

# BioSoundSCape

# Connecting acoustics and remote sensing to study animal-habitat diversity across environmental gradients

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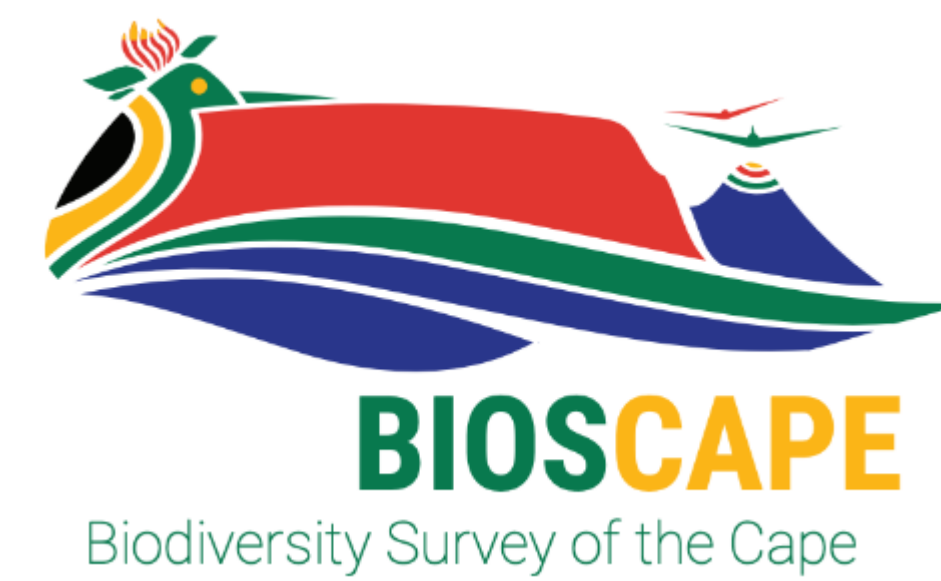
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Check out our storymap to hear some sounds!



16 science teams

**BioSCape** is an international collaboration between the South Africa National Space Agency (SANSA) and the US National Aeronautics and Space Administration (NASA) to study biodiversity in South Africa's Greater Cape Floristic Region (GCFR)  
<https://www.bioscape.io>

## BioSoundSCape Project

- A regional-scale animal diversity monitoring project with the umbrella BioScape project
- Measure ground-based animal diversity with sound recorders
- Scale these measurements using remotely-sensed indicators of habitat variation

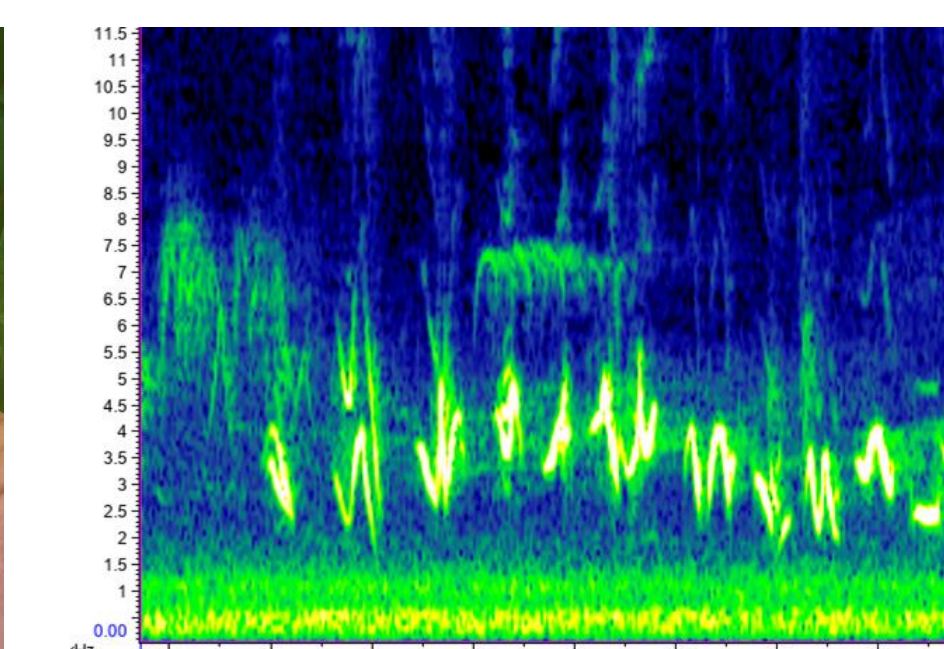


Only pilot data so far. Field work starts July 2023!

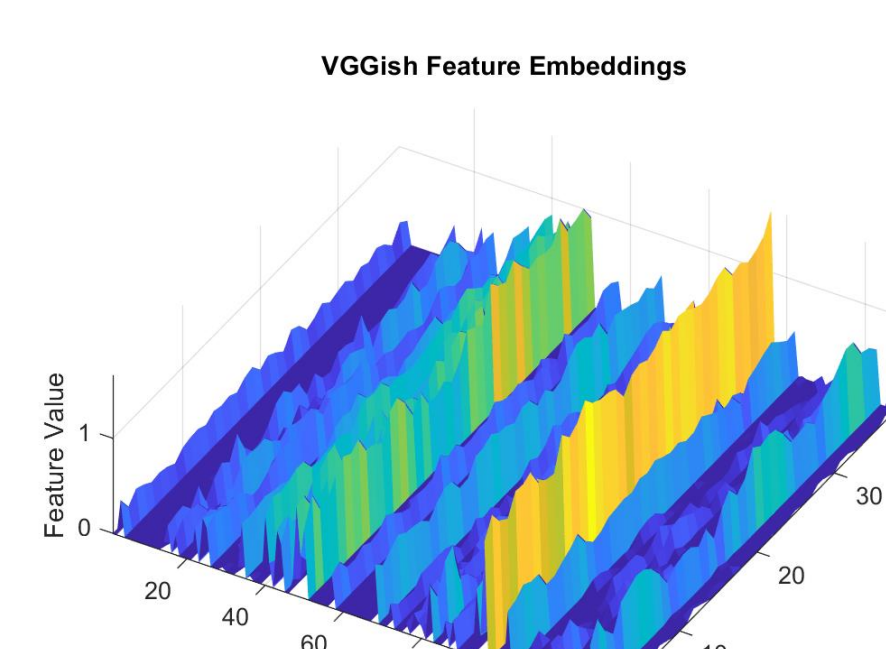
## Collecting and Processing Sound Data



Low-cost, automated recorders



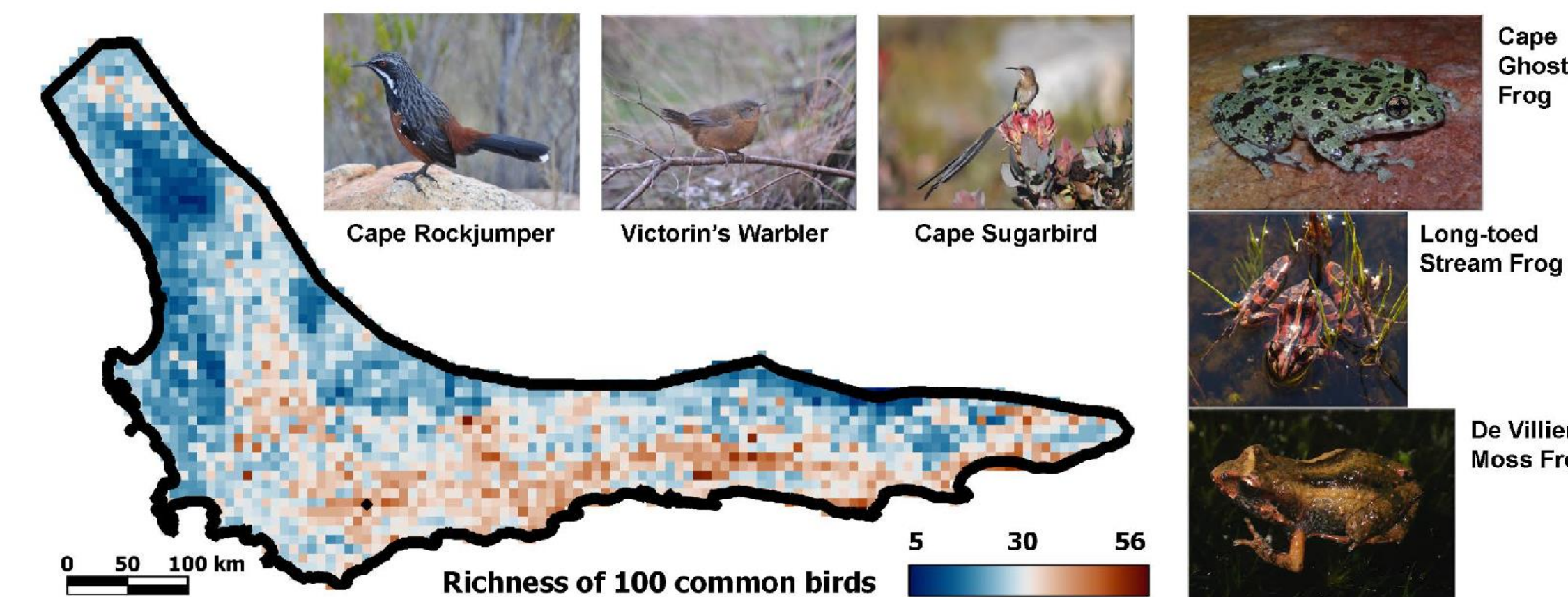
Sounds represented as images, called spectrograms



Acoustic features from a convolutional neural network (VGGish)

## Field and Remote Sensing Measurements

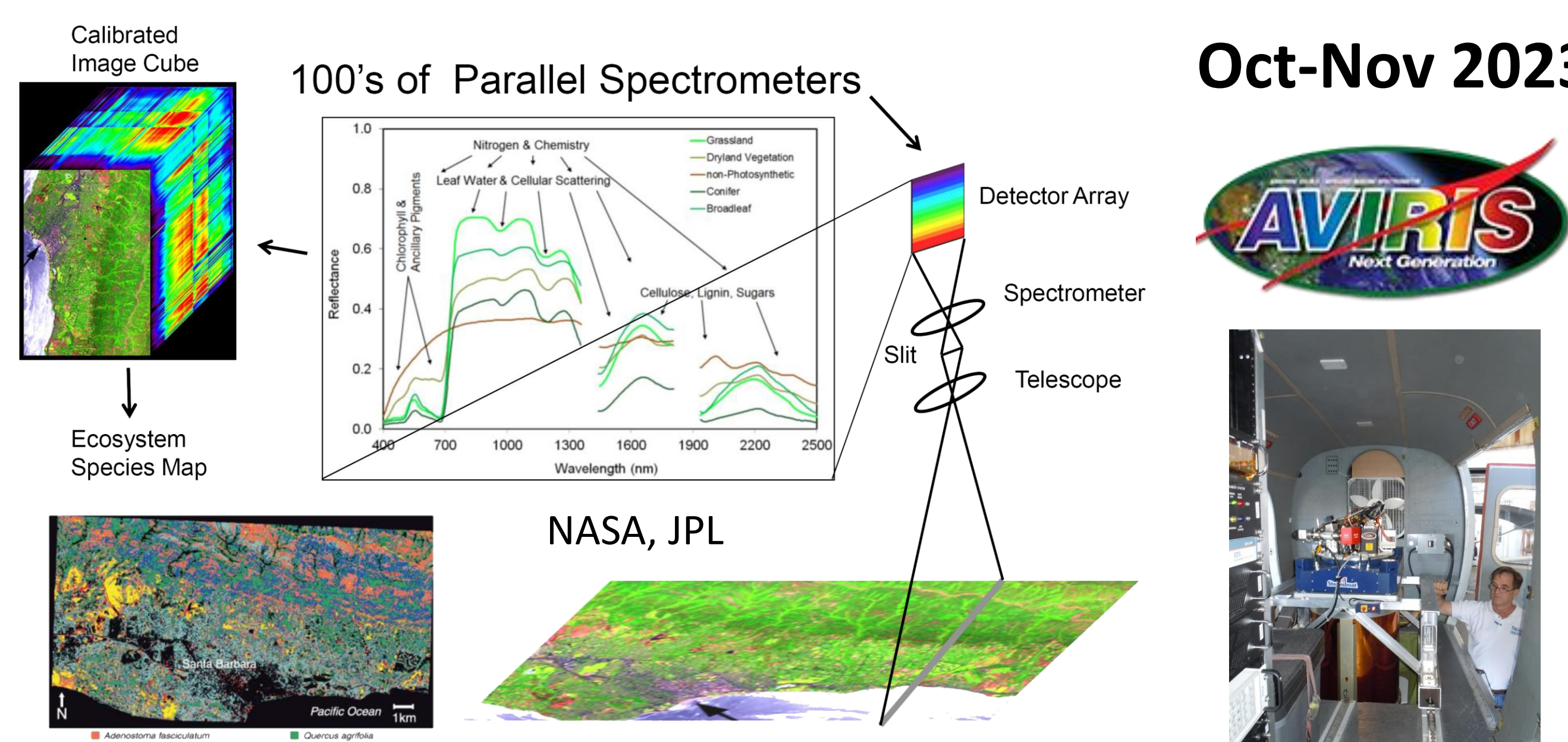
Bird and amphibian observations (point counts)



Sound Recordings (AudioMoth) July-Aug & Oct-Nov 2023



Vegetation Reflectance Spectral (AVIRIS NG – imaging spectroscopy) Oct-Nov 2023

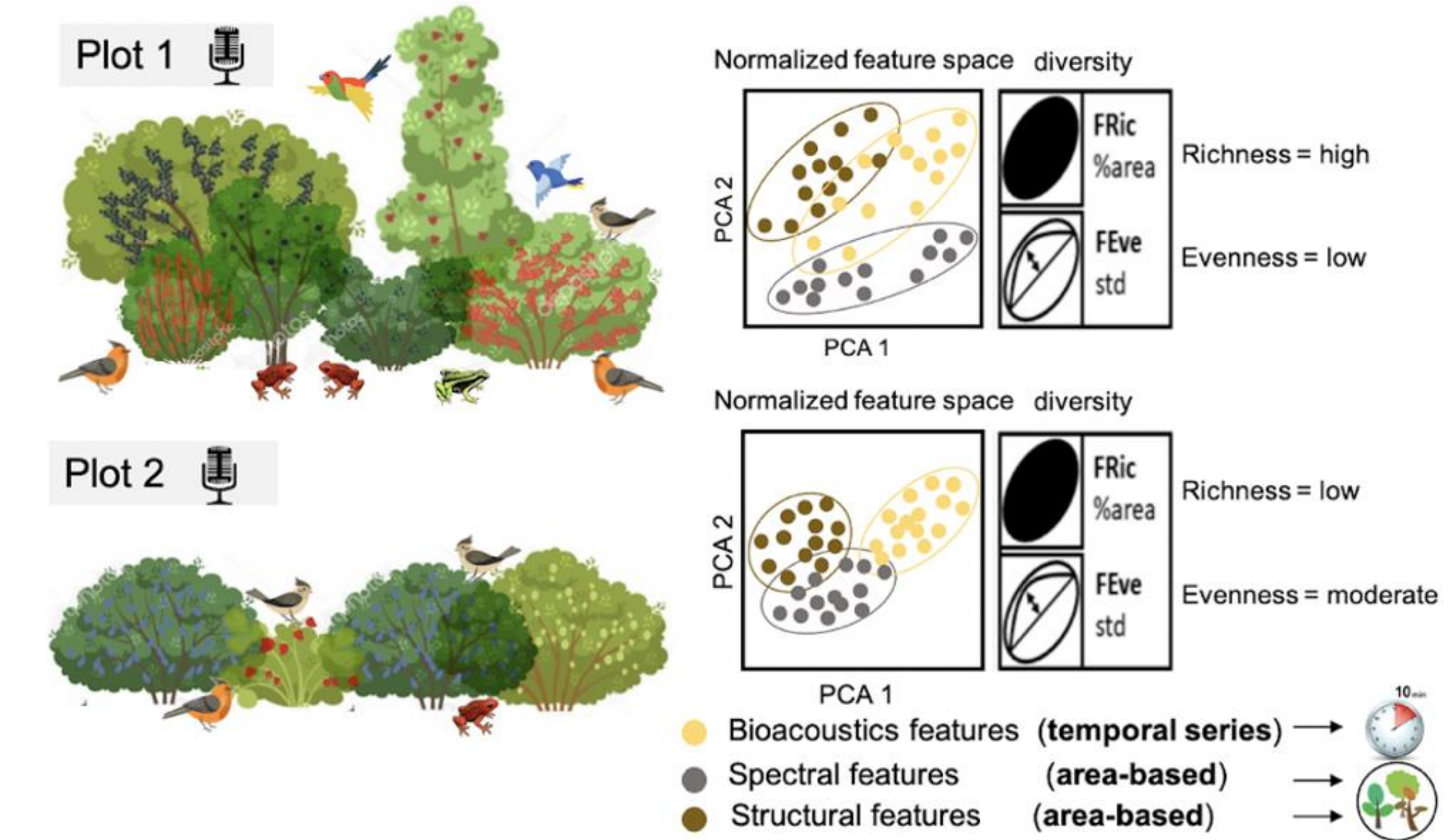


Vegetation Structure (LVIS – waveform lidar) Oct-Nov 2023



## Analytical Approach

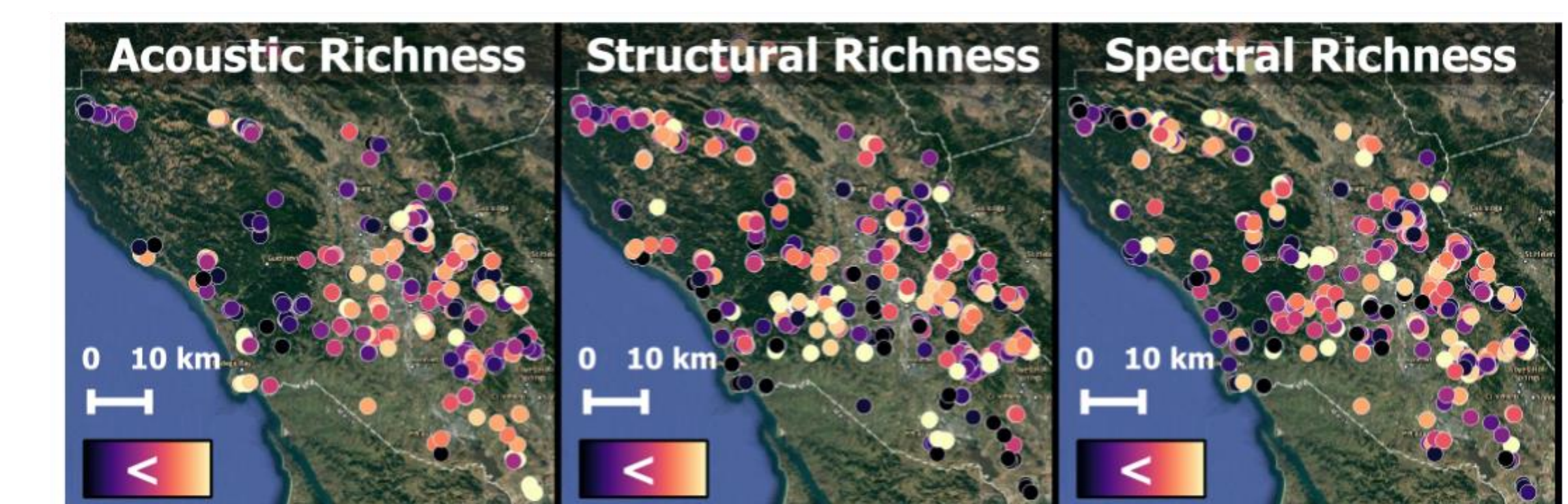
Acoustic, structural, spectral diversity estimated using Hutchinson's n-dimensional hypervolume approach  
**richness, evenness, divergence**



- Species agnostic approach to monitor animal diversity
- Acoustic diversity used as an indicator of animal diversity
- Does not require laborious species identification in acoustic data
- Acoustic diversity linked to animal-habitat diversity, as measured by remote sensing (spectral & structural diversity), for spatial scaling

## Research Questions

- Q1. How is acoustic diversity related to animal diversity (birds and amphibians)?
- Q2. What are the relationships among measures of acoustic, spectral and structural diversity and how do they change across spatial scales and vegetation types?
- Q3. How do anthropogenic and natural disturbance affect acoustic diversity and habitat quality?



Sonoma County, CA prototype

