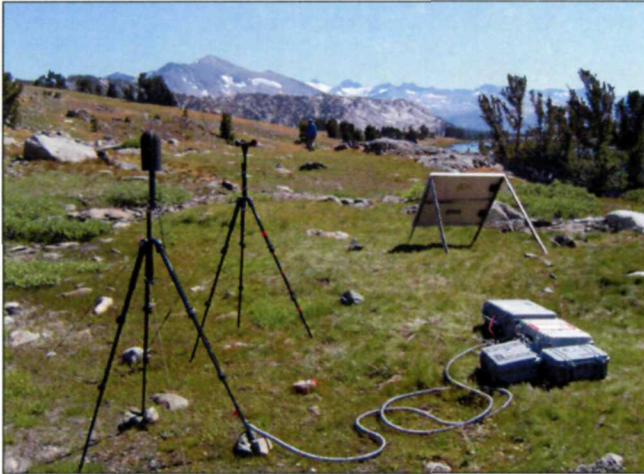# Getting Started with Acoustic Monitoring in Your National Park Unit



## What are Acoustic Resources?

Acoustic resources are sound sources (wildlife, waterfalls, wind, precipitation, historic and cultural sounds), factors that modify sound transmission (vegetation, topography, and atmospheric conditions), and the soundscape perceived by park visitors.

## Why is it Important to Inventory and Monitor Acoustic Resources?

Because acoustic resources can become degraded over time, NPS Management Policy 4.9 mandates that the NPS will preserve, to the greatest extent possible, the natural soundscapes of parks. Acoustic monitoring allows managers to quantify existing acoustic resource conditions, establish desired acoustic resource conditions, and prevent impacts through planning efforts. Management objectives for desired acoustic conditions depend upon the resources and the values of the park and its management zones. For example, wilderness areas may be managed for opportunities to experience quiet and solitude, whereas a historic battlefield may utilize the sounds of cannon fire.

# Equipment and Monitoring Details

| | ANSI Type I Larson Davis sound level meter (recommended) | ANSI Type I Spectra | Continuous Recorder | PDA |
|---|---|---|---|---|
| **Description** | The Larson Davis SLM is a hardware-based real-time analyzer which constantly records one second sound pressure level (SPL) and 1/3 octave band data, and saves this data to a data logger (i.e. laptop or PDA). | SpectraRTA is PC-based real-time analysis software which decomposes an incoming audio signal into 1/3 octave spectrum values, and then utilizes a macro to collect recording samples and sound pressure level (SPL) data. | The continuous recorder is a portable hard disk digital audio recorder which can record in either stereo or mono. The audio can then be post processed to get estimates of SPL data. This is *not* (ANSI) Type I data. | The PDA has an easy to use graphical interface designed for staff, park visitors, or volunteers to document sounds they hear during listening sessions. |
| **Equipment Required** | • PDA running Windows Mobile 5.0 or Notebook PC<br>• Microphone with environmental shroud<br>• Preamp<br>• 12V power source (e.g., batteries)<br>• Anemometer<br>• Meteorological data logger<br>• Two photovoltaic panels (optional) | • Notebook PC<br>• Microphone with environmental shroud<br>• Preamp<br>• 12V power source (e.g., batteries) | • Hard disk digital audio recorder<br>• External power source (5V)<br>• High quality external microphone | •PDA and charger |
| **Cost** | $11,000- $18,000 (with notebook and solar options) | $13,000 | $750 | $350 per PDA |
| **Use** | ATMPs, GMPs, ARMPs, biological I&M, VERP | ATMPs, GMPs, ARMPs, biological I&M, VERP | GMPs, ARMPs, biological I&M, VERP | Preliminary description of acoustic environment, education and outreach with visitors and volunteers, biological I&M, VERP |
| **Analysis Time** | 30 hours of analysis per site per season | 30 hours of analysis per site per season | This involves the most intensive analysis of all the options; it requires the most computing power (5x real time). Processing time = 20% of data collection time. | Automatic: is the least time intensive |
| **Output Metrics** | Percent time audible, $L_{nat,}$ $L_{(50, 90, 10)}$ | Percent time audible, $L_{nat,}$ $L_{(50, 90, 10)}$ | Percent time audible, estimated $L_{nat,}$ $L_{(50, 90, 10)}$ | Noise free intervals, percent time audible |
| **Operation Expertise** | Requires trained staff | Requires trained staff | Easy to operate | Easy to operate, volunteers can use |
| **Location** | Backcountry or frontcountry | Frontcountry preferred due to heavy equipment | Backcountry or frontcountry | Backcountry or frontcountry |

# NPS Natural Sounds Program

The NPS Natural Sounds Program (NSP) was established in 2000 to help parks manage sounds in a way that balances access to the park with the expectations of park visitors and the protection of park resources. The NSP addresses acoustical issues raised by Congress, NPS Management Policies, and NPS Directors Orders. An important element of this mission is working with the Federal Aviation Administration (FAA) to implement the National Parks Air Tour Management Act. Congress mandated that FAA and NPS jointly develop Air Tour Management Plans (ATMPs) for more than 106 parks where commercial air tours operate. The program also provides technical assistance to parks in the form of acoustic monitoring, data processing, park planning support, and comparative analyses of acoustic environments throughout the national park system.

## Who Can I Contact for Assistance?

For scientific questions and monitoring capabilities:

> Kurt Fristrup: 970-267-2101
> *Senior Acoustician*

For questions about equipment and processing software:

> Damon Joyce: 970-267-2116
> *Information Management Specialist*
> *and Acoustic Technician*

For questions about data analysis and reporting formats:

> Emma Lynch: 970-267-2104
> Charlotte Formichella: 970-267-2152
> Ericka Pilcher: 970-267-2107
> *Acoustic Technicians*

**National Park Service**
**Natural Sounds Program**
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