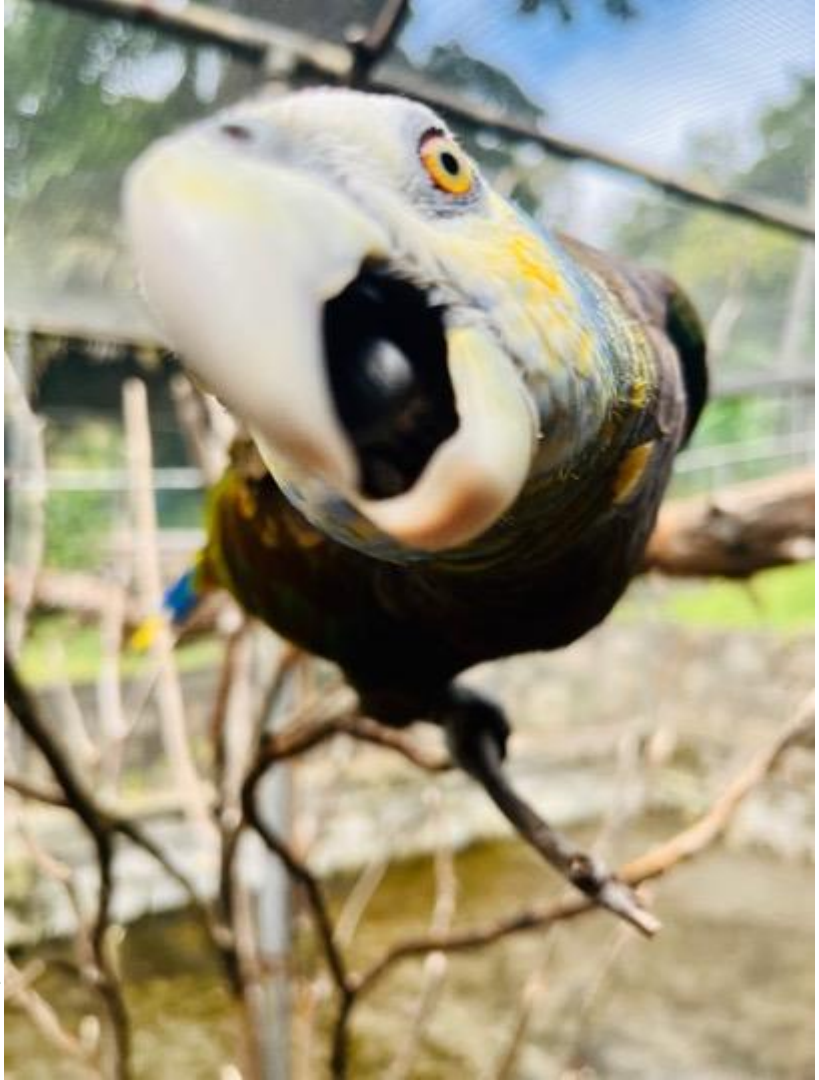
WORKSHOP #1: MONITORING PARROTS AND OTHER WILDLIFE IN SVG: PASSIVE ACOUSTIC MONITORING

Cristina M Gomes, PhD
Vijay Ramesh, PhD

TABLE OF CONTENTS



CRISTINA M GOMES

PROYECTO SANOMA

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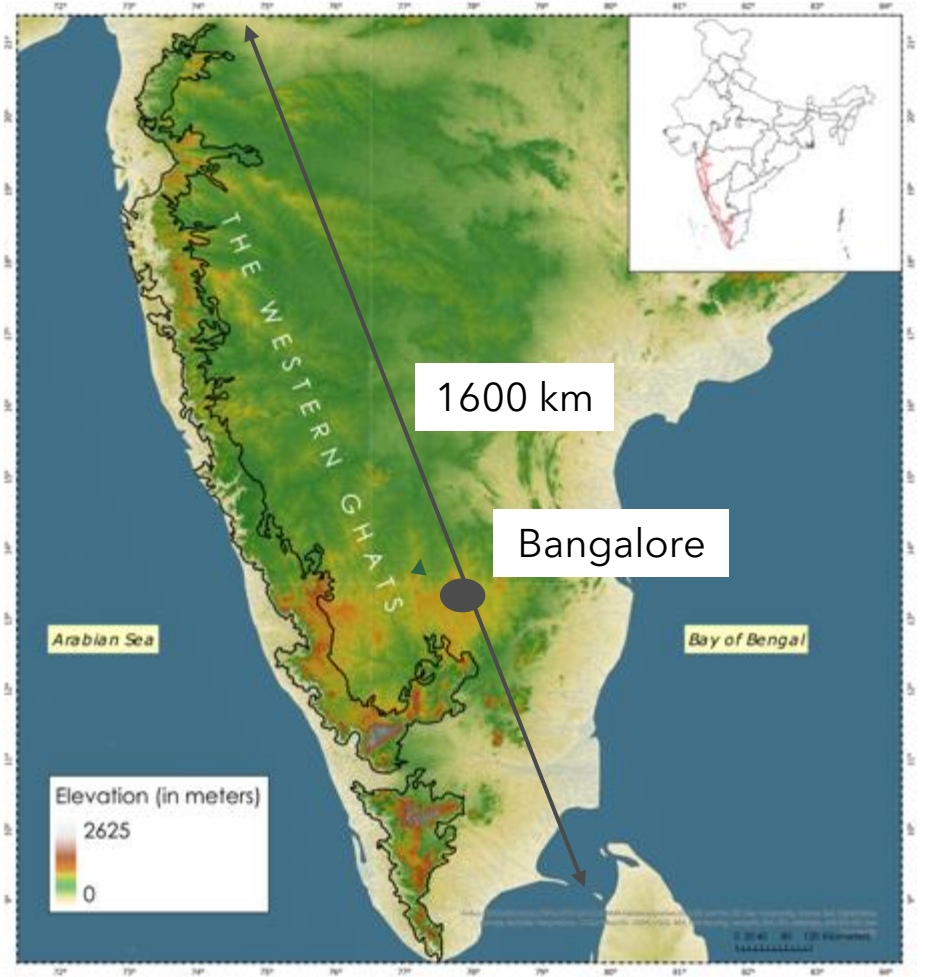
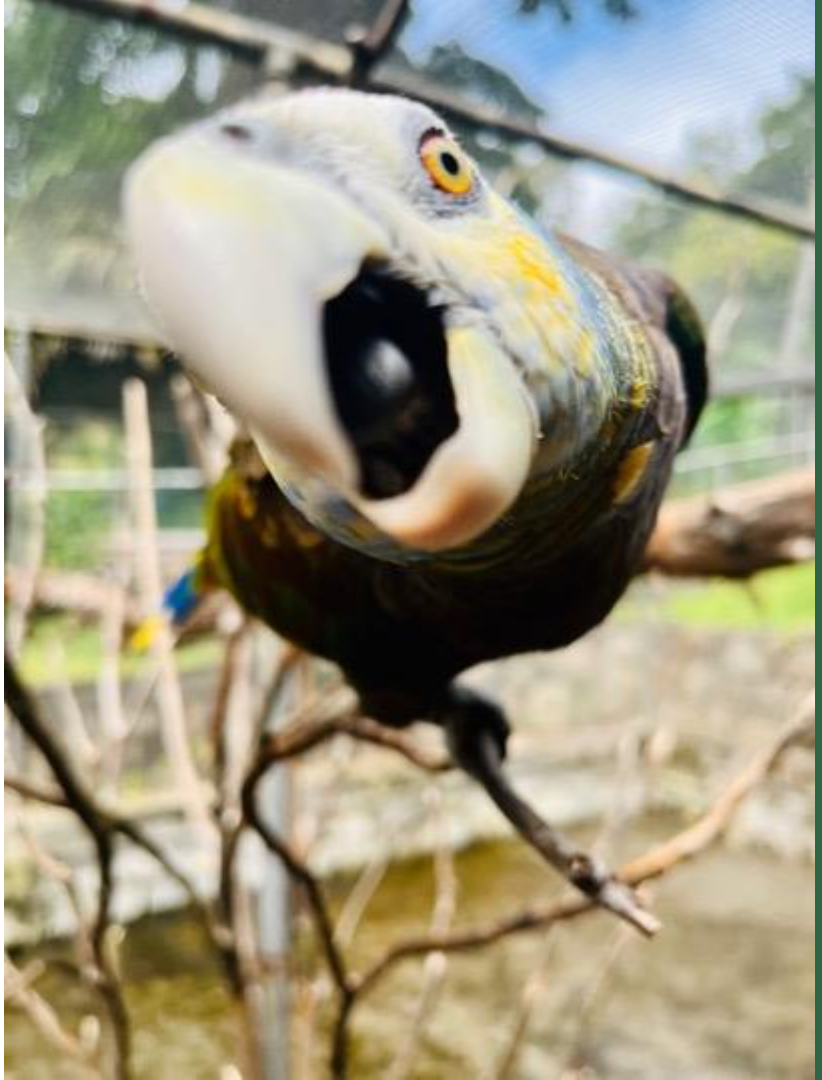


01. GOALS

GOAL

Provide the Forestry Department with the information and tools to monitor the St Vincent parrot and other wildlife using PAM:

- Introduction to Passive Acoustic Monitoring
- AudioMoths & their deployment
- Data management: entering, storing, organizing and sharing acoustic data
- St Vincent parrot monitoring protocol



02. PASSIVE ACOUSTIC MONITORING


“WE CANNOT MANAGE
WHAT WE HAVE NOT MEASURED.”

WHAT IS MONITORING?

Keeping track of animals

- Movement patterns
- Habitat utilization
- Population demographics (numbers, trends, etc)
- Poaching
- Conflicts with humans

WHY IS MONITORING IMPORTANT?

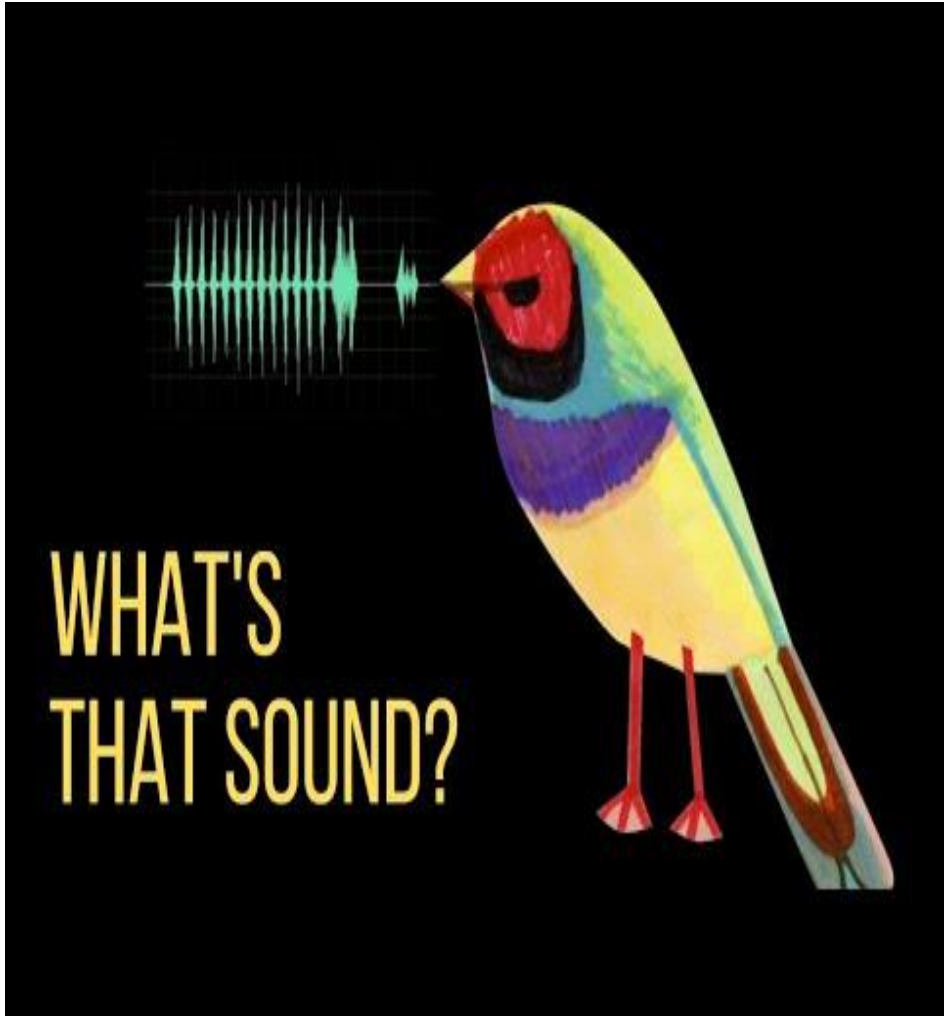
Protect wildlife

- Detect population changes
- Understand impact of natural disasters
- Detect issues related to poaching
- Address population decline through conservation action

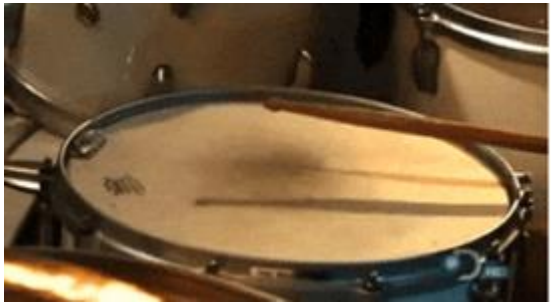
WHAT IS BIOACOUSTICS?

- Researchers use acoustics to study living things by deploying bioacoustic monitors

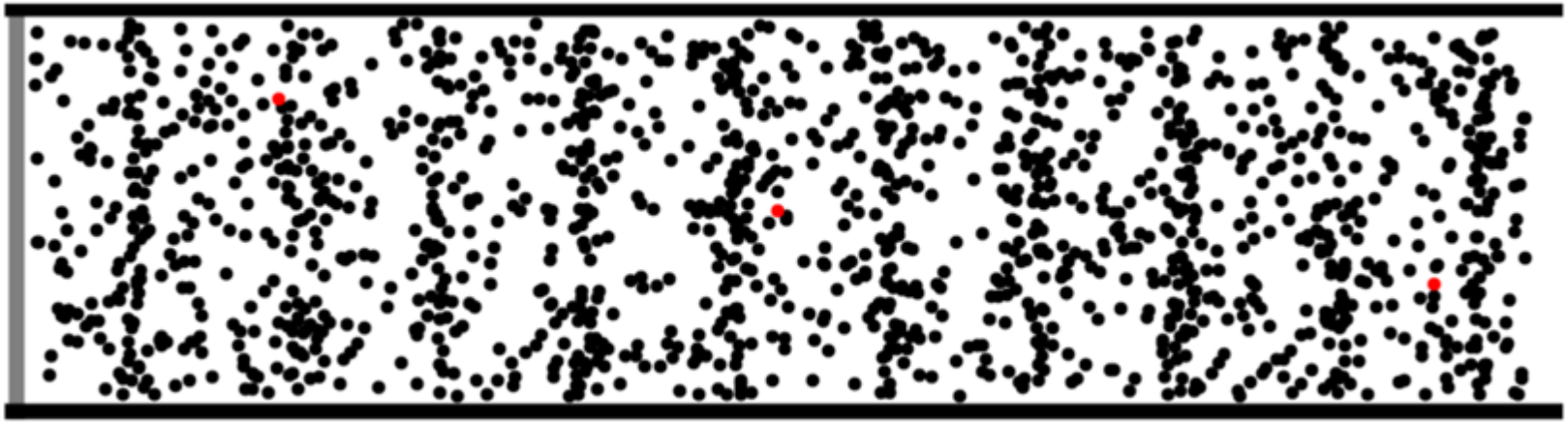
- Monitors also are known as passive acoustic monitors (PAM) or autonomous recording units (ARU)



What is sound?



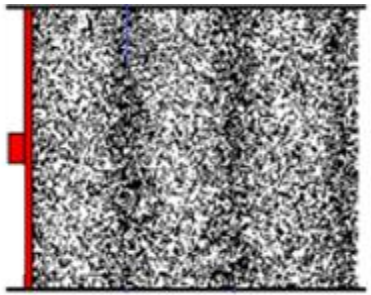
- Sound is created when an object vibrates in a medium
- Sound is a vibration that propagates as an acoustic wave -> species specific

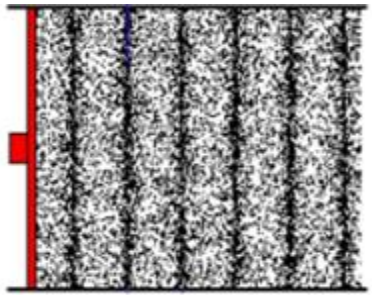


THE FREQUENCY OF A SOUND

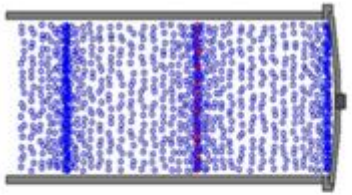
- How fast the object vibrates determines the frequency of the sound (cycles per second)

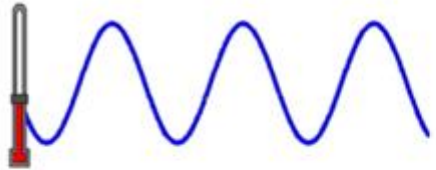
- Frequency is measured in Hertz (Hz; cycles / second; 1 kHz = 1,000 Hz)



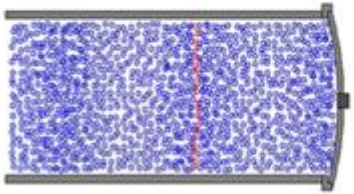


THE AMPLITUDE OF A SOUND





Bigger pressure changes (sounds LOUUUUD)

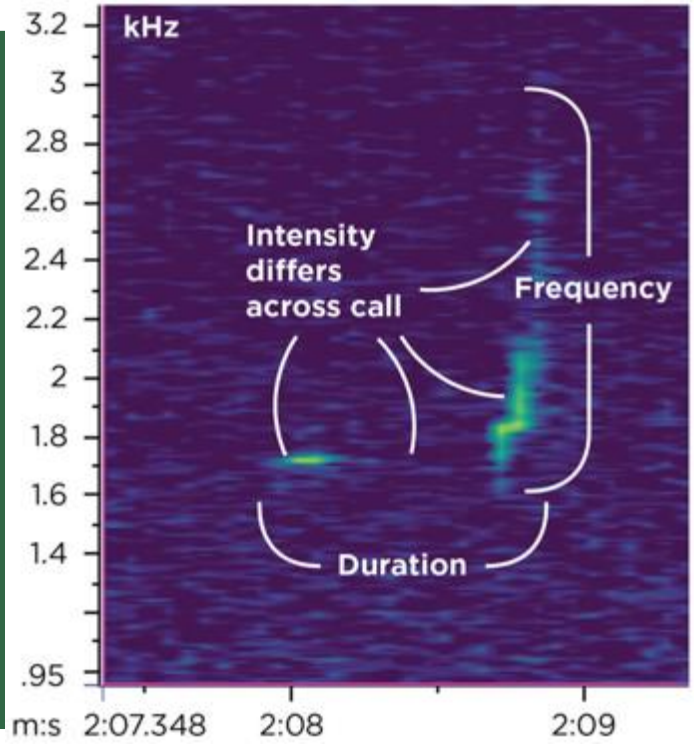


Smaller pressure changes (sounds quiet)

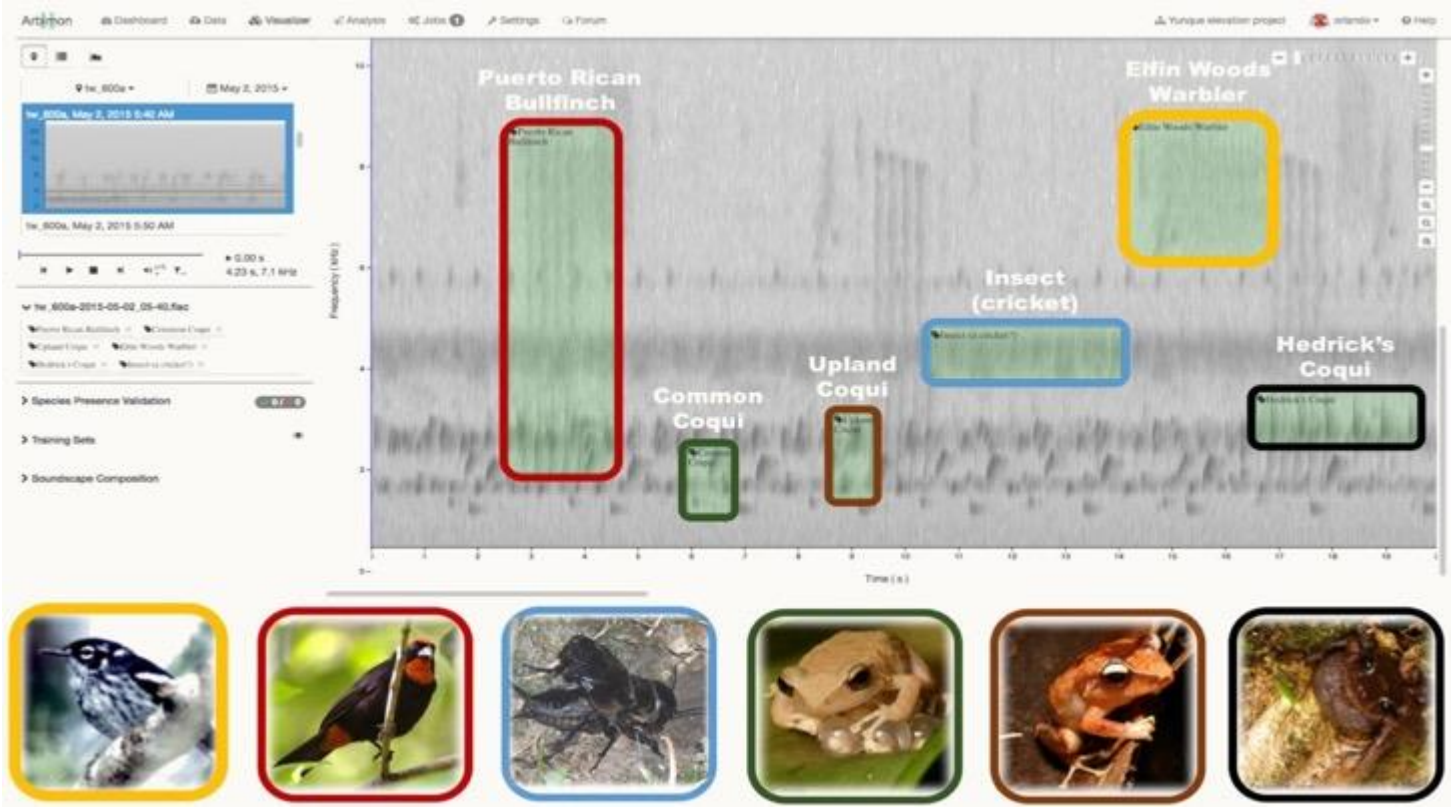
Photo from Esselstyn et al.

WHO MADE THAT NOISE?

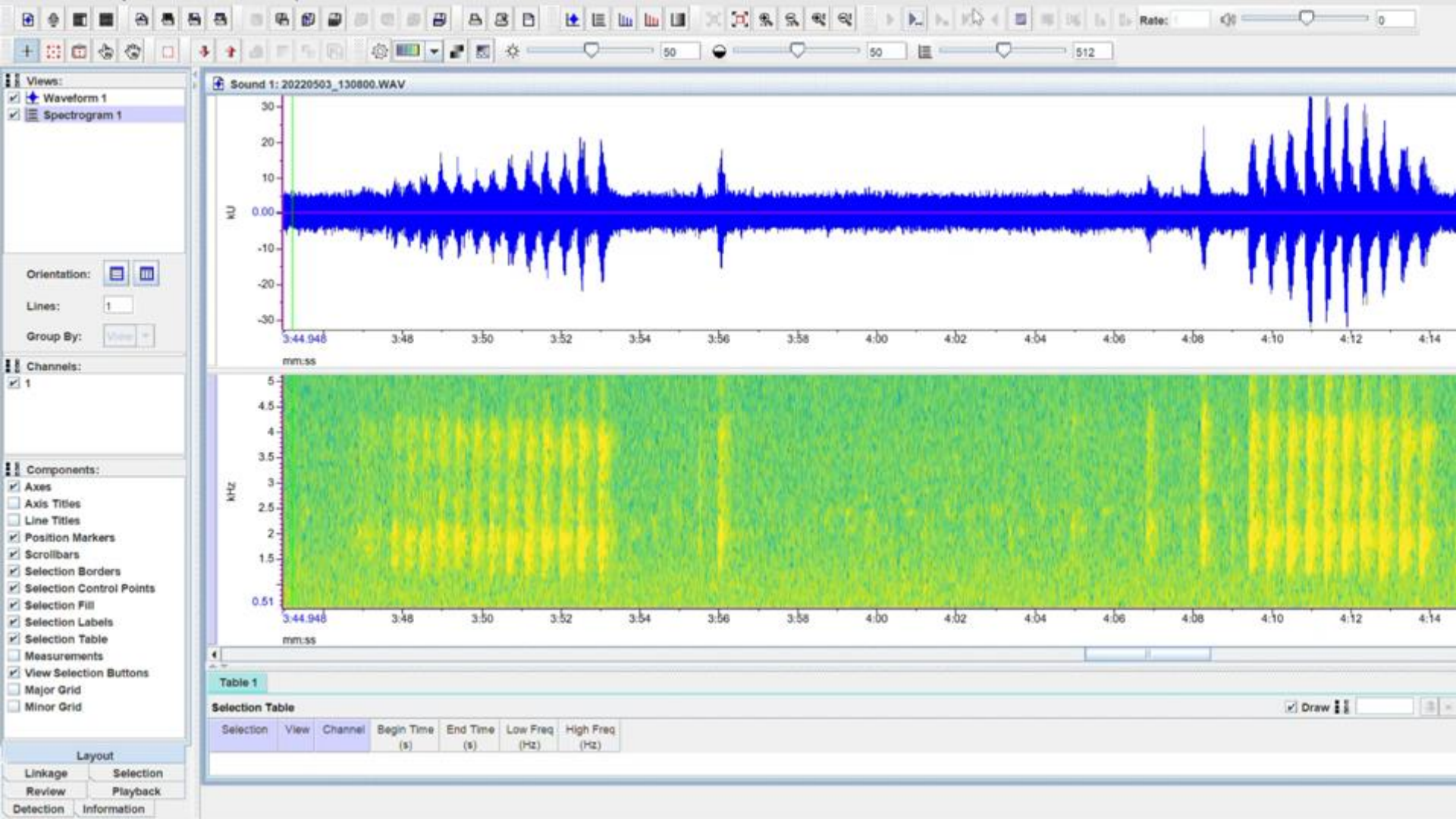
The audio files are converted to a spectrogram, which is a visual representation of the spectrum of frequencies of a signal as it varies with time.



DIFFERENT SPECIES HAVE DISTINCTIVE CALLS



The Y-axis (left) depicts the frequency (kHz), and the X-axis (bottom) shows the duration of the call.


Views:
Waveform 1
Spectrogram 1
Orientation:
Lines:
1
Group By:
View
Channels:
1
Components:
Axes
Axis Titles
Line Titles
Position Markers
Scrollbars
Selection Borders
Selection Control Points
Selection Fill
Selection Labels
Selection Table
Measurements
View Selection Buttons
Major Grid
Minor Grid
Layout
Linkage
Selection
Review
Playback
Detection
Information
Sound 1: 20220503_130800.WAV
kU
30
20
10
0.00
-10
-20
-30
3:44.948
3:48
3:50
3:52
3:54
3:56
3:58
4:00
4:02
4:04
4:06
4:08
4:10
4:12
4:14
mm:ss
kHz
5
4.5
4
3.5
3
2.5
2
1.5
0.51
Table 1
Selection Table
Draw
Selection
View
Channel
Begin Time (s)
End Time (s)
Low Freq (Hz)
High Freq (Hz)

BROAD-WINGED HAWK

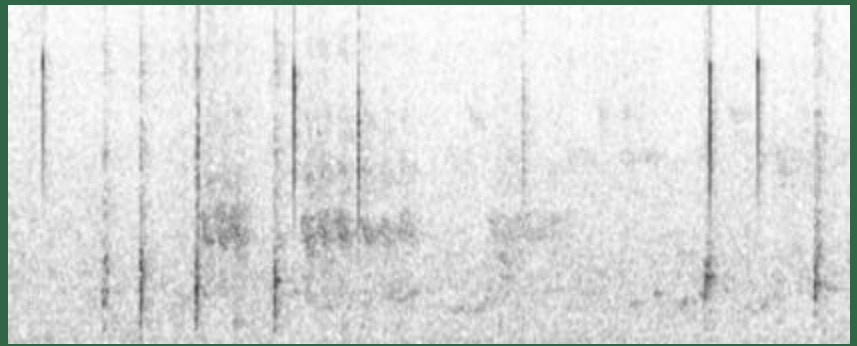
(Buteo platypterus)

COCOA THRUSH

(Turdus fumigatus)

ANTILLEAN CRESTED HUMMINGBIRD

(Orthorhyncus cristatus)



COMMON BLACK HAWK

(Buteogallus anthracinus)

ST. VINCENT PARROT

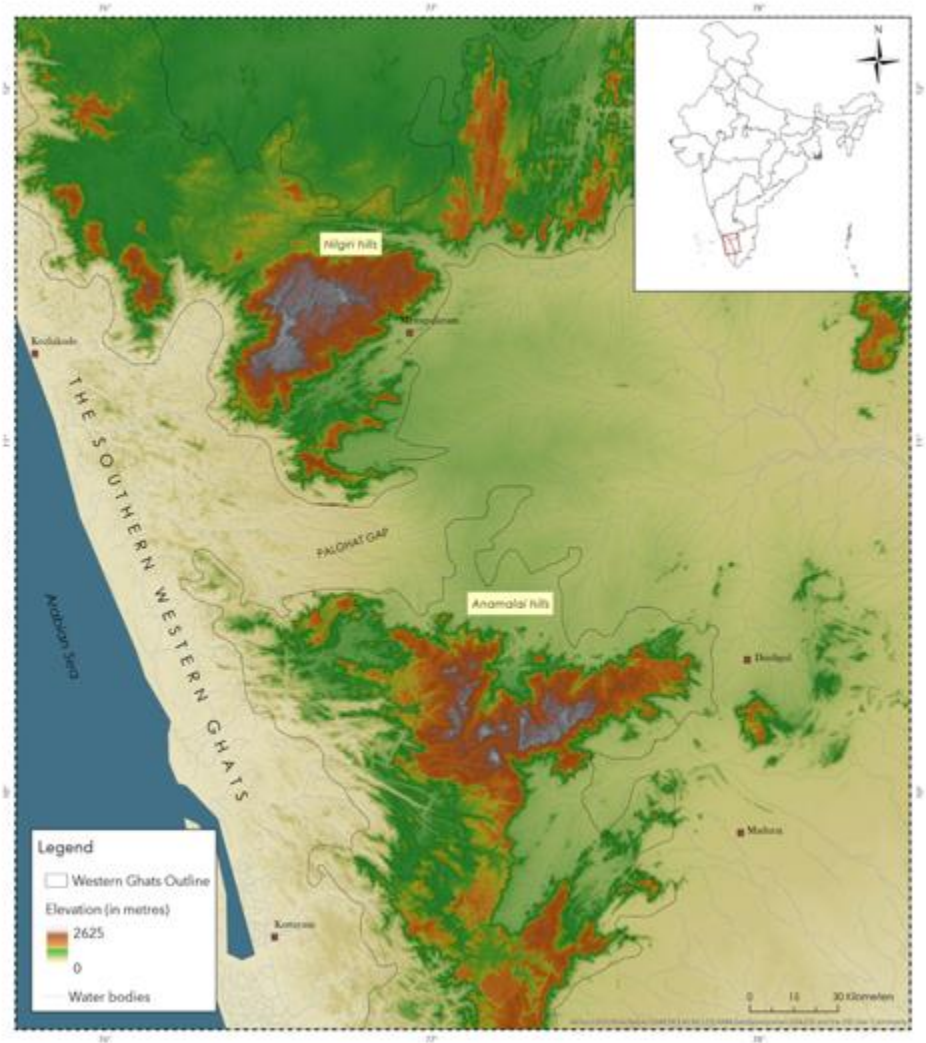
(Amazona guildingii

FORESTRY AGENTS

(Homo sapiens sapiens)

EXAMPLES OF PAM

THE ANAMALAI HILLS



HUMAN-MODIFIED LANDSCAPES

Picture: Sreedhar Vijayakrishnan

Picture: Ganesh Raghunathan

A dream of trees

BEFORE (2007)

PRESENT (2021)

What about fauna?

nature conservation foundation

Picture: T R Shankar Raman

Most tropical birds are detected by ear!

A gradient of forest regeneration

Actively restored

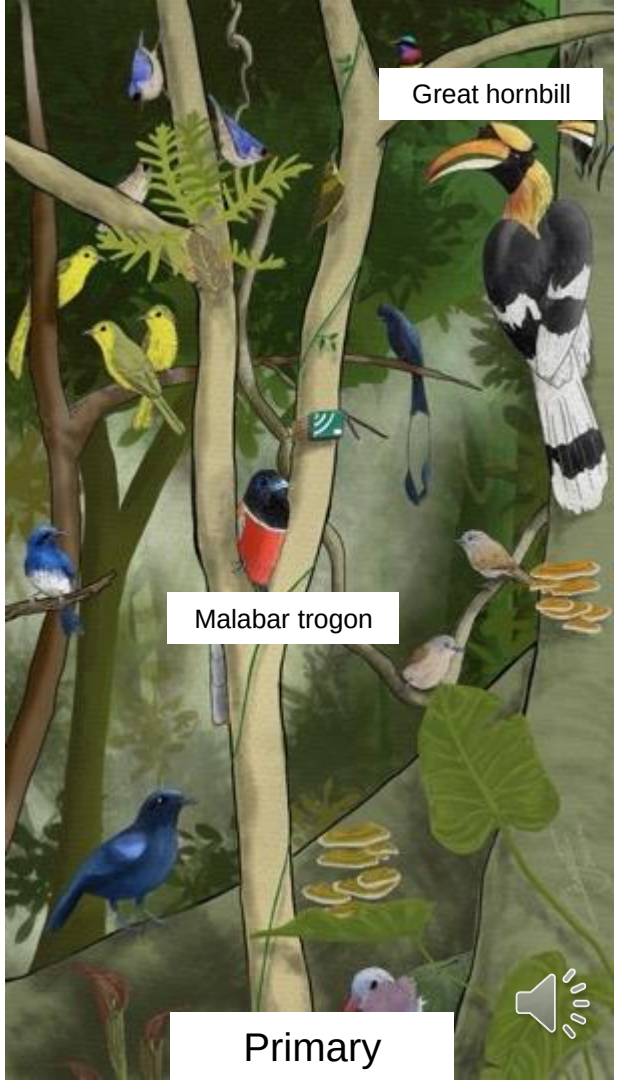
Undisturbed benchmark forests

Degraded

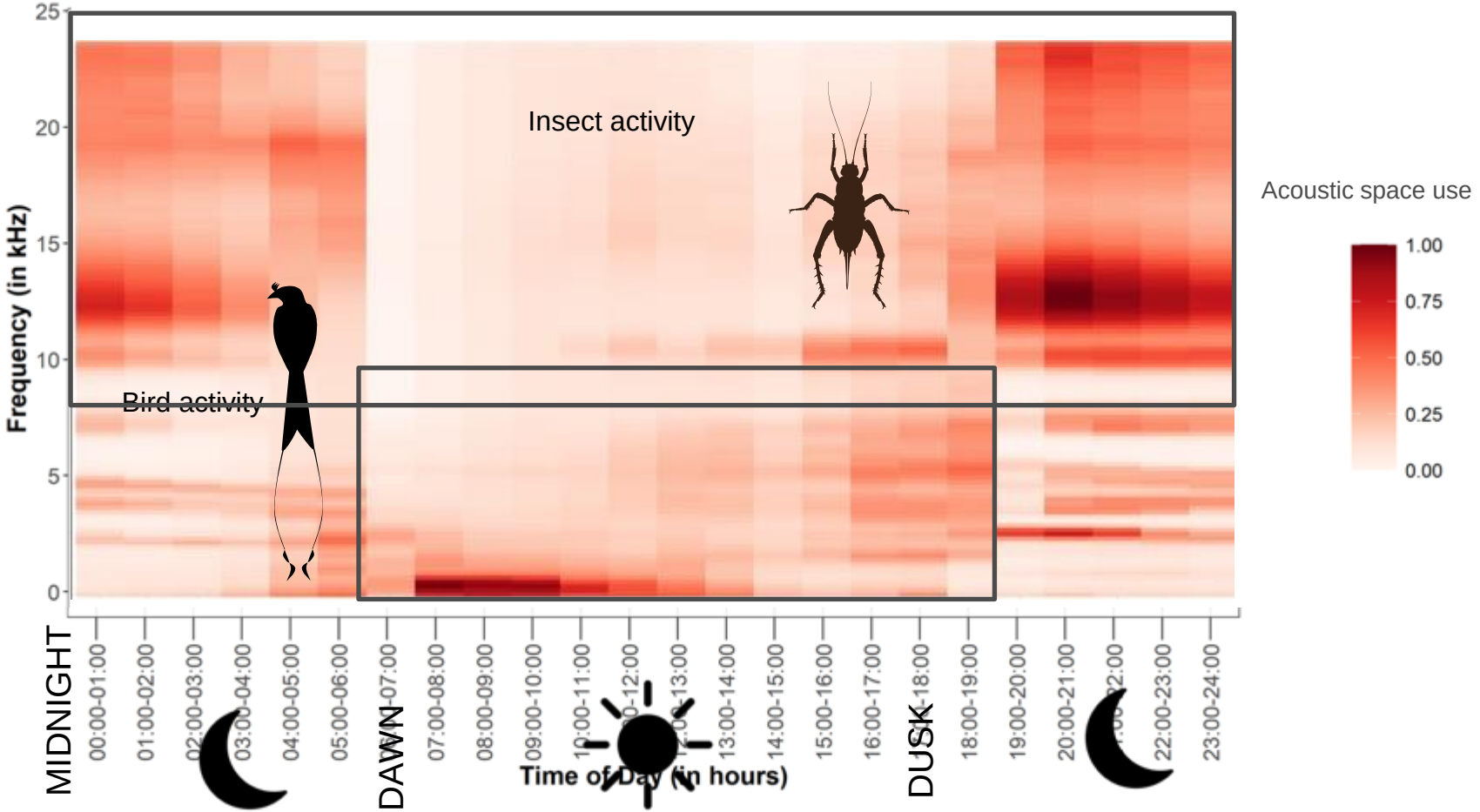

Brown-cheeked fulvetta
Greater-racket tailed drongo
Gray-headed canary flycatcher
Crimson-backed sunbird


Chestnut-headed bee eater
Common tailorbird
Rufous babbler
Degraded

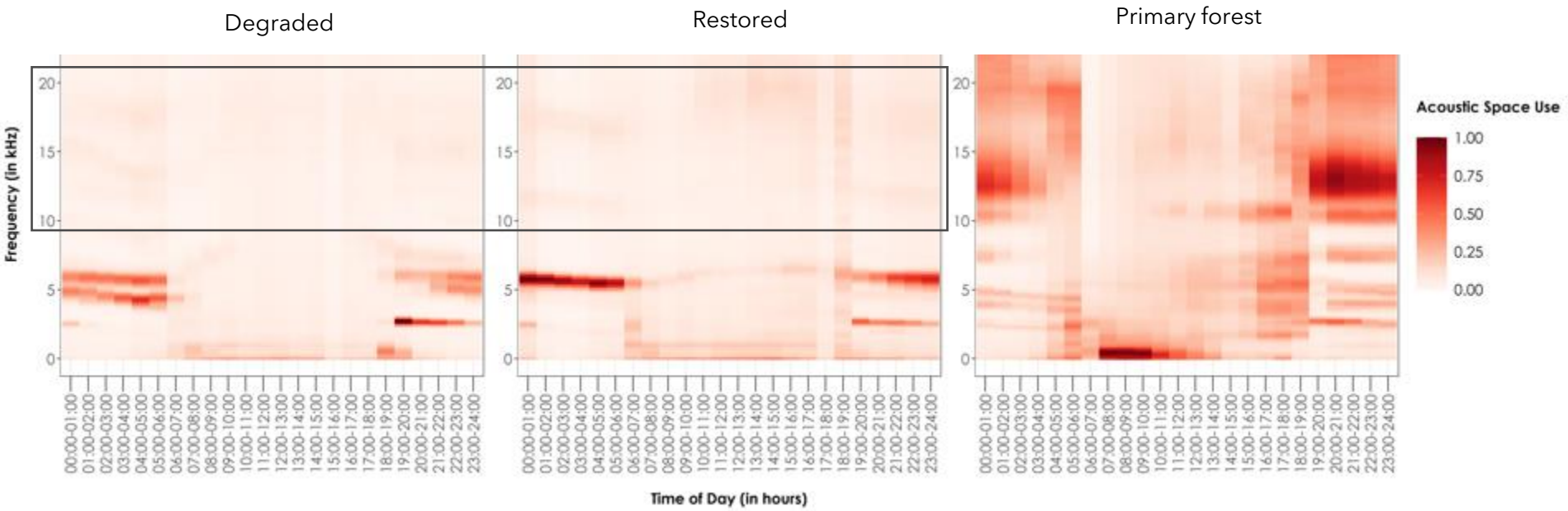

Southern hill myna
Artist: Chayant Gonsalves
Greater-racket tailed drongo
Restore


Great hornbill
Malabar trogon
Primary

What about other wildlife?


Insect activity
Bird activity
Frequency (in kHz)
25
20
15
10
5
0
MIDNIGHT
DAWN
DUSK
00:00-01:00
01:00-02:00
02:00-03:00
03:00-04:00
04:00-05:00
05:00-06:00
07:00-08:00
08:00-09:00
09:00-10:00
10:00-11:00
13:00-14:00
14:00-15:00
15:00-16:00
16:00-17:00
18:00-19:00
19:00-20:00
20:00-21:00
22:00-23:00
23:00-24:00
Time of Day (in hours)
Acoustic space use
1.00
0.75
0.50
0.25
0.00

Do you notice anything weird in this image?



Insect vocalizations are largely missing from restored and degraded forests!

WHY IS PAM APPEALING?

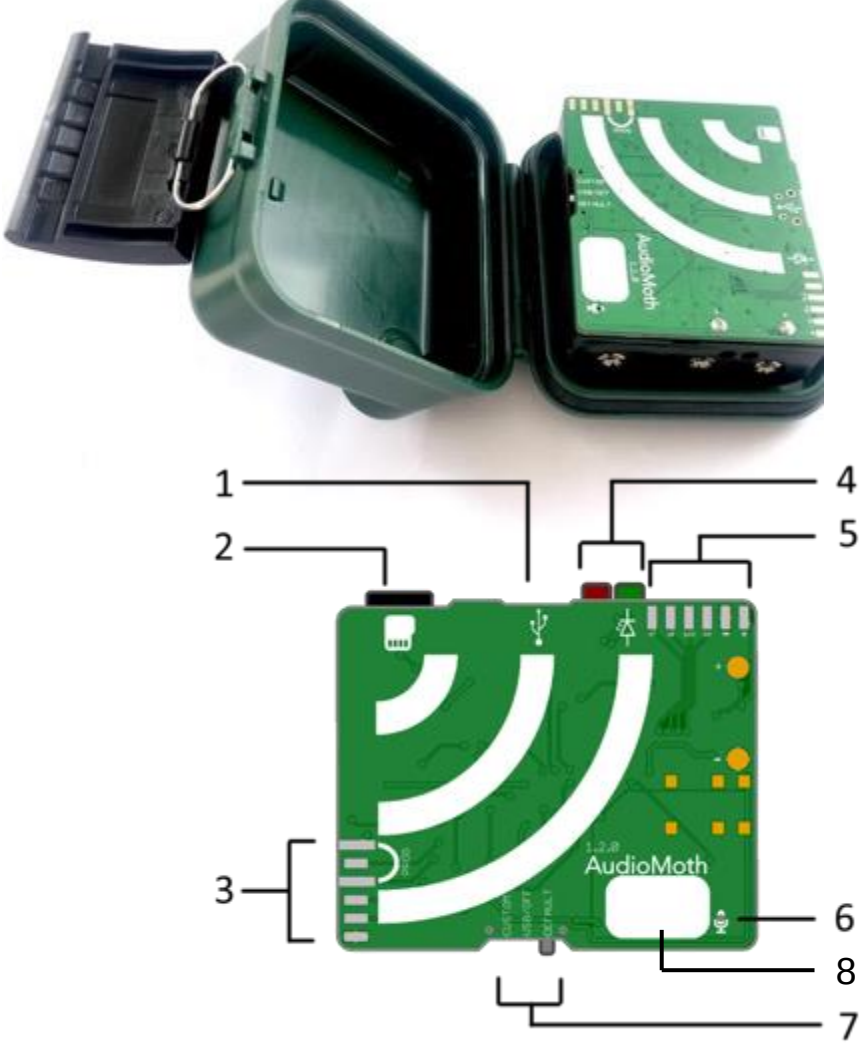
- Cost effective
- Less manpower
- Wide range of habitats
- Long periods of time
- Definite collection

Ideally leading to **MORE** data collected!

AudioMoth: low-cost, full-spectrum acoustic logger

Steps in a PAM project

03. AUDIOMOTHS



1. USB port
2. SD card
3. Programming header
4. Status LED: important when deploying that only the RED light blinks
5. Exposed GPIO pins
6. Microphone
7. Mode switch: Should be put on CUSTOM to start recording
8. Box with audiomoth number

FORMS

Digital forms help decrease transcription mistakes, save paper and help standardize data-collection
They work offline and are very easy to use

AUDIOMOTH DEPLOYMENT

1. Field materials: recorders needed +2, GPS, phone with kobo collect, extra batteries, compass, flag tape, notebook
    - RECORDERS: should be numbered, configured, have batteries taped in, SD card
    - If batteries fall out, the recorder CANNOT be deployed
2. Find the sample point using a GPS (we will practice later)
3. Locate a good spot to place the AudioMoth

AUDIOMOTH DEPLOYMENT

What is a good spot?

- Choose a spot inside the forest, where parrots could potentially sleep or feed. Don’t place the AudioMoth overlooking a cliff as we don’t want to record them traveling.
- Choose a tree far from noisy places: water sources, roads
- Conceal well to avoid theft:
  - Walk at least 5-10mts from the trail and put the AudioMoth pointing away from the trail to decrease visibility
  - Place at 2-2.5mts height whenever possible
  - Camouflage, if possible, without covering the vent
- Use flag tape to mark the spot but without making the AudioMoth easy to find, take many photos of the location

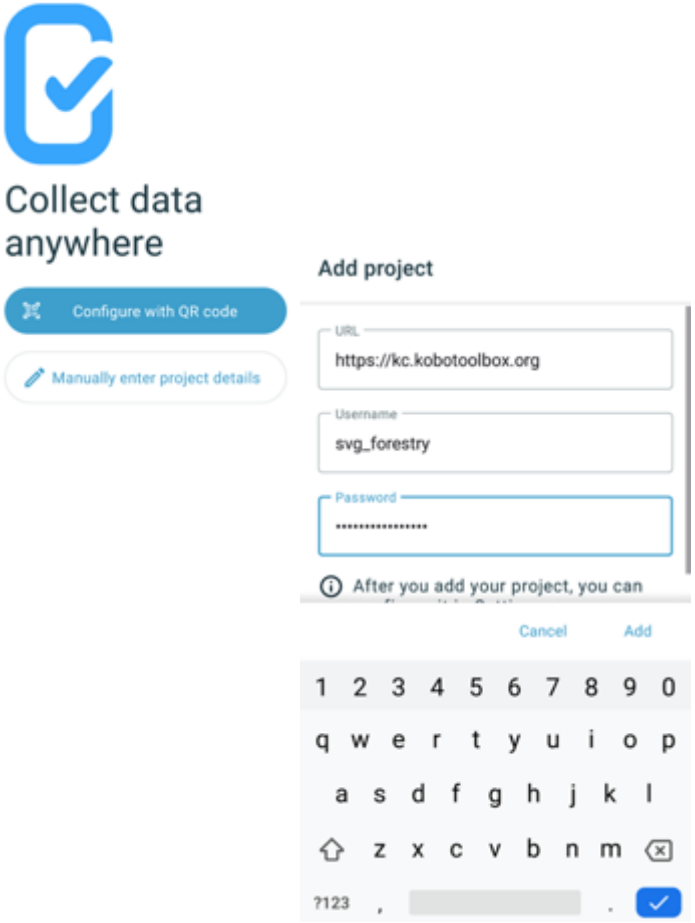
AUDIOMOTH DEPLOYMENT

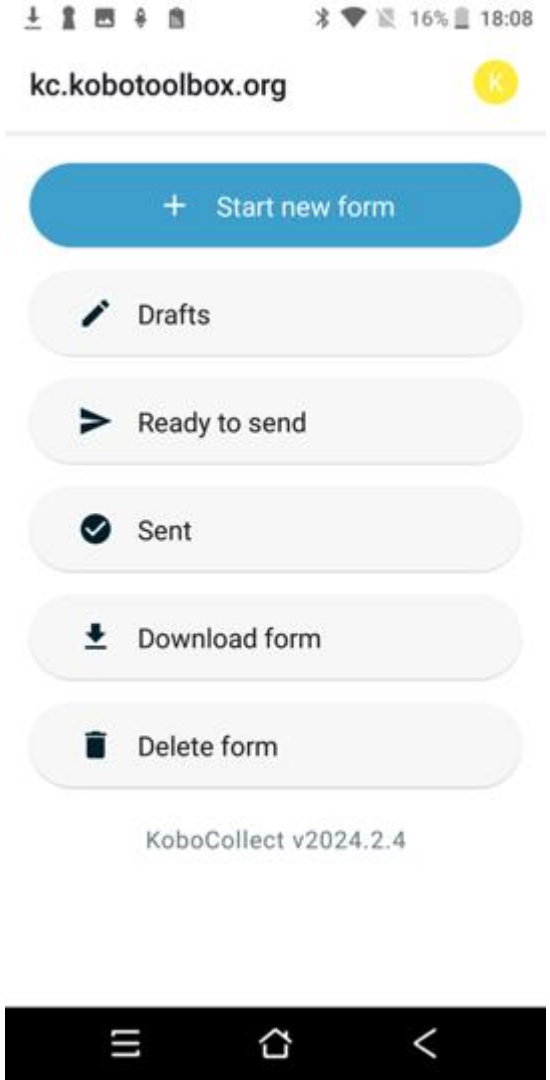
4. Open new form in kobo collect

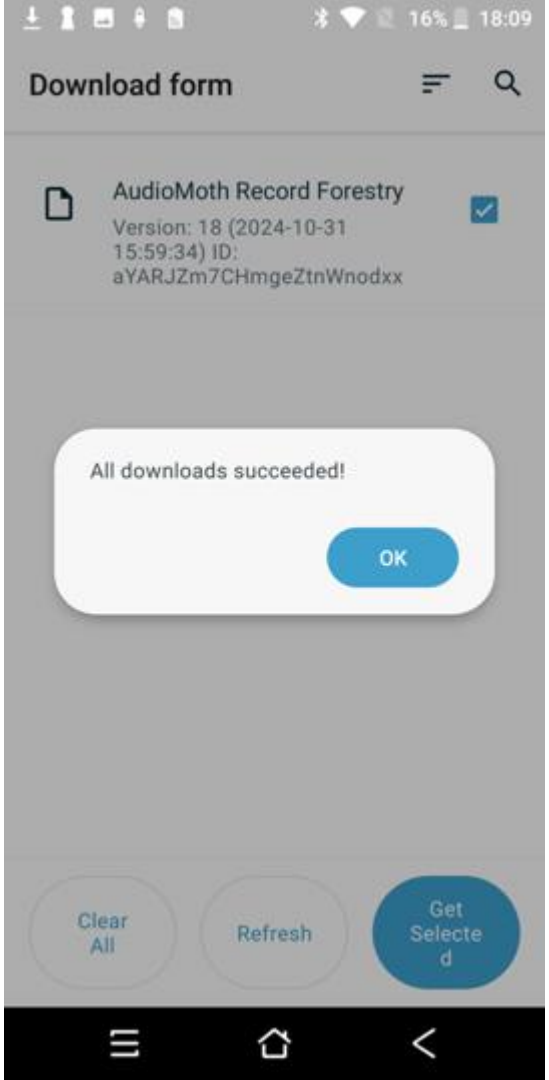
Download kobo collect onto your phone

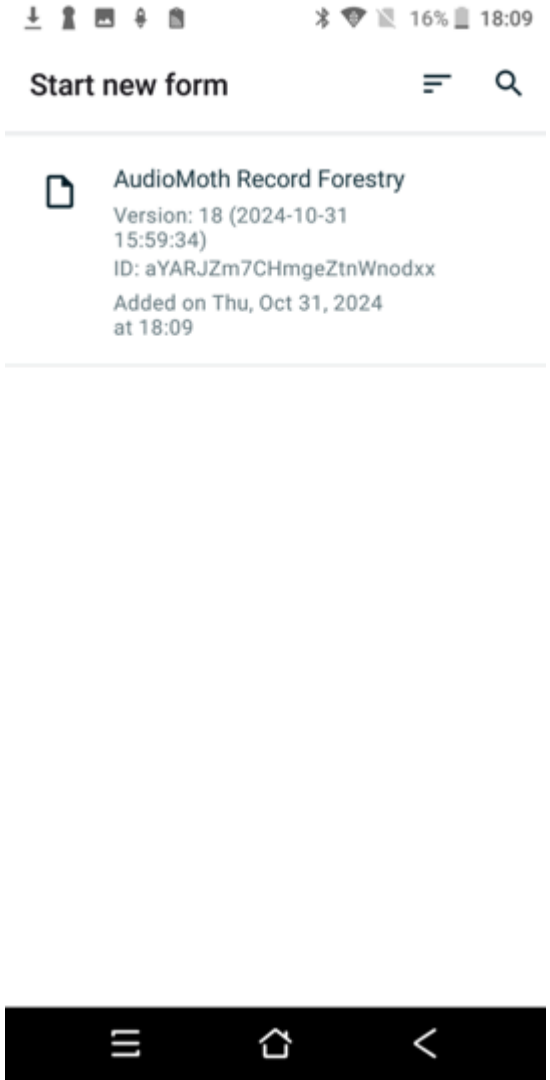
- Choose “Manually enter project details”
- In the **URL** box copy and paste the global server name:

https://kc.kobotoolbox.org




16% 18:08
kc.kobotoolbox.org
K
+ Start new form
Drafts
Ready to send
Sent
Download form
Delete form
KoboCollect v2024.2.4


16% 18:09
Download form
AudioMoth Record Forestry
Version: 18 (2024-10-31 15:59:34) ID: aYARJZm7CHmgeZtnWnodxx
All downloads succeeded!
OK
Clear All
Refresh
Get Selected

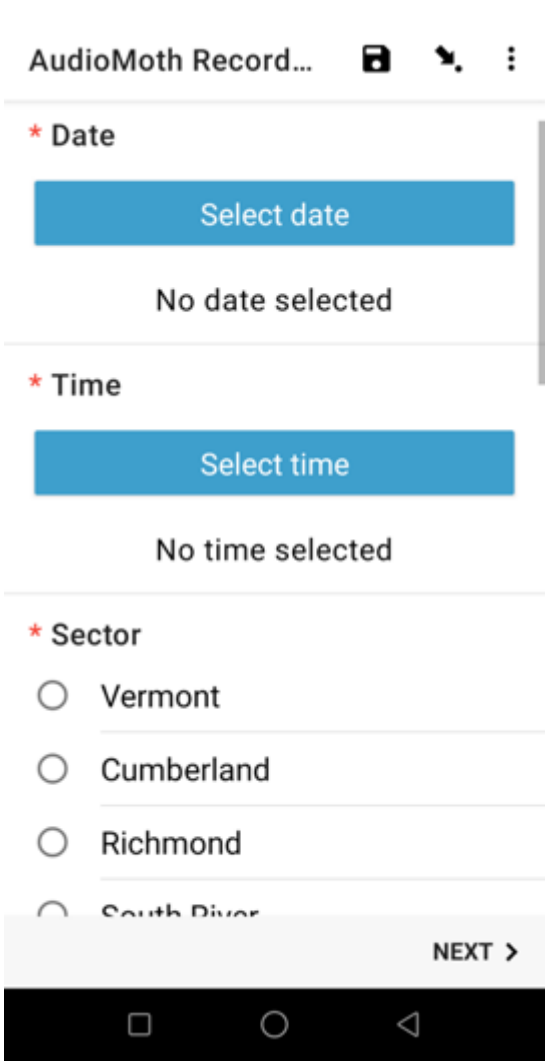

16% 18:09
Start new form
AudioMoth Record Forestry
Version: 18 (2024-10-31 15:59:34)
ID: aYARJZm7CHmgeZtnWnodxx
Added on Thu, Oct 31, 2024 at 18:09

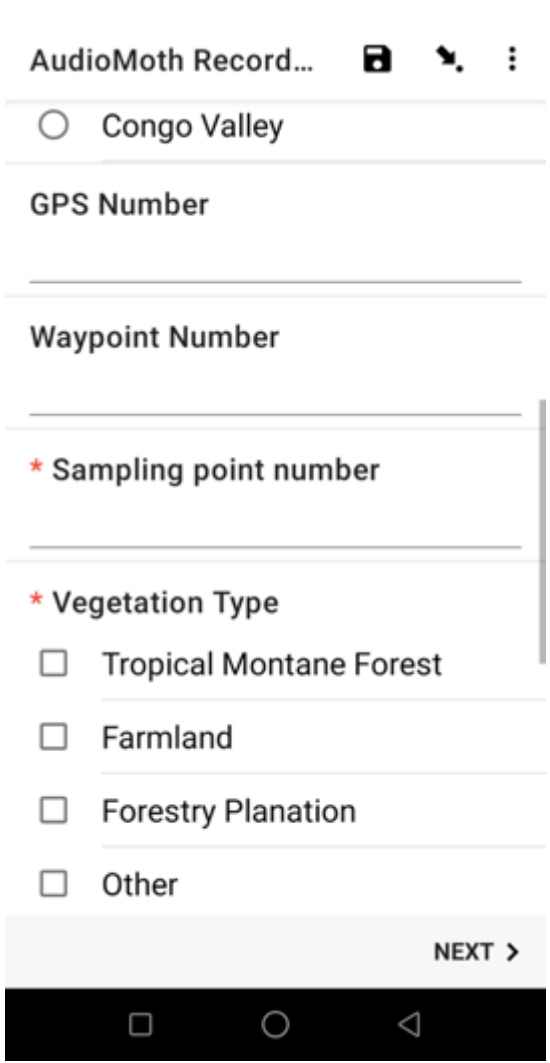
AUDIOMOTH DEPLOYMENT

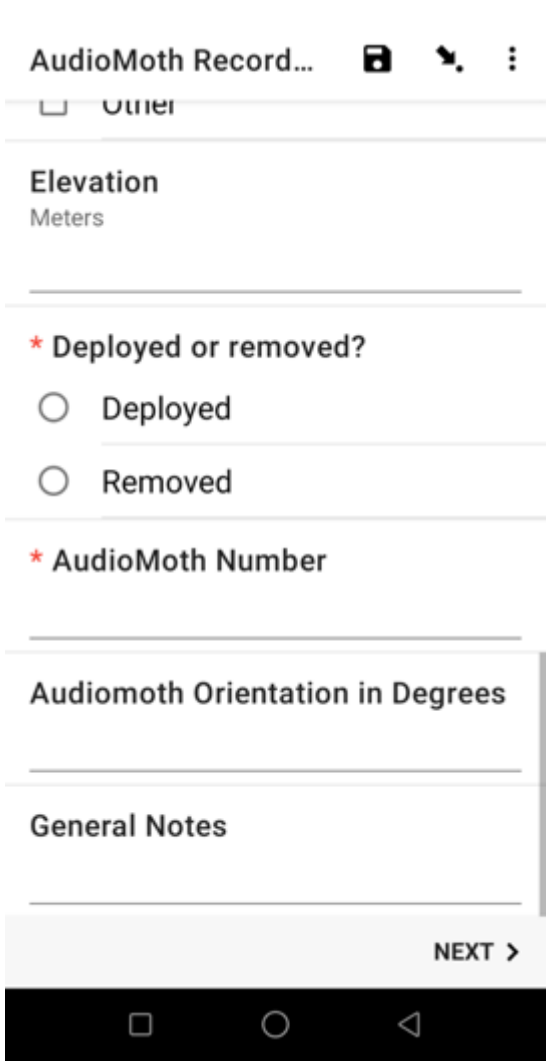
4. Open new form in kobo collect

5. Fill in basic info: Date, time, range, data collector, GPS number, Sampling point numb, Waypoint numb, Longitude, Latitude, Elevation, Vegetation type, Deployed/Removed, AudioMoth Number

- Ensure you deploy the AudioMoth Number that corresponds to the Sampling point number
- Take a GPS point (we will practice later)
- Characterize vegetation: Tropical montane forest, farmland, forestry plantation, other?

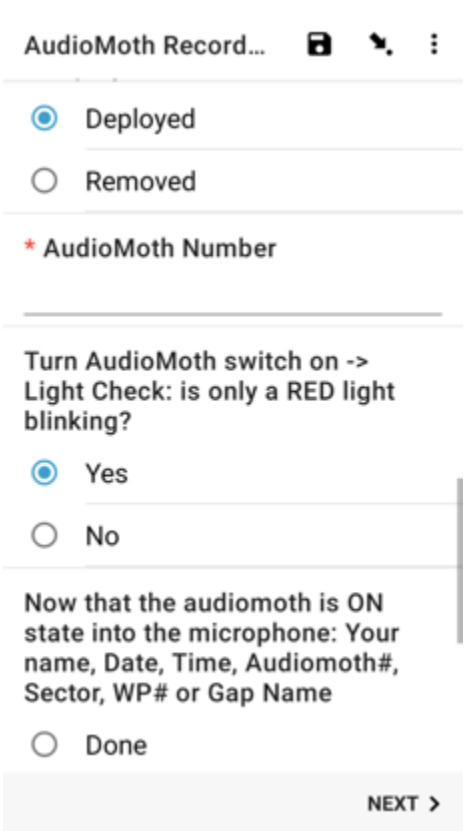

AudioMoth Record...
* Date
Select date
No date selected
* Time
Select time
No time selected
* Sector
Vermont
Cumberland
Richmond
NEXT >


AudioMoth Record...
Congo Valley
GPS Number
Waypoint Number
* Sampling point number
* Vegetation Type
Tropical Montane Forest
Farmland
Forestry Planation
Other
NEXT >


AudioMoth Record...
Elevation
Meters
* Deployed or removed?
Deployed
Removed
* AudioMoth Number
Audiomoth Orientation in Degrees
General Notes
NEXT >

AUDIOMOTH DEPLOYMENT

6. Open the waterproof case by pulling the black tab up and forward, and then backwards. The recorder may be taped to the box, don't try to move it or pull on the recorder as it might loosen the batteries. Leave it stuck to the box. If the batteries fall out you CANNOT deploy that AudioMoth.



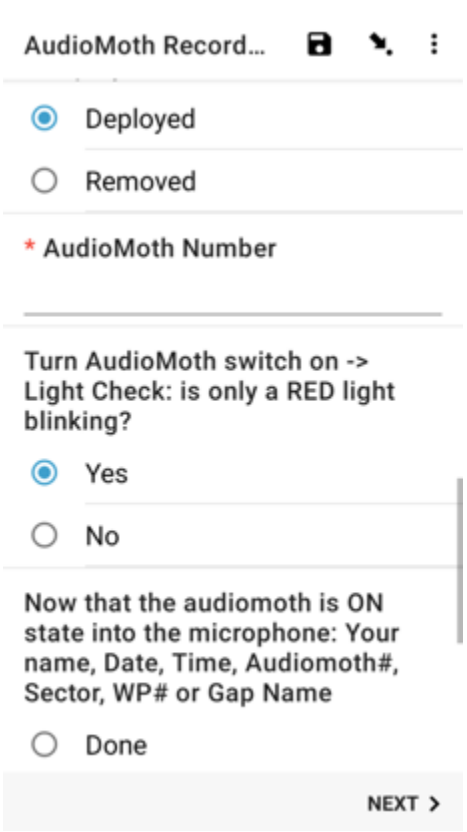
7. Turn the white switch to **CUSTOM**

8. Check that **ONLY the RED light** or **ONLY the GREEN light** is **blinking**. If both are blinking simultaneously, DO NOT deploy the AudioMoth as this means it is not well configured.

AUDIOMOTH DEPLOYMENT

9. Put the AudioMoth in the case and align the microphone icon with the vent on the bottom of the green box.

10. Close the case. If it doesn't close, gently push the black part of the recorder to give more space for it to close.



AUDIOMOTH DEPLOYMENT

11. Secure the AudioMoth to the chosen tree/branch using the strap. Make sure there are no branches or leaves blocking the vent.

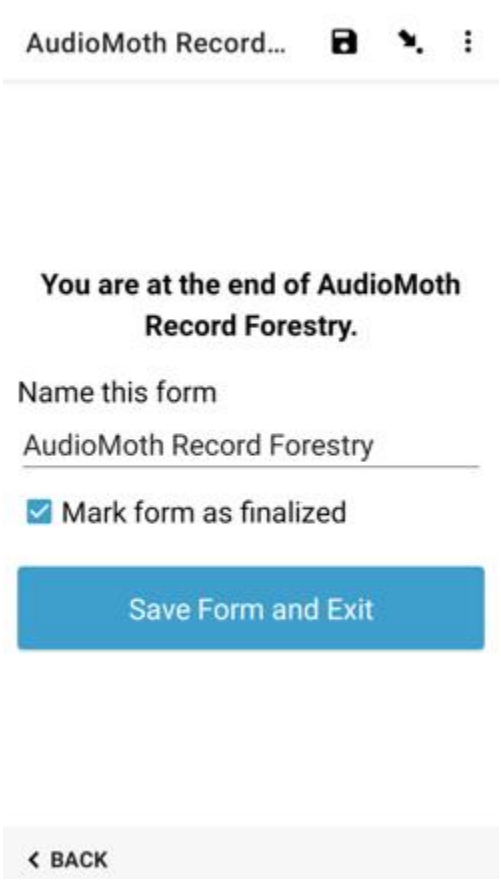
12. Take a picture of the AudioMoth. Try to have as many identifiable and easily recognizable features in it as possible. Write in any necessary description.

AUDIOMOTH DEPLOYMENT

13. If there are any more identifying details, note them in the “AudioMoth point description” or “General Notes” questions of the survey.

14. SAVE the form and exit.

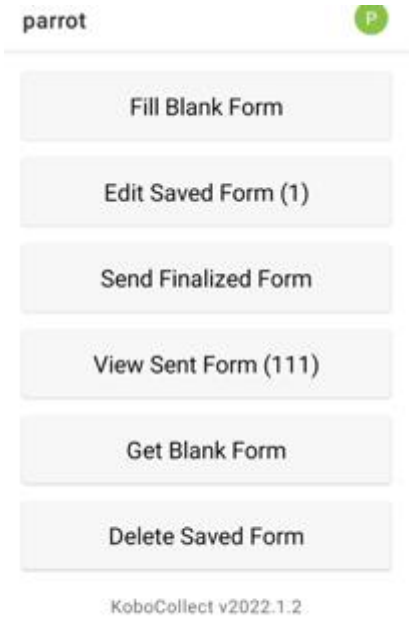
15. Flag a tree on the trail closest to the AudioMoth, preferably on the opposite side of where the AudioMoth was placed to be discrete.

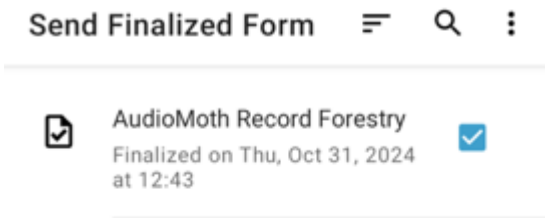


AUDIOMOTH DEPLOYMENT

13. Transfer data from kobo when you have internet connection by clicking on “Send Finalized Form”

14. Add details of deployment in your notebook: Date, time, audiomoth #, sample point #, confirm that data was transferred





Congratulations!
You completed a deployment cycle!

AUDIOMOTH RETRIEVAL

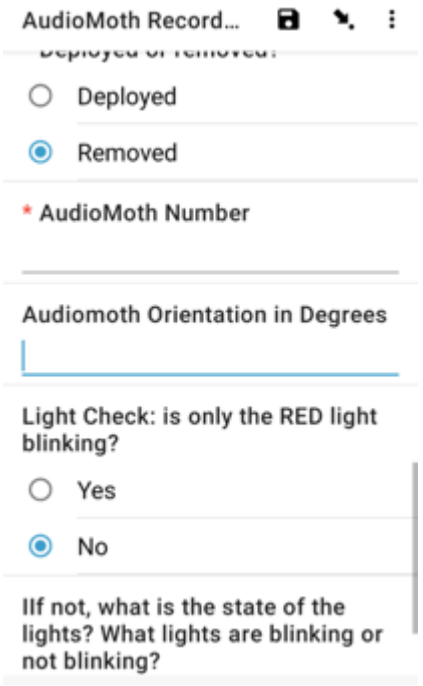
1. Field materials: GPS, phone with kobo, notebook

2. Open new form in kobo collect

3. Fill in basic info

4. Open the case

5. Check that ONLY the RED light or ONLY the GREEN light is blinking. If other lights are blinking note it in your form.



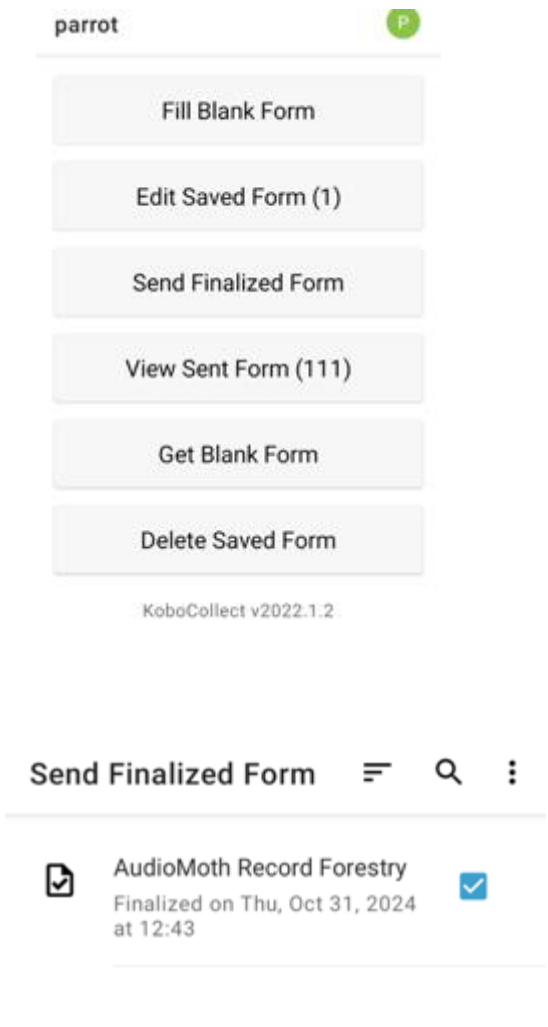
AUDIOMOTH RETRIEVAL

6. Turn AudioMoth switch OFF.

7. Transfer data from kobo when you have internet connection by clicking on “Send finalized form”

8. Add details of retrieval in your notebook: Date, time, audiomoth #, sample point #, confirm that data was transferred

9. Return AudioMoths to FMIP team and inform them if red or green light WAS NOT flashing.



04. ST VINCENT PARROT PAM PROTOCOL

PROJECT GOALS

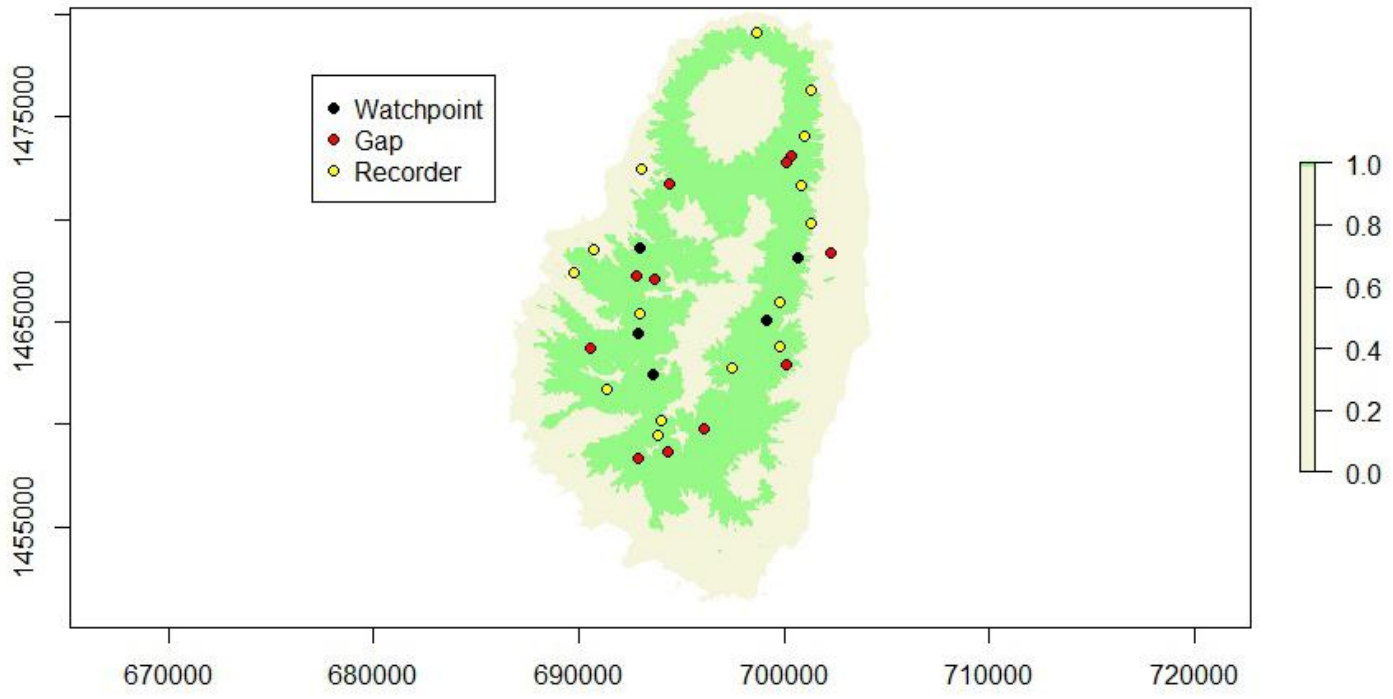
Critical habitat: Feeding

Critical habitat: Sleeping

Inform CAP and habitat delineation

Protect other wildlife that share parrot habitat; flagship species concept; indicator species

SVG PARROT MONITORING PROTOCOL: MONITOR LOCATION




Leaflet | Tiles © Esri — Source: Esri, i-cubed, USDA, U

SVG PARROT MONITORING PROTOCOL: CONFIGURATION

What times of the day should we have the monitors turned on?

- Battery life
- SD card capacity
- When they are making noise
- Questions:
  - What is the parrot's preferred habitat for SLEEPING (not traveling)

    5:30am-7:30am

    5:30pm-7:30pm

  - What is the parrot's preferred habitat for EATING

    10am-4pm

SVG PARROT MONITORING PROTOCOL: SCHEDULE

When will AudioMoths be deployed and retrieved based on configuration, battery life and SD capacity?

05. GPS OVERVIEW

USING YOUR GPS: FINDING A SURVEY POINT

1. Turn ON: Press and hold power button
2. Select **FIND**
3. Choose WAYPOINTS -> Choose survey point
4. Start Navigation -> Press GO
5. Follow the arrow on the compass screen or the route on the Map screen

USING YOUR GPS: TAKING A WAYPOINT

1. Turn ON: Press and hold power button
2. Press MARK
3. Confirm or edit the waypoint: change the number at the top of the screen to “survey point & location” (e.g., PO1 Fancy”). This is only done the first time AM are deployed.
4. Save the waypoint: Navigate to “Done” and pressOK.
5. Note latitude, longitude and elevation

THANK YOU!

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