
Amusement and recreation	$340,710	$12,413	$353,123
Employment Effects (Jobs)			
Economic sectors	**Direct effects**	**Secondary effects**	**Total effects**
Agriculture	0.4	1.1	1.6
Mining	0.1	0.6	0.8
Construction	0.0	3.9	3.9
Manufacturing	0.4	1.2	1.5
Transport/utilities	0.2	4.3	4.5
Trade	53.0	15.4	68.4
Insurance/real estate	-1.1	7.3	6.2
Services	121.1	22.5	143.6
Government	5.8	16.8	22.6
Other	0.0	0.5	0.5
Total	**180.0**	**73.6**	**253.6**
Key industries			
Eating and drinking	38.2	4.1	42.3
Hotels and lodging places	90.9	0.3	91.4
Amusement and recreation	28.9	1.0	29.9