

Figure 1. Water resources proved among the most important to a positive visitor experience in Rocky Mountain National Park as evidenced by this visitor-produced photograph.



VISITOR EMPLOYED PHOTOGRAPHY AT ROCKY MOUNTAIN NATIONAL PARK: A VALUATION TECHNIQUE

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RECENTLY, THE NATIONAL PARK SERVICE and the National Biological Survey joined forces to clarify and quantify visitor values of resources in Rocky Mountain National Park in Colorado. During the summer and fall 1993, 197 park visitors participated in a *photo survey* in which we asked them to photograph features of the park (figure 1).

For this study, we were particularly interested in the importance of water and water-related resources to the visitor experience. Researchers at the National Biological Survey were investigating public knowledge and appreciation of riparian ecosystems. Rocky Mountain National Park resource managers needed to establish the importance of water resources to the park visitors, in part because of the many competing demands on park water. By not revealing that our primary research focus was the perceived values of water and water-related resources, we could objectively assess how important these resources were to the visitors by counting the relative frequency at which these features occurred as the subject of the photographs.

Park volunteers distributed single-use cameras to park visitors (figure 2), and instructed them to, "photograph the 12 scenes, features, or situations within Rocky Mountain National Park that have the most important effect (either positive or negative) on your experience of the park." In addition to the cameras, visitors were given *photo logs* in which they recorded the subject and location of each photograph, whether it was a positive or negative scene, and their reasons for taking the photo.

The specific technique used in this study, termed *visitor employed photography* (VEP), has been utilized by other researchers (see, for example, Cherem 1973, Cherem and Traweek 1977, Cherem and Driver 1983). The study technique involves distributing cameras to visitors to an area and asking them to photograph elements indicated by a specific research objective. This allows the researcher to "see through the eyes of the beholder" (Cherem 1973).

This technique has several advantages for measuring human perceptions of environment. First, visitor employed photography captures important scenes or landscapes pictorially, so researchers can see what is valued, firsthand. Second, the

method can leave the specific research focus unstated, thus allowing a more objective measure of the importance of a specific resource of interest. Third, the results come directly from participants, rather than being prompted by the researchers. Fourth, the method is an unobtrusive means of measuring elements important to a recreation experience, and fifth, this method does not rely upon after-the-fact recall, which can be quite inaccurate (Bradburn et al. 1987).



Figure 2. A volunteer distributes cameras and questionnaires and explains the study to a prospective participant.

Traditionally, the National Park Service has used visitor-use surveys and observations to obtain visitor opinion and park-use information. Those surveys are primarily conducted as personal interviews at park entrances or exits. The VEP technique is distinct from these surveys in both the way it is administered and the research objectives it is designed to achieve. In visitor employed photography, we are interested in measuring human perceptions and preferences as they relate to critical natural resources and ecosystems. The demographic data collected in the follow-up survey is used to search for explanatory human characteristics and to cross-check with other surveys to ensure a representative sampling of park visitors.

We stratified the target sample of 200 park visitors to include a broad range of park users. Half of the cameras were distributed in July, during the peak summer season, and half in September, during the fall colors and elk bugling period. Cameras were distributed throughout a full week during both periods. In addition, we split those subsamples evenly among four levels of use intensity: drive-through visitors, campers, day-hikers, and backcountry users. From start to finish, this study was a full collaboration between resource managers and social science researchers, sustained by significant volunteer contributions of time, effort, and materials.

Visitors accepted the photo challenge with enthusiasm. Ninety-one percent of the respondents completed the assignment and returned the cameras. We then sent each respondent a complimentary set of his or her photographs, accompanied by a follow-up survey. The surveys were designed to obtain demographic data, more information on each respondent visit, and the values they held for the park water and water-related resources. Eighty-five percent of the photo recipients returned their follow-up surveys. Rates of return for the cameras and surveys are quite high (Dillman 1978).

RESULTS

Features captured in the 2,060 resulting photographs ranged from pristine mountain lakes to park shuttle buses. From the photographs, we identified 12 main categories of features (figure 3). Of these, mountain vistas, water bodies, wildlife, and management features (e.g., maintained trails, buildings, and picnic sites) were photographed most often. Only a smattering of the features photographed were reported to have had negative effects on the visitor experience. The majority of the

negative features were human impacts on the park (e.g., crowding, litter, and horse manure on trails), plus a few management features, such as road closures and inadequate facilities.

We identified several important differences between user groups. Campers found management features to be more than twice as important as any other user category (figure 4), but they did not photograph park water features nearly as often. Drive-through and backcountry visitors, groups that had greater access to the mountainous terrain via Trail Ridge Road or high country trails, photographed mountain vistas more often than others. The fact that backpackers took proportionately fewer pictures of wildlife may be explained, in part, by their getting away from heavily traveled areas, where wildlife is habituated to human presence.

Preliminary analyses suggest that water and water-related ecosystems are very important to the visitor experience of Rocky Mountain National Park. Water bodies were the second most photographed category in the park and were the main focus of 17% of the 2,060 photographs. Over 75% of the respondents photographed at least one water feature within the park. When asked in the follow-up survey how a one-third reduction in water and water-dependent plants and animals would affect their experience, 82% of the respondents said it would negatively affect their experience of the park. On a 1 = "negatively affect" to 10 = "positively affect" scale (figure 5), the response mode was 1 and the median was 2 for all three reductions: water, water-dependent plants, and water-dependent animals. Respondents also reported their willingness to pay to preserve the park water resources (figure 6). Nearly two-

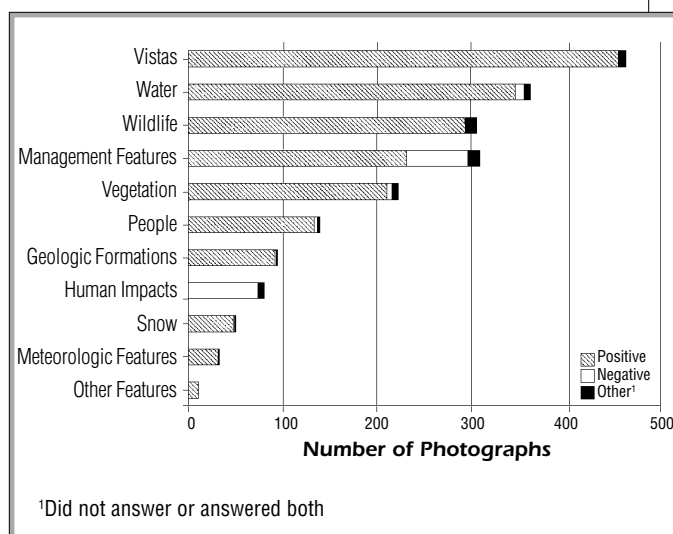


Figure 3. Number of photographs taken by survey respondents of park features by category; participants indicated whether feature effect was positive or negative.

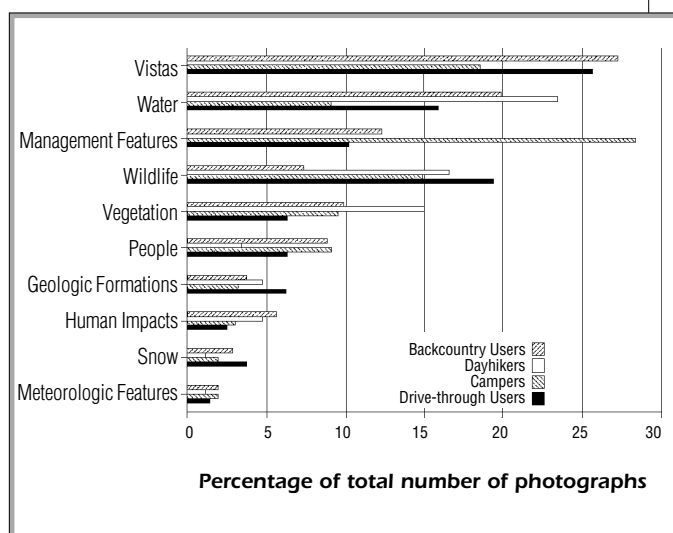


Figure 4. Percentage of total number of photographs comprised of categorized park features photographed by the four user group subsamples in the study.

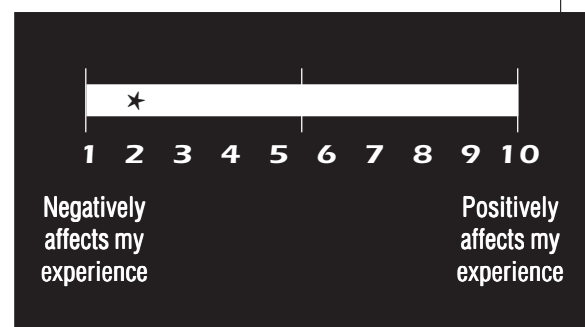


Figure 5. Median rating given by respondents of the effects of reducing park water or water-dependent resources by one-third.

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thirds (63%) stated that they would pay an additional \$2 or more in entrance fees to preserve the Rocky Mountain National Park water resources.

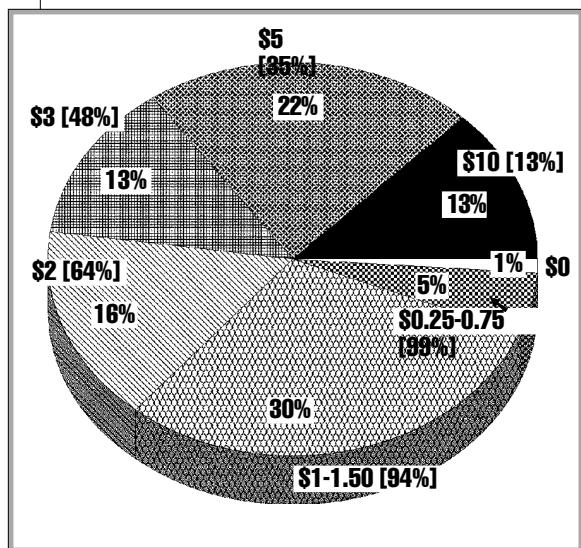


Figure 6. Visitor willingness (by percentage) to pay to protect Rocky Mountain National Park water resources. Numbers in brackets are cumulative percentages: willing to pay \$X or more.

An important part of the data analysis involved the use of a geographical information system (GIS) to record the location from which each photograph was taken. Volunteers from the Colorado Mountain Club were able to determine location coordinates for almost all of the photographs by reading the location information provided by respondents in the photo logs, looking at the photographs, and comparing this information to their detailed knowledge of the park environs. With the GIS coordinates in this system, it is possible to determine locations of negative features, areas essential to the park visitor experience, water features most often photographed, and other critical park resources.

MANAGEMENT IMPLICATIONS

The application of visitor employed photography to Rocky Mountain National Park had practical, on-the-ground management utility. During the time that the survey was being conducted, the U.S. Department of Justice, on behalf of Rocky Mountain National Park, was presenting claims for federal reserved water rights for the park in State Water Court.

These claims held that all water unappropriated as of the date of the reservation was necessary for maintaining the park in its natural condition. Park managers believe that the many water-dependent values, both physical and biological, found in Rocky Mountain National Park, require an undetermined amount of water to prevent impairment. However, until this study, the values of water-dependent features held by visitors had been largely unknown.

Data from the study suggest that water and water-dependent features are extremely important to a visitor experience to the park. A large majority of all respondents (78%) took pictures of water features, comprising 17% of all photos. Many anticipated that the results of this study would be presented to the water court to help bolster the park claims. However, this was not necessary because of a recent favorable ruling by the court granting the park its claimed federal reserved water rights.

In order to attach a general monetary value to water resources, the study asked respondents how much money they would be willing to pay, in the form of increased entrance fees, to protect the park water resources. Over 90% indicated they would be willing to pay \$1 or more to protect these resources.

These results are important to park managers in making decisions to fund protection of water-related resources. Recently, Rocky Mountain National Park has acquired the right-of-way for a failed dam. This study affirms that managers are allocating funds in a manner that is in concert with values held by the visiting public. Further development in the form of high elevation storage for irrigation, hydroelectric generation, and continued trans-basin diversion of water for a growing Front Range populace are issues facing park management that will require the continued attention of all park visitors.

Preliminary results of the study show a general support for the park management policies. In particular, the management objectives of protecting wetlands; preserving lakes, rivers, streams, and other water courses; and restoring riparian areas appear to be well justified. The park general maintenance practices, the architectural style of the buildings, and the quality of service provided by park staff were the features most often praised by study participants. However, they identified other issues as negative, including wildlife feeding,

general crowding, conflicts with horse use, closure of certain facilities, and the lack of solitude. These results help park managers focus their attention on issues of concern to the visitor-public.

How society values natural resources differs greatly from one resource to another and from one public to another; these values also change over time. Valuation research has demonstrated that, quite often, resource managers value the resources for which they are responsible in a manner different from the society at large (Peterson and Lime 1973). Visitor employed photography is a potentially important research tool for the study of resource values and environmental perceptions of the user-public. Results from the use of this study technique can help validate, for the resource manager, the need for resource protection or impact mitigation. Park managers can use this information when making decisions about resources, knowing that the views of those who use the park are included in that process. Visitor employed photography helps managers to be more responsive to visitors and to manage resources more effectively.

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