

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Assessing wildlife responses to noise and the ecological functions of acoustical environments

Discipline: Natural
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: Colorado State University
Effective Dates: 9/30/2011- 10/31/2013
Funding Amount: \$431,471

Investigators and Agency Representative:

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Project Abstract: Noise is an increasingly pervasive pollutant in protected natural areas. Data collected by CSU Research Associates in 22 National Park units (Landscape Ecology, forthcoming) show that noise is audible about one quarter of the time (hourly median value across all hours and sites), and some wilderness sites can have hourly noise audibility levels exceeding 50%. Chronic noise exposure can have many potential effects on wildlife behavior and ecology, and numerous scientific papers provide evidence of changes in wildlife behavior, fitness, distribution, and community structure (Patricelli and Blickley 2006; Slabbekoorn and Ripmeester 2008; Fahrig and Rytwinski 2009; Barber et al. 2010; Benítez-López et al. 2010). Noise has also been shown to affect plant communities, through its effects on wildlife (Francis et al. 2009). Although the broad outlines of noise impacts to wildlife are clear, more detailed understanding is needed to identify priorities for noise management in protected natural areas, and to devise efficient and effective mitigation. For example, in urban environments there are numerous acoustical and other factors that could be causing observed changes in birdsong (Warren et al. 2006).

NPS is required to manage noise and its effects on wildlife for several reasons. The Organic Act (1916) requires that NPS preserve wildlife and other biological resources unimpaired for the enjoyment of future generations. The Wilderness Act (1964) and NPS Management Policies (2006) require NPS to manage many park areas in a condition untrammelled by man, with outstanding opportunities for solitude, and such that natural processes predominate. Opportunities to view wildlife are consistently identified as one of the most important motivations for visiting parks, and an important factor in the perceived quality of a visit.

This cooperative agreement will characterize background acoustical conditions and noise exposure levels in National Parks and other public lands, pursue research projects to expand scientific knowledge regarding the effects of noise on wildlife, and educate National Park unit staff and other natural resource managers on acoustics and the effects of noise. Some projects can be specified at this time, but many will arise as National Park units contact the Natural Sounds and Night Skies Division with requests for technical assistance. A specific objective of this cooperative agreement is to recognize and pursue research opportunities that can be addressed in the course of satisfying an NPS unit's need for technical assistance. In FY 2011, there were 30 requests for technical assistance from 25 National Park units.

The CSU research team will be comprised of four faculty currently investigating wildlife responses to acoustical environments, as well as postdoctoral researchers, graduate students, and research associates under their supervision. Four broad areas of activity are anticipated. First, the foundational data for most projects are extended temporal and spatial samples of the acoustical environment in a study area. This involves deployment of instruments that collect 1/3rd octave sound level data at 1 second intervals, continuous digital audio recordings, and meteorological data pertinent to sound production and transmission. These data will be analyzed and compiled into reports suitable for posting in the NPS IRMA web portal. Second, the research associates will educate NPS and other resource management staff regarding the methods and applications of acoustical monitoring, and the functional significance of acoustical environments on public lands. Third, many projects will require noise modeling to evaluate the spatial and temporal footprints of specific activities. The CSU research team will utilize GIS tools and noise modeling packages like CadnaA, NMSim, and SPread to address these questions. Fourth, a variety of methods and instruments will be utilized to monitor wildlife distribution and behavior at field sites in national parks and other public lands.

Outcomes with Completion Dates: Final Report - 30 September 2013

Keywords: Colorado State University, WASO Natural Sounds Program, sound pollution, wildlife response