

NPS CESU Project Final Report

Project Title: Natural ambient monitoring and noise source characterization for Glacier National Park	NPS Task Order #: H1200090004/ J1434090055
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Federal Agreements Technical Representative: Kurt Fristrup Natural Sounds Program National Park Service 1201 Oakridge Drive, Suite 100 Fort Collins, CO 80525 970 267 2102 kurt_fristrup@nps.gov	Additional Federal Project Staff:
Project Objectives:	
<ul style="list-style-type: none"> • Analyze previously collected acoustical data from Glacier National Park to characterize natural ambient sound levels. • Identify and characterize all noise sources. • Collect and analyze data regarding the mix of vehicle types on the roads and the speeds of those vehicles. • Correlate the traffic count data with the noise data to characterize the noise source levels for each class of vehicles. • Develop acoustical models that map noise sources for existing conditions and a range of possible management actions. • Develop criteria for assessing the cumulative impacts of all noise sources, especially the effects of other noise sources in combination with air tour noise • Provide advice and guidance to Natural Sounds Program and Glacier Park staff, including support for possible development of ATMP and NEPA documents. Support for other planning activities may also be required. • May accompany senior staff in representing the park on NPS task forces, interagency working groups, or other appropriate teams. May assist in making related presentations in parks or at technical meetings. Attends management and technical conferences, usually with senior planners, for the purposes of exchanging information and advocating for park stewardship. 	
Project Activities:	
<ul style="list-style-type: none"> • Inform the CSU academic community regarding policy issues and scientific opportunities associated with the value of natural sounds and the costs of intrusive noise in national parks • Develop research and modeling capabilities at the university in the area of environmental acoustics and the effects of sounds on national park resources and visitors • Provide GLAC and NPS with a more rigorous basis for understanding impacts to acoustic resources and their management • Develop, train, and challenge students in natural resource management and engineering 	
Project Accomplishments	
<ul style="list-style-type: none"> • Collected detailed acoustical data (vehicles) and road count data at four sites on Going to the Sun Road using FHWA guidelines as a model • Isolated passby events and characterized speed and acoustical spectra for sources of interest 	

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(automobiles and motorcycles)

- Applied passby data to two modeling efforts (NmSim and CadnaA) to produce detailed acoustical maps and simulation videos (2D and 3D) of vehicle noise on Going to the Sun road in Glacier National Park
- See below for study area information, noise maps, and model outputs
- Calculated sound pressure level at numerous areas of interest in Glacier National Park under different vehicle noise level scenarios
- Presented results at an interagency (park staff, Denver law enforcement, Washington Office National Park Service Staff, park level natural resource management staff, Colorado State University researchers and administrators) forum on motorcycle noise (April 20, 2010) in Fort Collins, CO.
- Presented results to NPS Natural Resource Chiefs (August 3, 2011)
- To address the need for criteria for assessing the cumulative impacts of all noise sources, we developed a new metric which measures noise free interval (or the length of time between noise intrusions). This is a critical metric for assessing opportunities to experience solitude in national parks.

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Figure 1. Data collection (sound pressure level measurement and traffic counts) on Going to the Sun Road, Glacier National Park

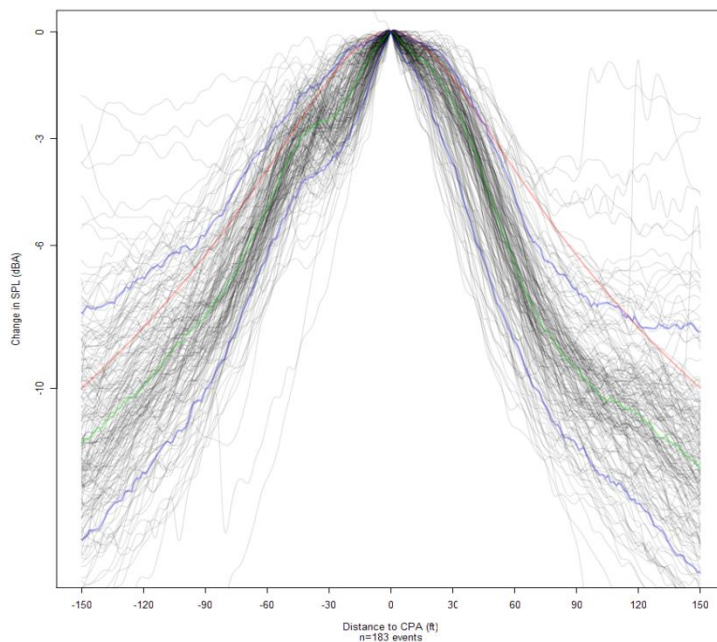


Figure 2. Sound pressure levels of motorcycles vs. distance

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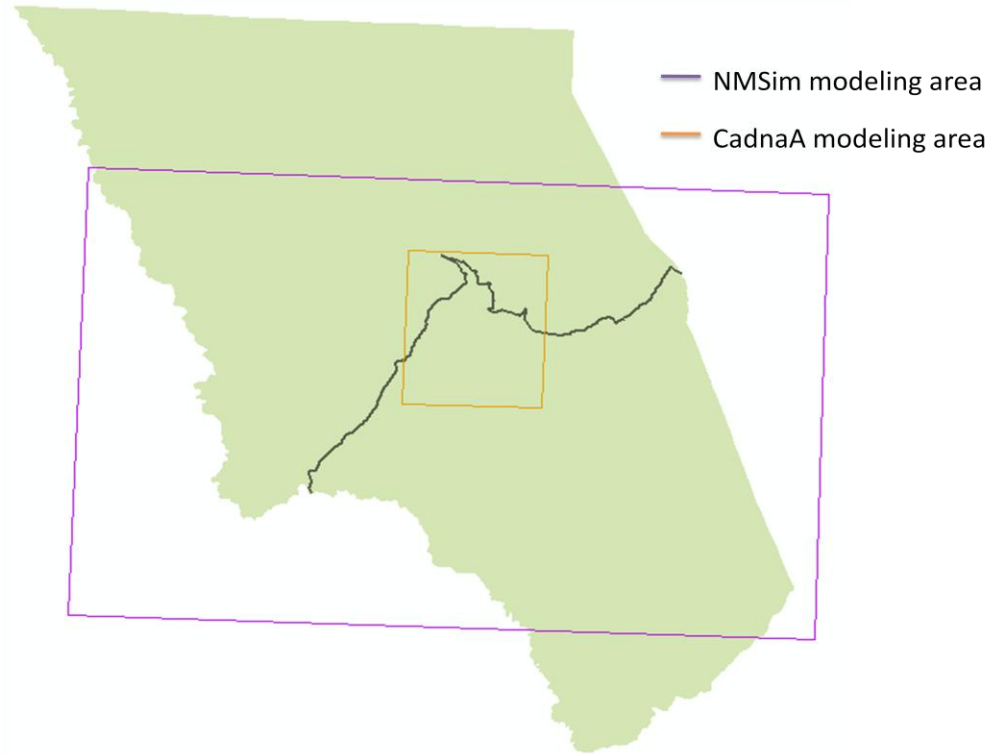


Figure 3. Extent of modeling areas in Glacier National Park

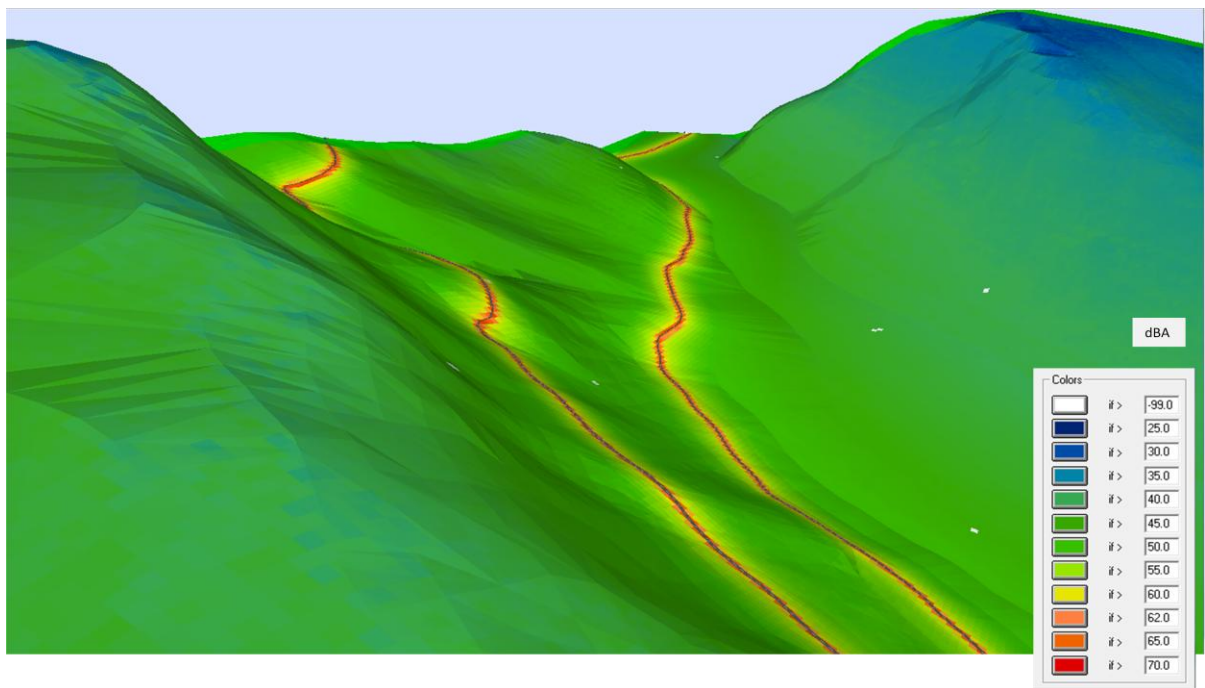


Figure 4. Three-dimensional model of the "Loop" section of Going to the Sun Road, Glacier National Park (CadnaA modeling package)

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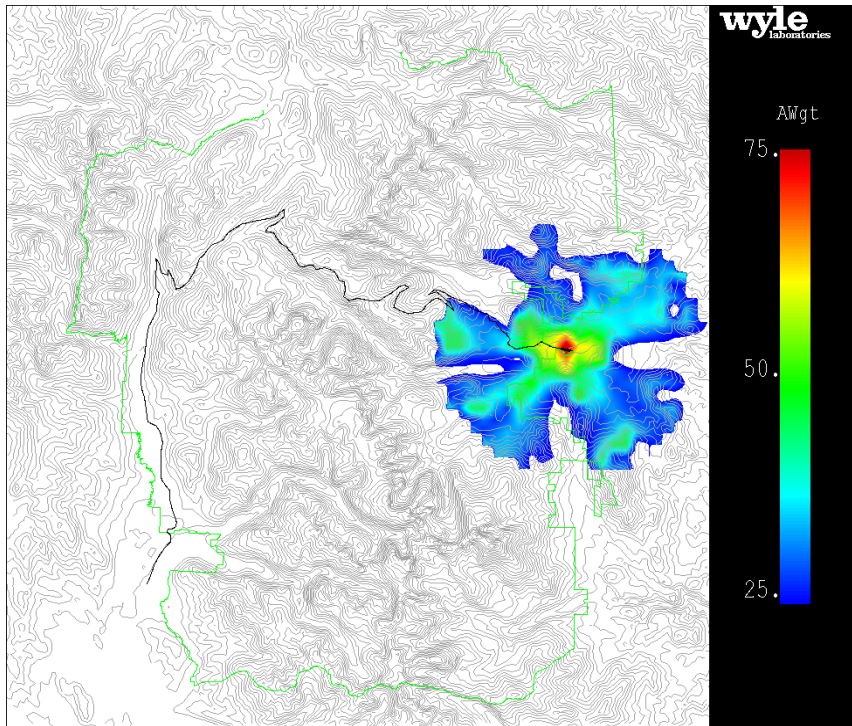


Figure 5. Snapshot from animated motorcycle track (NMSim modeling package)

SITE	Bird Woman Falls		Logan Pass		Hidden Lake Interp		Packers Roost		Lake McDonald	
	Motorcycle	Car	Motorcycle	Car	Motorcycle	Car	Motorcycle	Car	Motorcycle	Car
A-Weighted Max	39.2dB	29.6dB	61.0dB	53.1dB	9.8dB	1.1dB	56.9dB	51.7dB	56.3dB	49.6dB
Time Above Ambient	3.36 min.	2.04 min.	3.42 min.	2.40 min.	0.00 min.	0.00 min.	8.05 min.	6.53 min.	9.90 min.	5.73 min.
Time Audible	5.93 min.	2.41 min.	6.00 min.	3.02 min.	0.02 min.	0.00 min.	9.16 min.	7.61 min.	13.62 min.	8.10 min.

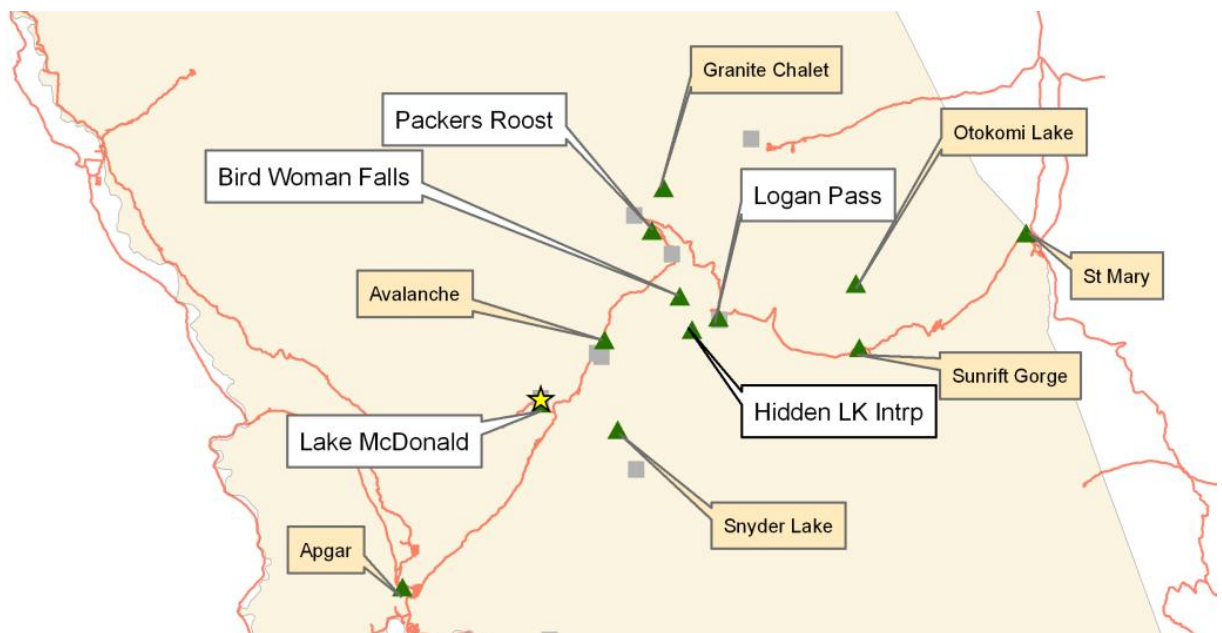


Figure 6. Modeled sound pressure levels at 5 receiver points (NMSim modeling package) under one vehicle noise scenario