

# YELLOWSTONE WILDLIFE AND THE REGIONAL ECONOMY

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## REVIEW OF ECONOMIC STUDY RESULTS AND ANALYSIS

Summary Report Prepared for  
National Parks Conservation Association

As part of the  
Gateways to Yellowstone Project



BIOECONOMICS

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## EXECUTIVE SUMMARY

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This report was undertaken as a review of recent studies regarding visitor and resident attitudes, opinions, and behavior related to wildlife and wildlife-related issues specific to the Yellowstone NP area. Included in this analysis was a review of 1991, 1998, and 1999 Yellowstone NP visitor survey results, 1999 local and national phone survey results, and a preliminary analysis of partial data gathered from the on-going 2005 Yellowstone NP visitor survey. This review and analysis focused on the role wildlife plays in the actions, decisions, and opinions of park visitors and residents of the local communities surrounding the park. The key findings of this analysis are the following:

- The presence of wildlife within Yellowstone NP is a powerful factor in motivating visitation to the park. Visitor surveys in Yellowstone NP consistently show that over 90% of visitors report participating in wildlife watching on their trips.
- Wildlife-related activities are the primary activity participated in by a large share of YNP visitors. The 2005 Yellowstone visitor survey found that 37% of spring visitors and 30% of summer visitors primarily participated in wildlife recreation on their trips to the park.
- Conservatively, between 5% and 8% of Yellowstone NP visitation is directly tied to enjoyment of wildlife. Loss of these visitors would result in an estimated \$22 million loss in direct visitor spending annually in the communities surrounding the park.
- Residents of the Greater Yellowstone Area participate in wildlife viewing and bird watching activities in significantly greater proportions than the average resident of the 3-state (WY, ID, and MT) area, or of the U.S. as a whole.
- While participation in wildlife watching activities is greater for GYA residents, residents of the GYA, 3-state region, and the nation all express consistently high levels of concern for protecting wildlife habitat, and biodiversity.
- Residents of the GYA have stated a willingness to donate funds to protect threatened species, such as bison, through the purchase of expanded winter range outside the park, or to pay for a brucellosis vaccination program.
- Across visitor surveys, Yellowstone NP visitors show well-defined and consistent preferences for ranking the wildlife species they would most like to see in the park. At the top of these lists are the “charismatic mega-fauna” species such as bears, wolves, moose and elk.

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## INTRODUCTION

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Between 1991 and 2005 there have been a number of visitor and resident population surveys conducted either within Yellowstone NP or concerning issues specific to Yellowstone NP or the Greater Yellowstone Area (GYA). These surveys, many conducted by the current authors, addressed issues including wolf reintroduction, winter use management, control of bison and brucellosis, and evaluation of the NPS fee demonstration program. This suite of population and visitor surveys is somewhat unique in that across several surveys spanning 15 years, identical or near identical questions related to perceptions and attitudes towards wildlife were asked. These consistently posed survey questions present a unique opportunity to view the importance and contribution of wildlife in the Greater Yellowstone Area to the general U.S. and local area populations, as well as to Yellowstone NP visitors.

This study examines the information collected in the 1991-2005 Yellowstone NP surveys and presents this data in the context of how wildlife influences the opinions, concerns, and actions of park visitors as well as of the general population of the Greater Yellowstone Area, surrounding states, and the U.S. as a whole.

*Figure 1: Relationship of Yellowstone-Area Wildlife to Social and Economic Values*

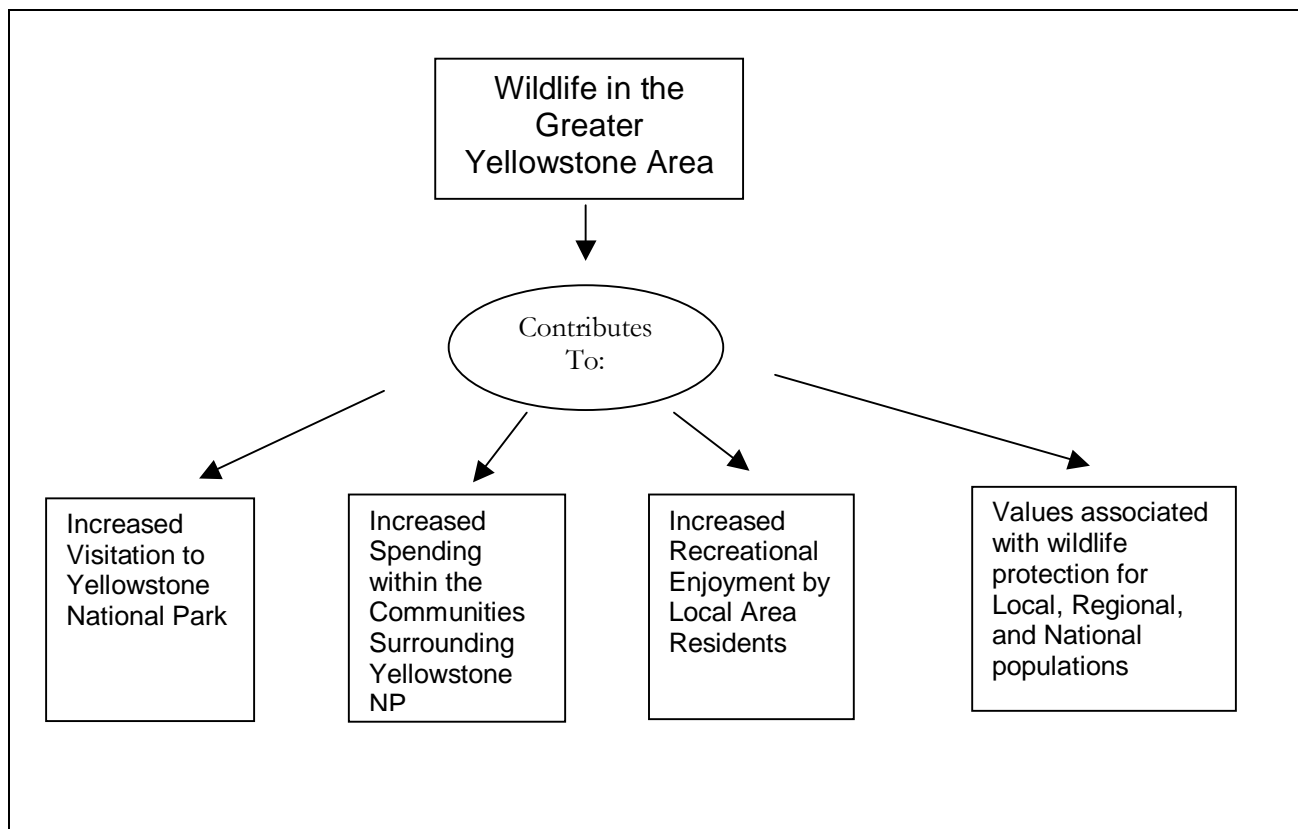


Figure 1 illustrates the relationship between wildlife in the Yellowstone Ecosystem and various social and economic values. As the figure demonstrates, wildlife in the region benefits many classes of people including local-area residents and businesses, park visitors, and regional and national residents at large.

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## DATA SOURCES AND ORGANIZATION

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The data examined in this study came from a number of surveys either directly targeted at Yellowstone NP visitors or at the general population of the U.S. on issues specific to Yellowstone. The studies examined in this report are detailed in Table 1. These six surveys (all sponsored by the National Park Service) were conducted under the direction of Dr. John Duffield. The first five studies (1991-1999) provide a valuable long-term baseline against which to measure the final study. The 2005 Yellowstone Visitor Survey provides current measures of the impacts associated with Yellowstone area wildlife that can be compared with similar results from previous park studies.

The results presented in this report are organized into three primary sections:

- 1) General population attitudes regarding wildlife and Yellowstone NP wildlife issues.
- 2) Yellowstone NP visitor opinions, attitudes and preferences regarding wildlife in the Greater Yellowstone Area.
- 3) The relationship between park wildlife and regional economic impacts.

The first section reports the results of the 1999 Yellowstone telephone survey (Duffield et. al, 2000a). This survey was administered to randomly selected residents of three areas: 1) the local 17-county Greater Yellowstone Area, 2) the 3-state (MT, WY, and ID) region, and 3) the entire U.S.

The second section of this report draws primarily on the four Yellowstone NP visitor surveys (1991, 1999 winter, 1999 summer, and 2005).

The final section of the report utilizes the partial results from the ongoing 2005 Yellowstone NP visitor survey to estimate local-area economic impacts associated with wildlife-related visitation to the park. Information from the 1999 Fee Demonstration Program Study is also used to augment the discussion of the regional economic impacts of wildlife-related visitation and spending.

An important caveat accompanies the presentation of interim results from the 2005 Yellowstone visitor survey. The 2005 survey is ongoing as of the drafting of this report. Therefore, the results presented, while substantially complete, may change somewhat in the final analysis of this data.

*Table 1: Summary of Data Sources*

Year of Survey	Population Surveyed	Survey Method	Survey Response Rate	Primary issue of Study	Sponsoring agency
1991	Yellowstone NP visitors	Mail	87%	Visitor characteristics, attitudes and values associated with wolves	National Park Service
1998	Yellowstone NP Visitors	Mail	81.7%	Fee Demonstration Program	National Park Service
1998-99	Yellowstone NP Winter visitors	Mail	58.9%	Winter Use & Bison Management	National Park Service
1999	Yellowstone NP summer visitors	Mail	68.4%	Winter Use & Bison Management	National Park Service
1999	Population survey: Local, Regional, and National samples	Phone	47%	Winter Use & Bison Management	National Park Service
2004-2005	Year-long Yellowstone NP Visitors	Mail	~70%	Wolf Reintroduction	Yellowstone Park Foundation

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## RESULTS

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### POPULATION ESTIMATES OF WILDLIFE-RELATED ACTIVITY

#### ESTIMATES OF PARTICIPATION IN WILDLIFE-RELATED ACTIVITIES

In 1999, the NPS commissioned a phone survey of local, regional and national populations exploring issues related to winter use planning and bison management in Yellowstone NP. This survey, while generally focusing on specific management issues related to winter park use and access and the bison-brucellosis issue, included a number of questions relative to general population attitudes and participation in wildlife-related activities.

The specific populations surveyed in the 1999 phone survey were the “local” 17-county Greater Yellowstone Area (GYA), the “regional” 3-state (Montana, Idaho, and Wyoming) area, and the entire U.S. “National” area. Table 2 shows a consistent trend in reported participation in bird-watching and wildlife viewing among the three sample populations. The lowest viewing proportions were found in the National sample with higher percentages reported for the Regional and higher still for the Local samples. This trend was most evident in the case of wildlife viewing where participation rose from 39 percent at the National level to 66 percent for GYA residents. These results reinforce commonsense expectations regarding wildlife viewing. National samples are dominated by high-density population areas where little opportunity for casual wildlife viewing exists. Conversely, the Local GYA sample is a largely rural or small community sample from an area where wildlife is often highly accessible for viewing.

*Table 2: 1999 Phone Survey, Reported Participation in Wildlife-related Activities*

	Local Sample	Regional Sample	National Sample
Bird watching	36.9%	29.4%	26.9%
Wildlife viewing	65.9%	55.7%	39.2%
Sample size	413	408	405

Source: Duffield, Patterson and Neher 2000a

Table 3 and Table 4 show the reported frequency with which people in the three phone survey samples engaged in bird watching and, more generally, wildlife viewing. Again, consistent with Table 2, the smaller the sample population (and the more closely it was centered around the GYA) the more frequent the reported participation in wildlife viewing activities.

*Table 3: 1999 Phone Survey, Reported Frequency of Participation in Birdwatching*

	<b>Local Sample</b>	<b>Regional Sample</b>	<b>National Sample</b>
Frequently	20.5%	14.7%	15.3%
Occasionally	10.9%	8.6%	6.5%
Rarely	5.5%	6.1%	5.1%
Never	63.1%	70.6%	73.1%
Sample size	413	408	405

Source: Duffield, Patterson and Neher 2000a

*Table 4: 1999 Phone Survey, Reported Frequency of Participation in Wildlife Watching*

	<b>Local</b>	<b>Regional</b>	<b>National</b>
Frequently	33.5%	25.7%	16.6%
Occasionally	26.3%	22.7%	14.9%
Rarely	5.8%	7.3%	7.7%
Never	34.3%	44.3%	60.8%
Sample size	413	408	405

Source: Duffield, Patterson and Neher 2000a

#### POPULATION SURVEY OPINIONS ON WILDLIFE ISSUES

Table 5 through Table 8 detail responses to selected attitude questions from the 1999 phone survey. Table 5 shows the responses of the Local GYA phone sample respondents. Large majorities of Local respondents voiced support for protection of wildlife populations across each of the five specific issues or statements presented to them. Table 6 and Table 7 show these same statistics for the Regional and National samples. Again in these cases there was strong support voiced for each wildlife-related issue or statement.

Table 5: 1999 Phone Survey, Opinions about Wildlife and Bison Management: Local GYA Sample

	<b>Strongly agree</b>	<b>Moderately agree</b>	<b>Neither agree nor disagree</b>	<b>Moderately disagree</b>	<b>Strongly disagree</b>	<b>Do not know</b>
I have a great deal of concern for protecting wildlife habitat	59.7%	34.1%	1.6%	2.7%	0.9%	1.0%
Wildlife species must be beneficial to humans to deserve protection	16.4%	19.7%	1.8%	26.5%	32.5%	0.3%
It is important to protect rare plants and animals to maintain genetic diversity	48.8%	35.0%	3.6%	5.0%	4.1%	3.6%
I am concerned about the possible disturbance of Yellowstone wildlife in the winter	31.7%	30.7%	5.0%	14.9%	12.9%	4.9%
I would be willing to contribute to protecting wildlife habitat even if I never see or enjoy the animals myself	32.5%	39.3%	5.6%	9.6%	8.4%	4.6%
Sample size for all questions	413					

Source: Duffield, Patterson and Neher 2000a

Table 6: 1999 Phone Survey, Opinions about Wildlife and Bison Management: 3-State Regional Sample

	<b>Strongly agree</b>	<b>Moderately agree</b>	<b>Neither agree nor disagree</b>	<b>Moderately disagree</b>	<b>Strongly disagree</b>	<b>Do not know</b>
I have a great deal of concern for protecting wildlife habitat	60.6%	33.2%	1.2%	3.4%	0.5%	1.1%
Wildlife species must be beneficial to humans to deserve protection	20.1%	18.5%	2.4%	24.1%	31.5%	3.4%
It is important to protect rare plants and animals to maintain genetic diversity	48.4%	35.7%	3.6%	6.1%	3.2%	3.0%
I am concerned about the possible disturbance of Yellowstone wildlife in the winter	33.4%	34.2%	4.0%	16.3%	8.1%	3.9%
I would be willing to contribute to protecting wildlife habitat even if I never see or enjoy the animals myself	29.9%	43.7%	5.5%	6.6%	9.0%	5.3%
Sample size for all questions	408					

Source: Duffield, Patterson and Neher 2000a

Table 7: 1999 Phone Survey, Opinions about Wildlife and Bison Management: National Sample

	Strongly agree	Moderately agree	Neither agree nor disagree	Moderately disagree	Strongly disagree	Do not know
I have a great deal of concern for protecting wildlife habitat	61.6%	32.1%	1.5%	3.3%	0.7%	0.9%
Wildlife species must be beneficial to humans to deserve protection	24.3%	15.7%	1.1%	22.5%	34.6%	1.7%
It is important to protect rare plants and animals to maintain genetic diversity	67.7%	23.3%	2.9%	3.0%	0.8%	2.2%
I am concerned about the possible disturbance of Yellowstone wildlife in the winter	39.3%	38.1%	6.2%	6.6%	2.7%	7.1%
I would be willing to contribute to protecting wildlife habitat even if I never see or enjoy the animals myself	27.3%	45.9%	5.8%	10.0%	6.2%	4.8%
Sample Size for all questions	405					

Source: Duffield, Patterson and Neher 2000a

A direct comparison of the results shown in Table 5, Table 6, and Table 7 is shown in Table 8. Interestingly, this direct comparison of responses shows strong consistency across samples with regard to support for wildlife and wildlife issues. The one statement where significant differences were seen between Local and National populations regarded disturbance of Yellowstone wildlife in the winter, this difference (with the National population expressing more concern than the Local population) likely reflects the divergent opinions on snowmobile access to the park, and is reflected in other NPS-sponsored surveys (Duffield et. al, 2000b and 2000c).

One interesting result seen in the comparison of Table 2 and Table 8 is that while National populations engage in activities such as bird watching and wildlife viewing less frequently than do Local area residents, their concern for wildlife and wildlife-related issues, if different at all, may be slightly greater than that voiced by the Local population sample respondents.

Table 8: 1999 Phone Survey, Comparison of Wildlife Opinions across Population Samples

Statement	Local Sample		Regional Sample		National Sample	
	% Agreeing	% Disagreeing	% Agreeing	% Disagreeing	% Agreeing	% Disagreeing
I have a great deal of concern for protecting wildlife habitat	93.8%	3.6%	93.8%	3.9%	93.7%	4.0%
Wildlife species must be beneficial to humans to deserve protection	36.1%	59.0%	38.6%	55.6%	40.0%	57.1%
It is important to protect rare plants and animals to maintain genetic diversity	83.8%	9.1%	84.1%	9.3%	91.0%	3.8%
I am concerned about the possible disturbance of Yellowstone wildlife in the winter	62.4%	27.8%	67.6%	24.4%	77.4%	9.3%
I would be willing to contribute to protecting wildlife habitat even if I never see or enjoy the animals myself	71.8%	18.0%	73.6%	15.6%	73.2%	16.2%

Source: Duffield, Patterson and Neher 2000a

#### POPULATION SURVEY ESTIMATED WILDLIFE VALUES

As noted, the 1999 phone survey was a general population survey designed to address, among other things, the issues of winter management of Yellowstone NP and management of the Park's Brucellosis infected bison herd. In regards to this last issue, the survey asked respondents a series of questions designed to elicit estimates of the value respondents place on protecting the YNP bison herd through two alternative hypothetical methods.

The valuation question in the phone survey asked respondents about their willingness to pay to support two different programs in the context of a donation to a trust fund. These programs were addressed in the following question formats: 1) a question about respondent willingness-to-pay to support increased winter range for bison migrating out of Yellowstone Park and 2) respondent willingness-to-pay to support a vaccination program to eradicate brucellosis in Yellowstone Park bison. The type of program that respondents were presented with was varied across all respondents so that approximately one-half of the phone sample was asked about the winter range issue and the other half about the vaccination issue.

The estimated mean willingness to pay values are summarized in Table 9 for the three sample populations. These results demonstrate that on average survey respondents supported and placed significant value on protecting the wild Yellowstone area bison population. Additionally, the stated willingness to pay to expand bison winter range outside of the park boundaries shows concern regarding wildlife issues, includes recognition of the importance habitat within the GYA plays in the overall welfare of wildlife populations.

Table 9: 1999 Phone Survey, Estimated Willingness to Pay per Respondent to Protect Yellowstone NP Bison

Sample / estimate	Program	
	Winter Range Purchase	Vaccination Program Funding
Estimates of mean one-time donations		
Local Sample	\$17.68	\$18.79
Regional Sample	\$15.12	\$14.70
National Sample	\$8.94	\$9.20

Source: Duffield, Patterson and Neher 2000a

#### YELLOWSTONE VISITOR ESTIMATES OF WILDLIFE-RELATED ACTIVITY

While the preceding section discusses the results of a national phone survey of residents regarding issues facing the Yellowstone ecosystem, the majority of studies (and associated surveys) examined in this report are visitor surveys administered within Yellowstone NP. In addition to the 1991 Yellowstone visitor survey addressing the issue of wolf reintroduction, two surveys of summer and winter visitors to the park were conducted in 1999 in order to gather information related to winter use and bison management. These three surveys shared common questions with the national phone survey discussed above.

This discussion of attitudes, opinions and values associated with wildlife in the context of Yellowstone visitor surveys is presented in three parts: 1) visitor activities within the park, 2) visitor preferences for viewing wildlife species and the importance of wildlife in decisions to visit Yellowstone, and 3) Visitor attitudes and opinions on wildlife-related issues.

#### VISITOR PARTICIPATION IN WILDLIFE-RELATED ACTIVITIES

Table 10 details the percent of respondents to the 1999 Yellowstone NP visitor surveys who reported participating in alternative activities during their visit to the GYA area. The 1999 surveys showed a significant difference between winter and summer visitors in their levels of participation in wildlife viewing. Overall, 62 percent of winter visitors and 95 percent of summer visitors reported participating in wildlife viewing on their trips.

Table 10: 1999 Winter and Summer Visitor Surveys, Participation in Activities while Visiting the GYA

Activity	Winter Report	Summer Report
Bird watching	--	26.7%
Wildlife viewing	62.1%	94.9%
View geysers	42.2%	87.2%
Fishing	--	12.8%
Camping	--	26.7%
Hiking	--	39.0%
Backpacking	--	1.8%
Sample size	1,093	1,302

Source: Duffield, Patterson and Neher 2000b and 2000c

A closer look at the 1999 summer visitor data is presented in Table 11. This table lists not only the reported levels of participation in wildlife watching by summer visitors, but the percentage of visitors for whom each activity was the primary activity they participated in on their trip. For the summer visitor sample, approximately one-third of visitors listed wildlife dependent activities (wildlife watching, bird watching, and wildlife photography) as their primary activity on their trip to the Yellowstone area.

Table 11: 1999 Summer Visitor Survey Participation and Primary Activities on Trip.

Activities	Percent that participated in this activity while visiting YNP	Percent that considered this option their primary activity while visiting YNP
Wildlife Viewing	94.9%	29.2%
View Geysers	87.2%	13.3%
Wildlife Photography	72.2%	3.3%
Fishing	12.8%	3.6%
Bird Watching	26.7%	0.2%
Camping	26.7%	4.7%
View Scenery	92.4%	38.1%
Hiking	39.0%	4.9%
Backpacking	1.8%	0.6%
Other	9.8%	2.1%
Sample size		1302

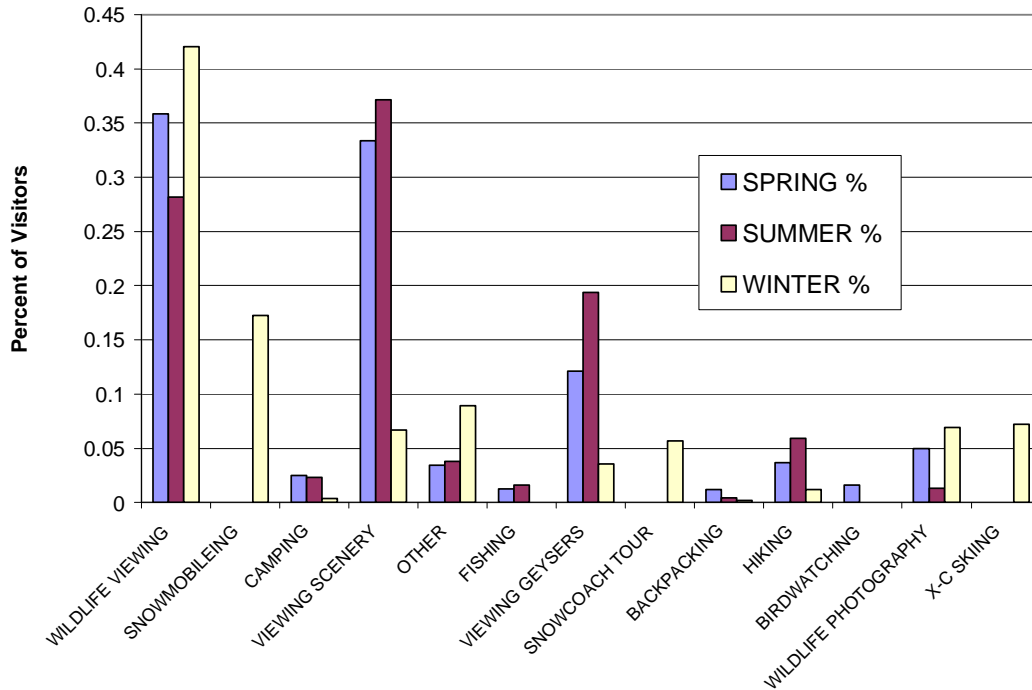
Source: Duffield, Patterson and Neher 2000b

The 2005 Yellowstone Visitor Survey is a yearlong survey of Yellowstone NP visitors. This study, funded by the Yellowstone Park Foundation with support from Yellowstone NP has two primary focuses: 1) to explore attitudes and opinions on the now recovered wolf population in the region, and 2) to address several gaps in YNP planning data. Again, this visitor survey included a number of questions found in previous YNP surveys.

The results presented for the 2005 survey are necessarily partial results as the yearlong survey effort continues through February of 2006. The 2005 survey results differ in one way from the results shown for the 1999 (and 1991) visitor surveys. The 2005 survey like the others was designed as a stratified probability sample. However, the 2005 survey added the additional refinement of correcting results for the possibility of over-sampling visitors who enter the park numerous times on their trips to the park. Because of this sampling correction, the results of the 2005 and previous samples are not strictly comparable for identical survey questions. However, as will be seen observed differences between these samples are in general small.

Figure 2 shows reported levels of participation in certain activities that were reported by visitors as their “primary activity” on their trip to the park. The results of the 2005 survey are shown for three seasonal strata. As was seen in the 1999 summer survey, wildlife viewing is among the most important motives for visiting the park. This general result is also consistent across the seasons of visitation. However, note that in the spring and winter seasons are a larger share of total use. This demonstrates that wildlife viewing is relatively more important to the local economy in the shoulder seasons when local communities most need the business.

Figure 2: 2005 Yellowstone Visitor Survey, Participation in Primary Activities



#### YELLOWSTONE VISITOR ATTITUDES TOWARDS SPECIFIC WILDLIFE SPECIES

The 1999 winter and summer visitor surveys asked respondents how several high-profile wildlife species found in the park affected their decisions to visit the GYA. Table 12 shows how the 1999 visitors reported that the presence of bison, wolves, black bears, and grizzly bears affect the respondents' decision to visit the Greater Yellowstone Area. For bison, about one half of the residents and nonresidents said that seeing bison was one of the reasons for visiting the GYA. The majority said they would still visit the GYA even if bison were not present (70.1% residents, 78.3% nonresidents). For wolves, about 40% of both residents and nonresidents said seeing or hearing wolves was a reason for their visit to the GYA. A higher percentage of nonresidents, 80.1% said they would still make the trip even if wolves weren't present. Seeing bears, either grizzly or black bears was a reason for visiting the GYA for 73.3% of residents and 74.1% of nonresidents. However, more than 70% of both residents and nonresidents would still visit the GYA even if bears were not present.

Table 12: 1999 Winter and Summer Visitors, Influence of Specific Species on Park Visitation Decisions

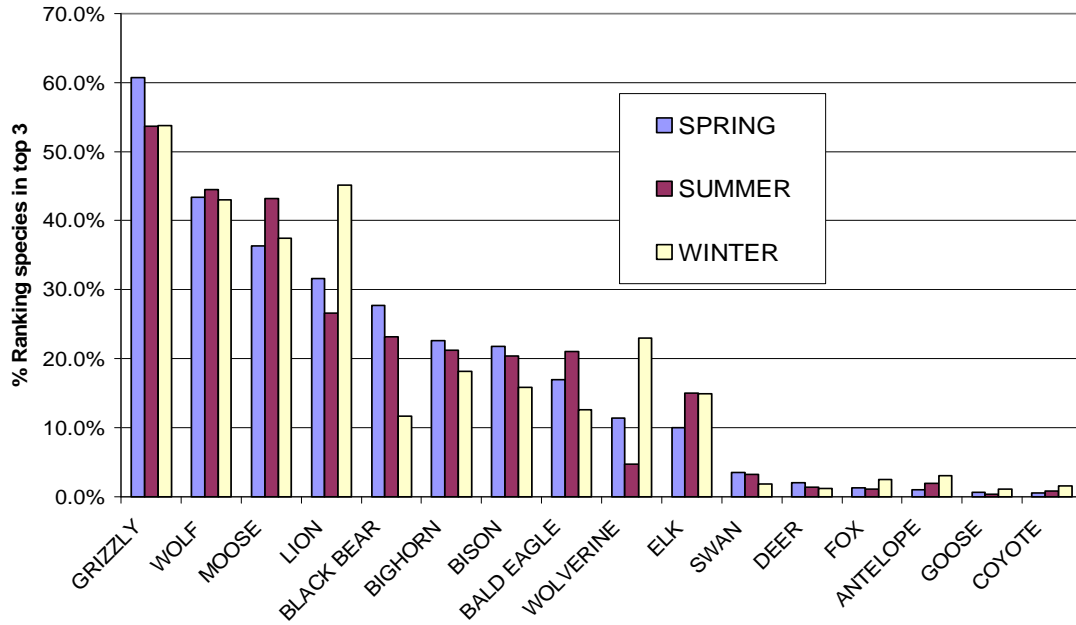
Question/ Response	Winter	Summer	
		Residents	Nonresidents
Was seeing <b>bison</b> one the reasons for your visit to the GYA?			
Yes	53.9%	48.9%	52.0%
No	46.1%	51.1%	48.0%
If yes, would you still have made this trip even if <b>bison</b> were not present in the GYA?			
Yes	67.2%	70.1%	78.3%
No	12.2%	10.3%	6.9%
Not sure	20.6%	19.6%	14.9%
Was seeing or hearing <b>wolves</b> one of the reasons for making the trip to the GYA?			
Yes	35.9%	41.6%	42.0%
No	64.1%	58.4%	58.0%
If yes, would you still have made this trip even if <b>wolves</b> were not present in the GYA?			
Yes	76.1%	73.9%	80.1%
No	10.2%	8.7%	7.9%
Not sure	13.7%	17.4%	12.0%
Was seeing <b>black bears or grizzly bears</b> one the reasons for your visit to the GYA?			
Yes	--	73.3%	74.1%
No	--	26.7%	25.9%
If yes, would you still have made this trip even if <b>bears</b> were not present in the GYA?			
Yes	--	74.7%	78.4%
No	--	11.0%	8.6%
Not sure	--	14.3%	13.0%

Source: Duffield, Patterson and Neher 2000b and 2000c

Consistent with the results for the 1999 questions asking visitors their primary activities on their park visits, are the results shown in Table 12 detailing that for several high profile species including bears, bison, and wolves, the presence of these species is not only a reason for visiting, but their absence could lead to significant declines in park visitation.

One set of species-specific questions was asked in the 1991, 1999, and 2005 surveys. This question asked visitor respondents to look at a list of Yellowstone Area species and identify the top 3 species that they would like to see on their trip to the park. Figure 3 displays the results for this question from the 2005 visitor survey for the spring, summer, and winter samples. The figure shows that for the 2005 sample the less common mega-fauna including bears, wolves, moose, and lions hold the top places as species most desired to be seen. In general, large carnivores are the most preferred species to see on a visit to Yellowstone NP.

Figure 3: Percent of 2005 Survey Park Visitors who Ranked Species in the Top 3 Species they would Like to See



As noted, the question on preferences to see specific species in the Yellowstone area was repeated in the 1991, 1999, and 2005 studies. A comparison of the responses to this question across the three study years is shown in Table 13. This comparison shows remarkable consistency across study years for the ranking of these species. One exception to this rule is in the case of the wolf. Wolves moved from the number nine place on the “most desired” list of wildlife species in 1991 to the number two place in the 1999 and 2005 surveys. This movement is particularly striking in the context of the remarkable stability of the species rankings other than for wolves. The movement of the wolf in the rankings can be explained by the dramatic change in the visibility of the species between 1991 (4 year prior to reintroduction) when the wolf was for practical purposes extinct in the region, to 1999 when wolves were a high-profile species often viewed within the park.

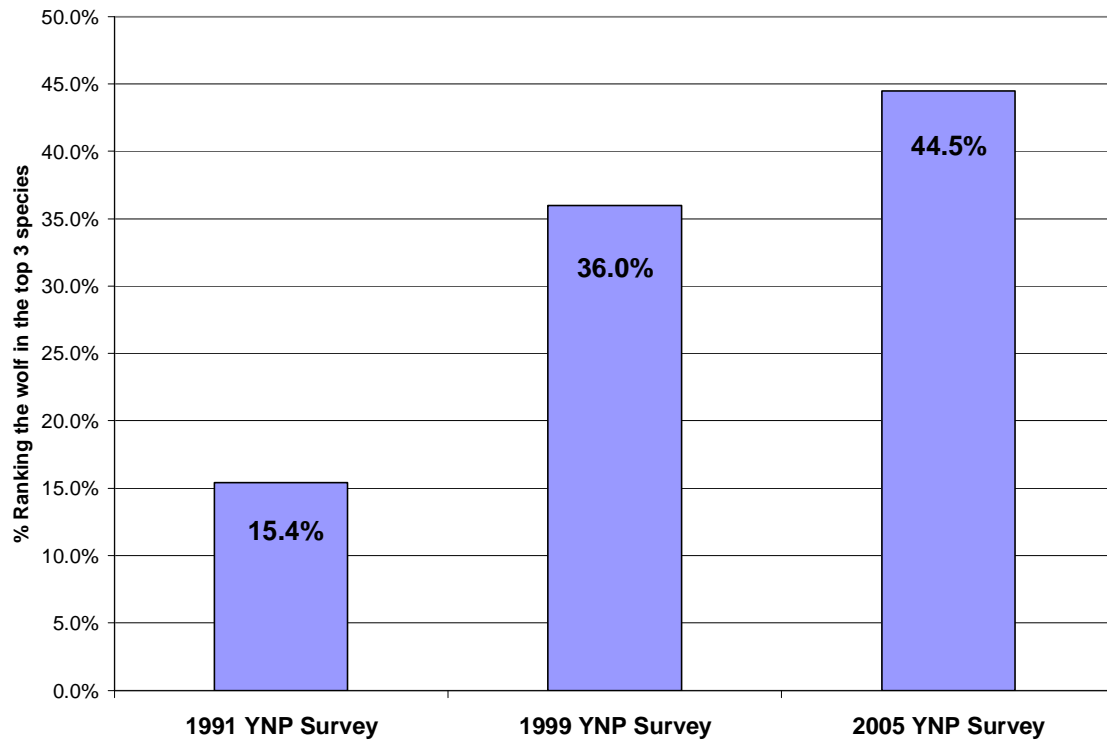
Table 13: Comparison of Yellowstone Visitor Ranking of Wildlife Species they Desire Most to See on their Trips

Rank	1991 Study		1999 Summer Study		2005 Summer Study	
	Species	Percent	Species	Percent	Species	Percent
1	Grizzly	0.550	Grizzly	0.58	Grizzly	0.54
2	Black Bear	0.332	<b>Wolf</b>	<b>0.36</b>	<b>Wolf</b>	<b>0.45</b>
3	Moose	0.332	Moose	0.35	Moose	0.43
4	Elk	0.239	Lion	0.31	Lion	0.27
5	Lion	0.229	Black Bear	0.29	Black Bear	0.23
6	Sheep	0.219	Sheep	0.23	Sheep	0.21
7	Eagle	0.187	Eagle	0.21	Eagle	0.21
8	Bison	0.160	Bison	0.19	Bison	0.20
9	<b>Wolf</b>	<b>0.154</b>	Elk	0.14	Elk	0.15
10	Wolverine	0.047	Wolverine	0.06	Wolverine	0.05

Source: Duffield 1992; Duffield, Patterson and Neher 2000c, and 2005

Figure 4 shows a comparison of the percentage of Yellowstone visitors who said that the wolf was one of the three species they would most like to see on their trip to the park for the three study years, 1991, 1999, and 2005. All three visitor samples were summer samples. The movement of the profile of the wolf in Yellowstone clearly demonstrates that visitors are responsive to opportunities to view wildlife species.

Figure 4: Comparison of the Percent of Yellowstone Visitors Listing the Wolf as a Species they Would Like Most to See on Their Trip



#### YELLOWSTONE VISITOR ATTITUDES AND OPINIONS ON WILDLIFE-RELATED ISSUES

As was the case in the 1999 national resident phone survey discussed previously, respondents to the 1991, 1999, and 2005 Yellowstone Visitor surveys were given a set of wildlife-related statements with which they were asked to either agree or disagree. Table 14 compares responses to several of these wildlife questions across the 1999 and 2005 samples. Again, there is remarkable consistency among the samples on responses to statements such as “I have a great deal of concern for protecting wildlife habitat.”

The 2005 survey presented a statement not included in previous surveys that was designed to probe visitors’ opinions regarding the adequacy of wildlife habitat in the Yellowstone area. This statement was “current wildlife habitat is adequate for most species in the Yellowstone area.” In the 2005 survey, less than one-half of respondents agreed with this statement and nearly one-quarter explicitly disagreed with it. This indicates that there is a substantial degree of concern regarding the adequacy of habitat in the Yellowstone area.

Table 14: Comparison of Yellowstone Visitor Responses to Wildlife-Related Attitude and Opinion Statements

Statements	% who agree			% who disagree		
	1999 Winter	1999 Summer	2005 Summer	1999 Winter	1999 Summer	2005 Summer
I have a great deal of concern for protecting wildlife habitat	95.1%	97.7%	92.3%	1.2%	1.4%	0.3%
Wildlife species must be beneficial to humans to deserve protection	20.7%	24.4%	18.3%	68.0%	65.6%	52.0%
It's important to protect rare plants and animals to maintain genetic diversity	83.5%	87.8%	85.8%	5.9%	2.7%	3.2%
I would be willing to contribute to protecting wildlife habitat even if I never see or enjoy the animals	67.6%	63.2%	52.8%	10.8%	10.0%	16.4%
<b>Current habitat is adequate for most wildlife species in the Yellowstone area</b>	--	--	<b>44.6%</b>	--	--	<b>23.9%</b>

Source: Duffield, Patterson and Neher 2000b, 2000c, and 2005

#### YELLOWSTONE VISITOR ATTITUDES: COMPARISON BETWEEN LOCAL 5-COUNTY RESIDENTS AND NON-LOCAL VISITORS

The data from the 2005 Yellowstone visitor survey is of sufficient richness to allow the examination of responses of sub-samples of visitors. One fundamental divide in examining visitor data (such as in the Yellowstone surveys) is that between residents of the areas directly adjacent to the site being visited (in this instance Yellowstone NP), and those respondents from outside the local area.

The local area defined in these tables is the 5-county area directly adjacent to the park, including Park, Madison, and Gallatin Counties in Montana, and Park and Teton Counties in Wyoming. Table 15 and Table 16 show selected comparisons of 5-county resident visitors and non-local visitor responses to wildlife-related survey questions on motivations for visiting the park and on opinion on wildlife and habitat issues. The comparison of 5-county and Non-local visitor responses are comparable across a wide variety of questions. However, in some respects locals are more interested in wildlife. For example, Table 15 shows that a higher proportion of local, 5-county visitors cite seeing wolves and elk as reasons for visiting the park than do non-local visitors.

Table 15: 2005 Yellowstone Visitor Survey, Comparison of Visitation Motivation Responses between Local Resident Visitors and Non-local Visitors: Spring Sample

Question	5-County Residents	Non-Local Visitors
Seeing bison was a reason for visiting Yellowstone NP	56.6%	58.2%
Seeing black or grizzly bears was a reason for visiting Yellowstone NP	76.6%	71.9%
Seeing or hearing wolves was a reason for visiting Yellowstone NP	62.6%	48.3%
Seeing elk was a reason for visiting Yellowstone NP	67.08%	52.8%
Personally favor the reintroduction of wolves in Yellowstone NP	62.2%	64.2%

Source: Duffield, Patterson and Neher 2005

Table 16: 2005 Yellowstone Visitor Survey, Comparison of GYA Resident and Non-resident Attitudes on Wildlife-related Issues: Spring Sample

Statements	Percent of Respondents Who Agree	
	5-county GYA Residents	Non-residents
I have a great deal of concern for protecting wildlife habitat	92.4%	92.7%
Wildlife species must be beneficial to humans to deserve protection	13.7%	18.4%
I would be willing to contribute to protecting wildlife habitat even if I never see or enjoy the animals	63.8%	52.4%
Current habitat is adequate for most wildlife species in the Yellowstone area	45.2%	43.9%

Source: Duffield, Patterson and Neher 2005

#### ESTIMATES OF THE IMPORTANCE OF WILDLIFE IN THE REGIONAL ECONOMY OF THE GYA

Yellowstone NP and the Greater Yellowstone Area attract visitors from across the country and the world. The approximately 3 million recreational visitors to Yellowstone NP each year come for

many reasons. The preceding sections of this report show that visitor surveys have repeatedly identified the wildlife in the Yellowstone area as a major motivating factor for YNP visitors to come to the park and area.

The 2005 Yellowstone visitor survey had as a major goal the development of estimates of the degree to which wildlife in general and wolves in particular are responsible for visitors coming to the park. This question is of interest for both social and economic reasons. On the social side, it is of interest to understand what factors and attributes of a national park motivate support for the park and draw visitors. Yellowstone has a broad range of unique attributes (both physical and biological).

From an economic perspective, visitors to the Yellowstone area bring money from outside of the local area and spend a portion of that money on goods and services within the local area. This attraction of outside spending leads to economic growth and vitality within the local communities surrounding the park. To the extent that the percentage of YNP visitors who would not have come to the park without the presence of Yellowstone wildlife can be identified, the contribution of these individuals to the local-area economy can also be estimated. This section uses the partial results of the 2005 Yellowstone visitor survey to generally estimate the contribution of wildlife-motivated Yellowstone visitation to the economy of the 17-county region surrounding the park.

#### RECREATIONAL VISITATION LEVELS FOR YELLOWSTONE NP

Table 17 shows total 2005 recreational visitation to Yellowstone NP. Data for the not yet completed month of December is from 2004 Yellowstone visitation records. In total, there will be approximately 2.8 million recreational visits to the park by the end of 2005. The vast majority of these visits are in the three summer months of June, July, and August (69%).

*Table 17: 2005 Recreational Visitation to Yellowstone NP, by Month*

2005 Yellowstone NP Recreational Visitation	
January	22,297
February	29,018
March	17,324
April	26,116
May	225,811
June	560,014
July	743,165
August	647,288
September	393,362
October	142,912
November	11,505
December (2004)	14,597
Winter	2.9%
Spring	8.9%
Summer	68.8%
Fall	19.3%

Source: NPS Visitation Statistics

## EXAMPLE OF THE LINKAGE BETWEEN PARK VISITATION AND LOCAL AREA ECONOMIC ACTIVITY: WEST YELLOWSTONE CASE STUDY

The preponderance of lodging, tour services, and gift shops in communities surrounding Yellowstone NP is evidence of a substantial link between park visitation and local economic activity. This section quantifies that relationship in economic terms.

The town of West Yellowstone is located at the West Entrance to Yellowstone NP. The economy of this small town of approximately 1,000 year-round residents is heavily tourist-oriented. In recognition of the heavily tourist-dependent nature of the town's economy, the city in 1986 instituted a 3% resort sales tax targeted directly at expenditures made by recreational visitors to the town. The tax currently adds over a million dollars per year to the city's treasury.

Geographically, the town of West Yellowstone is relatively isolated from major regional business centers. The towns of Bozeman, MT and Idaho Falls, ID are both approximately 100 miles distant from West Yellowstone. This increases the tourism-dependent nature of the community. In West Yellowstone tourism-dependent economic sectors such as eating and drinking establishments and hotels and lodging make up a disproportionately large share of this town's economic base. The isolated location of West Yellowstone in conjunction with the existence of a high quality measure of tourism-related expenditures within the town (resort tax collections) provide a unique setting in which to analyze specific linkage of visitation and local spending.

In order to investigate the strength of the link between Yellowstone NP visitation levels and the level of economic activity in the town of West Yellowstone for a study of NPS fee policies (Duffield, Patterson and Neher 1998), a data base was constructed including the key variables of Yellowstone West Entrance monthly visitation and West Yellowstone monthly resort tax receipts. Other variables in the data set included an indicator variable for the heavy winter recreation months of December through March, an annual trend variable, and an interaction variable between West Entrance visitation and the winter indicator variable. This data was collected for the period of January 1989 through December 2001.

A simple linear regression model using this data showed an extremely strong link between park visitation through the West Entrance and resort tax receipts in the town (Table 18). Based on the estimated relationship between Yellowstone West Entrance visitation and resort tax collections, any significant change in visitation levels in Yellowstone NP would be reflected in the town of West Yellowstone's tax receipts. The estimated model predicts that the average visitor who passes through the West Yellowstone park entrance in the summer contributes 91 cents to the West Yellowstone resort tax. That is, they spend \$30.22 in West Yellowstone on taxable goods and services (at a 3% tax rate). The average winter visitor, on the other hand, generates \$5.64 in tax revenue to the town and spends about \$188 on taxable goods in the town.

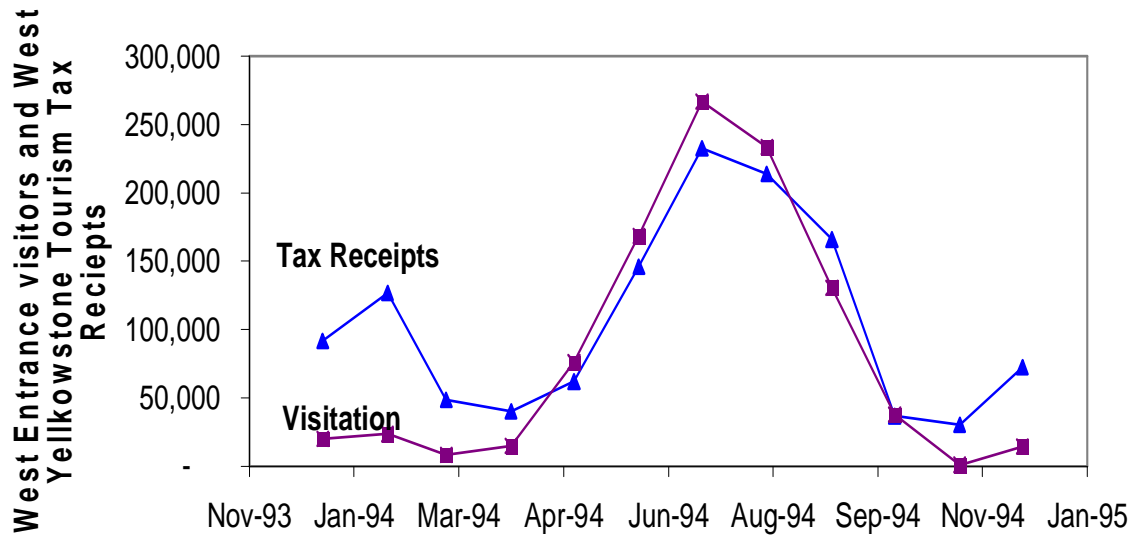
Figure 5 shows the close nature of the relationship between West Entrance visitation and tax receipts in West Yellowstone for a representative year.

Table 18: Summary Regression Results: West Yellowstone, MT Resort Tax-Park Visitation Model

<b>Regression of West Yellowstone resort tax collections on W. Yellowstone N.P. Gate Entrances</b>							
Entrance statistics, by month, January 1989 - December 2001.							
<i>Regression Statistics</i>							
Multiple R		0.95					
R Square		0.90					
Adjusted R Square		0.90					
Standard Error		26,612					
Observations		156					
 ANOVA							
		<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression		3	9.89091E+11	3.29697E+11	465.5397517	2.27608E-76	
Residual		152	1.07647E+11	708203561.8			
Total		155	1.09674E+12				
		<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95.0%</i>
Intercept		17,587.8	4,147.7	4.24	3.86029E-05	9,393.1	25,782.
Visits		0.91	0.025	35.39	2.68371E-75	0.85	0.957
WINTER		1,672	9,959	0.16	0.866907448	-18,005	21,349
Visits*WINTER		4.73	0.56	8.35	3.77867E-14	3.61	5.84

Source: Duffield, Patterson, and Neher 1999 (updated to 2001 tax and visitation data)

Figure 5: Plot of West Yellowstone Resort Tax Receipts and Park Entrance



ESTIMATION OF THE CONTRIBUTION OF YELLOWSTONE AREA WILDLIFE TO PARK VISITATION AND VISITOR SPENDING

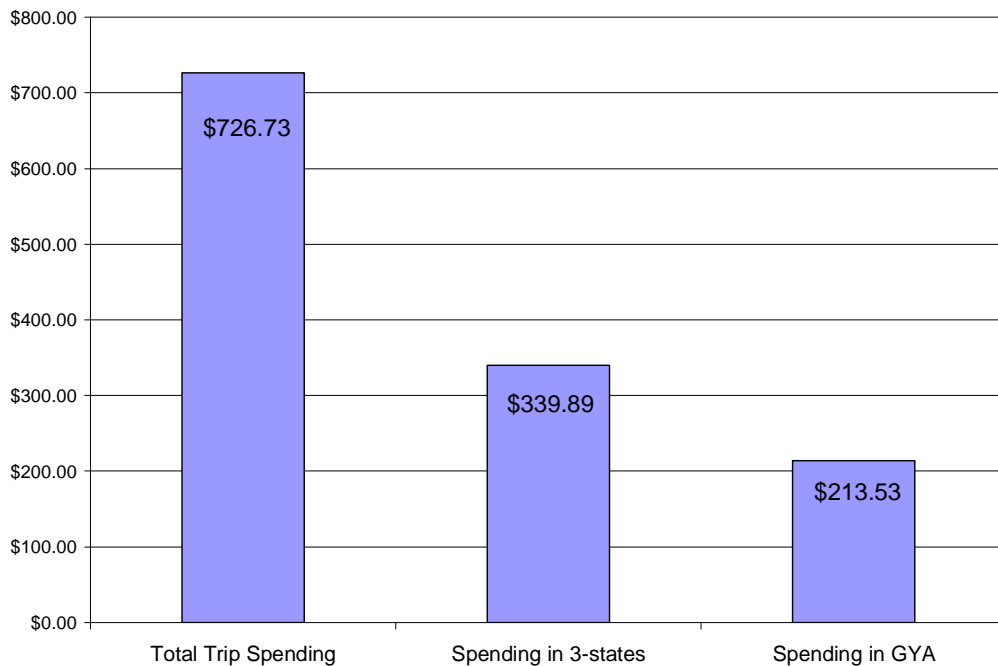
The previous section demonstrates an example of the linkage between park visitation and local-area spending. This section develops estimates of the annual linkage between Yellowstone area wildlife and visitation and non-resident visitor spending. To the degree possible this analysis relies on data from the ongoing 2005 Yellowstone visitor survey. Where the 2005 data is not yet sufficiently complete, estimates from prior analyses are used.

There are several primary pieces of information needed to estimate the contribution of wildlife to park visitation and visitor spending:

- 1) *Since only spending by visitors coming from outside the 17-county GYA area is considered, the proportion of visitation from outside the GYA is necessary.*
- 2) *The average spending per trip within the GYA by these non-residents is needed.*
- 3) *The percent of non-residents who would not have visited without the presence of wildlife.*
- 4) *Total annual recreational visitation for the park.*

Figure 6 shows the reported distribution of visitor spending between geographic areas. On average, for the spring season sample, visitors from outside the Greater Yellowstone Area spent an average of \$726 per person on their trips which included visits to Yellowstone NP. Of this amount, about 47 % was reported as being spent within the 3-state Idaho, Montana, and Wyoming region, and about 29% being spent in the 17-county Greater Yellowstone area. In estimating the impact of non-resident visitor spending on the GYA counties, it is this later amount (that spending within the GYA) that is relevant in calculating local-area expenditure impacts.

*Figure 6: Distribution of Trip Spending by Yellowstone NP Visitors from Outside the Greater Yellowstone Area*



Estimation of the percent of Yellowstone NP visitors who would not have visited the park without the presence of wildlife is derived from two specific questions posed in the ongoing 2005 Yellowstone visitor survey. The first question asked respondents to identify the primary activity they engaged in while on their trip to the park. The second question asked if visitors would have still made their trip to the park had they not been able to participate in their primary activity. For those park visitors coming from outside the GYA, between 4 percent and 8 percent (depending on the sample season) said they would not have made the trip had wildlife-related activities not been available to them in the park.

As noted, the 2005 visitor survey is stratified by season of the year. As of the time of this report, sufficient survey returns for the spring and summer seasons have been received to allow statistical analysis. For this analysis the average statistics for these seasons are supplemented with partial results for the winter season where appropriate and available. Table 19 details the estimation of annual out-of-area visitor spending within the 17-county GYA that can be attributable to the presence of wildlife and the opportunity to view, and photograph that wildlife. Over the course of the year,

approximately 5 percent of non-resident visitors to Yellowstone NP state they would not have made the trip had the opportunity to view wildlife, bird-watch, or photograph wildlife not been available.

As Table 19 shows, it is estimated that approximately \$22 million in non-resident spending within the GYA is directly attributable to the presence of wildlife. This estimate may be conservative for several reasons. The estimate does not consider reductions in spending by visitors who might still come to the park but not stay as long without the presence of wildlife. Additionally, the entries in the table highlighted in grey have been estimated from other seasons with available data. For these missing estimates the most conservative estimate from the other available seasons was used in every case of missing data.

Table 19: Estimated Non-resident Visitor Spending Attributable to Presence of Wildlife in the GYA.

Statistic	Spring	Summer	Fall	Winter
Total recreational visitation to Yellowstone	258,000	1,951,000	548,000	83,000
% of visitors from outside the 17-county GYA	91.7%	93.9%	85.9%	85.9%
<b>(A) Recreational visitors from out of the GYA</b>	<b>236,500</b>	<b>1,832,000</b>	<b>471,000</b>	<b>71,000</b>
% listing wildlife activities as their primary purpose for visiting	37.4%	29.5%	29.5%	45.1%
% stating they would not have visited without participating in their primary activity	21.5%	15.4%	15.4%	15.4%
<b>(B) % of visitors who would not have visited without the availability of a wildlife-related activity</b>	<b>8.0%</b>	<b>4.55%</b>	<b>4.55%</b>	<b>6.95%</b>
<b>(C) Average spending per visitor within the GYA by visitors from outside the GYA</b>	<b>\$213.53</b>	<b>\$159.66</b>	<b>\$159.66</b>	<b>\$219.02</b>
<b>(A) * (B) * (C) Total estimated annual GYA visitor spending attributable to wildlife</b>	<b>\$4,040,000</b>	<b>\$13,309,000</b>	<b>\$3,422,000</b>	<b>\$1,081,000</b>
<b>Total estimated annual visitor spending in the GYA attributable to wildlife</b>		<b>\$21,852,000</b>		

Source: Duffield, Patterson and Neher 2005

The estimated local-area visitor spending directly attributable to the presence of wildlife in the GYA, as detailed in Table 19, is a “point estimate” of that spending. The construction of a confidence interval around this estimate would take into consideration the variability in each of the constituent estimates in Table 19, and thus would likely have a considerable degree of uncertainty associated with it.

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