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Understanding and Managing Soundscapes in National Parks: Part 2 - Standards of Quality

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A growing body of research has documented the potential impacts of outdoor recreation in national parks and related areas. These impacts apply to multiple components of the landscape, including soil, vegetation, water, and wildlife. For example, visitors to parks can trample fragile soils and vegetation, erode soils, pollute waters, and disturb wildlife. Moreover, there are often aesthetic implications of these impacts that can degrade the quality of the visitor experience. Research and management attention is now being extended from conventional landscapes to "soundscapes" and includes aural impacts of outdoor recreation. "Natural quiet" – the sounds of nature undisturbed by human-caused noise – is now being recognized as an important and endangered resource in national parks and related areas. In particular, human-caused noise can mask the sounds of nature, disturb wildlife, and detract from the quality of the visitor experience.

Research at Muir Woods National Monument (California), a unit of the U.S. National Park System, was designed to enhance understanding and management of the park's soundscape. An initial survey of visitors found that the park's soundscape was important to many respondents in determining the quality of the visitor experience. For example, some respondents reported that hearing the sounds of nature added to the quality of the visitor experience, while other respondents reported that human-caused noise detracted from the quality of the visitor experience. Based on these findings, two subsequent phases of research were designed and conducted. This research was designed using the framework of indicators and standards of quality as developed in contemporary park management and carrying capacity frameworks, including Limits of Acceptable Change and Visitor Experience and Resource Protection.

The first phase of research was conducted to measure and analyze the natural and human-caused sounds that visitors hear in the park. A representative sample of visitors participated in an "attending logging" exercise in which they recorded the sounds they heard in the park and their reactions to these sounds. Large percentages of visitors reported hearing the natural sounds of the park (e.g. rushing water of Redwood Creek, wind through the trees, birds calling and singing) as rated these types of sounds as "pleasant". However, large per-

centages of visitors also reported hearing many human-caused sounds (e.g. visitors talking, boisterous behavior of children) and rated these types of sounds as "annoying". This study is described in a companion abstract by Newman et al.

Based on resulting data, a second phase of research was designed to explore normative standards of quality for human-caused noise in the park. Five tape recordings were prepared that included an initial recording of natural quiet only and four recordings of increasing levels of human-caused noise. Metrics designed to construct these tapes and measure the visitor-caused noise included in the study tapes were 1) sound pressure level, 2) human noise-free interval, 3) percent of time natural sounds were audible, 4) percent of time human sounds were audible, and 5) number of human-caused sound events. These tapes were incorporated into a survey administered to a representative sample of park visitors. Respondents listened to each of the five study tapes and were asked to 1) rate the acceptability of each tape recording on a nine-point scale that ranged from -4 ("very unacceptable") to +4 ("very acceptable"), 2) identify the types of sounds they found pleasing and annoying, and 3) identify the tape recording that best represented the conditions of the park during their visit. Aggregate respondent ratings of the acceptability of each of the five study tapes were plotted to form a social norm curve. Resulting data provide an empirical basis to help formulate standards of quality for the soundscape of the park.