

The Denali Park Road experience: Indicators and standards of quality

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CONTEMPORARY APPROACHES TO MANAGING PARKS

and outdoor recreation—and carrying capacity in particular—rely on a foundation of formulating indicators and standards of quality. Visitor Experience and Resource Protection (VERP) (National Park Service 1997; Manning 2007) and Limits of Acceptable Change (LAC) (Stankey et al. 1985) are examples of this type of management/carrying capacity framework. In these frameworks, indicators and standards of quality are used as empirical measures of management objectives or desired conditions. Indicators of quality are measurable, manageable variables that serve as proxies for management objectives/desired conditions, and standards of quality define the minimum acceptable condition of indicator variables. Once indicators and standards of quality are formulated, indicator variables are monitored to determine the degree to which standards of quality are being maintained. If monitoring suggests that standards of quality are in danger of being violated, then carrying capacity has been reached and management practices must be applied. Management practices can range widely, including “hardening” park resources (e.g., paving trails, constructing tent platforms), reducing the impacts of visitors (e.g., encouraging visitors to stay on designated trails, substituting public transit for private automobiles), and limiting the amount of visitor use (e.g., limiting the length of stay, requiring a use permit) (Manning 2004; Manning 2007).

The study

This study was designed to support formulation of indicators and standards of quality for the visitor experience on the Denali Park Road (see fig. 1, page 28). We conducted the study in two phases. Phase 1 consisted of a series of qualitative interviews with Denali Park Road users to identify potential indicators of quality for the visitor experience. Interviewers asked a series of open-ended questions that encouraged respondents to provide narrative, contemplative answers about their experience on the Denali Park Road. Qualitative methods provide a depth of insight into recreation experiences and are particularly useful when little is known about the nature of experiences or what influences them. We conducted 126 interviews during the 2006 peak visitor use season (July–August), and two focus groups at one of the park lodges. Questions asked were intended to gather information to help understand the visitor experience on the park road and to inform development of indicators of quality. All interviews were recorded and transcribed verbatim. A content analysis of each interview was then performed by segmenting data into codes—simpler, general categories that can then be used to expand and develop new questions and levels of interpretation (Coffey and Atkinson 1996).

Abstract

Contemporary frameworks for managing parks and outdoor recreation, like the National Park Service’s (NPS) Visitor Experience and Resource Protection (VERP) framework, rely on indicators and standards of quality as empirical measures of management objectives or desired conditions. This study identified indicators and standards for the Denali Park Road experience based on data from 126 interviews and 707 questionnaires. Indicators that may be used to measure and manage this experience include number of buses seen along the road, number of buses at informal wildlife stops, waiting time to see wildlife at informal wildlife stops, number of buses and people at rest stops, and percentage chance of seeing a grizzly bear. Potential standards for these were then identified based on visitor evaluations of photos or narrative descriptions representing a range of conditions for each indicator variable. For example, visitors’ mean acceptability ratings fall out of the acceptable range and into the unacceptable range when more than five buses are visible along the road. This value represents one possible standard for measuring and managing crowding on the Denali Park Road. In keeping with the VERP framework, findings from this program of research should be combined with other information to define and guide management of the visitor experience on the Denali Park Road. Indicators should be monitored and management actions taken to ensure that standards of quality are maintained. In this way, the carrying capacity of the Denali Park Road can be defined and managed. However, a more proactive approach is also possible by incorporating these indicators and standards into a simulation model that estimates the maximum number of vehicles that can be accommodated on the road without violating standards of quality.

Key words: carrying capacity, Denali National Park, norms, VERP (Visitor Experience and Resource Protection framework), visitor experience

Phase 2 of the study consisted of a quantitative survey of Denali Park Road visitors to measure standards of quality for selected indicator variables. Research on standards of quality increasingly has focused on personal and social norms. Developed in the discipline of sociology, norms have attracted considerable attention as a theoretical construct and empirical framework in park and outdoor recreation research and management (see, for example, two double issues of *Leisure Sciences*, volume 18, numbers 1 and 2, and volume 24, numbers 3 and 4). In particular, normative theory has special application in helping to formulate standards of quality for the recreation experience. As applied in parks and outdoor recreation, norms are generally defined as standards that individuals and groups use for evaluating behavior and social and environmental conditions (Donnelly et al. 1992). If visitors have normative standards concerning relevant aspects of park and out-

In Focus: Denali Park Road

If monitoring suggests that standards of quality are in danger of being violated, then carrying capacity has been reached and management practices must be applied.

door recreation experiences, then such norms can be measured and used as a basis for helping to formulate standards of quality.

Application of normative theory and methods to help formulate visitor-based standards of quality in parks and outdoor recreation is most fully and recently described in Manning 2007 and 2009. Park and outdoor recreation visitors (or other survey respondents) are conventionally presented with a range of recreation-related impacts and asked to judge the acceptability of such conditions. Using these methods, the personal norms of individuals can be aggregated to test for the existence of social norms or the degree to which norms are shared across groups. Normative research in outdoor recreation has focused largely on the issue of crowding, but has also been expanded to include other relevant issues, such as ecological impacts to trails and campsites.

Normative research on standards of quality in parks and outdoor recreation has often used visual simulations to portray a range of resource and social impacts and resulting conditions (Manning et al. 1996; Manning and Freimund 2004; Manning 2007; Manning 2009). Visual research methods offer several potential advantages over conventional narrative/numerical questions to measure standards of quality. For example, visual methods can help “standardize” such research, focus more directly and exclusively on the treatment variables under study, offer a more elegant means of communicating variables that are difficult or awkward to describe in narrative/numerical terms, and can be used to represent conditions that are difficult to find in the field or that do not currently exist. Research suggests that visual research methods may be most appropriate in relatively high-use density contexts, may result in more valid or realistic estimates of visitor standards of quality in such applications, may meet generally accepted standards of validity, and may be methodologically robust (Manning and Freimund 2004).

We administered the phase 2 survey during the 2007 summer use season to the five major types of bus users on the Denali Park Road: (1) those who use the park’s general shuttle bus system, (2) those who use special shuttle buses to access campgrounds, (3) those who use special buses to access the commercial lodges at Kantishna at the road’s terminus, and (4 and 5) Tundra Wilderness Tour and Denali Natural History Tour participants—relatively

short commercial tours. A response rate of 78% was attained and this yielded 707 completed questionnaires.

Study findings

Indicators of quality

We considered two questions from the 2006 interviews to be foundational to identifying potential indicators of quality for the Denali Park Road experience. In the first question, we asked respondents about the things they enjoyed most about their time on the Denali Park Road. The most frequently occurring responses related to “wildlife,” “scenery or mountains,” and “driver or information provided by driver” (table 1).

Other responses suggested the importance of specific landscape attributes, activities, and experience characteristics. For example, one respondent said, “We had wonderful weather so we were able to see Denali in all its glory.” Another identified the significance of “social experience with others,” in addition to the importance of the bus driver. Some respondents indicated the importance of “solitude or not too much traffic” and “using bus transportation.”

A greater number of coded responses emerged from the second question about the things respondents enjoyed least about their time on the park road (table 2). The two most frequently occurring codes—“long ride or being on the bus” and “uncomfortable seats on the bus”—related to the schedule of the bus trip or the bus itself. Other experiential issues regarding the bus and its schedule emerged in less frequently occurring responses, such as “malfunctioning or dirty windows,” “frequency or duration of stops,” “buses too big,” and “time to load and unload the bus.”

Codes related to the built road environment emerged in response to this question. Several respondents expressed safety concerns related to the road, particularly regarding traveling through Polychrome Pass. Also, respondents suggested that the “condition of the road” or “dust” generated by vehicles detracted from their experience. Other responses indicated that “some of the outhouses weren’t as nice as they could have been” or that there was a “lack of signs on the road.”

Table 1. Things enjoyed most by visitors on the Denali Park Road

Category/Code	Frequency Indicated (n=126)
Wildlife	87
Scenery/mountains	83
Driver/information provided by the bus driver	49
Mount McKinley	14
Natural environment/landscape	8
Social experience with others	7
Solitude/not too much traffic on the road	6
Bus transportation	4
Hiking	3
Ride along the road	3
Wildflowers	2
Polychrome Pass	2
Driving on the road with a recreational vehicle	2
Rules on the bus intended to protect wildlife	1
Being able to get off the bus and walk around	1

We assigned codes for wildlife viewing and factors influencing that experience in response to the second question. Some responses indicated that “not seeing enough wildlife” or “wildlife being too far away” negatively affected their experience. For example, “We didn’t see any moose, or sheep, or bear” and “we didn’t see anything.” One respondent reported an issue with a bus scaring away wildlife of interest.

We assigned other codes to responses related to whom respondents interacted with or what people experienced. Seeing “other buses or traffic” or “too many people at rest areas” impacted the experience of road users. For example, one respondent said, “I don’t like all the buses. . . . I would like to have the road all to myself.” For other respondents the least enjoyable aspects of their experience were their interactions with the “driver,” the “behavior and actions of others on the bus,” and “not seeing Mount McKinley.” Also, we assigned codes of “poor value or too costly” and “bus not going far enough into the park” in the analysis.

Based on findings from the interviews conducted in phase 1, we included a more quantitative approach to identifying indicators of quality in the visitor survey administered in 2007. A series of 29 issues associated with the visitor experience on the Denali Park Road were included in the questionnaire, and respondents were asked to report the extent to which they considered these issues to be problems (table 3, next page). The three most problematic issues were “not seeing wildlife close to the road,” “too many buses on the Denali Park Road,” and “too few animals along the road.”

Table 2. Things enjoyed least by visitors on the Denali Park Road

Category/Code	Frequency Indicated (n=126)
Long ride/being on the bus	28
Nothing	20
Uncomfortable seats on the bus	19
Didn’t see enough wildlife/wildlife too far away	12
Safety concerns (e.g., driving through Polychrome Pass)	12
Dust	12
Condition of the road	10
Seeing buses/traffic	7
Frequency/duration of stops	6
Driver (e.g., couldn’t hear, annoying, not informative)	5
Malfunctioning/dirty windows	4
Behavior and actions of other visitors on the bus	4
Lodge buses too big and with too many people	3
Too many people at rest areas	2
Lack of facilities	2
Tour didn’t go far enough into park	2
Bathroom facilities along road were not very nice	2
Vehicles scaring wildlife away	1
Road was unpaved	1
Poor value/cost	1
Not seeing Mount McKinley	1
Lack of signs on road	1
Time to load and unload the bus	1

Standards of quality

The phase 2 visitor survey measured a range of standards of quality for five potential indicator variables: (1) number of buses on the Denali Park Road, (2) number of buses stopped at the same place to observe wildlife, (3) number of buses and people stopped at a rest area, (4) wait time at wildlife stops to see wildlife (as all buses/visitors take their “turn”), and (5) percentage chance of seeing a grizzly bear. These indicators were selected by researchers and Denali Park staff because they are measurable, manageable, and related to visitor use.

We addressed the first three of these variables through a series of photographic simulations to depict a range of use levels and associated impacts. For each series of photographs, respondents were asked a battery of evaluative questions. They were first asked to evaluate the acceptability of each of the study photographs (termed “acceptability”). Acceptability was measured using a nine-point Likert-type scale ranging from -4 (“very unacceptable”) to 4 (“very acceptable”). Zero represented the middle of

In Focus: Denali Park Road

Table 3. Visitor perceptions of problems on the Denali Park Road

Parameter	Percentage of Respondents				N	Mean*
	Not a Problem (1*)	Small Problem (2*)	Big Problem (3*)	Don't Know		
Too many buses on the Denali Park Road	43.3	45.7	9.8	1.2	685	1.66
Too many private cars/recreational vehicles on the Denali Park Road	64.5	23.0	9.3	3.2	668	1.43
Not seeing enough wildlife	49.5	33.2	16.7	0.6	683	1.67
Not seeing enough wildlife close to the road	39.6	37.4	22.0	1.0	690	1.82
Too few animals along the road	45.1	34.4	18.9	1.6	683	1.73
Wildlife being scared away from the road by buses	57.8	22.2	9.1	10.9	615	1.45
Other buses blocking views	62.4	30.4	5.4	1.7	675	1.42
Too many buses at "wildlife stops"	53.7	36.3	7.3	2.7	652	1.52
Visitors not following rules for observing wildlife while on the bus	67.3	23.3	6.3	3.2	666	1.37
Bus drivers not providing enough time at "wildlife stops"	87.0	10.4	1.6	1.0	686	1.14
Dust generated by buses	48.3	36.8	13.2	1.6	676	1.64
Uncomfortable seating on buses	55.0	34.9	9.8	0.3	689	1.55
Too many people on buses	61.4	29.0	9.1	0.4	689	1.47
Bus noise along the road	63.0	29.3	5.8	1.9	677	1.42
Noisy people on the bus	65.5	27.0	7.3	0.3	687	1.42
Too many buses at rest stops	65.3	27.0	6.4	1.3	677	1.40
Buses being poorly maintained	82.7	11.8	1.8	3.7	659	1.16
Windows on buses not working properly	68.5	24.0	6.7	0.9	682	1.38
Windows on buses are dirty	62.6	28.6	8.3	0.4	685	1.45
Bus drivers not stopping when asked	92.6	5.1	1.2	1.2	677	1.08
Lack of interpretive information provided on the bus	86.6	10.3	2.2	0.9	680	1.15
Lack of visitor facilities (e.g., restrooms)	90.6	8.3	0.6	0.6	686	1.09
Degradation of the quality of the Denali Park Road	64.4	26.2	5.0	4.4	656	1.38
Degradation of the wilderness character of the Denali Park Road (e.g., by buildings and human presence)	70.1	21.1	5.9	2.9	662	1.34
Not having binoculars	68.5	16.3	13.5	1.6	669	1.44
Poor weather	71.8	19.0	7.8	1.5	670	1.35
Smoke from wildfires	89.2	3.1	0.9	6.9	636	1.05
Feeling unsafe traveling along the road	85.7	11.5	2.0	0.7	682	1.16
Brush along the road obscured view of wildlife	75.5	20.9	2.8	0.9	683	1.27

*Means are based on a scale of 1 ("not a problem") to 3 ("big problem"). "Don't know" responses are excluded from mean calculations.

this scale or the point of indifference. The second question in the series asked respondents to report the photograph that showed the number of buses they would prefer to see (termed "preference"). A third question asked visitors to report which photograph showed the condition that would be "so unacceptable that they would no longer use the Denali Park Road" (termed "displacement"). Further, respondents were given the opportunity to indicate that "none of the photographs are so unacceptable that I would no longer use the Denali Park Road." The fourth question asked visitors to report the photograph representing

the highest level of visitor use they thought the National Park Service should allow, or the point at which the number of buses should be restricted (termed "management action"). Additionally, respondents were given the opportunity to report that none of the photographs showed a high enough level of use to restrict use or that use should not be restricted at all. The fifth question referred to existing conditions (termed "typically seen"), asking respondents to report the photograph that best represented the condition they "typically saw today" while traveling on the Denali Park Road.

NPS PHOTOS (7) BY WAYNE FREIMUND AND JEFFREY HALLO



Figure 1. Study photographs showing the number of buses at one time on the Denali Park Road.

For the variables “wait time at wildlife stops to see wildlife” and “percentage chance of seeing a grizzly bear,” a range of conditions was described numerically. We asked respondents to evaluate the acceptability of the numerical options, and we again measured acceptability using a nine-point Likert-type scale ranging from -4 (“very unacceptable”) to 4 (“very acceptable”).

We measured standards of quality for the number of buses on the Denali Park Road using a series of seven study photographs as shown in fig. 1. Figure 2 shows the social norm curve derived from the average acceptability ratings. These findings indicate that increasing numbers of buses are generally found to be increasingly unacceptable and that this pattern holds across all five types of bus users. For all respondents, mean acceptability ratings fall out of the acceptable range and into the unacceptable range at 5.5 buses. Findings for the other evaluative dimensions of preference, management action, displacement, and typically seen are summarized (along with the above findings on acceptability) in table 4.

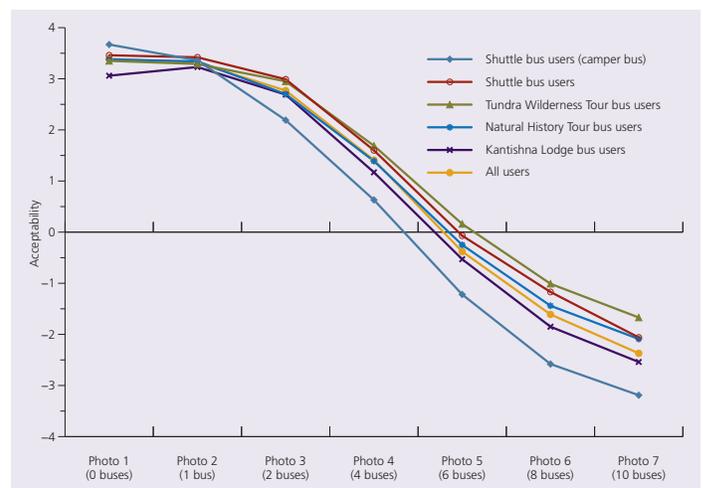


Figure 2. Social norm curve for the number of buses at one time on the Denali Park Road.

Standards of quality for the number of buses stopped to observe wildlife on the Denali Park Road were measured using a series

Evaluative Dimension	Camper Bus User	General Bus User	Tundra Wilderness Tour	Natural History Tour	Lodge Bus User	All Users
Acceptability	4.7	5.9	6.3	5.7	5.5	5.5
Preference	1.2	2.3	2.8	2.2	1.9	2.1
Management action	5.5	5.5	5.1	6.0	5.1	5.5
Displacement	7.2	8.1	8.2	7.7	7.6	7.8
Typically seen	2.6	3.5	4.2	3.5	4.1	3.6

In Focus: Denali Park Road



Figure 3. Study photographs showing the number of buses stopped to observe wildlife on the Denali Park Road.

of eight study photographs, as shown in fig. 3. Figure 4 shows the social norm curve derived from the average acceptability ratings. These findings reveal that increasing numbers of buses are generally found to be increasingly unacceptable. For all respondents, mean acceptability ratings fall out of the acceptable range and into the unacceptable range at 4.7 buses. Findings for the other dimensions of preference, management action, displacement, and typically seen are summarized (along with the above findings on acceptability) in table 5.

Standards of quality for the number of buses and people at a rest stop along the Denali Park Road were measured using a series of eight study photographs, as shown in fig. 5. Figure 6 shows the social norm curve derived from the average acceptability ratings. These findings indicate that increasing numbers of buses and people are generally found to be increasingly unacceptable. For all respondents, mean acceptability ratings fall out of the acceptable range and into the unacceptable range at 4.7 buses. Findings for the other dimensions of preference, management action, displacement, and typically seen are summarized (along with the above findings on acceptability) in table 6 (page 40).

We asked respondents to evaluate the acceptability of different waiting times to see wildlife when buses were stopped along the road. We presented them with a range between “no wait time” and a “15-minute wait.” Figure 7 (page 40) shows the resulting social norm curve. Study findings suggest that longer wait times are found to be increasingly unacceptable, and that the mean acceptability rating falls out of the acceptability range and into the unacceptable range at 4.6 minutes.

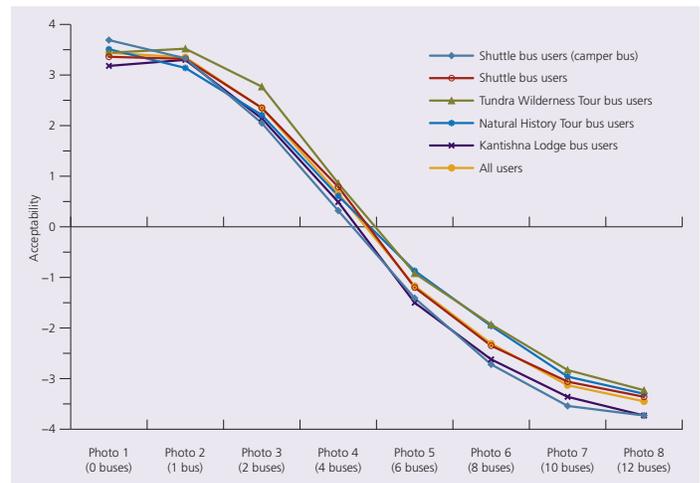
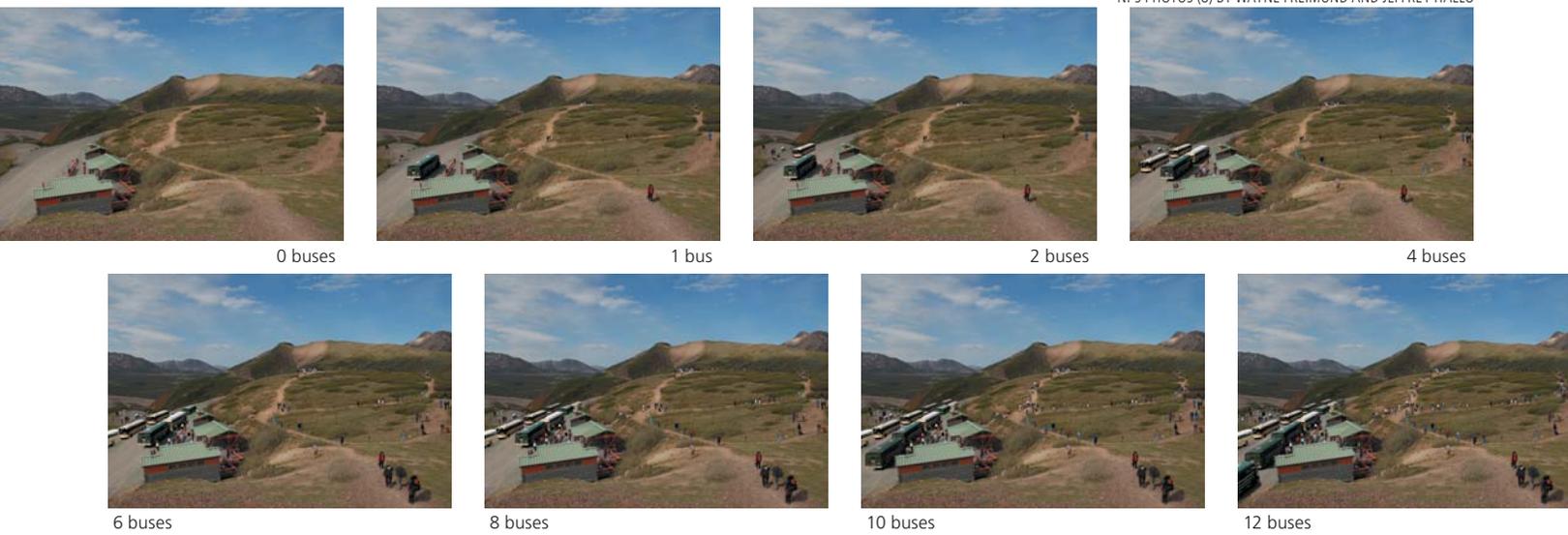


Figure 4. Social norm curve for the number of buses stopped to observe wildlife on the Denali Park Road.

We asked respondents to evaluate the acceptability of different percentage chances of seeing a grizzly bear along the Denali Park Road. Respondents were presented with a range between a “0% chance of seeing a grizzly bear” and a “100% chance of seeing a grizzly bear.” Figure 8 (page 40) shows the resulting social norm curve. Study findings suggest that lower percentage chances of seeing a grizzly bear are found to be increasingly unacceptable, and that the mean acceptability rating falls out of the acceptability range and into the unacceptable range at a 20% chance of seeing a grizzly bear.



NPS PHOTOS (8) BY WAYNE FREIMUND AND JEFFREY HALLO

Figure 5. Study photographs showing the number of buses stopped at a rest stop along the Denali Park Road.

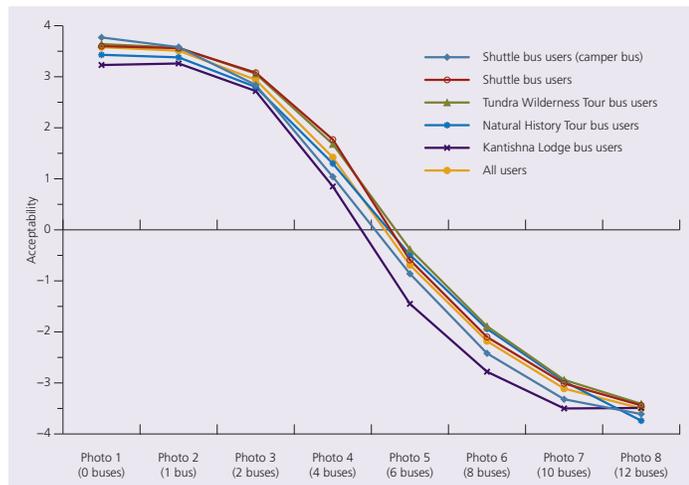


Figure 6. Social norm curve for the number of buses stopped at a rest area on the Denali Park Road.

We examined differences between mean responses among user groups for all the above questions. In general, differences among the values reported by the five types of bus users are not large, though camper and lodge bus users are often more sensitive to increasing use levels.

Conclusions

Phase 1 qualitative interviews identified a number of issues that affected the quality of the visitor experience. However, some of these issues do not meet the criteria for good indicators of quality because they are not readily measurable, they are beyond the control of park staff to manage, or they are not related to visitor use levels (Manning 2007). Examples include the quality of scenery, ability to see Mount McKinley, the physical condition of buses,

Table 5. Range of standards for the number of buses stopped to observe wildlife by type of bus visitor

Evaluative Dimension	Camper Bus User	General Bus User	Tundra Wilderness Tour	Natural History Tour	Lodge Bus User	All Users
Acceptability	4.4	4.8	5.0	4.8	4.5	4.7
Preference	1.2	1.5	2.1	1.5	1.7	1.6
Management action	5.2	5.3	5.8	6.2	5.4	5.5
Displacement	7.6	7.7	7.8	7.9	7.7	7.9
Typically seen	2.6	2.6	3.4	3.1	2.7	2.8

In Focus: Denali Park Road

Table 6. Range of standards for the number of buses at a rest stop by type of bus visitor

Evaluative Dimension	Camper Bus User	General Bus User	Tundra Wilderness Tour	Natural History Tour	Lodge Bus User	All Users
Acceptability	4.4	4.8	5.0	4.8	4.5	4.7
Preference	1.6	2.1	2.5	2.1	1.9	2.1
Management action	5.7	6.0	6.0	6.1	5.4	5.9
Displacement	7.8	7.7	8.0	8.4	7.4	7.8
Typically seen	3.5	3.7	3.9	3.0	3.5	3.6

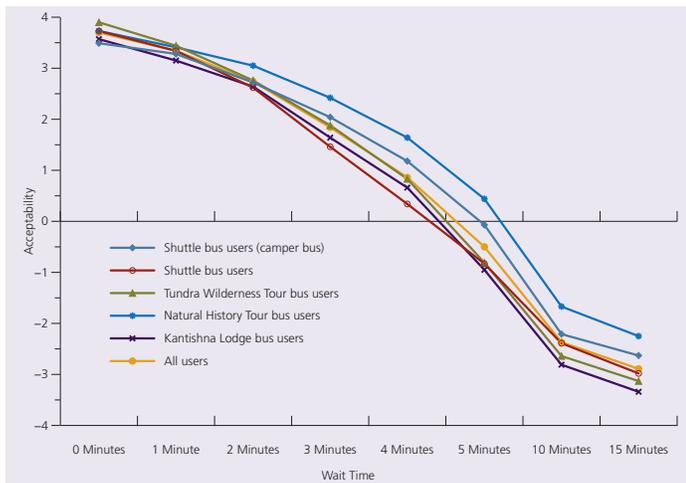


Figure 7. Social norm curve for the wait time to see wildlife on the Denali Park Road.

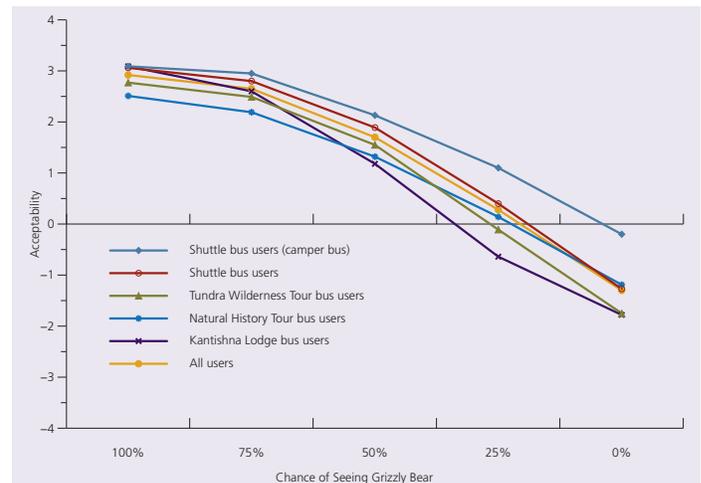


Figure 8. Social norm curve for the percentage chance of seeing a grizzly bear on the Denali Park Road.

the quality of bus drivers and their commentary, and the long bus ride needed to travel to the interior of the park.

However, several issues do constitute potentially important indicators of quality, and these include the number and type of wildlife seen (especially wildlife seen close to the road and especially grizzly bears), the number of buses seen along the road, the number of buses at informal “wildlife stops,” waiting time to see wildlife at informal wildlife stops, and the number of buses and people at rest stops. For example, many of the comments in the interviews noted that seeing wildlife was one of the most enjoyable aspects of the trip along the Denali Park Road, while many other comments noted that not seeing much wildlife or that wildlife was too far from the road was the most disappointing element of the trip. Moreover, many responses noted that little traffic along the road contributed to the feeling of being in the “wilderness,” while the number of buses and people seen along the road sometimes detracted from this sense. Most comments reflected support for the NPS limit on the number of buses that can use the road. Findings from the phase 2 quantitative visitor survey generally corroborated these conclusions.

Findings from the phase 2 visitor survey provide an empirical foundation to formulate standards of quality for several potential indicators of quality. Resulting data offer a range of potential standards of quality to be formulated. Generally, there was considerable agreement about these potential standards across the five major types of bus users, though Visitor Transportation System camper bus users and Kantishna Lodge bus users were often more sensitive to deteriorating conditions than were other types of bus users. There was a generally consistent relationship between what visitors experienced on the road and their evaluations of the study photographs. Generally, visitors saw more buses and people than they preferred, but fewer than they found minimally acceptable.

In keeping with the VERP framework, findings from this program of research should be combined with other information and used to formulate a series of indicators and standards of quality to define and guide management of the visitor experience on the Denali Park Road. Indicators should then be monitored and management actions taken to ensure that standards of quality are maintained. In this way, the carrying capacity of the Denali Park

Most comments reflected support for the NPS limit on the number of buses that can use the road.

Road can be defined and managed. However, a more proactive approach is also possible by incorporating these indicators and standards into a simulation model that estimates the maximum number of vehicles that can be accommodated on the road without violating standards of quality (Lawson et al. 2003). In this way, a numerical vehicle carrying capacity can be estimated, and this approach is described in the accompanying research report by Morris, Hourdos, Donath, and Phillips on pages 48–57.

As noted, study data present a continuum of potential standards of quality that range from “preference” to “displacement.” Selection of a standard of quality within this continuum should be based on management objectives and desired conditions for the Denali Park Road and other considerations. Generally, a standard of quality associated with “preference” will result in a very high-quality visitor experience, but will probably result in some limitations on visitor use levels. A standard of quality associated with the other end of the continuum will allow more visitors to use the road, but will also result in a lower-quality visitor experience. Consideration should be given to applying more than one standard of quality based on either spatial or temporal zoning in order to create a range of visitor opportunities/experiences.

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