

# Soundscape Condition in the Vicinity of the Denali Massif

Resource Brief • 02 / 27 / 2019



NPS photo, Amanda Erickson

The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations (see: <https://www.nps.gov/aboutus/index.htm>). Preservation of natural soundscapes is an inherent component of this mission.

In its wild and natural state, the Denali Massif represented rich opportunity to experience the austere solitude of high alpine environments. The park's establishing legislation envisions Denali's future as a place that continues to provide "*superlative opportunities for remote wilderness recreation*" (NPS 2014).

## Soundscape Management in Denali

Denali's Backcountry Management Plan (BCMP) echoes its establishing legislation by envisioning future resource condition in each area of the backcountry (NPS 2006). The plan also includes quantitative *indicators* of resource condition, allowing change to be measured. In particular, change is measured against a numeric management goal, or *standard*.

This document summarizes acoustic data collected adjacent to the Denali Massif - especially along the south side of the Alaska Range. The data provide a picture of how resource conditions change spatially, and also how conditions have changed in time after the BCMP was enacted.

## Acoustic Inventory: Spatial Results

Four BCMP soundscape management zones overlap the Denali Massif (Figure 1). In the area there are 15 soundscape sites, providing detailed spatial data on compliance with BCMP standards. The first standard states that no *hour* shall have noise audible for greater than *X%* of the hour. The second standard states that no *day* shall have greater than *Y* noise events. The third standard states that no individual *event* shall exceed a one-second equivalent sound pressure level of *Z* dBA. The specific standards for each BCMP zone are as follows:

|                  | <i>Noise is Audible<br/>≤ X% of Any Hour</i> | <i>Noise Event Count<br/>≤ Y on Any Day</i> | <i>Sound Pressure Level<br/>≤ Z for Any Event</i> |
|------------------|----------------------------------------------|---------------------------------------------|---------------------------------------------------|
| <b>LOW</b>       | 5% of hour                                   | 1 event per day                             | 40 dBA                                            |
| <b>MEDIUM</b>    | 10%                                          | 10                                          | 40                                                |
| <b>HIGH</b>      | 25%                                          | 25                                          | 60                                                |
| <b>VERY HIGH</b> | 50%                                          | 50                                          | 60                                                |

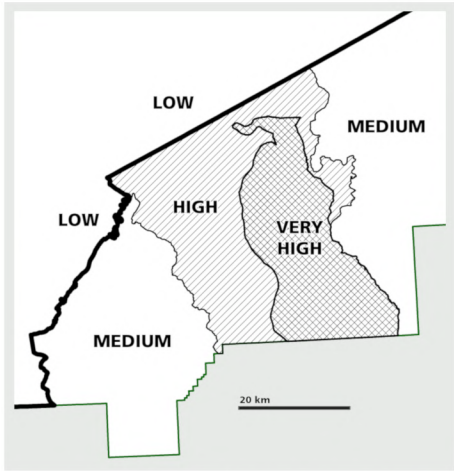


Figure 1. Denali BCMP Zones

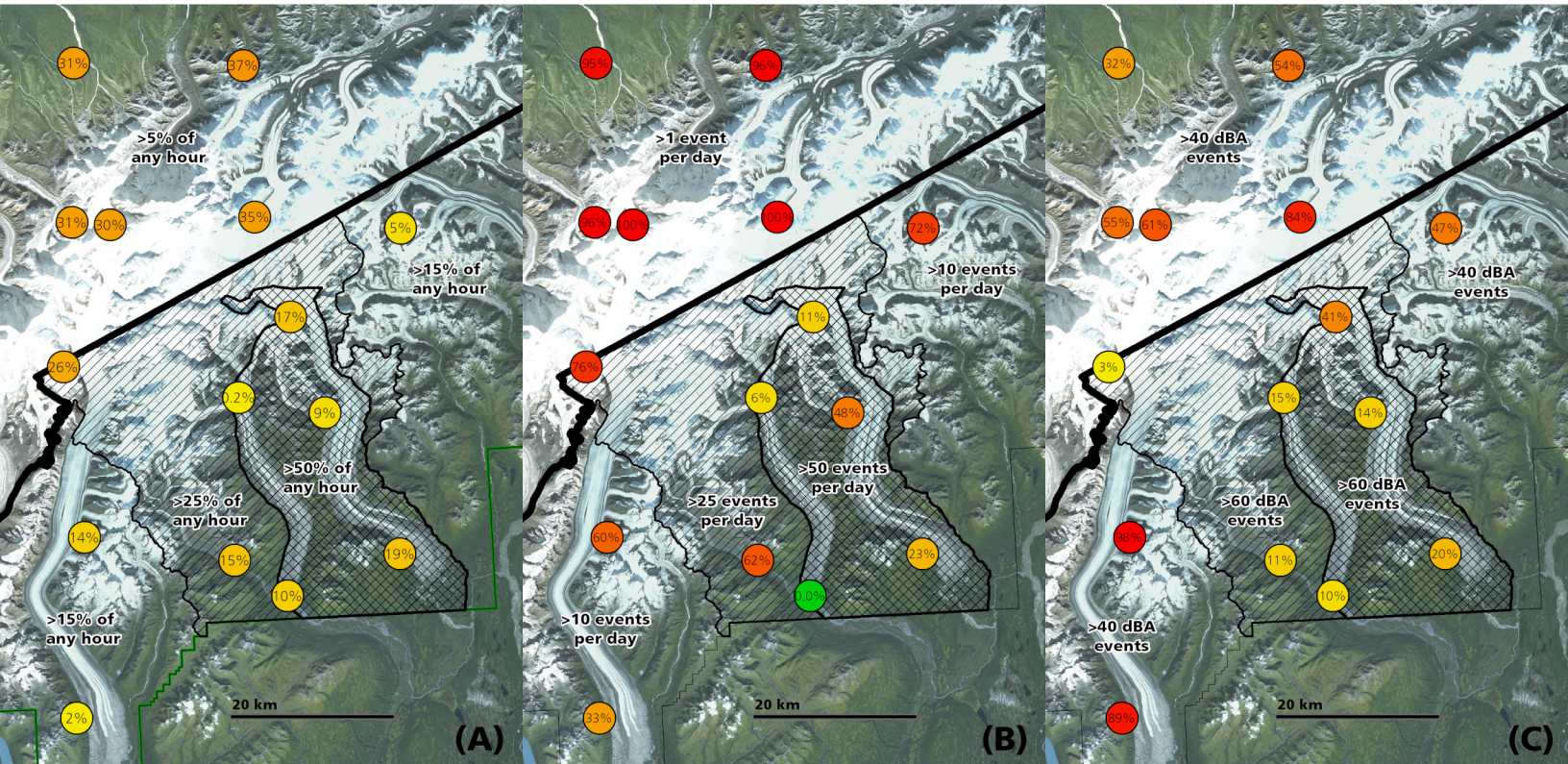


Figure 2. Soundscape Condition Relative to Denali Backcountry Management Plan Standards

Site exceedance is visualized as points grading from green (0% exceedance) to red (100% exceedance), with the measured value overlaid as text. (A) Points show percentage of *hours* that exceed the standard. (B) Points show percentage of *days* that exceed the standard. (C) Points show percentage of *events* that exceed the standard.

## Acoustic Monitoring: Temporal Results

Scientific monitoring is the process of repeating measurements at inventory sites. Denali is interested in assessing compliance with BCMP standards so it has implemented an *effectiveness monitoring plan* (Reynolds 2016) to reveal how the mitigation actions prescribed by the BCMP (NPS 2006, Table 2-11) change compliance over time.

Several sites have been monitored thus far: Toe of the Tokositna (6x measurements), Kahiltna Pass (3x), Ruth Ampitheater (2x), and Toe of the Ruth Glacier (2x). Figure 3 summarizes exceedance at each of these sites through time.

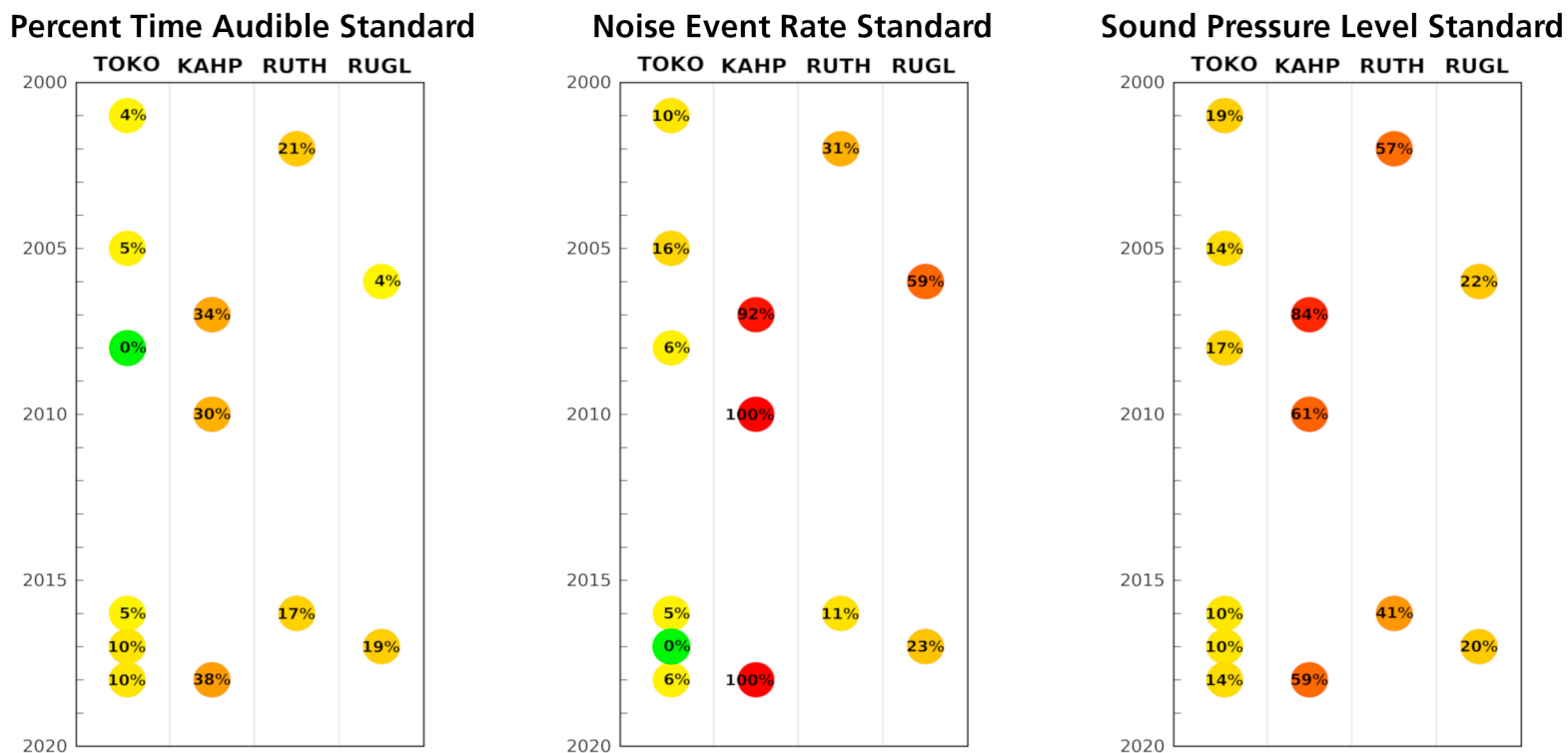


**Figure 3. Summary of Monitoring Results** Four sites have been monitored thus far: the Toe of the Tokositna (TOKO), Kahiltna Pass (KAHP), Ruth Amphitheater (RUTH), and the Toe of the Ruth (RUGL). Exceedance of each standard is visualized from green (0% exceedance) to red (100% exceedance). Positive progress appears to be occurring for some sites and indicators, but all sites remain out of compliance with the BCMP during their most recent measurement period.

Figure 3 shows positive progress for some sites (e.g., the Sound Pressure Level indicator at KAHP, or the Noise Event Rate indicator at RUTH and RUGL). Despite this, the desired future conditions of the BCMP have not been realized in the decade following its publication.

The plan contains a basic framework (NPS 2006, Table 2-11) to preserve of these iconic landscapes and help achieve park management objectives. Without the use of these mitigations, conditions are expected to remain impacted at similar rates into the future.

## References

Betchkal D. 2013. Acoustic Monitoring Report, Denali National Park and Preserve - 2012. Natural Resource Data Series NPS/DENA/NRDS-2013/589. U.S. Department of the Interior, National Park Service. Fort Collins, Colorado.

Betchkal D. 2015. Acoustic monitoring report, Denali National Park and Preserve – 2013. Natural Resource Data Series. NPS/DENA/NRDS—2015/989. National Park Service. Fort Collins, Colorado.

National Park Service (NPS)., 2006. Denali National Park and Preserve Final Backcountry Management Plan EIS. U.S. Department of the Interior, National Park Service, Denali Park, Alaska.

National Park Service (NPS)., 2014. Denali National Park and Preserve Foundation Statement. Denali National Park and Preserve, Denali Park, Alaska.

National Park Service (NPS)., 2014 - 2018. Unpublished Acoustic Data.

Reynolds, J.H., Knutson, M.G., Newman, K.B., Silverman, E.D. and Thompson, W.L., 2016. A road map for designing and implementing a biological monitoring program. Environmental monitoring and assessment, 188(7), p.399.

Withers J. 2010. Acoustic monitoring report, Denali National Park and Preserve - 2008. Natural Resource Data Series. NPS/CAKN/NRDS—2010/091. National Park Service, Natural Resource Program Center. Fort Collins, Colorado.

Withers J. 2012. Acoustic monitoring report, Denali National Park and Preserve - 2009. Natural Resource Data Series. NPS/DENA/NRDS—2012/271. National Park Service. Fort Collins, Colorado.

Withers J and Betchkal D. 2013. Acoustic Monitoring Report, Denali National Park and Preserve - 2010. Natural Resource Data Series NPS/DENA/NRDS-2013/441. U.S. Department of the Interior, National Park Service. Fort Collins, Colorado.

## For more information

Dave Schirokauer  
Resources and Science Team Leader  
Denali National Park and Preserve  
P. O. Box 9, Denali Park AK, 99755  
[dave\\_schirokauer@nps.gov](mailto:dave_schirokauer@nps.gov)

