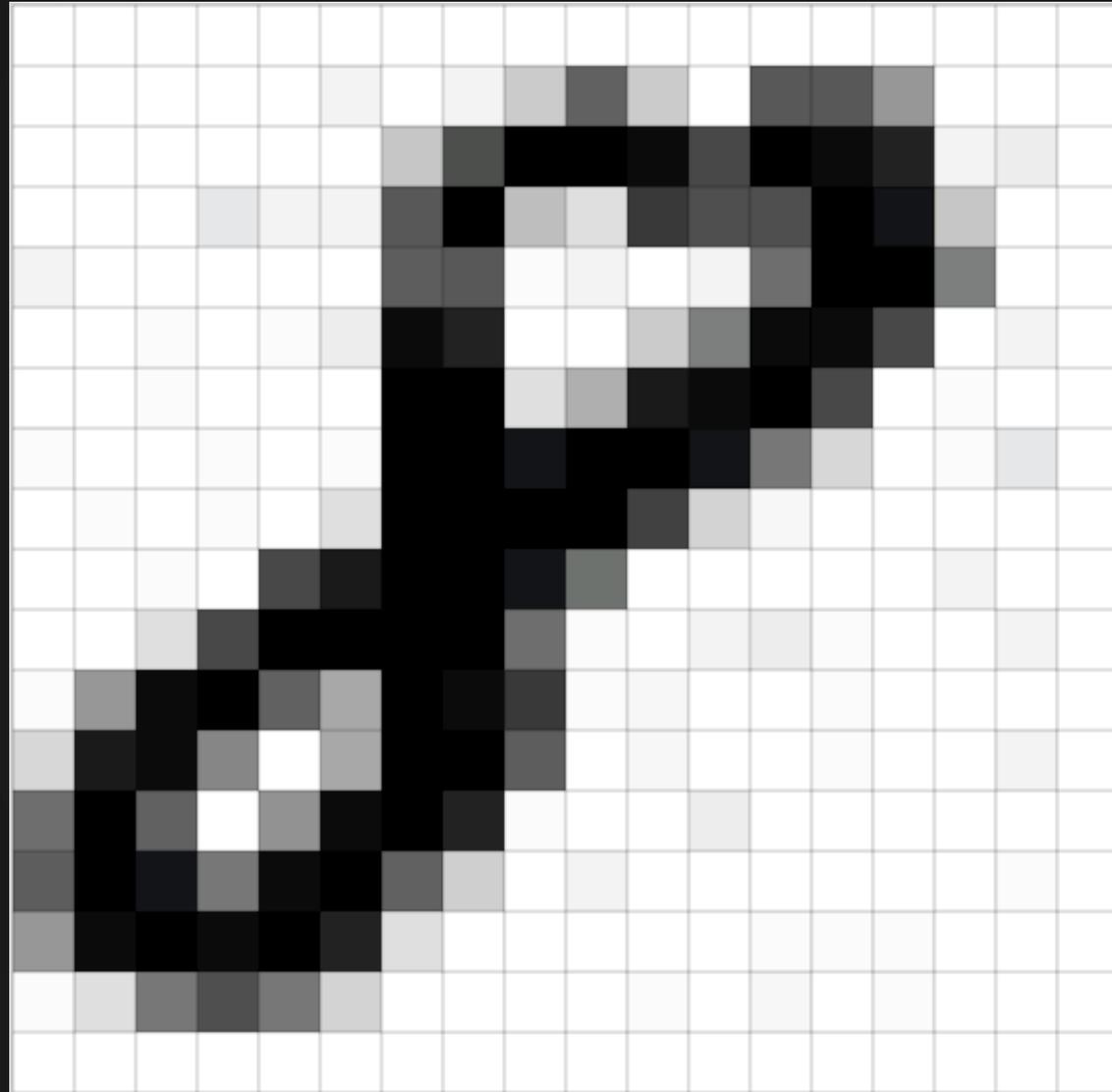
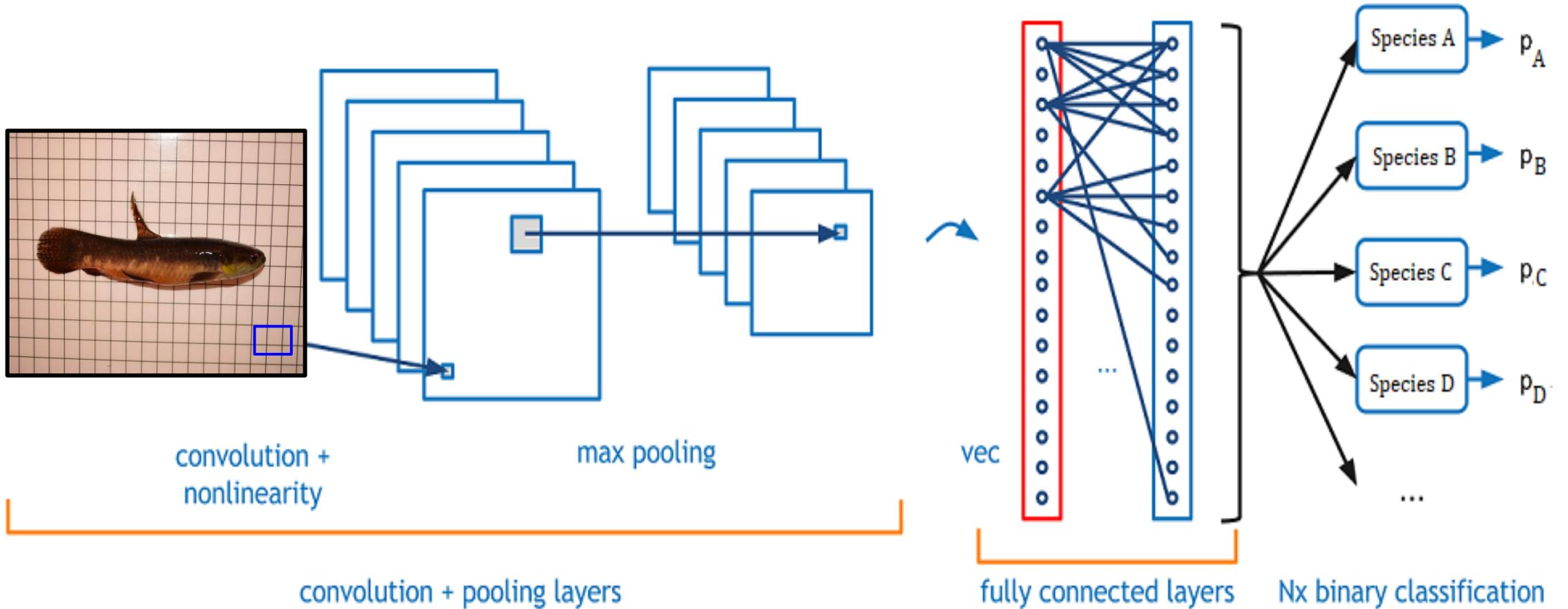




# Machine Learning



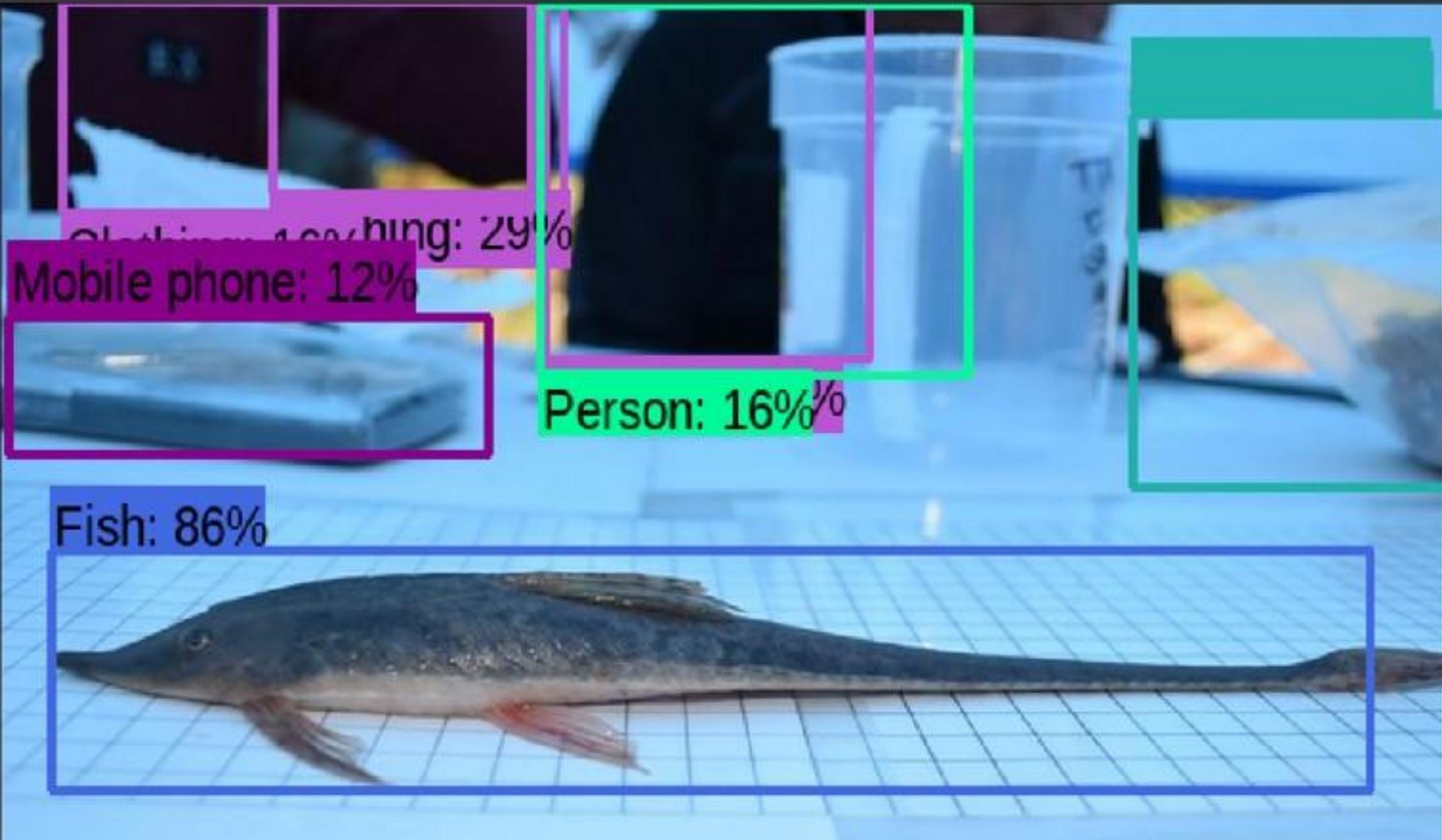
# Convolutional Neural Networks



Clothing: 29%  
Mobile phone: 12%

Person: 16%

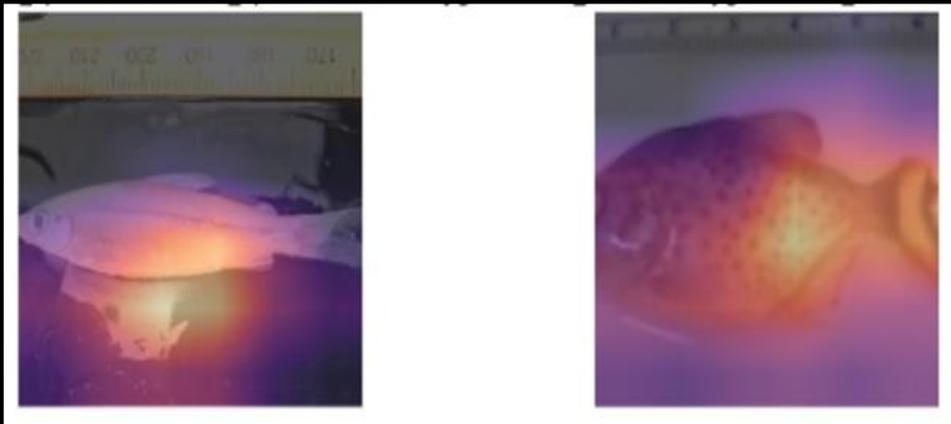
Fish: 86%





# Results

- 3,144 images
- 33 genera
- 88-99% accuracy



Confusion matrix

Actual \ Predicted	Ancistrus	Apistogramma	Astyanax	Bujurquina	Characidium	Copella	Corydoras	Curimata	Doras	Erythrinus	Hemigrammus	Hypessobrycon	Moenkhausia	Otocinclus	Oxyropsis	Phenacogaster	Pimelodella	Prochilodus	Pygocentrus	Pyrrhulina	Rineloricaria	Tatia	Tytocharax	
Ancistrus	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apistogramma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Astyanax	0	0	4	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0
Bujurquina	0	0	0	9	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Characidium	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Copella	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corydoras	0	0	0	0	0	0	6	0	0	1	1	0	1	0	0	0	0	0	0	0	0	2	0	0
Curimata	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Doras	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrinus	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Hemigrammus	0	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypessobrycon	0	0	0	0	1	0	0	0	0	0	1	15	0	1	0	0	0	0	0	0	0	0	0	0
Moenkhausia	0	0	0	0	0	0	1	0	0	0	1	2	11	0	0	2	0	0	0	0	1	0	0	0
Otocinclus	0	0	0	0	2	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	1	0	0
Oxyropsis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Phenacogaster	0	0	0	0	1	0	1	0	0	0	0	2	0	0	0	4	0	0	0	0	0	0	0	0
Pimelodella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	1	2	0	0
Prochilodus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0
Pygocentrus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0
Pyrrhulina	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	10	0	0	0
Rineloricaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Tatia	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	2	3	0
Tytocharax	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

## Benefits

- Standardized community monitoring approaches
- Reduces bias in species identification

## Considerations

- Take more photos, please!
- Requires technical capacity to develop model





# Questions

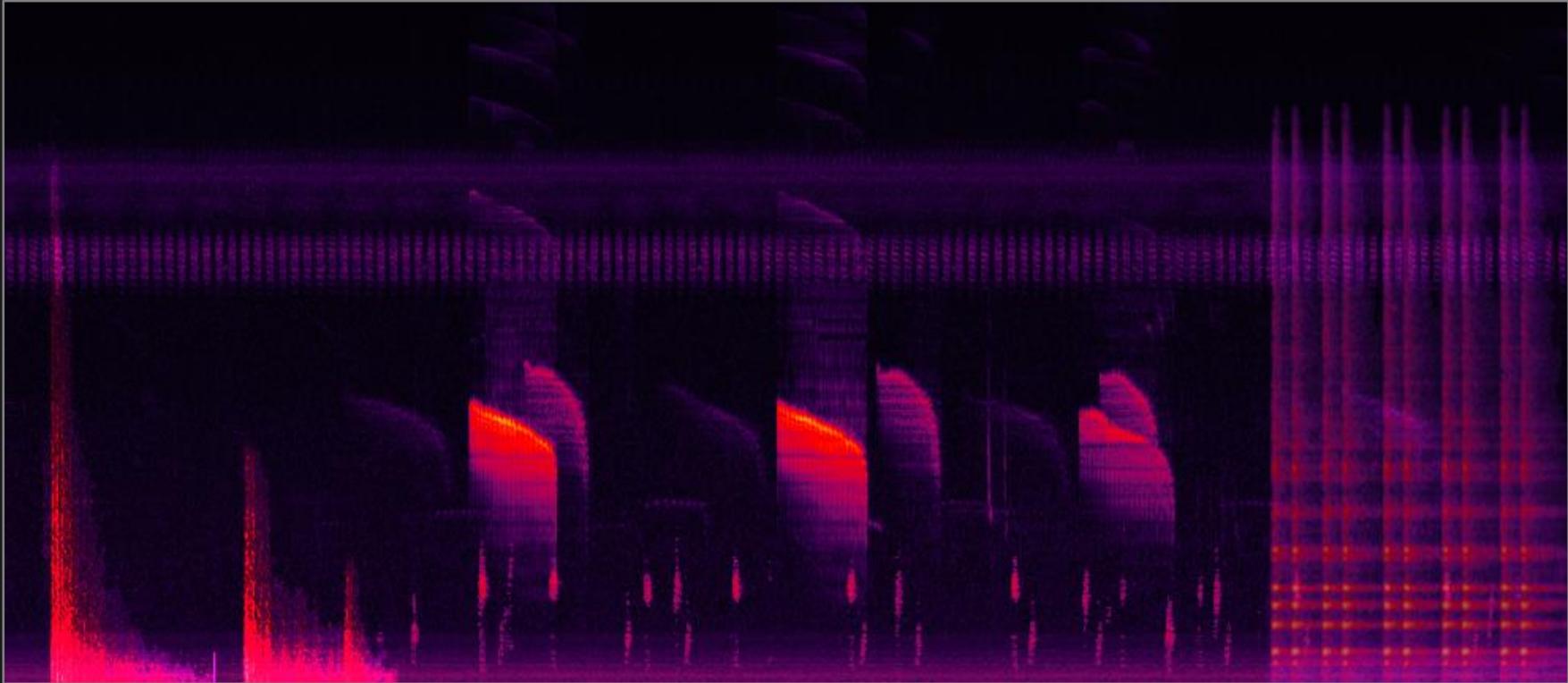


# Sound Classification



# Passive Acoustic Monitoring





**GEOPHONY**

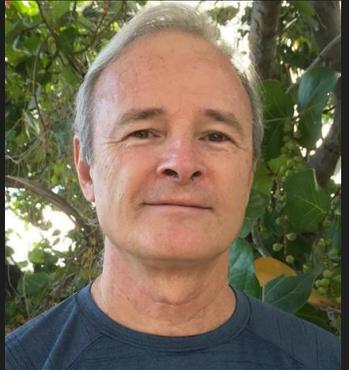


**BIOPHONY**

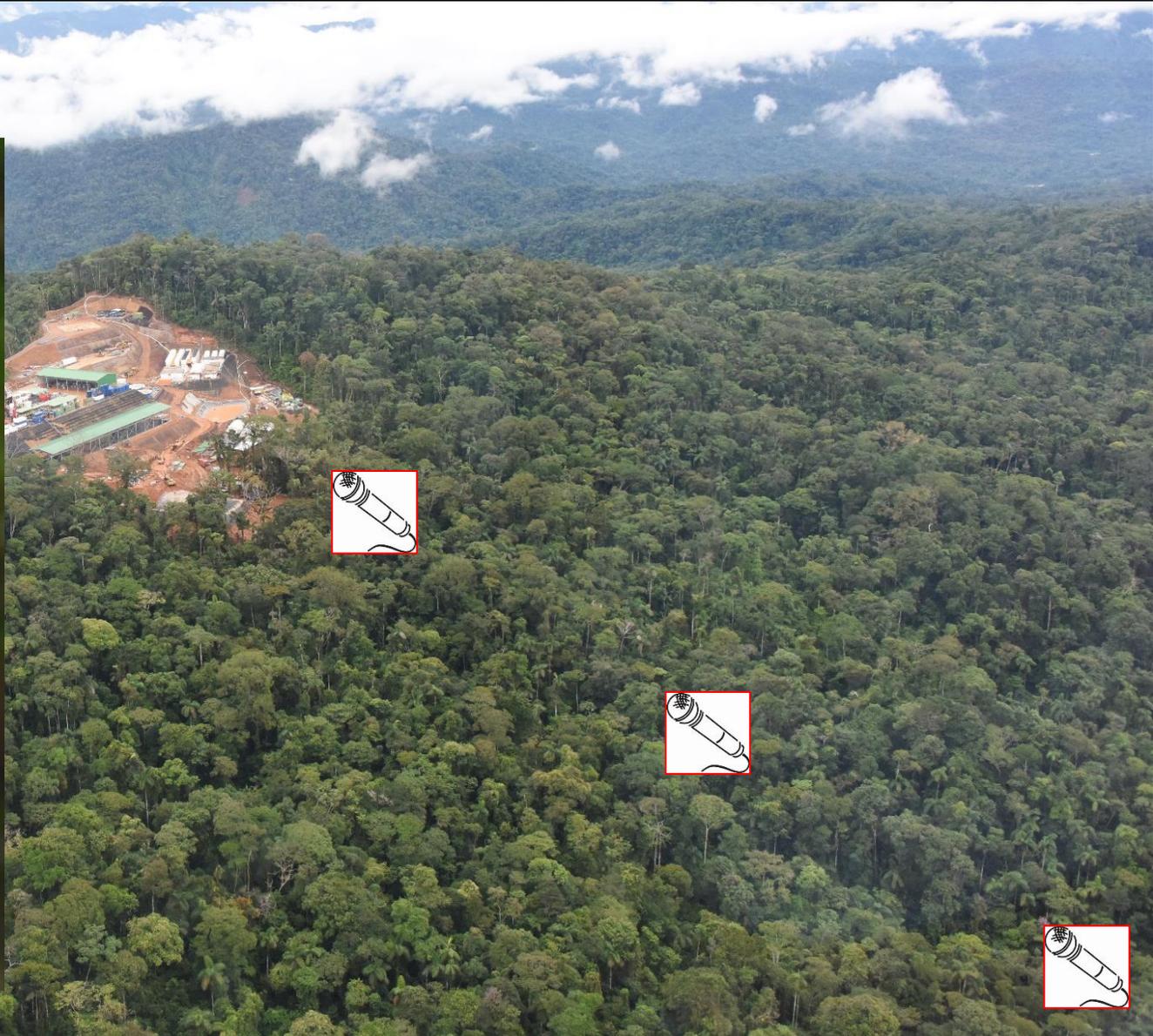


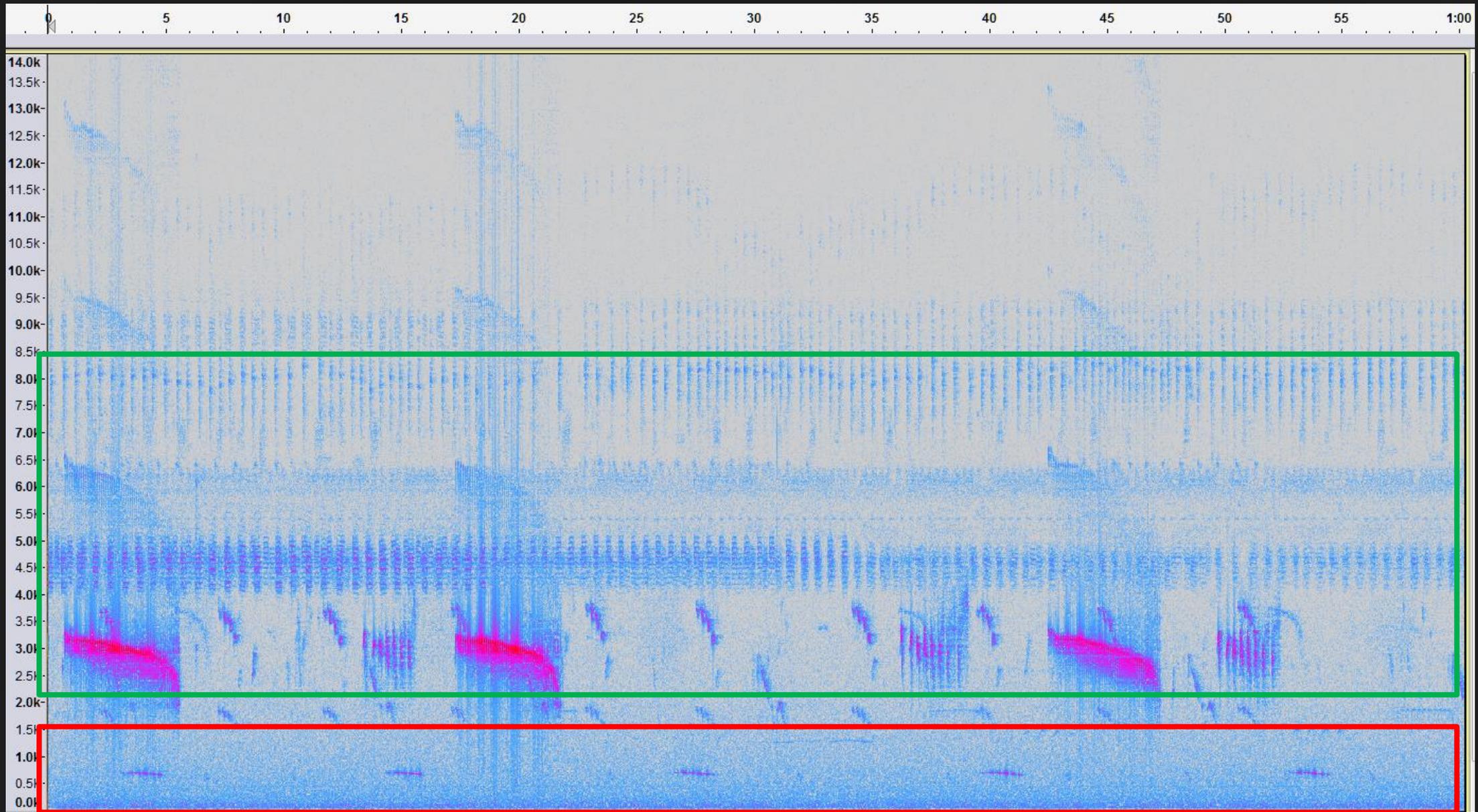
**ANTHROPHONY**

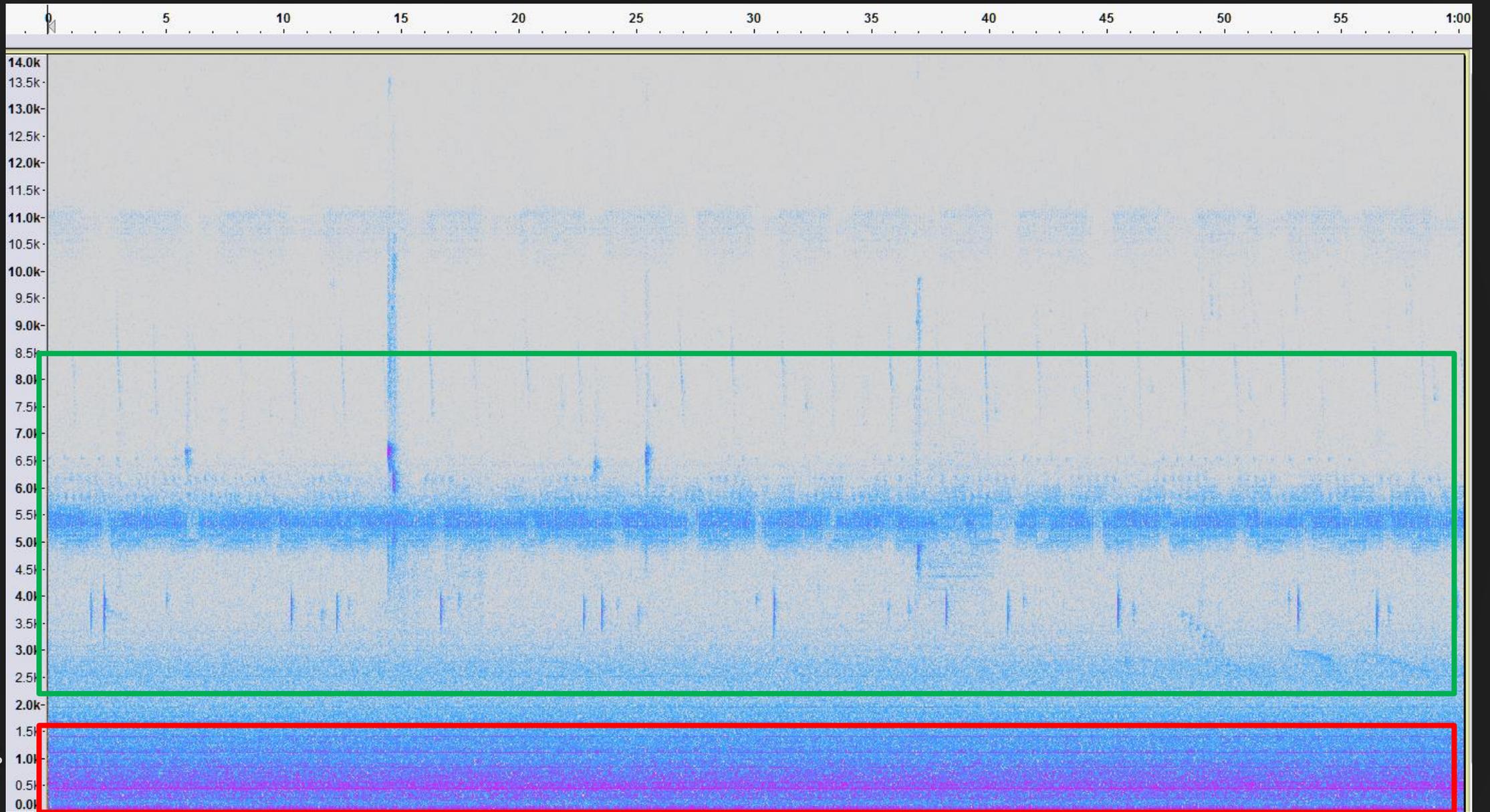






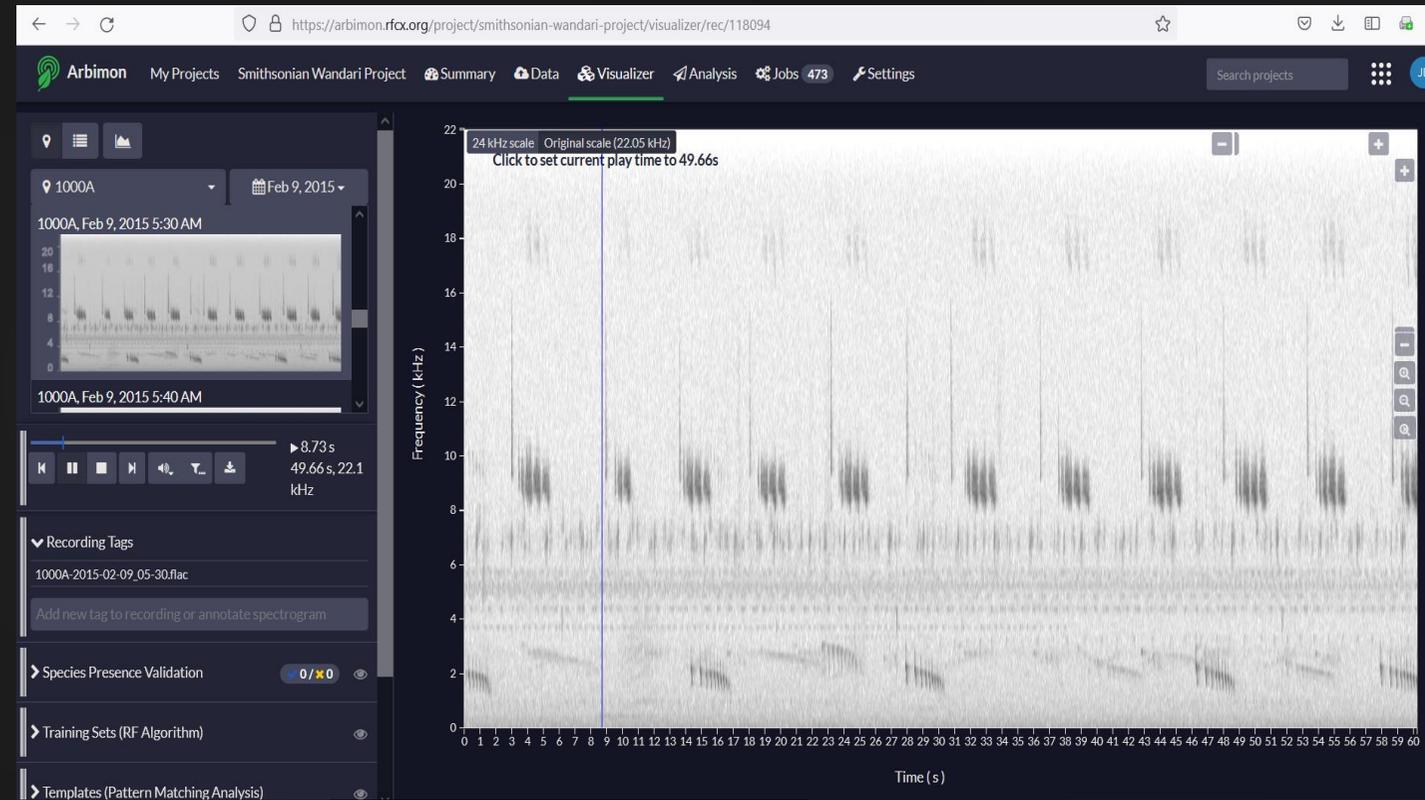






# Analysis

- >100,000 recordings
- Storage, visualization and analysis with Arbimon
- Manual revision
- Classification and focal species analysis
- Soundscape



<https://arbimon.rfcx.org/>

# Results - Manual



- 12 amphibian species (600 dusk recordings)
- Distance from platform

