

The Science of Sound

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Natural Sounds & Night Skies Division

- WASO level division, located in Fort Collins, CO
- Part of Natural Resource Stewardship and Science (NRSS) Directorate
- 3 program areas
 - Science/Engineering
 - Policy, Planning, and Compliance
 - Overflights



Natural Sounds and Night Skies Division



We protect the **acoustic resources** found in parks.

Soundscape is the acoustic environment that can be perceived and comprehended by humans.

Acoustic environment is the combination of all the acoustic resources within a given area.



Visitors travel to national parks to
find solitude,



listen to the natural world,



and to experience our nation's
history.

Noise, or unwanted sound, masks the natural and cultural sounds inherent to these experiences and our parks.



Noise also interferes with wildlife's ability to forage, mate, defend themselves, and raise young.

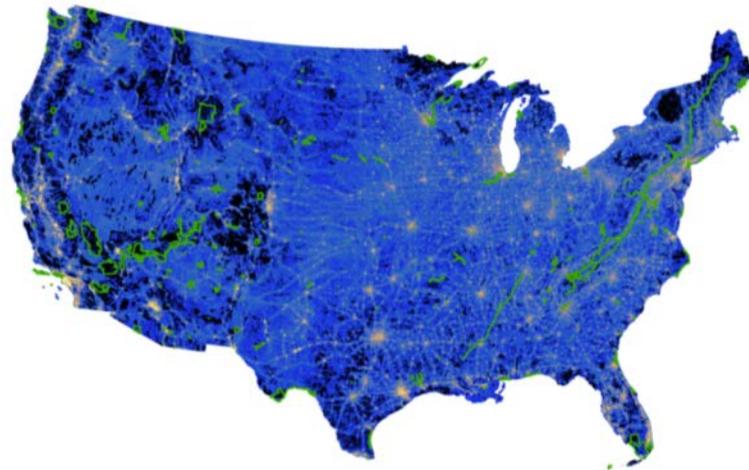
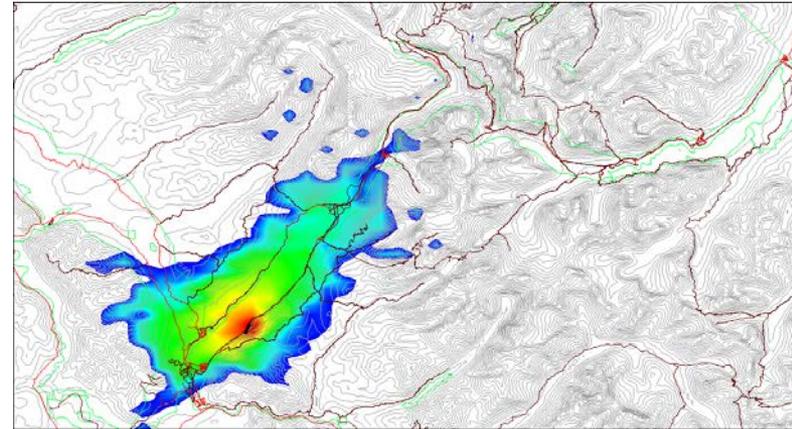




Acoustic Question

- Increase in road traffic. What is effect on park?
- How does this affect wilderness areas?
- Is there an alternate route?

Measurement and Modeling



Acoustic Monitoring

Sound level meter
How loud is it?



Digital Audio Recorder
What sounds do we hear?

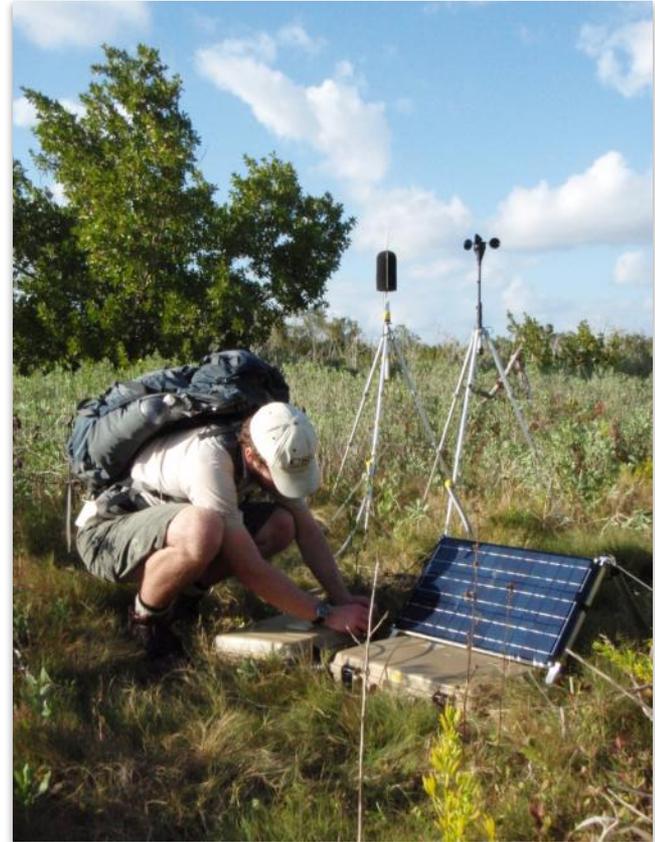


Anemometer
How windy is it?



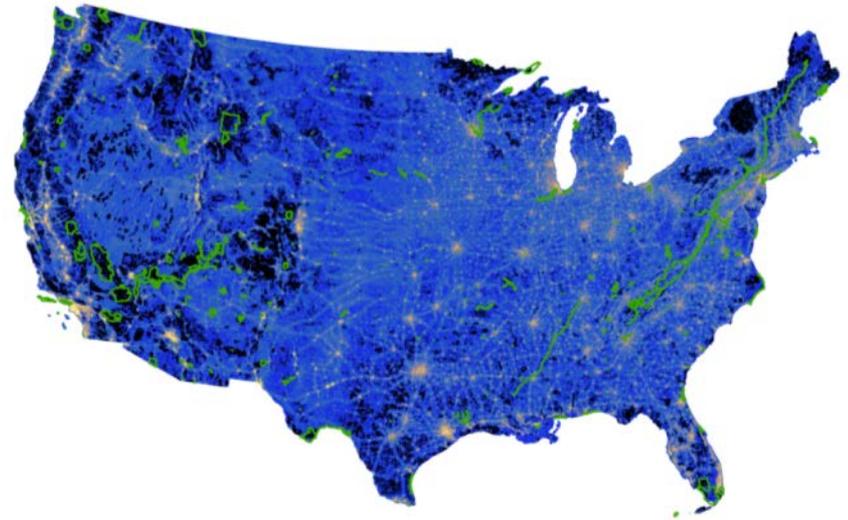
Acoustic Monitoring

- Deployed for 30 days.
- Used to get baseline data (natural or existing ambient level) for a park.
- Data may be used in an EA or EIS or general park knowledge.
- Baseline data informs model.

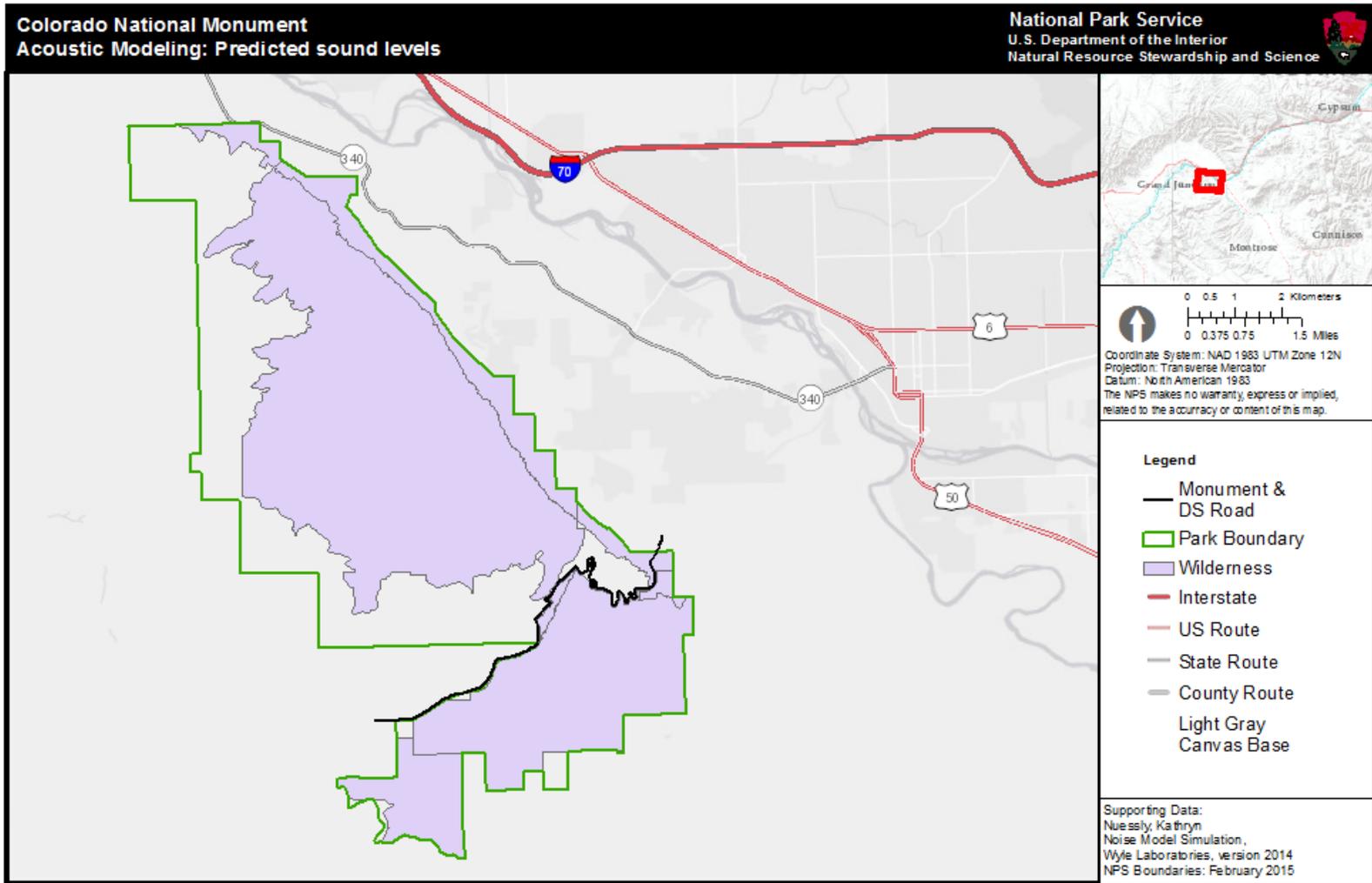


Acoustic Modeling

- A model is a prediction of what an area will look like based on what we know already about the variables.



Colorado National Monument



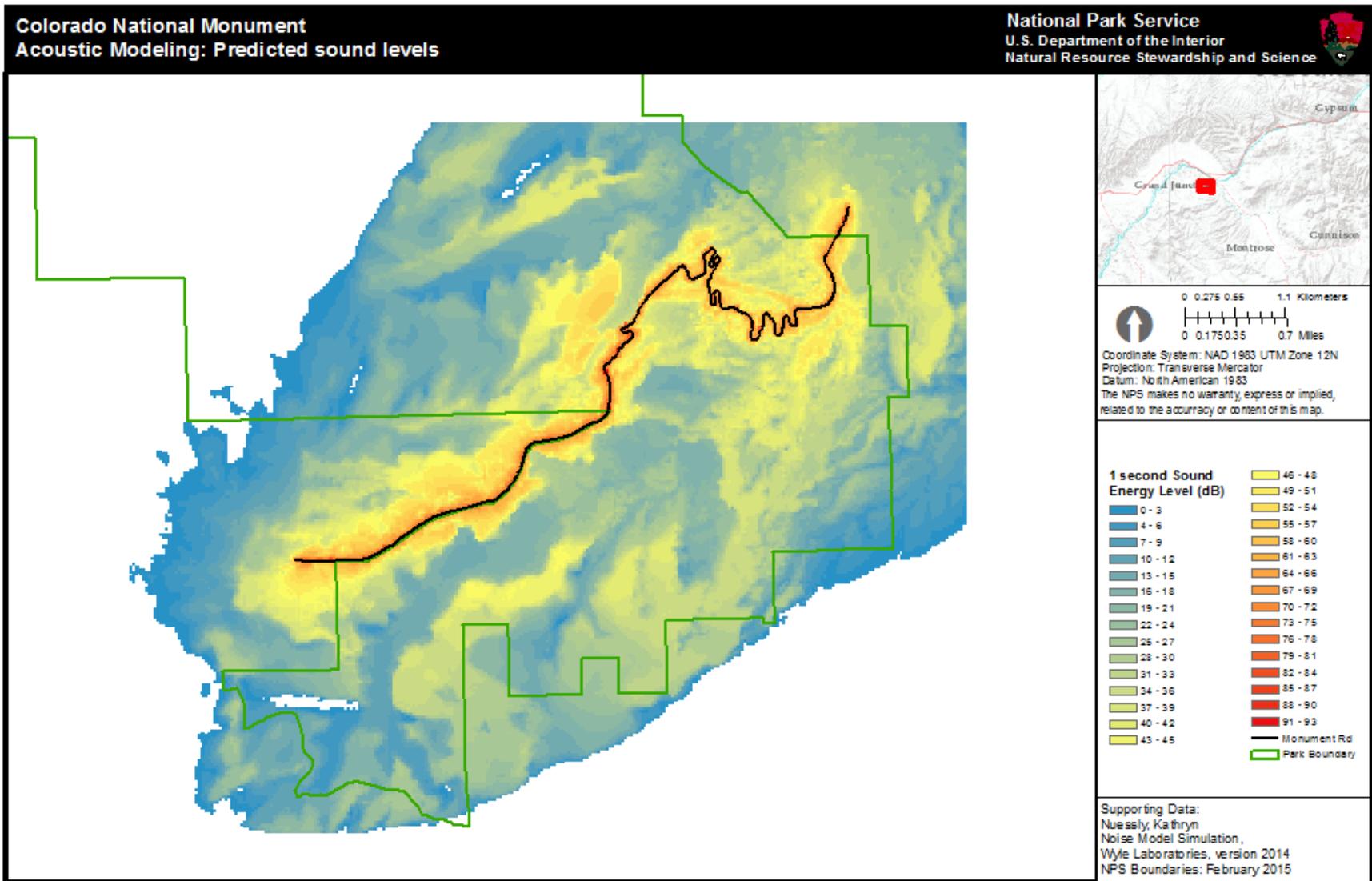
Traffic counts

Vehicle Traffic Categories	Vehicle Counts per Day
Motorcycle	26
Passenger Car	594
Medium Truck	242
Heavy Truck	105
TOTAL	12625

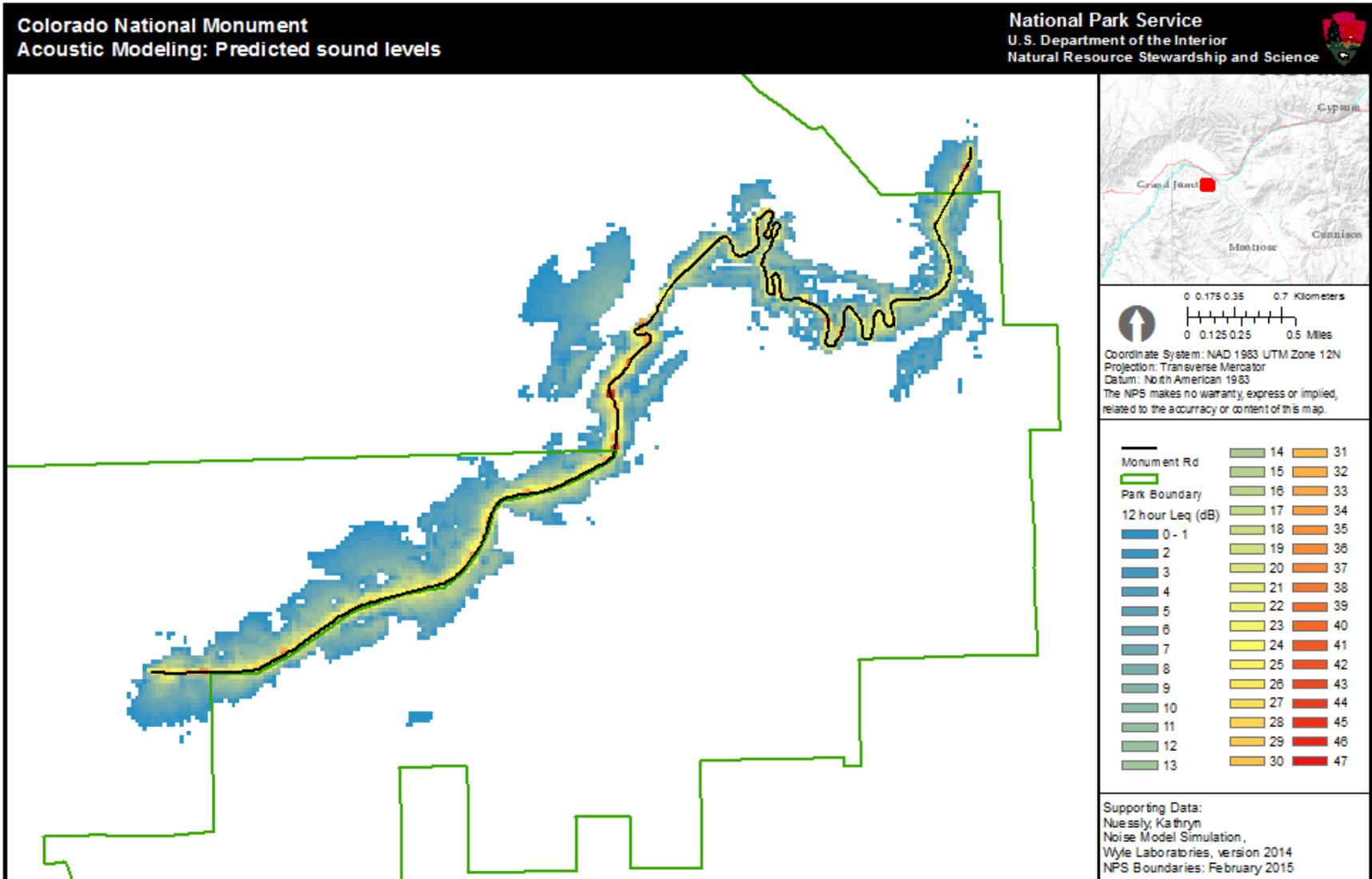
Run model

- Baseline Data
 - Traffic counts
 - Weather
 - Landcover
 - Elevation
 - Trajectory (Road)

Total Sound Energy 12 hr day



Average Sound Energy 12 hr day



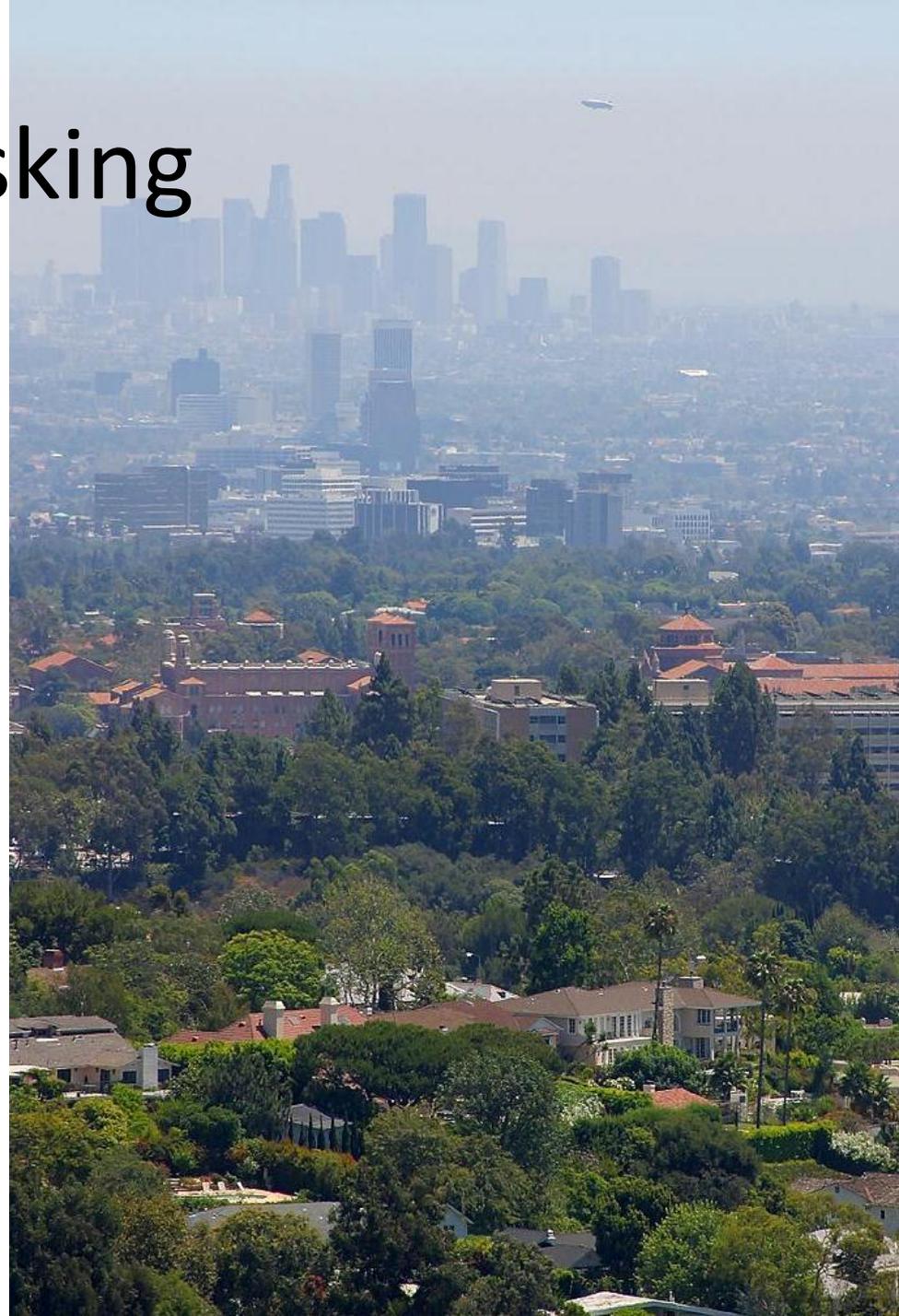
Examples of Park Sounds on the Decibel Scale

	<i>dBA</i>
Threshold of human hearing:	0
HALE: Volcano crater	10
CANY: Leaves rustling	20
ZION: Crickets (5 m)	40
WHMI: Conversational speech (5m)	60
YELL: Snowcoach (30 m)	80
ARCH: Thunder (distance ?)	100
YUCH: Military jet (100 m AGL)	120

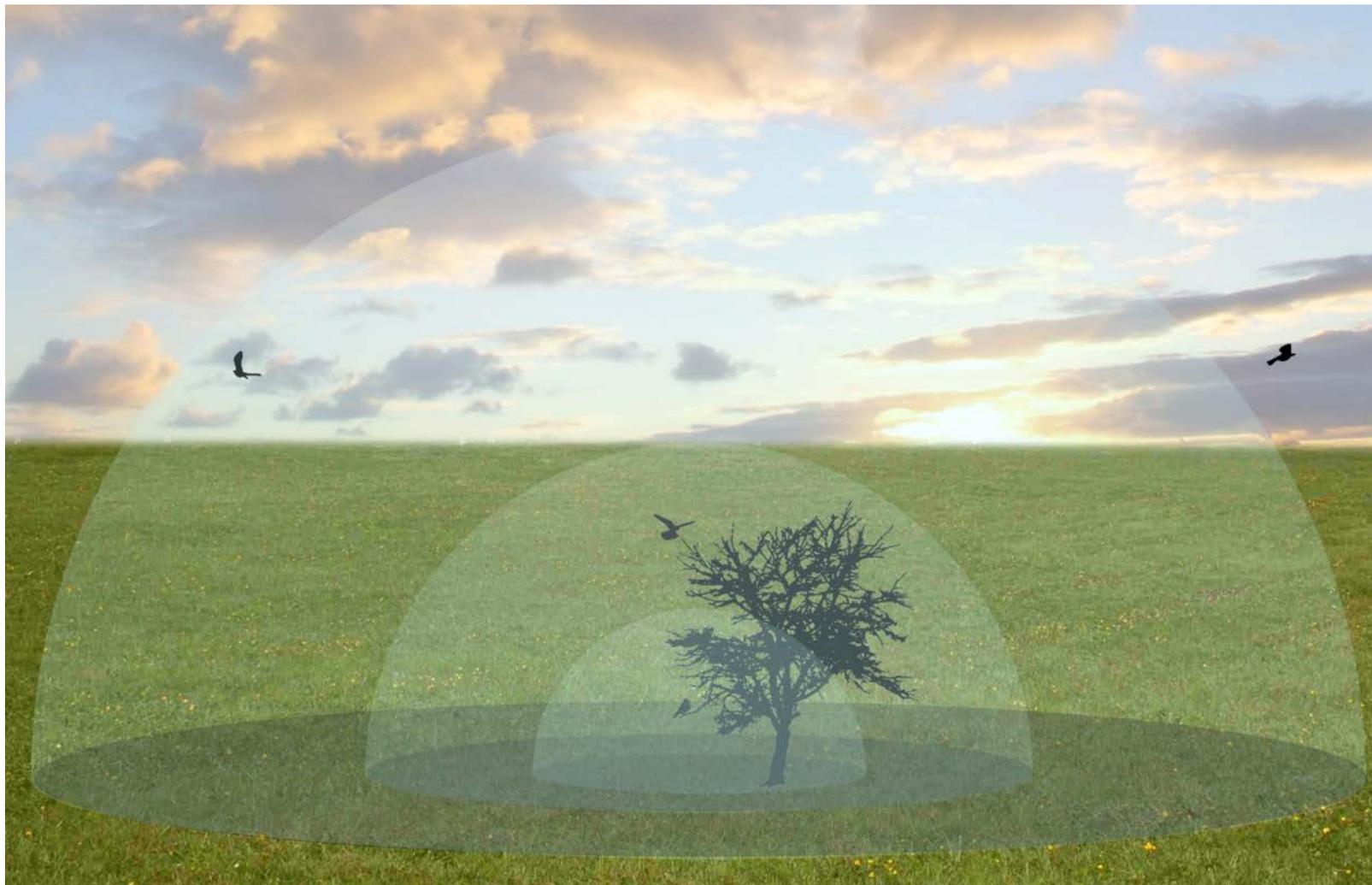


Masking

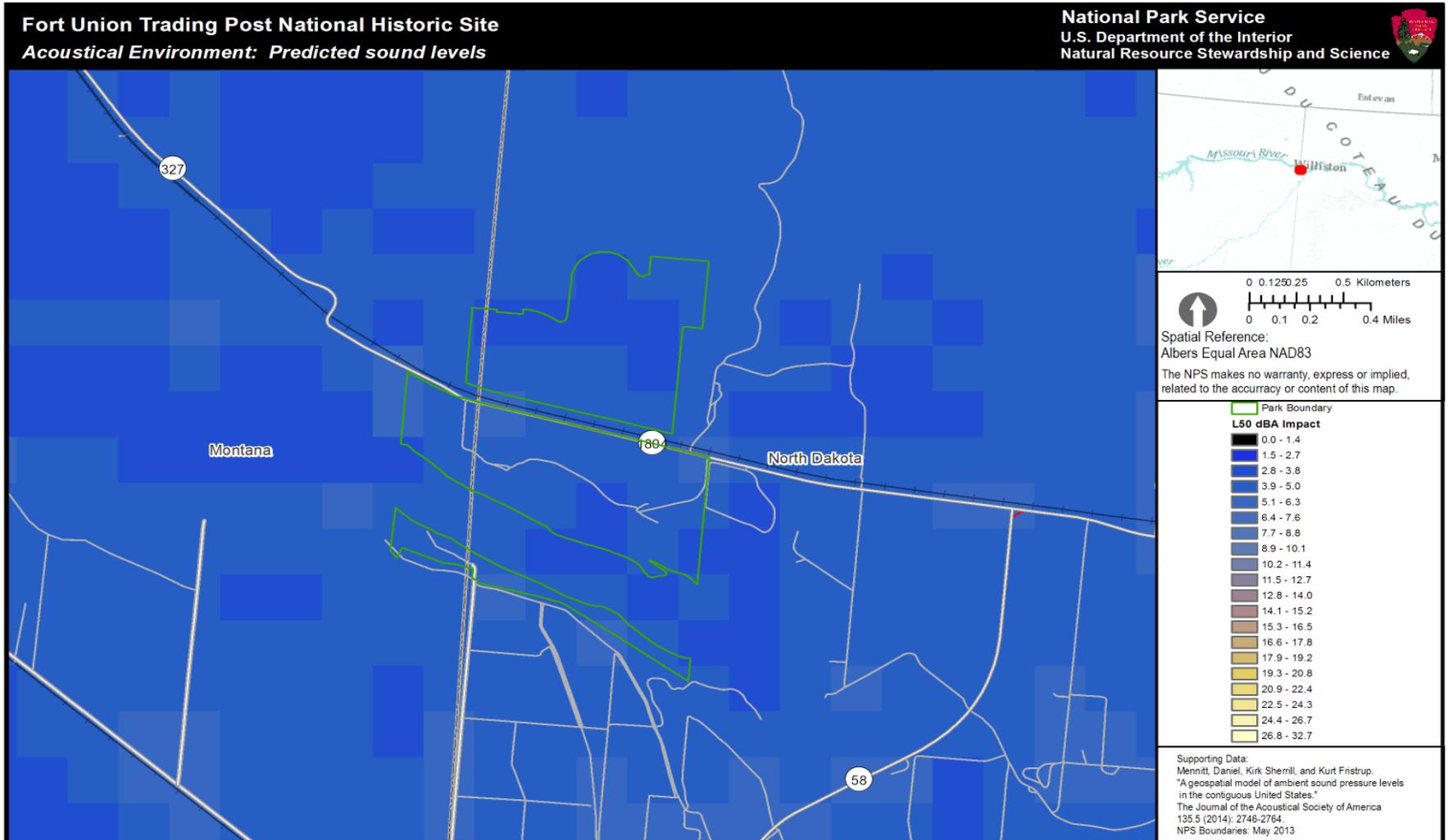
Just like air pollution masks our view of a landscape, **noise** pollution masks our ability to hear natural sounds.

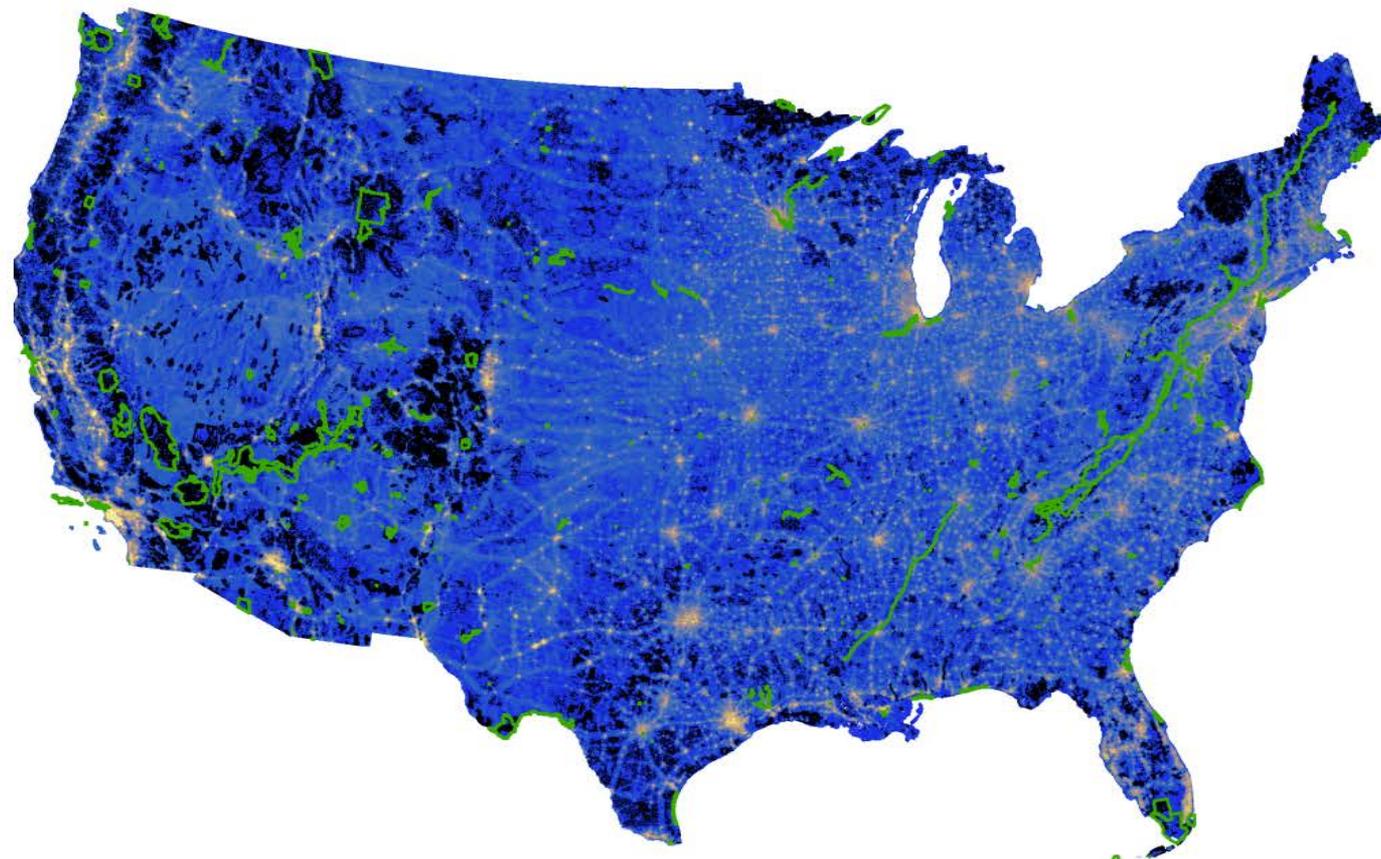


Reduction in Listening Area

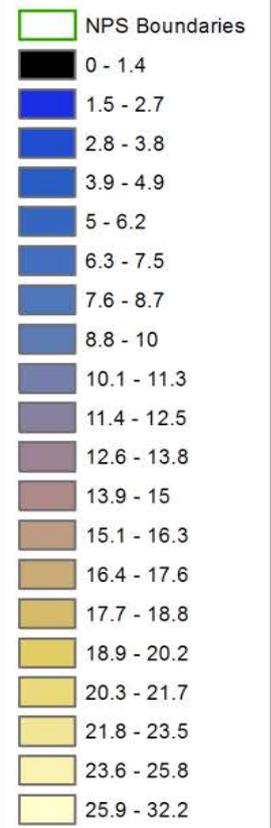


Fort Union Impact Map





L50 dBA Impact



Questions?

Natural Sounds and Night Skies Division
Natural Resource Stewardship and Science Directorate

www.nps.gov/nsnsd

970-267-7204



National Park Service
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