

COLORADO STATE UNIVERSITY
DEPARTMENT OF HUMAN DIMENSIONS OF NATURAL RESOURCES

To: Muir Woods Soundscape Working Group
From: Peter Newman and Vicki McCusker
CC: Karen Trevino and Dave Stack
Date: 12/10/2013
Re: Information for choosing MUWO Indicators

Two potential indicators were discussed and analyzed using data from MUWO visitor surveys as well as sound recordings made by the NPS Natural Sounds Program from 2005-2008. They were:

1. Percent of time human sounds are audible:
 - a. Visitor Surveys indicate that conditions related to soundscapes drop below acceptability at about tape three which is the equivalent to about 45% time human sounds are audible.
 - b. 84% of visitors identified the conditions they experienced as being between tape two and three. This indicates that visitors were able to assess actual conditions. Actual conditions recorded by the NPS NSP were about 40-45% time human sounds are audible.
 - c. This indicator can be measure in several ways:
 - i. Attended Logging by Park Staff.
 - ii. Short Visitor Survey
 - iii. Recording devices

2. Sound Pressure Level:
 - a. Based on data from a 2006 survey of visitors, dBA levels dropped below acceptability between tapes 2 and three. This is equivalent to conditions between 34 and 39 dBA.
 - b. Actual conditions (Hillside Site): Lnat: 28; L50:30; L90: 26.
 - c. Visitors also identified current conditions at L50.
 - d. This indicator can be used to as a surrogate for decrease in listening area
 - e. This indicator can be measured in several ways:
 - i. Sound recordings
 - ii. Visitor surveys

These two indicators are measureable, objective, sensitive to change and manageable. Our latest studies indicate that noise measured in dBA , generated by visitors can be decreased by 3-5 dBA which is the equivalent to at least a 70% increase in listening area. These 3-5 dBA increases are considered by agencies to be "significant impacts" under NEPA processes*. The dBA, of the average quiet day treatment was 1.96 dBA lower than the control. By dividing the change in dBA by the average dBA increment per person on a control day (.0025), the effects of these treatments can be quantified per person. The reduction of 1.96 dBA by the quiet day treatment, is equivalent to removing the acoustical effects of 793 visitors. The effect quiet zone treatment on dBA was a lowering of 2.84 dBA as compared to the control levels. Using the same formula described above, the quiet zone signs removed the acoustical effects of 1150 visitors. This implies that setting overall use limits is only one of many option of dealing with capacity and behavioral shift through management actions is an attractive alternative.

- * Note: the metric used by other agencies is called “change in exposure.” The Listening Area reduction is based on the concept of change in exposure but relates the change in noise level to masking. As the sound pressure level of a noise source(s) increases, it masks other sounds.