Identification and Evaluation of 'Soundmarks' in National Parks

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Background and Introduction

- Natural Sounds are crucial for:
  - Ecosystem Integrity
  - Conservation of Wildlife
  - Human Health and Well-Being
- Natural sounds give us a 'sense of place' similar to visual landmarks.
- Human noise is increasing in protected areas (1), reducing the benefits of hearing natural sounds and displacing wildlife.

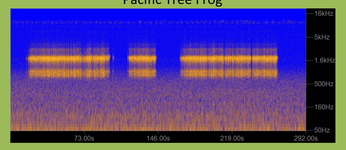
Soundscape = all of the "biological, geophysical, and anthropogenic sounds that emanate from a landscape and which vary over space and time"(2)

Methods and Design

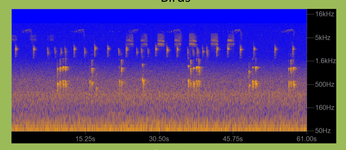
- CSU's Listening Lab has analyzed **12 years'** of acoustical data from **227 different sites in 69 national parks.**
- **Trained technicians** listened to clips and coded every sound they heard into categories (**bird, mammal, amphibian, insect, wind, water, car, airplane, train, boat, etc.**)
- I **ranked sites** to determine those with the best opportunities for hearing 4 natural sound sources: **Birds, Insects, Mammals, and Amphibians,** and **Biological Sounds Overall**.
- **Identifying "Soundmarks"**: A **test** was run to determine sites within the **highest percentile of biological** sound audibility AND the **lowest percentile of anthropogenic** sound audibility.

Categorizing sounds in recordings

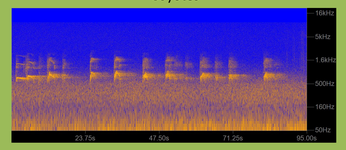
Pacific Tree Frog



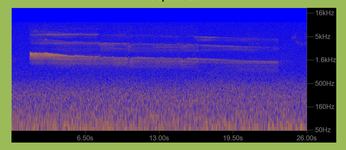
Birds



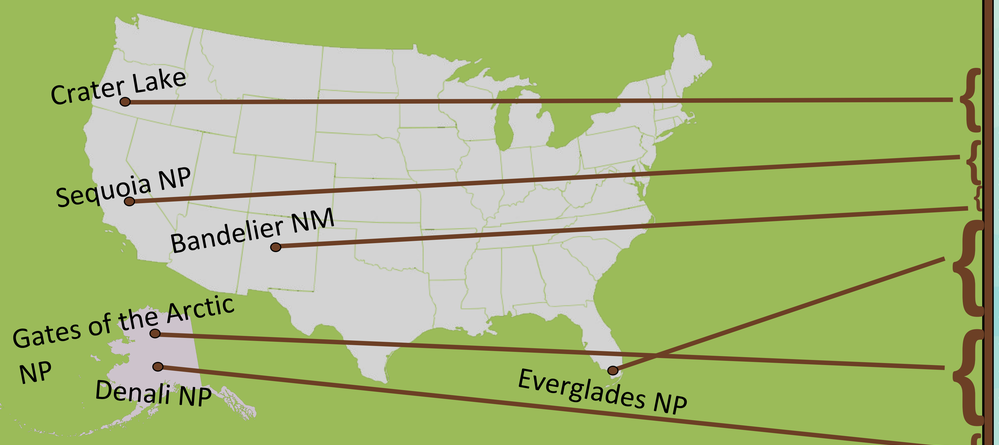
Coyotes



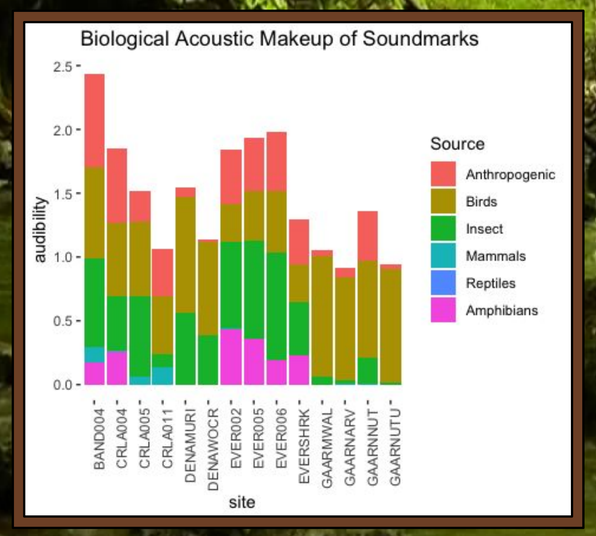
Squirrel



Like landmarks, our National Parks are full of **unique** and **valuable acoustic environments**. Using recordings collected at **227 sites** around the country to identify **high levels of biological sounds** and **low levels of human sounds** we helped locate these important **"soundmarks"**.



Soundmark Site ID					
CRLA004				✓	
CRLA005			✓		✓
CRLA011			✓		
SEKI003		✓	✓		✓
SEKI005		✓	✓		✓
BAND004	✓	✓	✓	✓	
EVER002				✓	
EVER005				✓	
EVER006				✓	
EVERSHRK				✓	
GAARMWAL		✓			
GAARNUTU		✓			
GAARNARV		✓			
GAARNNUT		✓			
DENAMURI		✓			✓
DENAWOCR		✓			✓



Pacific Tree Frog

Birds

Coyotes

Squirrel

Monitoring Goals

- **Highlight** the **value** of unique natural soundscapes to ecosystems, wildlife, and humans.
- **Identify sites** with unique and valuable acoustic characteristics within the US national park system. (*Soundmarks*)
- **Outline** an **approach** for identifying soundmarks.
- **Increase awareness** of the value and distribution of acoustic resources within the Park System.

Discussion

- I identified **16 sites** with important acoustic characteristics: **high numbers of biological sound, unique biological sounds,** and/or **low human noise**.
- This **process** for **identifying soundmarks** can provide the National Park Service (NPS) with information to prioritize protection of acoustic environments in certain areas.
- **Producing a soundmark index** (high natural sounds and low human sounds) allows the NPS to catalog **important acoustic resources**.
- **Increased awareness** of soundmarks in parks could create opportunities to **inform visitors** of soundscape resources and **foster and appreciation** for the acoustic character of a landscape.

Acknowledgements

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References

(1) Buxton RT, McKenna MF, Mennitt DJ, Fristrup KM, Crooks K, Angeloni LM, Wittemyer G (2017) Noise pollution is pervasive in U.S. protected areas. Science 356:531-533

(2) Pijanowski BC, Farina A, Gage SH, Dumyahn SL, and Krause BL. 2011. What is soundscape ecology? An introduction and overview of an emerging new science. Landscape Ecology 26: 1213-1232.