Project Completion Report
Rocky Mountains Cooperative Ecosystem Studies Unit (RM-CESU)

Project Title: A Social Normative Study of Backcountry Visitor's Acoustic Expectations and Experiences in Denali Park and Preserve

Project Code: CSURM-206 and 218; P10AC00222

Type of Project: Research

Funding Agency: National Park Service

Partner University: Colorado State University

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Start Date of Project: 8/1/2010

End Date of Project: 9/30/2014

Funding Amount: CSURM-206: $59,948, CSURM-218: $55,759, Total: $115,707

<u>Project Summary</u>, including descriptions of products, work accomplished and/or major results. If the information is restricted (e.g. location of endangered species or cultural resources), indicate the title and location of the final report. Also add web sites where project-related information may be found.

Over the last decade, Denali National Park has developed a comprehensive park-wide inventory of the park's acoustic resources. These efforts have largely focused on quantifying the physical properties of Denali's soundscape, and have collected and analyzed sound pressure level, acoustic event, and sound source audibility data. A number of surveys administered to backcountry users in Denali have included soundscape components, and have been helpful in formulating park policy, such as the 2006 Backcountry Management Plan (BCMP). However, the BCMP acknowledges the need for additional research in certain areas, including soundscape indicators. A social study focused specifically on soundscapes in Denali is being conducted through three funded projects to fill current knowledge gaps and inform management of status and trends in visitor's acoustic expectations.

Data collection for this project began during the summer of 2011 and addressed factors related to the visitor's acoustical experience in the park. During this phase, surveys were administered to mountaineers accessing the Kahiltna Glacier, backpackers at the Backcountry Information Center, and overnight and day hikers to the Wonder Lake and Triple Lakes backcountry areas of the park. Sound recordings and monitoring were taken concurrently at these locations using

instruments and methods established by the NPS. Sampling was designed to provide information specifically, but not exclusively, on visitor tolerance concerning levels of exposure (frequency, duration, intensity) to road vehicle, propeller aircraft, jet aircraft, rotor-wing aircraft, and other anthropogenic sounds, as well as visitor opinions concerning current soundscape conditions. This was accomplished by asking respondents to listen to the sounds around them for three minutes, then through use of a paper survey, indicate what sounds were heard, and how they felt about those sounds. Additional questions to determine visitor motivations, expectations, and demographics were also asked on the survey.

A "fact sheet" regarding this study, and the results of the efforts described above can be found at the following NPS website:
http://www.nps.gov/dena/naturescience/upload/Sounds_SocialScience2012.pdf

Number of students participating in this project: undergraduates, graduate students, degrees conferred.

- **3 undergraduate students**
- **2 graduate students (one completed degree May 2012/other completing August 2013)**

Lessons Learned from this project:

- Motivations for hearing natural sounds varied by user-group. For example, backpackers and backcountry-day-users were more motivated to hear natural sounds than mountaineers. Therefore, subsequent social soundscape research and management decisions should consider specific user-group motivations when planning and implementing management actions.
- On the Triple Lakes Trail the five most frequently heard natural sounds indicated by respondents were *running water, bird song, insects*, and the sounds of *small mammals* in descending percentage-heard order. On the McKinley Bar Trail the five most frequently heard natural sounds indicated by respondents were *insects, bird song, wind, running water*, and *rain* sounds in descending percentage-heard order. Generally, all of these sounds were found to be *acceptable* and *pleasing*.
- On the Triple Lakes Trail, the five most frequently heard anthropogenic sounds were *unknown aircraft, walking sounds,* vehicles other than buses, *people talking*, and the sounds of *propeller aircraft*, in descending percentage-heard order. On the McKinley Bar Trail the five most frequently heard anthropogenic sounds in descending percentage-heard order were *walking, shuttle buses, talking, unknown aircraft, and vehicles other than buses*. Generally, these sounds were substantially *less acceptable* and *more annoying* than the natural sounds heard at these sites.
- The five most frequently heard natural sounds by backpackers in their given camps, in descending percentage-heard order were *running water, wind, bird song, rain*, and *mammals*. Generally, these sounds were considered to be *acceptable*, and *pleasing*. The five most frequently heard anthropogenic sounds by backpackers in their camps, in descending percentage-heard order were *unknown aircraft, propellers, helicopters, vehicles* and *groups talking*. Generally, these sounds were substantially *less acceptable* and *more annoying* than the natural sounds heard at these camps.
- During hiking breaks, the five most frequently heard natural sounds that backpackers heard in descending percentage-heard order were *wind, bird song, running water, mammals* and *rain*. Generally, these sounds were considered to be *acceptable*, and

pleasing. The five most prevalently heard anthropogenic sounds experienced during a given hiking break in descending percentage-heard order were *unknown aircraft, vehicles, propellers groups of people talking* and *walking sounds*. Generally, these sounds were substantially *less acceptable* and *more annoying* than the natural sounds heard at these break locations.

- These listening results suggest that the frequency, duration and intensity of both natural sounds (e.g. running water) and anthropogenic sounds (e.g., aircraft) visitors experience in DENA may serve as informative social soundscape indicators of quality.

Other RM-CESU agencies or research partners who participated in this project:

- The NPS National Natural Sounds and Night Sky Division's staff helped with study design allowing the use of results from the Denali in a future multi park analysis.
- The Final Report of this Denali NP research will come out under the auspices of Penn State University, as part of the Chesapeake Watershed CESU, where Peter Newman will be working as of summer 2013.