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Supplemental Technical Memorandum

Regional Economic Impact Analysis of Options for
Yellowstone and Grand Teton National Parks and
John D. Rockefeller, Jr. Memorial Parkway
Winter Use Management

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Executive Summary

This supplementary report presents regional economic impacts estimates associated with six options for Yellowstone NP winter visitation management, compared with three differing baseline levels of visitation. This report relies on and extends analysis, assumptions, and caveats detailed in Duffield and Neher (2006).

This analysis is presented in two parts: 1) estimation of the relative change in winter visitation between each baseline use level and each management options, and 2) estimation of total regional economic impacts associated with each comparison for each of six analysis areas (3-states, 5-counties, and the communities of West Yellowstone, Cody, Jackson, and the Wapiti, WY zip code).

The estimated economic impact results detailed in Section 4 show a clear pattern. In terms of the level of total impact on an analysis area, two factors are particularly relevant: 1) the size and diversity of the economic analysis area, and 2) the share of total economic impact to the region that is allocated to each analysis area. For four of the analysis areas (5-county, 3-state, Jackson, and Cody) the size of economic impacts relative to the size of the economies combined to make estimated percentage changes in annual output and employment extremely small (generally much less than a 1% change). It should be noted that in these analysis areas, even though the percentage change in total economic activity associated with an option might be very small, impacts to specific sectors or individual businesses may be substantially larger.

The two analysis areas where substantial impacts are predicted are for the town of West Yellowstone, MT and the Wapiti, WY zip code area. In these analysis areas, small economies that depend heavily upon recreational visitor spending combined with a large share of GYA impacts associated with changes in winter access management leads to measurable economic impacts. For West Yellowstone, compared to the 1997-98 baseline, the management options represent a predicted short-term change in output of -2.6% to -3.1%, and a change in annual employment of -4.0% to -4.8%. For the Wapiti zip code, the predicted short-term impacts are a -2.0% to -2.9% change in annual output and a -5.4% to -7.8% change in annual employment. Since the impacts will be concentrated in the winter months, the impacts will be felt most acutely by businesses that rely on winter visitor expenditures for a disproportionately large share of their annual business.

In the case of the analysis of impacts to the Wapiti zip code area, the estimates presented should be viewed as a general indication of the levels of impacts expected. Modeling of the impacts to this small area was significantly constrained due to lack of sufficient data on the size and structure of the economic activity within the zip code. The estimates therefore rely to an extent on approximations of certain economic parameters based on other communities in the region.

1.0 Introduction

This report is organized as follows: Section 2 presents the management options and baseline visitation scenarios examined in this analysis, Section 3 describes the specific estimated winter visitation levels for the six management options and the three baselines, and Section 4 presents the results of the regional economic impacts analysis comparing the six management options to each of the three baseline management scenarios. Appendix A includes all estimated impacts results from the IMPLAN modeling.

2.0 Description of Options

The basis of this analysis is a comparison of expected outcomes from one or more management options to different baseline levels of activity. The different baseline levels of activity help to set a context for determining the relative magnitude and intensity of estimated impacts associated with different management options.

2.1 Baselines

Three different levels of winter use in the park are being treated as possible baselines for the purpose of this analysis. These three baselines are described below:

Baseline #1 The first baseline for comparison is to adhere to the 1983 regulations that governed snowmobile use in the parks prior to promulgation of the 2001 regulations. The implied baseline is **historical use** at levels consistent with management in place prior to the 2001-02 winter. For purposes of the analysis in this report, we use the winter of 1997-98. This year had fairly typical use levels for the period. The regulations are supported by the 1990 winter use plan and environmental assessment. They restrict snowmobile use to designated routes in the parks. Comparisons are made throughout this analysis between the management options and the historical conditions represented by the 1983 regulations.

Baseline #2 The second baseline selects the compares management options to historical use levels that existed during the 2001-2002 winter season.

Baseline #3 A third baseline would have neither snowmobiles, nor snowcoach use in the parks, in other words, **no motorized oversnow access** and no plowing. Under the implementing regulations for the current temporary plan, the authorization of snowmobile and snowcoach use in the parks expires at the end of the 2006-2007 winter season. In the absence of any action on the part of the agency, these motorized oversnow means of accessing the park would not be authorized.

2.2 Management Options

Table 1 presents the major winter visitation regulations and limitations across the six management options. For consistency with the analysis presented in Duffield and Neher (2006), the table shows all classes of possible winter access including several not considered under the six options examined in this supplemental study (Wheeled other than North Entrance, and unguided snowmobile and snowcoach).

Another aspect of these options is that options X, Y, and Z would close access to the East Entrance and X1, Y1, and Z1 would vary the allowed levels of snowmobile and snowcoach travel.

Table 1. Comparison of Yellowstone NP Entrance Limits per Day across Options. By Entrance and Type of Use.

Entrance	Type of use	Option X	Option X1	Option Y	Option Y1	Option Z	Option Z1
West Entrance	Com-guided snowmos	400	400	350	350	300	300
	Un-guided Snowmos	0	0	0	0	0	0
	Com-guided coach	49	49	45	45	37	37
	Un-guided coach	0	0	0	0	0	0
	Wheeled	0	0	0	0	0	0
South Entrance	Com-guided snowmos	265	220	220	180	185	150
	Un-guided Snowmos	0	0	0	0	0	0
	Com-guided coach	19	15	19	15	12	10
	Un-guided coach	0	0	0	0	0	0
	Wheeled	0	0	0	0	0	0
East Entrance	Com-guided snowmos	0	40	0	40	0	40
	Un-guided Snowmos	0	0	0	0	0	0
	Com-guided coach	0	17	0	4	0	2
	Un-guided coach	0	0	0	0	0	0
	Wheeled	0	0	0	0	0	0
North Entrance	Com-guided snowmos	35	30	35	30	35	30
	Un-guided Snowmos	0	0	0	0	0	0
	Com-guided coach	17	4	17	17	15	15
	Un-guided coach	0	0	0	0	0	0
	Wheeled[a]	0	0	0	0	0	0
Old Faithful	Com-guided snowmos	20	30	20	25	20	20
	Un-guided Snowmos	0	0	0	0	0	0
	Com-guided coach	20	20	19	19	19	19
	Un-guided coach	0	0	0	0	0	0
	Wheeled	0	0	0	0	0	0
Totals	**Com-guided snowmos**	**720**	**720**	**625**	**625**	**540**	**540**
	Un-guided Snowmos[b]	**0**	**0**	**0**	**0**	**0**	**0**
	Com-guided coach	**105**	**105**	**100**	**100**	**83**	**83**
	Un-guided coach	**0**	**0**	**0**	**0**	**0**	**0**
	Wheeled	**0**	**0**	**0**	**0**	**0**	**0**

[a] Not including traditional North to Cooke City wheeled route

[b] All options include a daily limit of 50 non-BAT, unguided snowmobiles on the Cave Falls Road.

3.0 Analysis of Estimated Use Levels under Alternatives

This section provides estimates of the parks' winter use levels under the 9 management options (3 baseline and 6 change options). Section 4, below, provides a comparison of the baseline and management options and develops economic impact estimates. There are two primary types of restrictive policies addressed in this analysis: 1) quantitative restrictions on winter entry levels, and 2) qualitative restrictions such as requirements for BAT technology, or for guided entry.

3.1 Analysis of Baseline Use Levels

As noted above, this analysis uses three different use levels as possible baselines against which to compare estimated use levels for the management options. The first task is to quantify the baseline visitation levels.

3.1.1 Estimated Use under Baseline #1

The baseline #1 provides as a baseline winter visitation to the parks under rules that existed prior to the 2001 rule-making. As noted, for this baseline measure, the 1997-98 winter season visitation level of 119,274 visits is used.

3.1.2 Estimated Use under Baseline #2

The second baseline used in this analysis uses the winter use seen in the 2001-02 winter season. Winter visitation in the 2001-02 season totaled 144,490 visits.

3.1.2 Estimated Use under Baseline #3

Under baseline #3 there would be no oversnow motorized access to the parks. Motorized oversnow winter access to YNP historically comprised over 70% of total winter visitation and nearly all visitation from the West, South, and East Entrances. No surveys of visitors have specifically addressed the issue of a total ban of all motorized access to the park during winter months. As described earlier, examination of use distribution since winter policy changes began in 2001 have suggested there is little evidence to date of substitution of use between park gates. Additionally, the existing data on forest snowmobile use in and around the West Entrance suggests that snowmobile use on the forest is possibly a complement to park snowmobiling rather than a direct substitute. For these reasons, under a total motorized ban it is assumed that the only use remaining in the park would be North Entrance wheeled entries and park-wide ski entries totaling 40,029 in 2005-06. Relative to 1997-98, this implies a 66% reduction in GYA visitation associated with YNP winter users under a total motorized ban. This estimate may be conservative because it assumes no substitution between entrances.

3.2 Analysis of Management Option Use Levels

Estimation of regional economic impacts associated with the winter management options requires developing estimates of the change in visitation to the analysis area under each baseline-option pairing.

The following discussion of visitation impacts associated with the six management options presents both a lower bound and an upper bound estimate of impacts. The lower bound estimates are based largely on observed data under current winter access policies. These estimates could be interpreted as "short-term" estimates, or estimates of visitation changes in the year following a policy change. Recent increases in snowcoach use in the park show that following a policy change, use patterns and levels evolve over time. The upper bound estimate of impacts acknowledges this adaptive behavior and presents estimates under the assumptions that all access limits are constraining, and that eventually use in the parks would be at the maximum legal limit each day of the winter season.

The following analysis of estimated GYA visitation levels under the management options utilizes the historical park access policies and associated visitation levels (as represented by 1997-98 levels) as one baseline point of comparison. Below, in Appendix A, the visitation impacts of the options will be additionally compared to the remaining two baselines.

3.2.1 Estimated Lower Bound Use Levels Associated with Management Options

A useful perspective on the management options is to first examine how they compare to actual current use levels. Specifically, whether the limits shown in Table 1 are currently constraining for any management option or entrance.

While the six management options examined in this report vary in the distribution of use across entrances, and in total allowed daily use levels, the limits associated with the options are generally not constraining on 2005-06 actual winter use levels. The exception to this is found in the case of the East Entrance limits of zero under options X, Y, and Z. In the context of total winter park visitation, however, closure of the East Entrance would have a very small impact on total park visitation (about 12 visitors per day for the 2005-06 season and six per day for the 2006-07 winter season).

Options X, Y, and Z also call for closure of the Norris to Madison road (in addition to the East Entrance, Sylvan Pass Road). While the impact of this road closure is not clear, the closure would cut off access to Old Faithful for North Entrance oversnow access. Additionally, the Norris to Madison closure would cut off Canyon access to West Entrance users. In the absence of survey data on how winter visitors would respond to this management change, it is estimated that in the short run winter use would decrease an amount equivalent to the 2005-06 North Entrance oversnow use level of 5,758 visits,

or about 6.5% of total winter visitation. Therefore, under Options X, Y, and Z it is assumed that total winter use levels would be 82,960 visits (2005-06 total winter visitation of 88,718 minus 5,758).

Options X1, Y1, and Z1 while presenting varying levels and distributions of use limits are not sufficiently different from each other to model short term impacts separately. This is particularly true given that the limits in these options are not generally constraining on current winter use levels. For short term estimated use under these options, it is assumed that winter use would be equal to total 2005-06 use of 88,718 visits.

3.2.2 Estimated Upper Bound Use Levels Associated with Management Options

For estimates of upper bound use levels under the six management options it is assumed that visitation will adjust to new restrictions and requirements, and use will continue to grow to fill allocated use levels. Therefore, in the long term it is assumed that total seasonal use will be a function of the total number of snowmobiles and snowcoaches allowed per day in the park. The upper bound estimated use is 195,096 visits under options X and X1, 181,199 visits under options Y and Y1, and 160,246 visits under management options Z and Z1.

3.2.3 Summary Comparison of Estimated Management Option Impacts on Winter GYA Visitation.

Sections 3.2.1 and 3.2.2 summarized lower and upper bound estimates of winter visitation levels for each of the six management options. It must be noted that each of the options contains a wide spectrum of varying detail regarding road segments and entrances open or closed, daily gate limits, requirements for oversnow machine technology, and guiding requirements. In estimating likely levels of visitation associated with the options, primary attention was paid to the significant management controls driving visitation: gate limits, and road closures.

4.0 Economic Impact Analysis

This analysis is presented in two parts: 1) estimation of the relative change in winter visitation between each baseline use level and each management options, and 2) estimation of total regional economic impacts associated with each comparison for each of Six analysis areas (3-states, 5-counties, and the communities of West Yellowstone, Cody, Jackson, and the Wapiti, WY zip code).

The degree of impact can be quantified when a model is used or data are obtainable. This is the case for all options examined here. However, often only qualitative descriptions of impact from specialists or from the scientific literature in similar cases are available. These qualitative descriptions are also useful for summarizing and interpreting the relative importance of quantitatively estimated impacts (Table 2). As noted earlier, under the following definitions, it is apparent that the only regional economies where impacts may not be "negligible" (at the lower levels of detection) is for West Yellowstone and the East Entrance, Wapiti zip code.

Table 2. Definition of impacts to socioeconomics.

Impact Category	Definition
Negligible	The impact is at the lower levels of detection (< 5% change)
Minor	The impact is slight, but detectable (5% - 10% change)
Moderate	The impact is readily apparent and has the potential to become major (10% to 20% change)
Major	The impact is severe, or if beneficial, has exceptional beneficial effects (> 20% change)

Table 3 and Table 4 present estimates for changes in GYA visitation by visitors from outside the GYA relative to each of the three different baselines. It is these estimated changes in visitation and associated visitor expenditures that are used as the primary input into the IMPLAN regional economic modeling program.

Table 3. Lower Bound Estimate: Comparison of Management Options, Estimated Change in GYA Visitation Levels Compared to Three Different Baselines.

LOWER BOUND ESTIMATE	Predicted Visitation	Historical Baseline (1997-98)	Motorized Ban Baseline	Historical Baseline (2001-02)
Baseline Visitation		**119,274**	**40,029**	**144,490**
Option X	**82,960**	(36,314)[a]	42,931	(61,530)
Option X1	**88,718**	(30,556)	48,689	(55,772)
Option Y	**82,960**	(36,314)	42,931	(61,530)
Option Y1	**88,718**	(30,556)	48,689	(55,772)
Option Z	**82,960**	(36,314)	42,931	(61,530)
Option Z1	**88,718**	(30,556)	48,689	(55,772)

a. Predicted visitation minus Baseline visitation

Table 4. Upper Bound Estimate: Comparison of Management Options, Estimated Change in GYA Visitation Levels Compared to Three Different Baselines.

UPPER BOUND ESTIMATE	Option Visitation	Historical Baseline (1997-98)	Motorized Ban Baseline	Historical Baseline (2001-02)
Baseline Visitation		**119,274**	**40,029**	**144,490**
Option X	**195,096**	75,822	155,067	50,606
Option X1	**195,096**	75,822	155,067	50,606
Option Y	**181,199**	61,925	141,170	36,709
Option Y1	**181,199**	61,925	141,170	36,709
Option Z	**160,246**	40,972	120,217	15,756
Option Z1	**160,246**	40,972	120,217	15,756

The analysis below relies upon IMPLAN modeling. IMPLAN is an input/output model designed by the U.S. Forest Service and is commonly used by state and federal agencies for policy planning and evaluation purposes. There are two important caveats relevant to the interpretation of IMPLAN model estimates, generally, and within the context of this analysis. Principally, the model is static in nature and measures only those effects

resulting from a specific change at one point in time. Thus, IMPLAN does not account for adjustments that may occur. For example, a change in NPS policy on snowmobile numbers within the parks may encourage local businesses to diversify or modify their operations and thereby abate reductions in employment and output. In addition, IMPLAN does not acknowledge the re-employment of workers displaced by the original change. In the application below, this caveat simply suggests that *the long-run net output and employment effects resulting from the modeled changes in winter access policy would likely be smaller than those estimated by the model*. A second caveat to the IMPLAN analyses is related to the model data. The IMPLAN analysis in this document relies upon input/output relationships derived from 2003 data. Thus, the analyses presented in this report assume that this characterization of the affected economies is a reasonable approximation of current conditions, and the conditions that will exist in the future when policy changes might actually go into effect. To the extent that significant changes have, or will, occur, the results may be sensitive to this assumption.

4.1 Estimated Alternative Visitor Expenditure Impacts

The modeling of the regional economic impacts associated with changes in visitation (and associated visitor spending) on an economic area requires several types of information: 1) number of visitors and their place of residence, 2) visitor spending per park entry, 3) distribution of spending across economic sectors, and 4) distribution of spending across the region (e.g. by county or community). In the case of this analysis, the primary driving impact for the IMPLAN models is changes in the number of visitors from outside an analysis area who decide not to visit the analysis area. For the following analysis, the percentage of visitors to the parks who did not live in each of the alternative economic analysis areas was taken from the results of the 1997-98 survey of winter park visitors' survey (Duffield and Neher 2000). Specifically, 82.5% of visitors lived outside of the 5-county area, 65.5% lived outside the 3-state region, and 99% lived outside each of the four communities (West Yellowstone, Cody, and Jackson, and Wapiti). In addition to the change in visitation, the average spending per visitor is required. Duffield and Neher (2006) estimated per-visit expenditures using a time series model of West Yellowstone resort tax collections and West Entrance visits. This regression model of winter visitation and tax receipts estimates that for every West Entrance winter visit, $175.33 is spent on taxable goods and services in the community of West Yellowstone. This spending does not represent total trip spending for an individual as they may visit the park more than once on a trip or may visit other areas in the vicinity such as national forest lands. This estimate of $175.33 per park entry was used in the following analysis.

Finally, in order to accurately input the expenditure changes into the IMPLAN regional model, it is necessary to understand the general distribution of non-resident visitor spending across economic sectors (for instance, lodging, restaurants, rental cars, etc.). The distribution of spending across economic sectors is also drawn from the 1997-98 Winter visitor survey (Duffield and Neher 2000). The 1997-98 survey asked winter visitors to the parks to detail their spending patterns within the GYA. Based on these responses, visitor spending was allocated as 27.5% lodging, 24.6% automotive and gas

stations, 17.1% miscellaneous retail expenditures, 14.3% eating and drinking establishments, 11.5% scenic and recreational transportation, and 5.0% other amusement services. Using these parameters, total estimated direct changes in non-resident visitor spending due to a management option, and relative to one of the baselines, is input into the IMPLAN impact analysis program. The IMPLAN program estimates total expenditure and employment impacts, including indirect and induced impacts arising from the initial direct spending impact, and allocates these impacts across the sectors of the analysis area.

At its most aggregated level, IMPLAN modeling applies expenditure and employment multipliers to initial impacts to arrive at estimated total output and employment impacts. In general, the smaller and less diverse an economic analysis area is, the closer its expenditure multiplier is to 1.0. Conversely, the larger and more diverse an economy, the larger are its multipliers.

The following analysis of impacts includes individual IMPLAN impact model results for each of the 6 analysis areas (three states, five counties, and four communities) for each comparison of management options and baselines, and for the lower bound and upper bound impact estimates. The complete modeling results are provided below in Appendix A. The results presented in Section 4 are for the six analysis areas and for comparisons to the historical (1997-98) baseline. Many of the estimates differ only marginally, and the large majority of estimated impacts represent a very small percentage change in total economic activity for the analysis areas.

Table 5 shows the relative sizes of the 6 geographic economic analysis areas. The range of total economic outputs among the areas is from $166 billion annually in the three-state region to $10 million in the very small and isolated Wapiti zip code. Clearly, a change in visitor spending that is trivial in the context of the three-state economy, has the potential to be substantial in the case of the much smaller economies.

Table 5. Economic Output and Employment for Six Analysis Areas, 2003.

Analysis Area	Total 2003 Economic Output	Total 2003 Full and Part-Time Employment (jobs)
5-County GYA	$ 9,547,000,000	115,822
3-State region	$ 166,318,000,000	1,750,137
West Yellowstone, MT	$ 167,000,000	2,333
Jackson, WY	$ 1,860,000,000	20,302
Cody, WY	$ 917,000,000	10,705
Wapiti, WY zip code	$ 10,300,000	112

Source: Minnesota IMPLAN group 2003 Data Files.

The following sections present upper and lower bound impact estimates for each of the six geographic analysis areas (5-county, 3-state, West Yellowstone, Jackson, Cody, and Wapiti) compared to historic visitation levels. The comparison of visitation under the management options to the historic baseline (1997-98) is presented alone in this section to isolate and highlight differences in relative and absolute impacts across options and analysis areas. Appendix A contains detailed comparisons of all management options to all three baselines. The reported impacts represent IMPLAN models of changes in total economic output (the total production of goods and services in the analysis area for a year). This total impact reflects both direct impacts, as well as indirect and induced impacts. Additionally, impacts to employment in the analysis areas are reported.

Estimates of direct impacts are based on the Table 3 and Table 4 estimated changes to the GYA under management option-baseline pairings, as well as estimated average spending per park visit within the GYA. For community-level analysis areas, reductions in visitation to a community were allocated using the actual observed changes in visitation from the comparison of 1997-98 and 2005-06 gate-level visitation. Based on this comparison 74.7 percent of park-wide visitation reductions were seen at the West Entrance, and thus allocated to impacts on West Yellowstone. For the South Entrance, the 18.5 percent reduction is an impact at Jackson.

For the communities of Cody and Wapiti, WY, allocation of use changes is based on actual East Entrance limits and historical use levels. Under three options the East entrance is closed, and it is assumed that all motorized access would be lost. The allocation of any changes in East Entrance visitation between Cody and the Wapiti zip code is based winter visitor responses reported in RTI International (2004). These responses showed that roughly 47% of East Entrance area visitor nights were spent in the Pahaska Teepee area (the primary camping/lodging establishment within the Wapiti zip code) and 53% in Cody. Therefore, this allocation of estimated East Entrance visitation changes was used. One entrance not modeled, the North Entrance, saw an increase in visitation between 1997-98 and 2005-06, which would primarily be an impact on Gardiner. The Northeast Entrance is closed in winter.

4.1.1 Caveats to Use and Interpretation of Wapiti, WY Impact Analysis

Generally speaking, the larger the analysis area examined in an IMPLAN impact analysis, the more stable and reliable the results. For instance, a large economy such as a state likely shows less year to year variation in employment and output than a very small economic area. This is true because within a very small analysis (such as the Wapiti, WY zip code) the inclusion of one or two businesses within the annual US Census County Business Patterns data can significantly change the number and distribution of businesses and wages and output of the economic area as constructed within the IMPLAN data set. Additionally, the primary data collection for the IMPLAN data is the County Business Patterns survey conducted in early March each year. In the case of communities

surrounding Yellowstone NP, this timing (essentially falling between the end of the winter and start of the spring seasons) may miss some businesses that close seasonally.

Overall, the challenges of building an accurate representative data set for a defined area increase as the geographic size of the area decreases. This is particularly true at the sub-county level where certain countywide data must be allocated to the sub-county (zip code) areas on some basis such as proportional population. In the case of Wapiti, WY, the US Census does not even report an estimated population of the zip code/town. Instead, the population was approximated using information on reported jobs, and elementary school population. For the Wapiti zip code analysis, a population of 153 residents and 112 full and part time jobs were estimated.

The reported impacts for the Wapiti zip code are presented with strong caveats that significant errors could be present. These errors could arise from two primary sources: 1) misspecification of the size and structure of the Wapiti zip code economy due to lack of adequate sub-county data, and 2) inappropriate allocation of East Entrance generated economic activity between the Cody and Wapiti economic areas due to lack of specific survey-based data on this parameter. The primary result from the Wapiti modeling reinforces a point made previously, the smaller and more specialized an economy is, the greater is the potential for NPS management changes to lead to significant short-term local-area economic impacts.

Additionally, the estimated output and employment impacts presented in the following results tables for Wapiti have been calculated from estimated output and employment multipliers rather than those calculated by the IMPLAN model. Due to lack of detail on the structure of the businesses within the Wapiti zip code, reliable impact estimators could not be constructed. In their place an output multiplier of 1.05 was used that was marginally smaller than the 1.11 West Yellowstone output multiplier. The difference reflects the less diversified and smaller economy in Wapiti compared to West Yellowstone. An employment multiplier of 3.1 jobs per 100,000 of output was used for Wapiti. This multiplier is the same as was found in Cody, WY, and was used by proxy.

4.2 Estimated Impacts Compared to Historical Baseline

Table 6 through Table 9 show a comparison of the estimated total output and employment impacts of the management options to the historical (1997-98) baseline level of visitation. The modeling results are shown both for the lower bound and upper bound impact estimates. Examination of Table 7 and Table 9 shows that overall, as a percentage of total annual economic activity, only in the towns of West Yellowstone and Wapiti do the estimated impacts of the winter use policy options represent a significant change in total annual economic activity. For West Yellowstone, compared to the 1997-98 baseline the management options represent a predicted short-term change in output of -2..6% to -3.1%, and a change in annual employment of -4.0% to -4.8%. For the Wapiti zip code, the predicted short-term impacts are a -2.0% to -2.9% change in annual output

and a -5.4% to -7.8% change in annual employment. Besides the cases of West Yellowstone and Wapiti, nowhere does the estimated change in annual output and employment rise to even a 1% change, and in most cases the change is much smaller (especially in the cases of the larger 5-county and 3-state analysis areas).

Just as the lower bound estimates in Table 6 show reductions in output and employment when comparing the options to historical visitation, the upper Bound estimates in Table 8 generally show that full utilization of entry limits could lead to substantial increases in visitation and associated spending.

Table 6. Comparison of IMPLAN Model Estimates of Total Output and Employment Impacts: Lower Bound Estimated Comparison to Historical Baseline (1997-98) (output impacts are in 2003$, and Employment impacts are in full or part time jobs)

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	(6,974,396)	(8,569,093)	(5,245,641)	(1,566,276)	(438,926)	(296,461)
	Employment	(129)	(160)	(113)	(27)	(10)	(9)
Option X1	**Output**	(5,868,525)	(7,210,366)	(4,413,885)	(1,317,925)	(303,488)	(204,983)
	Employment	(109)	(134)	(95)	(23)	(7)	(6)
Option Y	**Output**	(6,974,396)	(8,569,093)	(5,245,641)	(1,566,276)	(438,926)	(296,461)
	Employment	(129)	(160)	(113)	(27)	(10)	(9)
Option Y1	**Output**	(5,868,525)	(7,210,366)	(4,413,885)	(1,317,925)	(303,488)	(204,983)
	Employment	(109)	(134)	(95)	(23)	(7)	(6)
Option Z	**Output**	(6,974,396)	(8,569,093)	(5,245,641)	(1,566,276)	(438,926)	(296,461)
	Employment	(129)	(160)	(113)	(27)	(10)	(9)
Option Z1	**Output**	(5,868,525)	(7,210,366)	(4,413,885)	(1,317,925)	(303,488)	(204,983)
	Employment	(109)	(134)	(95)	(23)	(7)	(6)

Table 7. Comparison of IMPLAN Model Estimates of Percentage Change in Total Annual Economic Output and Employment: Lower Bound Estimated Comparison to Historical Baseline (1997-98)

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	-0.07%	-0.01%	-3.14%	-0.08%	-0.05%	-2.88%
	Employment	-0.11%	-0.01%	-4.84%	-0.13%	-0.09%	-7.81%
Option X1	**Output**	-0.06%	0.00%	-2.64%	-0.07%	-0.03%	-1.99%
	Employment	-0.09%	-0.01%	-4.08%	-0.11%	-0.06%	-5.40%
Option Y	**Output**	-0.07%	-0.01%	-3.14%	-0.08%	-0.05%	-2.88%
	Employment	-0.11%	-0.01%	-4.84%	-0.13%	-0.09%	-7.81%
Option Y1	**Output**	-0.06%	0.00%	-2.64%	-0.07%	-0.03%	-1.99%
	Employment	-0.09%	-0.01%	-4.08%	-0.11%	-0.06%	-5.40%
Option Z	**Output**	-0.07%	-0.01%	-3.14%	-0.08%	-0.05%	-2.88%
	Employment	-0.11%	-0.01%	-4.84%	-0.13%	-0.09%	-7.81%
Option Z1	**Output**	-0.06%	0.00%	-2.64%	-0.07%	-0.03%	-1.99%
	Employment	-0.09%	-0.01%	-4.08%	-0.11%	-0.06%	-5.40%

Table 8. Comparison of IMPLAN Model Estimates of Total Output and Employment Impacts: Upper Bound Estimated Comparison to Historical Baseline (1997-98) (output impacts are in 2003$, and Employment impacts are in full or part time jobs)

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	14,562,225	17,891,882	10,952,663	3,270,313	(438,926)	(296,461)
	Employment	269	334	236	56	(10)	(9)
Option X1	**Output**	14,562,225	17,891,882	10,952,663	3,270,313	1,604,792	1,083,915
	Employment	269	334	236	56	36	32
Option Y	**Output**	11,893,098	14,612,459	8,945,137	2,670,894	(438,926)	(296,461)
	Employment	220	272	193	46	(10)	(9)
Option Y1	**Output**	11,893,098	14,612,459	8,945,137	2,670,894	474,225	320,303
	Employment	220	272	193	46	10	9
Option Z	**Output**	7,869,002	9,668,252	5,918,500	1,767,182	(438,926)	(296,461)
	Employment	146	180	128	30	(10)	(9)
Option Z1	**Output**	7,869,002	9,668,252	5,918,500	1,767,182	300,291	202,824
	Employment	146	180	128	30	7	6

Table 9. Comparison of IMPLAN Model Estimates of Percentage Change in Total Annual Economic Output and Employment: Upper Bound Estimated Comparison to Historical Baseline (1997-98).

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	0.15%	0.01%	6.56%	0.18%	-0.05%	-2.88%
	Employment	0.23%	0.02%	10.11%	0.28%	-0.09%	-7.81%
Option X1	**Output**	0.15%	0.01%	6.56%	0.18%	0.18%	10.52%
	Employment	0.23%	0.02%	10.11%	0.28%	0.33%	28.57%
Option Y	**Output**	0.12%	0.01%	5.36%	0.14%	-0.05%	-2.88%
	Employment	0.19%	0.02%	8.26%	0.23%	-0.09%	-7.81%
Option Y1	**Output**	0.12%	0.01%	5.36%	0.14%	0.05%	3.11%
	Employment	0.19%	0.02%	8.26%	0.23%	0.10%	8.44%
Option Z	**Output**	0.08%	0.01%	3.54%	0.10%	-0.05%	-2.88%
	Employment	0.13%	0.01%	5.47%	0.15%	-0.09%	-7.81%
Option Z1	**Output**	0.08%	0.01%	3.54%	0.10%	0.03%	1.97%
	Employment	0.13%	0.01%	5.47%	0.15%	0.06%	5.35%

4.3 Summary of Economic Impact Analysis Results and Uncertainty

The estimated economic impact results detailed above in Section 4 show a clear pattern. In terms of the level of total impact on an analysis area, two factors are particularly relevant: 1) the size and diversity of the economic analysis area, and 2) the share of total economic impact to the region that is allocated to each analysis area. For four of the analysis areas (5-county, 3-state, Jackson, and Cody) the size of economic impacts relative to the size of the economies combined to make estimated percentage changes in annual output and employment extremely small (generally much less than a 1% change). It should be noted that in these analysis areas, even though the percentage change in total economic activity associated with an option might be very small, impacts to specific sectors or individual businesses may be substantially larger.

The two analysis areas where substantial impacts are predicted are for the town of West Yellowstone, MT and the Wapiti, WY zip code area. In these analysis areas small economies that depend heavily upon recreational visitor spending, combined with a large share of GYA impacts associated with changes in winter access management leads to measurable economic impacts. For West Yellowstone, compared to the 1997-98 baseline, the management options represent a predicted short-term change in output of -2.6% to -3.1%, and a change in annual employment of -4.0% to -4.8%. For the Wapiti zip code, the predicted short-term impacts are a -2.0% to -2.9% change in annual output and a -5.4% to -7.8% change in annual employment. Since the impacts will be concentrated in the winter months, the impacts will be felt most acutely by businesses that rely on winter visitor expenditures for a disproportionately large share of their annual business.

As noted, Appendix A to this report provides comparisons of estimated impacts of all management options to all three baselines for the range (low to high) of estimated impacts. The low estimate is an estimate of the impact expected in the next year following a policy change, and the high is in the indefinite future, should use increase to the legal limit under any given management option.

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Appendix A: IMPLAN Modeling Results for Comparisons to Motorized Ban and 2001-02 Historical Baselines.

Table 10. Comparison of IMPLAN Model Estimates of Total Output and Employment Impacts: Lower Bound Estimated Comparison to Motorized Ban Baseline (output impacts are in 2003$, and Employment impacts are in full or part time jobs)

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	8,245,244	10,130,521	6,201,482	1,851,677	(14,324)	(9,675)
	Employment	153	189	134	32	(0)	(0)
Option X1	**Output**	9,351,114	11,489,249	7,033,239	2,100,028	121,114	81,803
	Employment	173	214	152	36	3	2
Option Y	**Output**	8,245,244	10,130,521	6,201,482	1,851,677	(14,324)	(9,675)
	Employment	153	189	134	32	(0)	(0)
Option Y1	**Output**	9,351,114	11,489,249	7,033,239	2,100,028	121,114	81,803
	Employment	173	214	152	36	3	2
Option Z	**Output**	8,245,244	10,130,521	6,201,482	1,851,677	(14,324)	(9,675)
	Employment	153	189	134	32	(0)	(0)
Option Z1	**Output**	9,351,114	11,489,249	7,033,239	2,100,028	121,114	81,803
	Employment	173	214	152	36	3	2

Table 11. Comparison of IMPLAN Model Estimates of Percentage Change in Total Annual Economic Output and Employment: Lower Bound Estimated Comparison to Motorized Ban Baseline

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	0.09%	0.01%	3.71%	0.10%	0.00%	-0.09%
	Employment	0.13%	0.01%	5.73%	0.16%	0.00%	-0.26%
Option X1	**Output**	0.10%	0.01%	4.21%	0.11%	0.01%	0.79%
	Employment	0.15%	0.01%	6.49%	0.18%	0.03%	2.16%
Option Y	**Output**	0.09%	0.01%	3.71%	0.10%	0.00%	-0.09%
	Employment	0.13%	0.01%	5.73%	0.16%	0.00%	-0.26%
Option Y1	**Output**	0.10%	0.01%	4.21%	0.11%	0.01%	0.79%
	Employment	0.15%	0.01%	6.49%	0.18%	0.03%	2.16%
Option Z	**Output**	0.09%	0.01%	3.71%	0.10%	0.00%	-0.09%
	Employment	0.13%	0.01%	5.73%	0.16%	0.00%	-0.26%
Option Z1	**Output**	0.10%	0.01%	4.21%	0.11%	0.01%	0.79%
	Employment	0.15%	0.01%	6.49%	0.18%	0.03%	2.16%

Table 12. Comparison of IMPLAN Model Estimates of Total Output and Employment Impacts: Upper Bound Estimated Comparison to Motorized Ban Baseline (output impacts are in 2003$, and Employment impacts are in full or part time jobs)

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	29,781,864	36,591,497	22,399,787	6,688,266	(14,324)	(9,675)
	Employment	551	682	483	115	(0)	(0)
Option X1	**Output**	29,781,864	36,591,497	22,399,787	6,688,266	2,029,395	1,370,702
	Employment	551	682	483	115	45	40
Option Y	**Output**	27,112,738	33,312,074	20,392,261	6,088,846	(14,324)	(9,675)
	Employment	502	621	439	104	(0)	(0)
Option Y1	**Output**	27,112,738	33,312,074	20,392,261	6,088,846	898,827	607,089
	Employment	502	621	439	104	20	18
Option Z	**Output**	23,088,641	28,367,867	17,365,624	5,185,134	(14,324)	(9,675)
	Employment	427	529	374	89	(0)	(0)
Option Z1	**Output**	23,088,641	28,367,867	17,365,624	5,185,134	724,893	489,611
	Employment	427	529	374	89	16	14

Table 13. Comparison of IMPLAN Model Estimates of Percentage Change in Total Annual Economic Output and Employment: Upper Bound Estimated Comparison to Motorized Ban Baseline (1997-98).

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	0.31%	0.02%	13.41%	0.36%	0.00%	-0.09%
	Employment	0.48%	0.04%	20.68%	0.56%	0.00%	-0.26%
Option X1	**Output**	0.31%	0.02%	13.41%	0.36%	0.22%	13.30%
	Employment	0.48%	0.04%	20.68%	0.56%	0.42%	36.13%
Option Y	**Output**	0.28%	0.02%	12.21%	0.33%	0.00%	-0.09%
	Employment	0.43%	0.04%	18.83%	0.51%	0.00%	-0.26%
Option Y1	**Output**	0.28%	0.02%	12.21%	0.33%	0.10%	5.89%
	Employment	0.43%	0.04%	18.83%	0.51%	0.19%	16.00%
Option Z	**Output**	0.24%	0.02%	10.40%	0.28%	0.00%	-0.09%
	Employment	0.37%	0.03%	16.04%	0.44%	0.00%	-0.26%
Option Z1	**Output**	0.24%	0.02%	10.40%	0.28%	0.08%	4.75%
	Employment	0.37%	0.03%	16.04%	0.44%	0.15%	12.91%

Table 14. Comparison of IMPLAN Model Estimates of Total Output and Employment Impacts: Lower Bound Estimated Comparison to 2001-02 Baseline (output impacts are in 2003$, and Employment impacts are in full or part time jobs)

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	(11,817,331)	(14,519,368)	(8,888,151)	(2,653,879)	(549,937)	(371,441)
	Employment	(219)	(271)	(191)	(45)	(12)	(11)
Option X1	**Output**	(10,711,461)	(13,160,640)	(8,056,395)	(2,405,528)	(414,499)	(279,963)
	Employment	(198)	(245)	(174)	(41)	(9)	(8)
Option Y	**Output**	(11,817,331)	(14,519,368)	(8,888,151)	(2,653,879)	(549,937)	(371,441)
	Employment	(219)	(271)	(191)	(45)	(12)	(11)
Option Y1	**Output**	(10,711,461)	(13,160,640)	(8,056,395)	(2,405,528)	(414,499)	(279,963)
	Employment	(198)	(245)	(174)	(41)	(9)	(8)
Option Z	**Output**	(11,817,331)	(14,519,368)	(8,888,151)	(2,653,879)	(549,937)	(371,441)
	Employment	(219)	(271)	(191)	(45)	(12)	(11)
Option Z1	**Output**	(10,711,461)	(13,160,640)	(8,056,395)	(2,405,528)	(414,499)	(279,963)
	Employment	(198)	(245)	(174)	(41)	(9)	(8)

Table 15. Comparison of IMPLAN Model Estimates of Percentage Change in Total Annual Economic Output and Employment: Lower Bound Estimated Comparison to 2001-02 Baseline

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	-0.12%	-0.01%	-5.32%	-0.14%	-0.06%	-3.61%
	Employment	-0.19%	-0.02%	-8.21%	-0.22%	-0.11%	-9.79%
Option X1	**Output**	-0.11%	-0.01%	-4.82%	-0.13%	-0.05%	-2.72%
	Employment	-0.17%	-0.01%	-7.44%	-0.20%	-0.09%	-7.38%
Option Y	**Output**	-0.12%	-0.01%	-5.32%	-0.14%	-0.06%	-3.61%
	Employment	-0.19%	-0.02%	-8.21%	-0.22%	-0.11%	-9.79%
Option Y1	**Output**	-0.11%	-0.01%	-4.82%	-0.13%	-0.05%	-2.72%
	Employment	-0.17%	-0.01%	-7.44%	-0.20%	-0.09%	-7.38%
Option Z	**Output**	-0.12%	-0.01%	-5.32%	-0.14%	-0.06%	-3.61%
	Employment	-0.19%	-0.02%	-8.21%	-0.22%	-0.11%	-9.79%
Option Z1	**Output**	-0.11%	-0.01%	-4.82%	-0.13%	-0.05%	-2.72%
	Employment	-0.17%	-0.01%	-7.44%	-0.20%	-0.09%	-7.38%

Table 16. Comparison of IMPLAN Model Estimates of Total Output and Employment Impacts: Upper Bound Estimated Comparison to 2001-02 Baseline (output impacts are in 2003$, and Employment impacts are in full or part time jobs)

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	14,562,225	17,891,882	10,952,663	3,270,313	(549,937)	(371,441)
	Employment	269	334	236	56	(12)	(11)
Option X1	**Output**	14,562,225	17,891,882	10,952,663	3,270,313	1,493,782	1,008,936
	Employment	269	334	236	56	33	30
Option Y	**Output**	11,893,098	14,612,459	8,945,137	2,670,894	(549,937)	(371,441)
	Employment	220	272	193	46	(12)	(11)
Option Y1	**Output**	11,893,098	14,612,459	8,945,137	2,670,894	363,214	245,324
	Employment	220	272	193	46	8	7
Option Z	**Output**	7,869,002	9,668,252	5,918,500	1,767,182	(549,937)	(371,441)
	Employment	146	180	128	30	(12)	(11)
Option Z1	**Output**	7,869,002	9,668,252	5,918,500	1,767,182	189,281	127,845
	Employment	146	180	128	30	4	4

Table 17. Comparison of IMPLAN Model Estimates of Percentage Change in Total Annual Economic Output and Employment: Upper Bound Estimated Comparison to 2001-02 Baseline (1997-98).

		5-county	3-state	West Yellowstone	Jackson	Cody	Wapiti*
Option X	**Output**	0.15%	0.01%	6.56%	0.18%	-0.06%	-3.61%
	Employment	0.23%	0.02%	10.11%	0.28%	-0.11%	-9.79%
Option X1	**Output**	0.15%	0.01%	6.56%	0.18%	0.16%	9.79%
	Employment	0.23%	0.02%	10.11%	0.28%	0.31%	26.60%
Option Y	**Output**	0.12%	0.01%	5.36%	0.14%	-0.06%	-3.61%
	Employment	0.19%	0.02%	8.26%	0.23%	-0.11%	-9.79%
Option Y1	**Output**	0.12%	0.01%	5.36%	0.14%	0.04%	2.38%
	Employment	0.19%	0.02%	8.26%	0.23%	0.08%	6.47%
Option Z	**Output**	0.08%	0.01%	3.54%	0.10%	-0.06%	-3.61%
	Employment	0.13%	0.01%	5.47%	0.15%	-0.11%	-9.79%
Option Z1	**Output**	0.08%	0.01%	3.54%	0.10%	0.02%	1.24%
	Employment	0.13%	0.01%	5.47%	0.15%	0.04%	3.37%