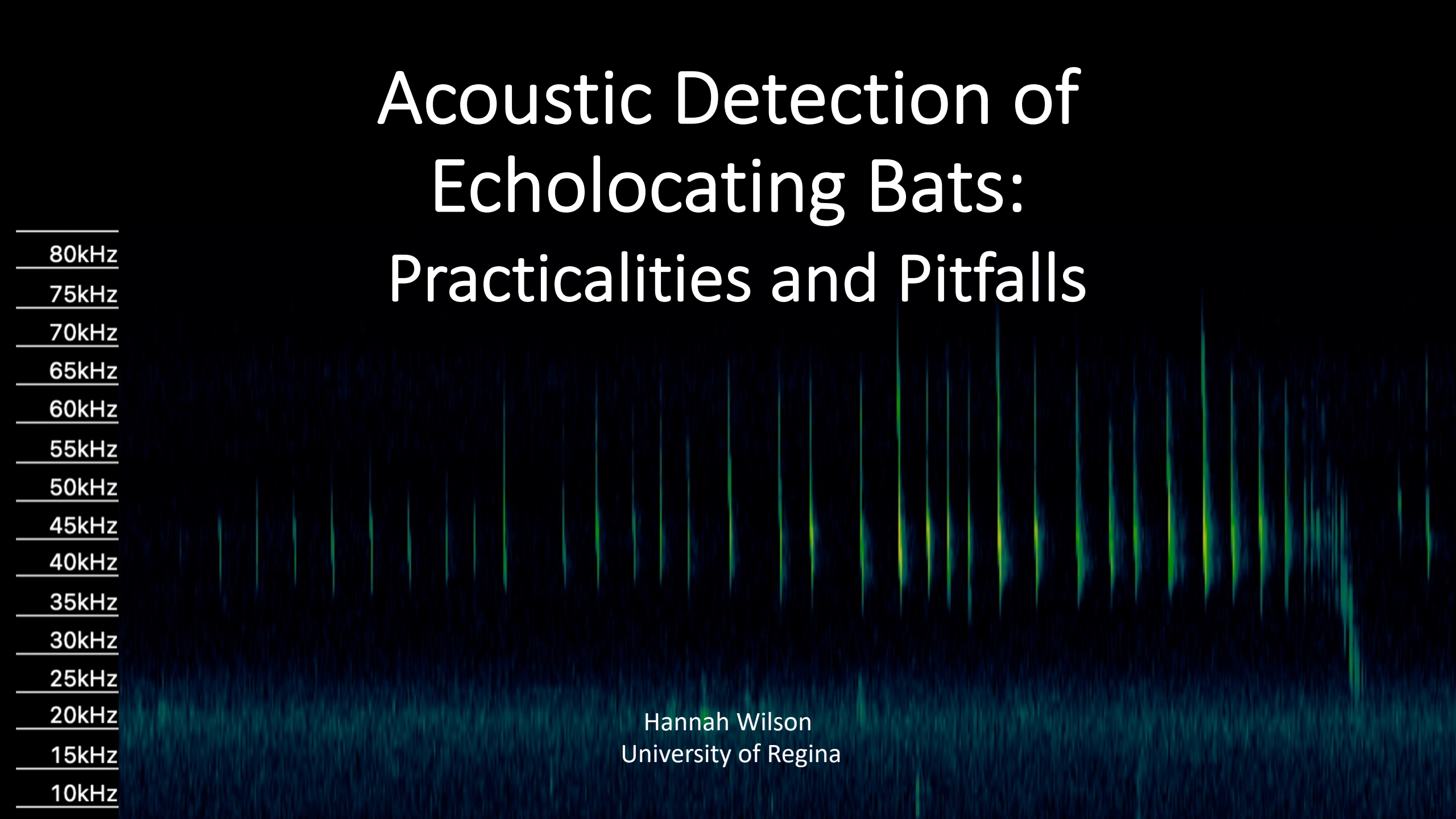
Acoustic Detection of Echolocating Bats: Practicalities and Pitfalls



Hannah Wilson
University of Regina

How do bats use sound

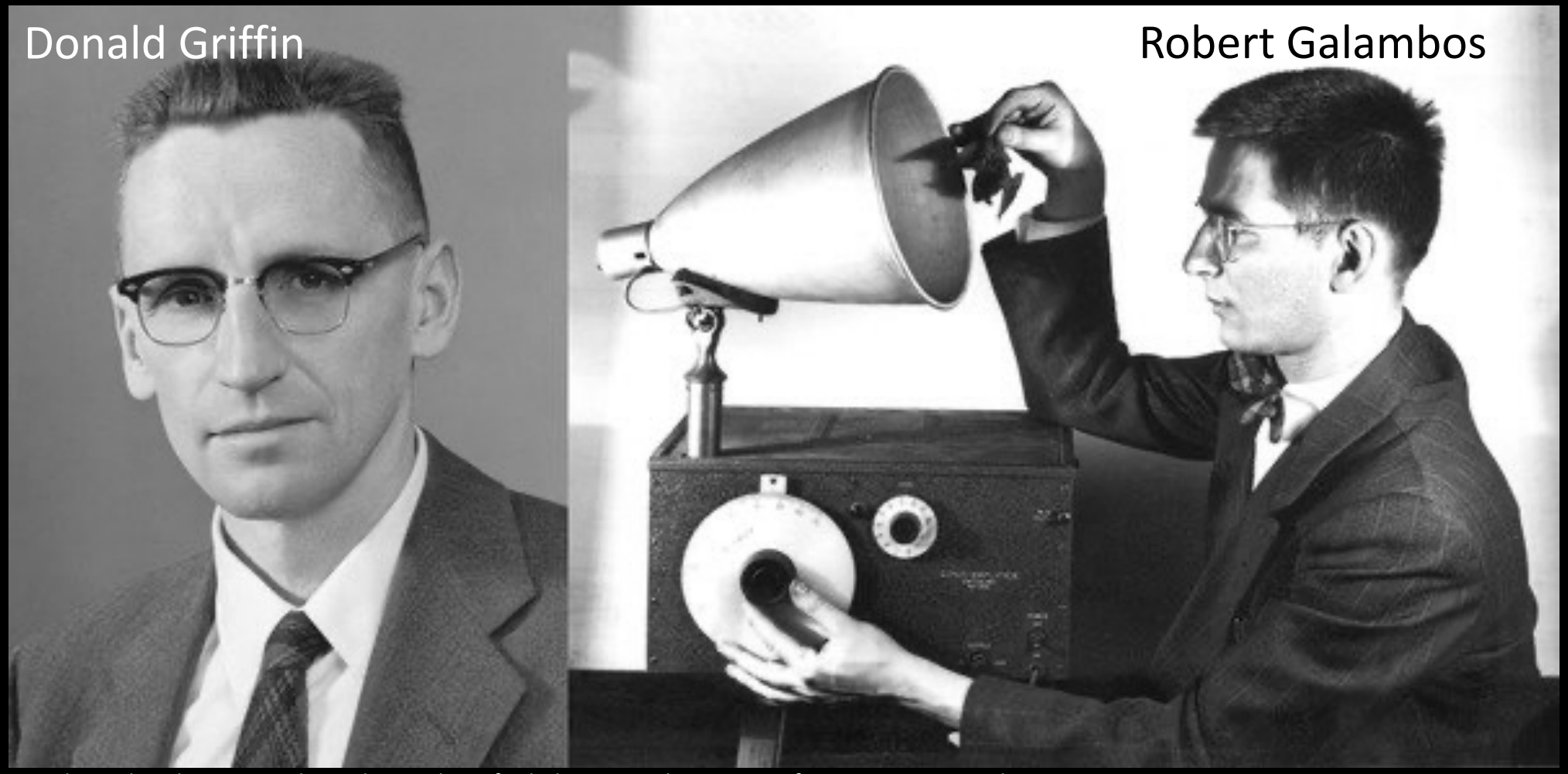
How do bats use sound

Echolocation

Communication

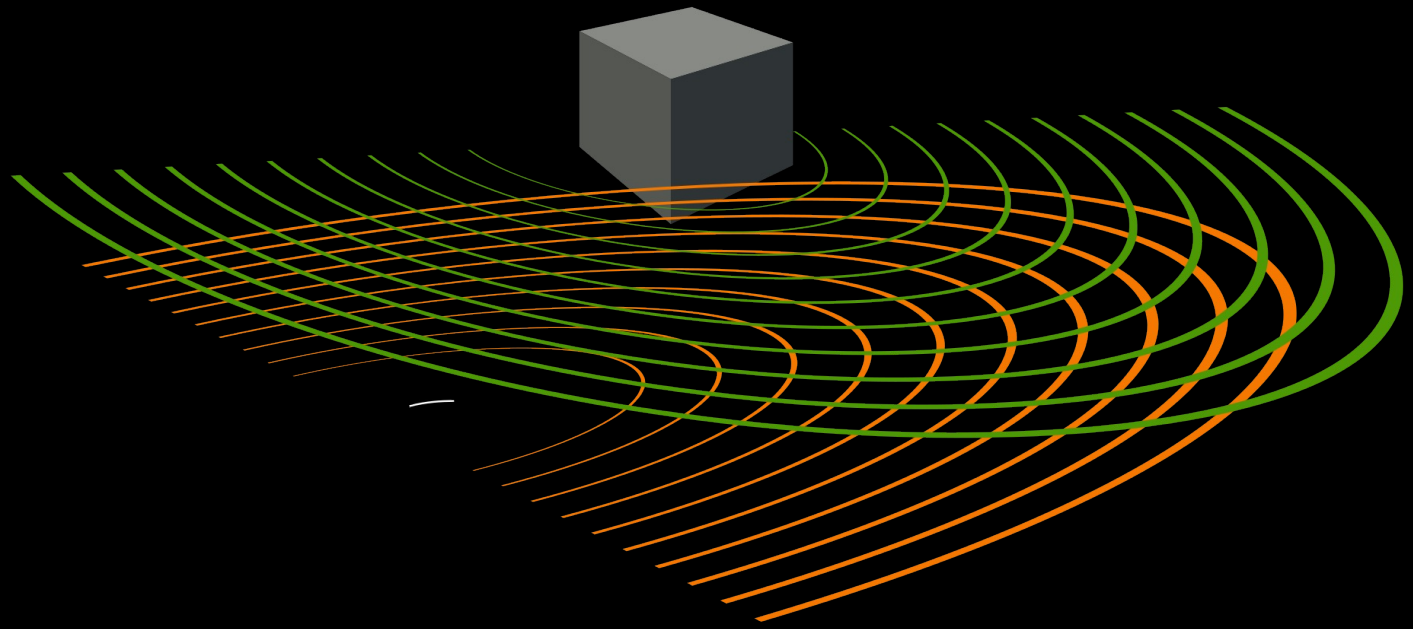
History of Echolocation

History of Echolocation

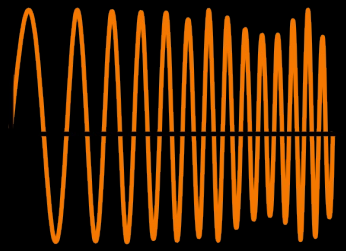


Credit: Early milestones in the understanding of echolocation in bats - Scientific Figure on ResearchGate.

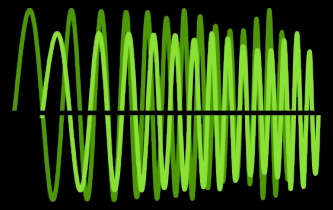
How does echolocation work?



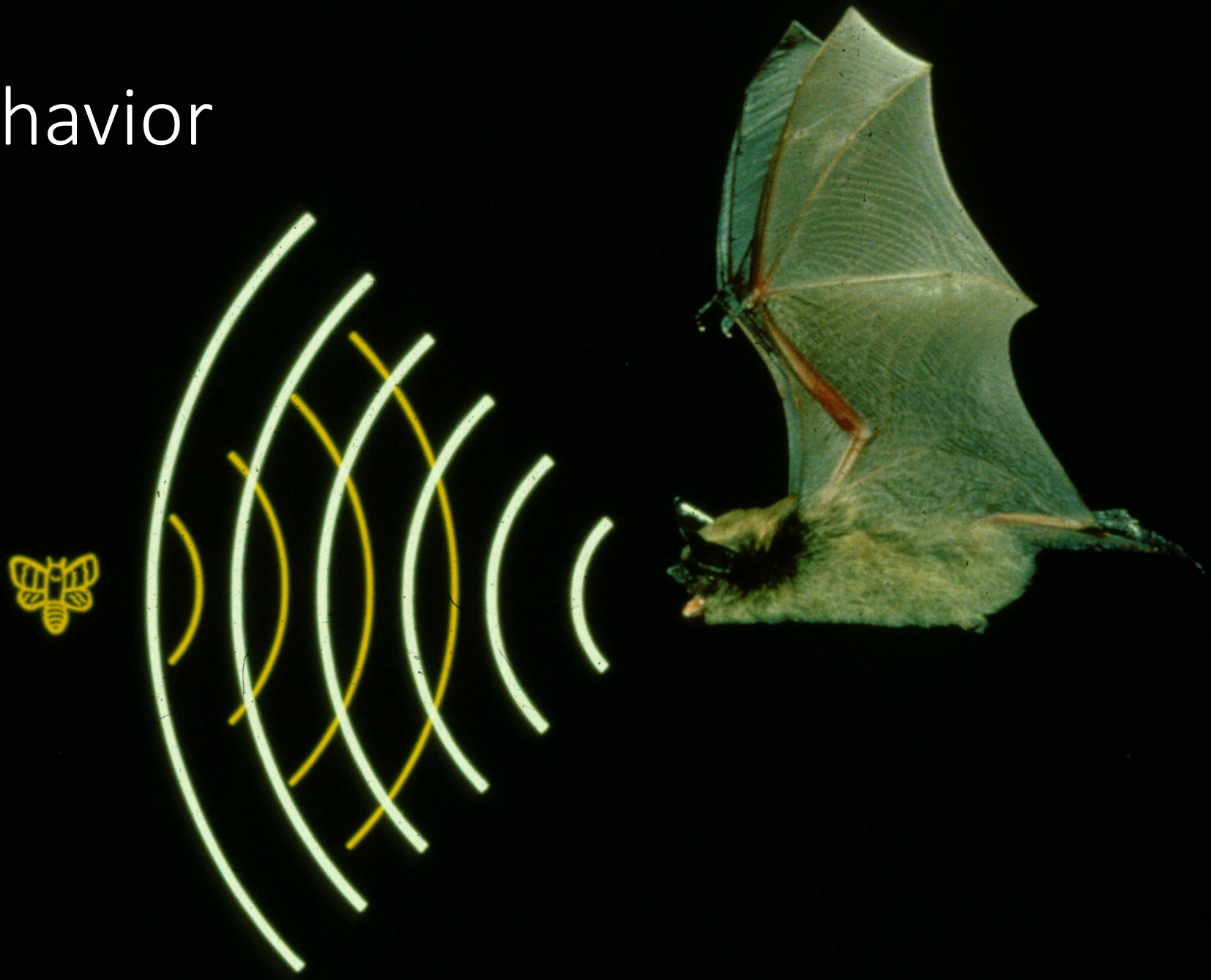
Call

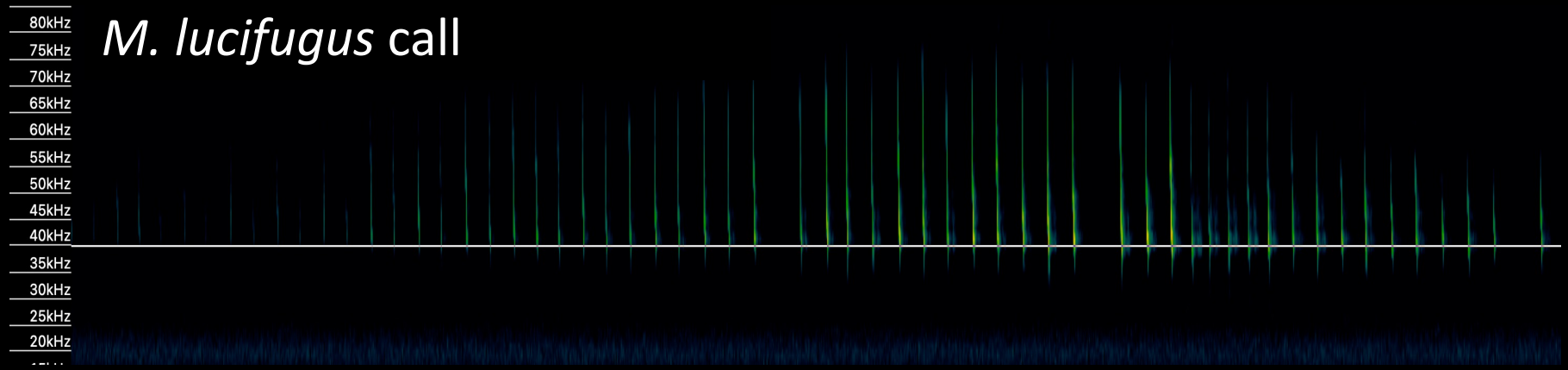


Echo

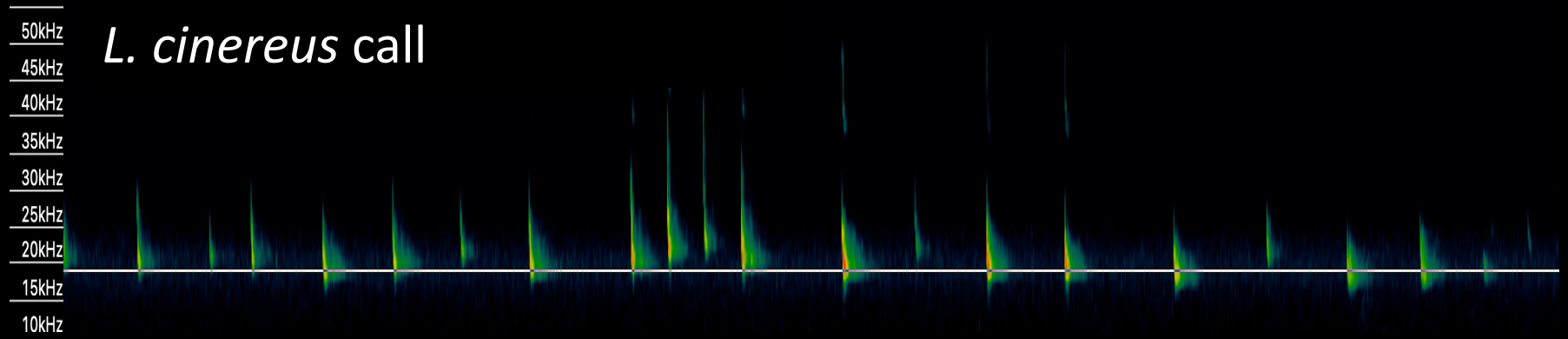


Feeding behavior

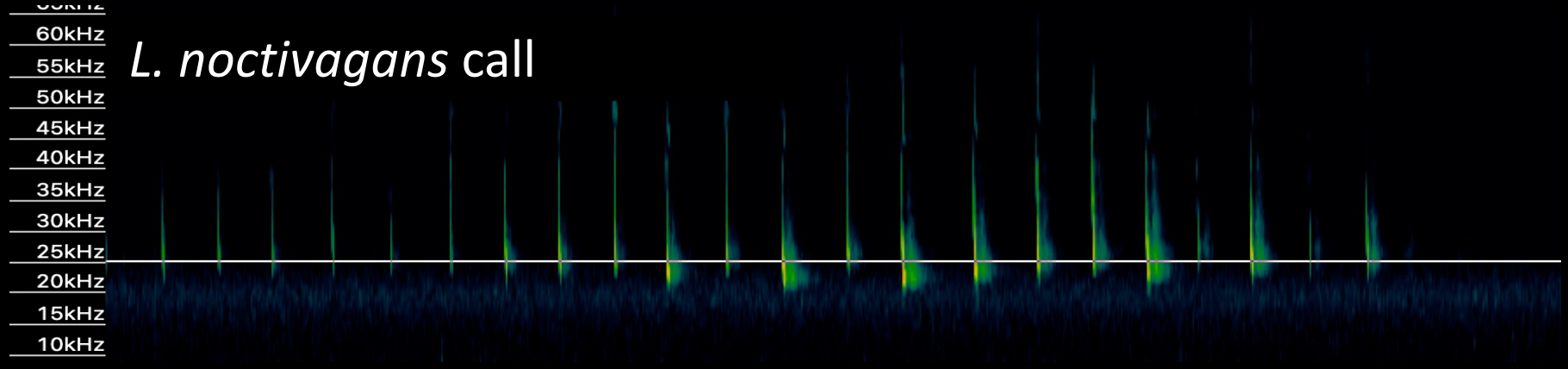




M. lucifugus call



L. cinereus call



L. noctivagans call

Whispering Bats

Fishing Bats

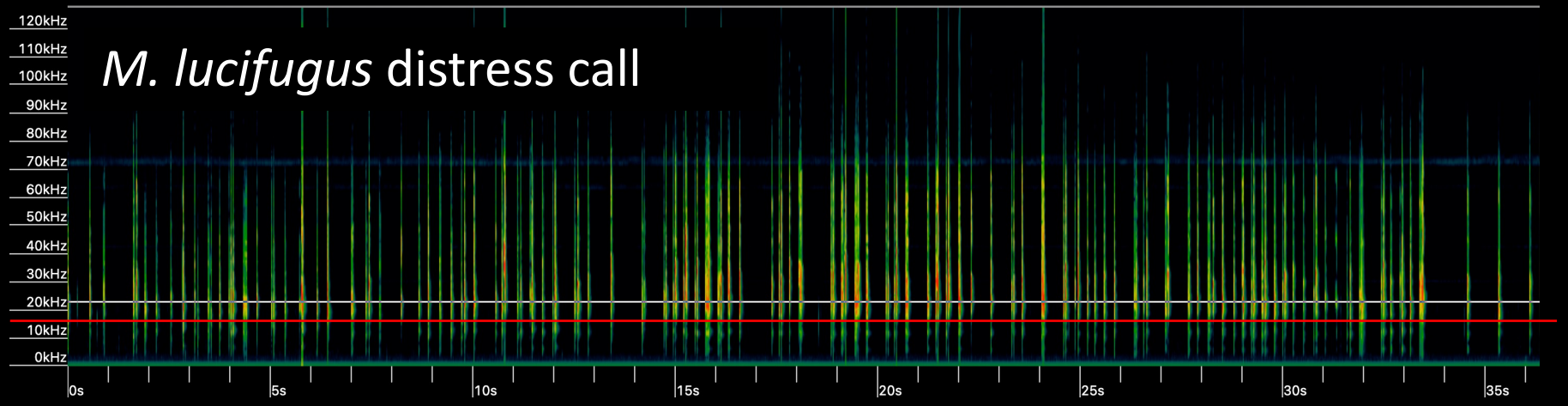
Credit: Phil Myers

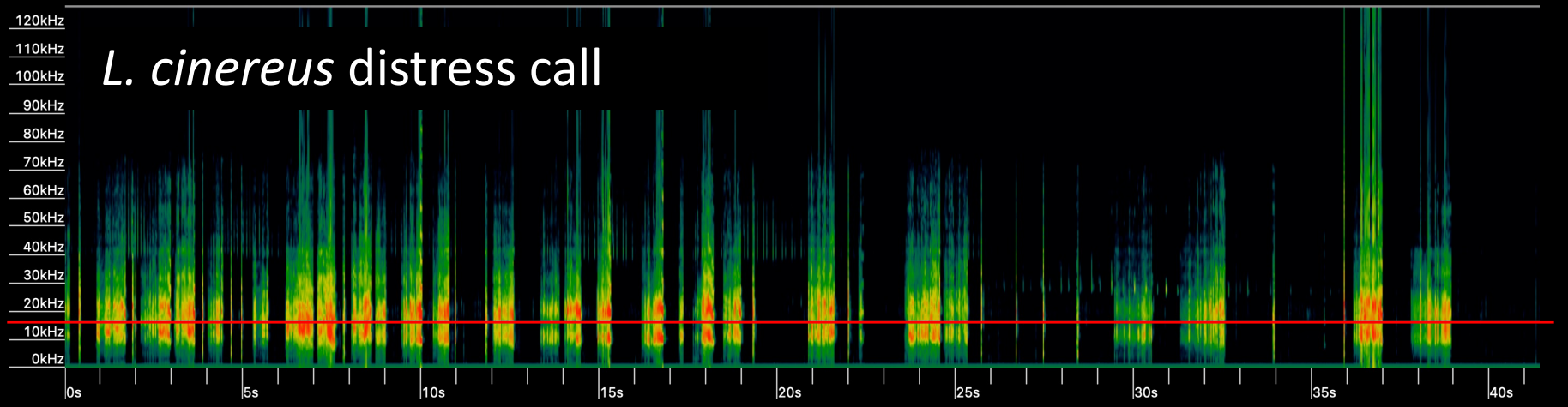
Nectivorous bats

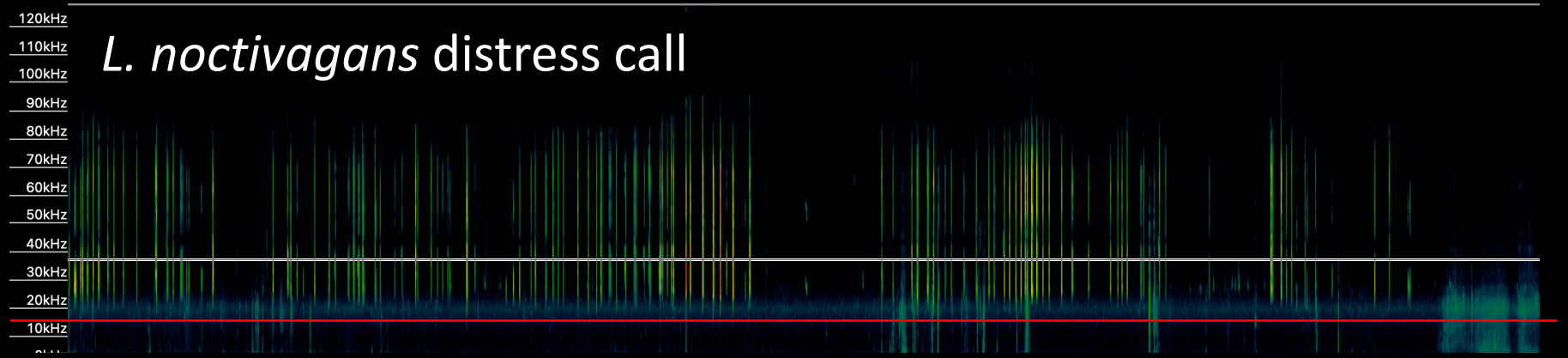
Credit: Franz Xaver

Credit: Karin Schneeberger

COMMUNICATION: distress calls


M. lucifugus distress call
120kHz
110kHz
100kHz
90kHz
80kHz
70kHz
60kHz
50kHz
40kHz
30kHz
20kHz
10kHz
0kHz
0s
5s
10s
15s
20s
25s
30s
35s


L. cinereus distress call
120kHz
110kHz
100kHz
90kHz
80kHz
70kHz
60kHz
50kHz
40kHz
30kHz
20kHz
10kHz
0kHz
0s
5s
10s
15s
20s
25s
30s
35s
40s


L. noctivagans distress call
120kHz
110kHz
100kHz
90kHz
80kHz
70kHz
60kHz
50kHz
40kHz
30kHz
20kHz
10kHz

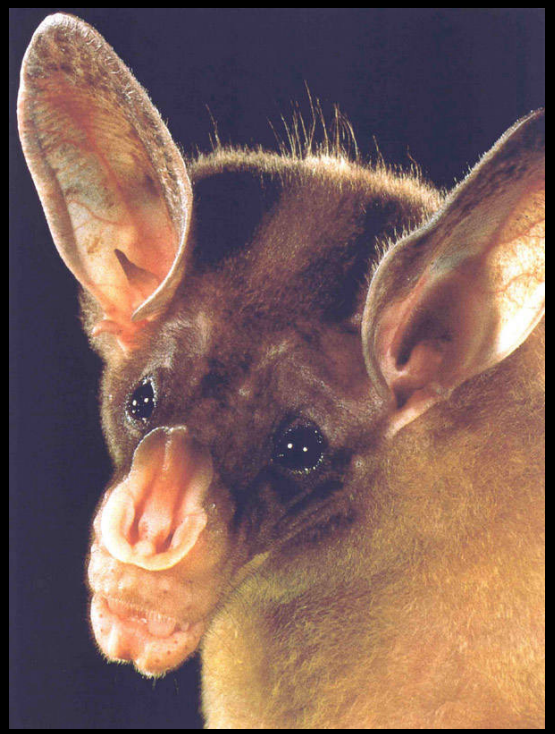
Individual Identification

Mating

What is bioacoustics?

Production

Transmission

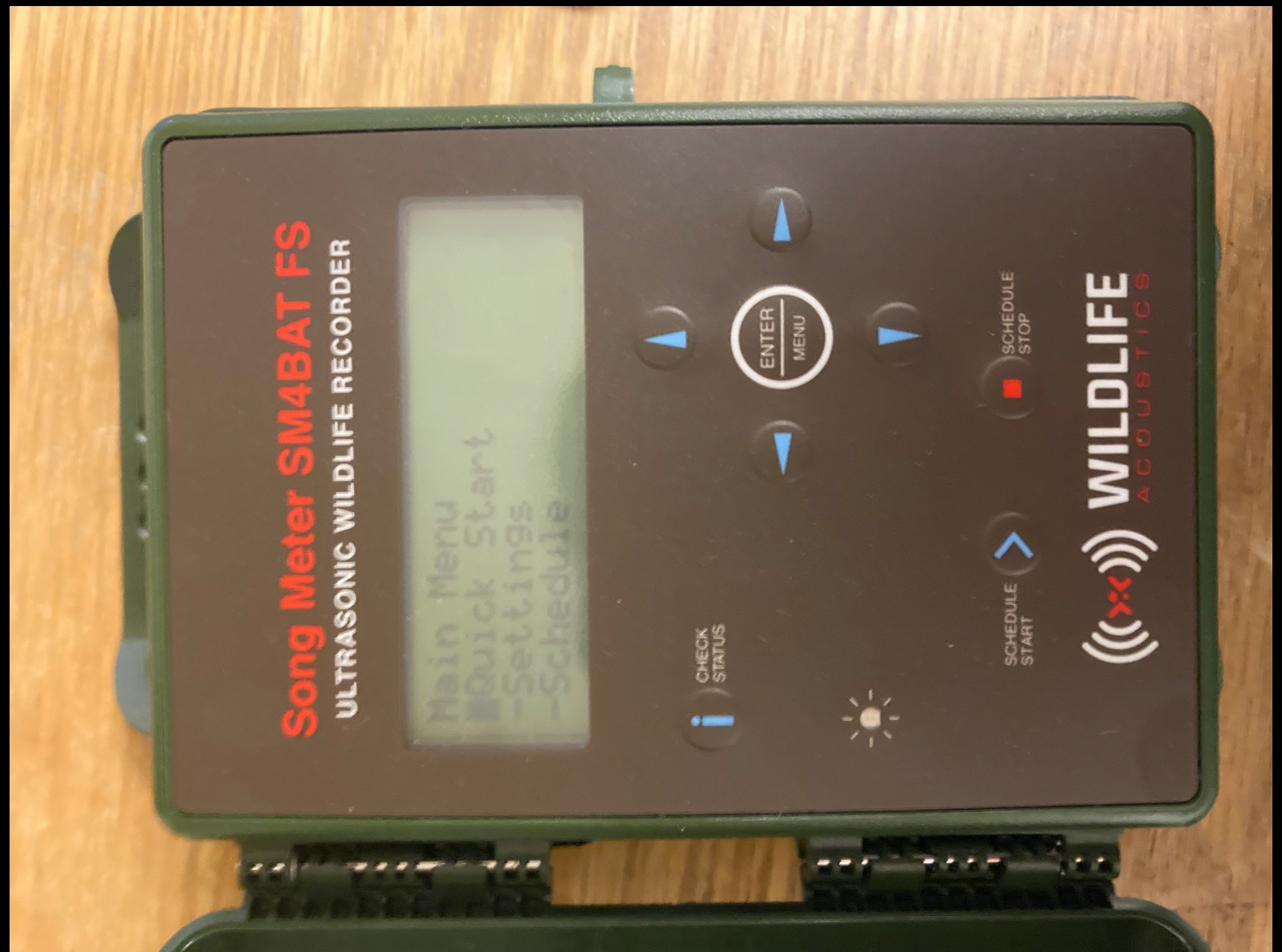


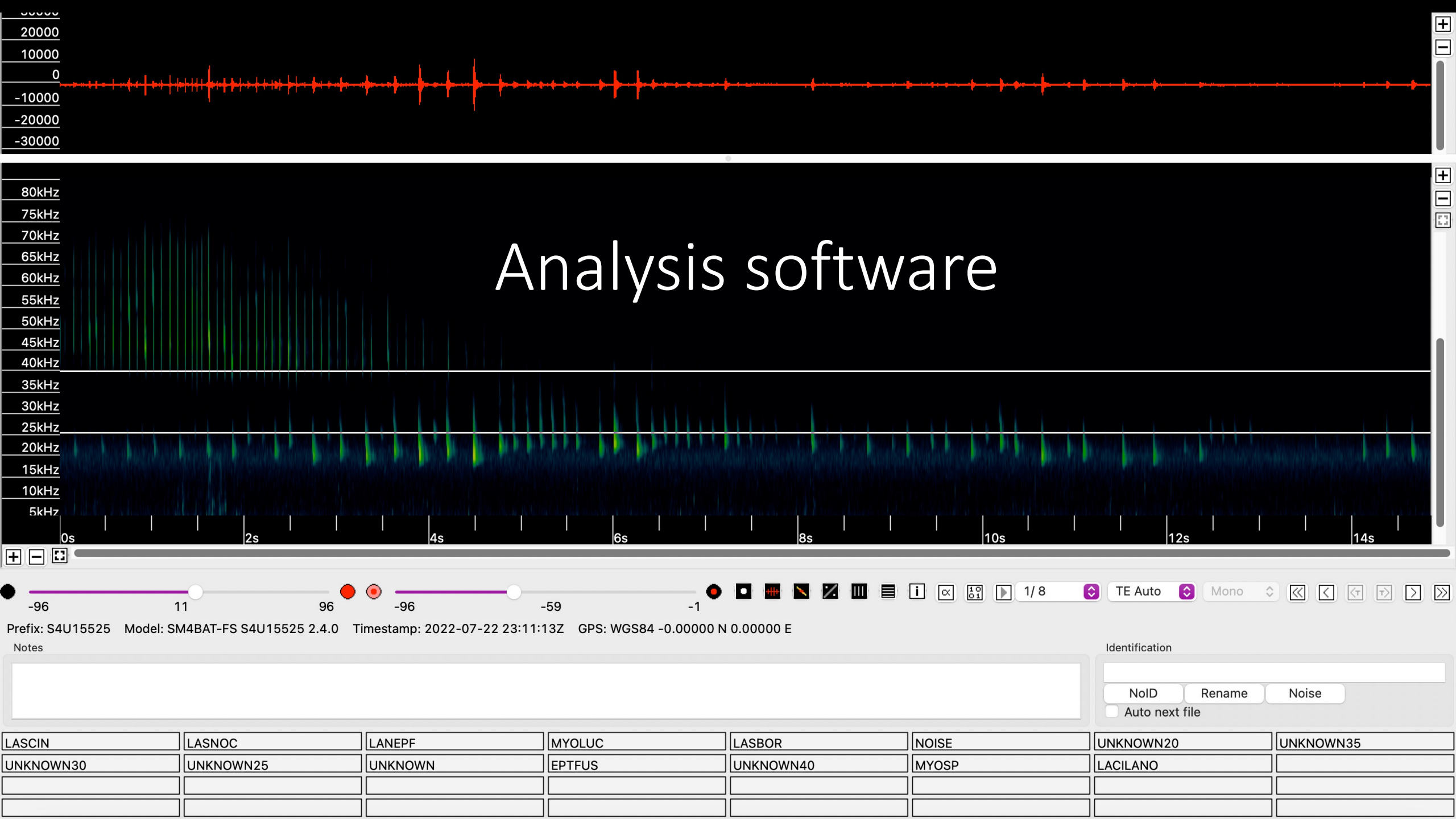
Reception

Common uses of acoustic detection

Equipment: detectors

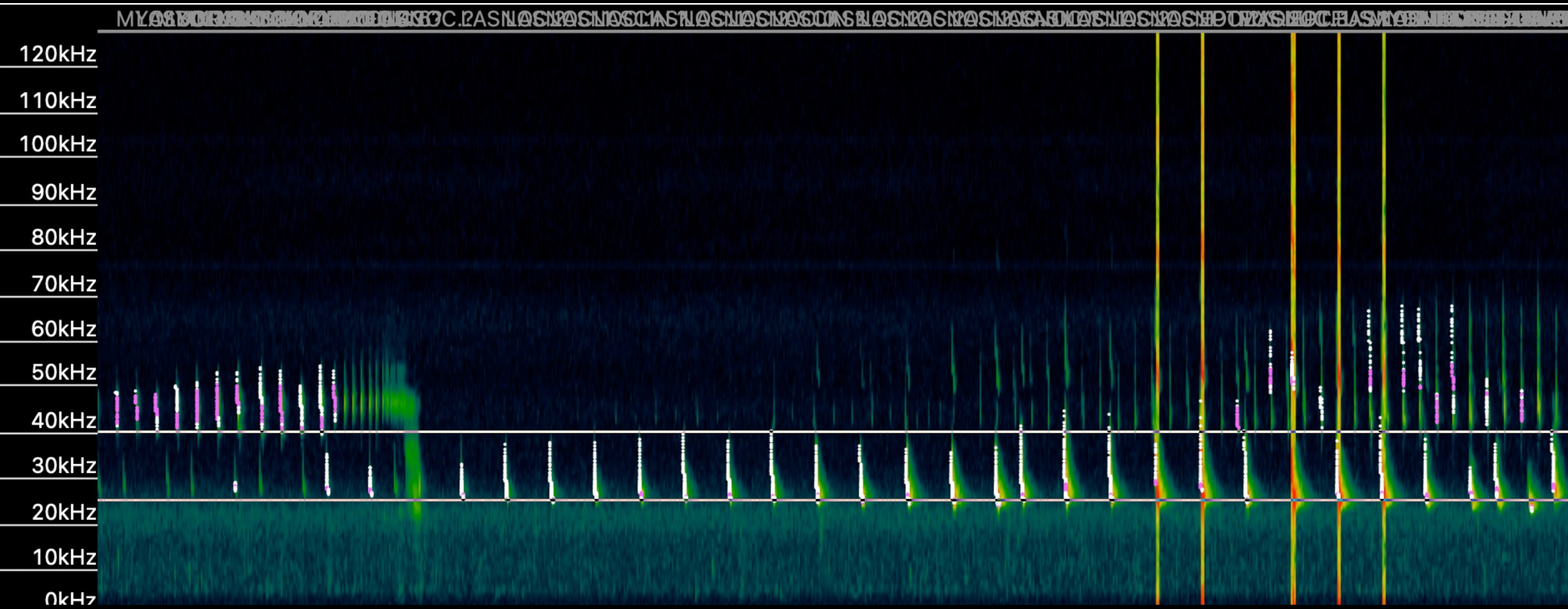
Acoustic detectors



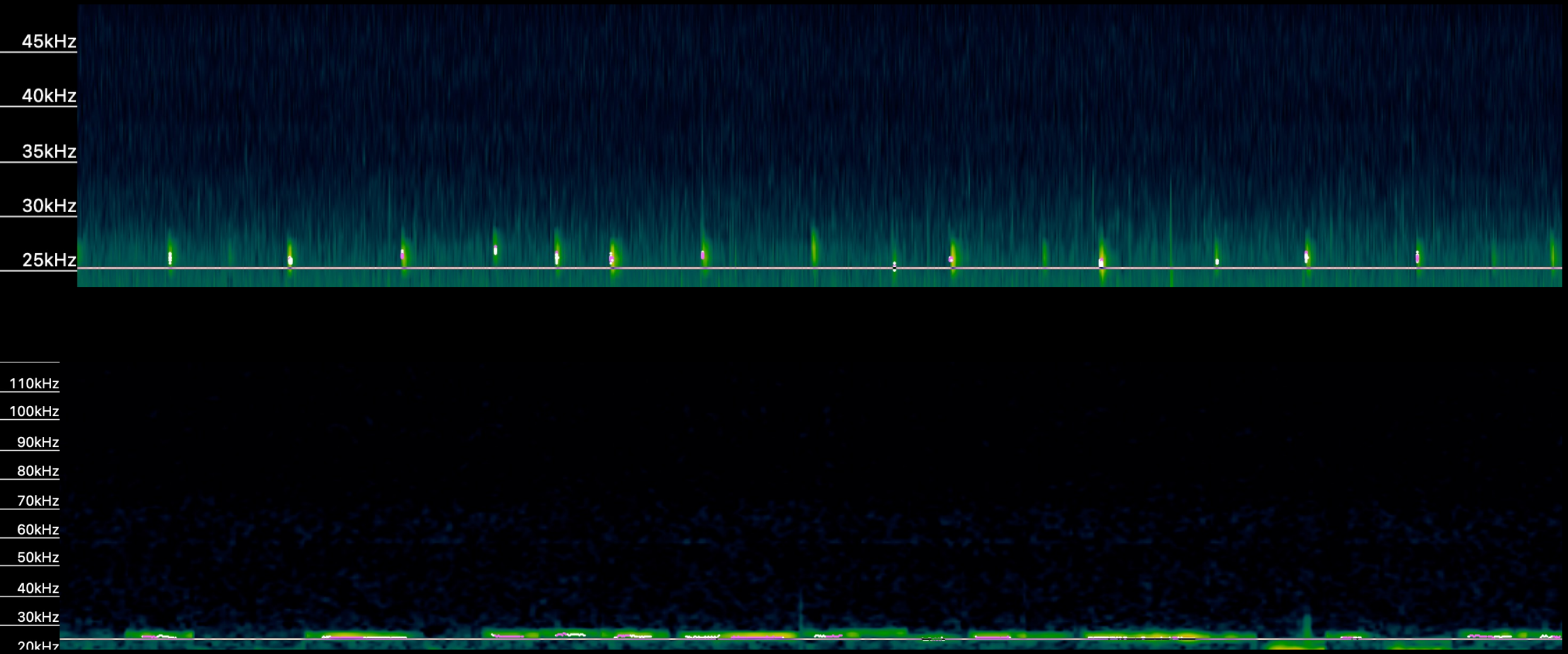

20000
10000
0
-10000
-20000
-30000
80kHz
75kHz
70kHz
65kHz
60kHz
55kHz
50kHz
45kHz
40kHz
35kHz
30kHz
25kHz
20kHz
15kHz
10kHz
5kHz
0s
2s
4s
6s
8s
10s
12s
14s
Analysis software
-96
11
96
-96
-59
-1
1/ 8
TE Auto
Mono
Prefix: S4U15525
Model: SM4BAT-FS S4U15525 2.4.0
Timestamp: 2022-07-22 23:11:13Z
GPS: WGS84 -0.00000 N 0.00000 E
Notes
Identification
NoID
Rename
Noise
Auto next file
LASCIN
LASNOC
LANEPF
MYOLUC
LASBOR
NOISE
UNKNOWN20
UNKNOWN35
UNKNOWN30
UNKNOWN25
UNKNOWN
EPTFUS
UNKNOWN40
MYOSP
LACILANO

How to ID a bat call: Geography

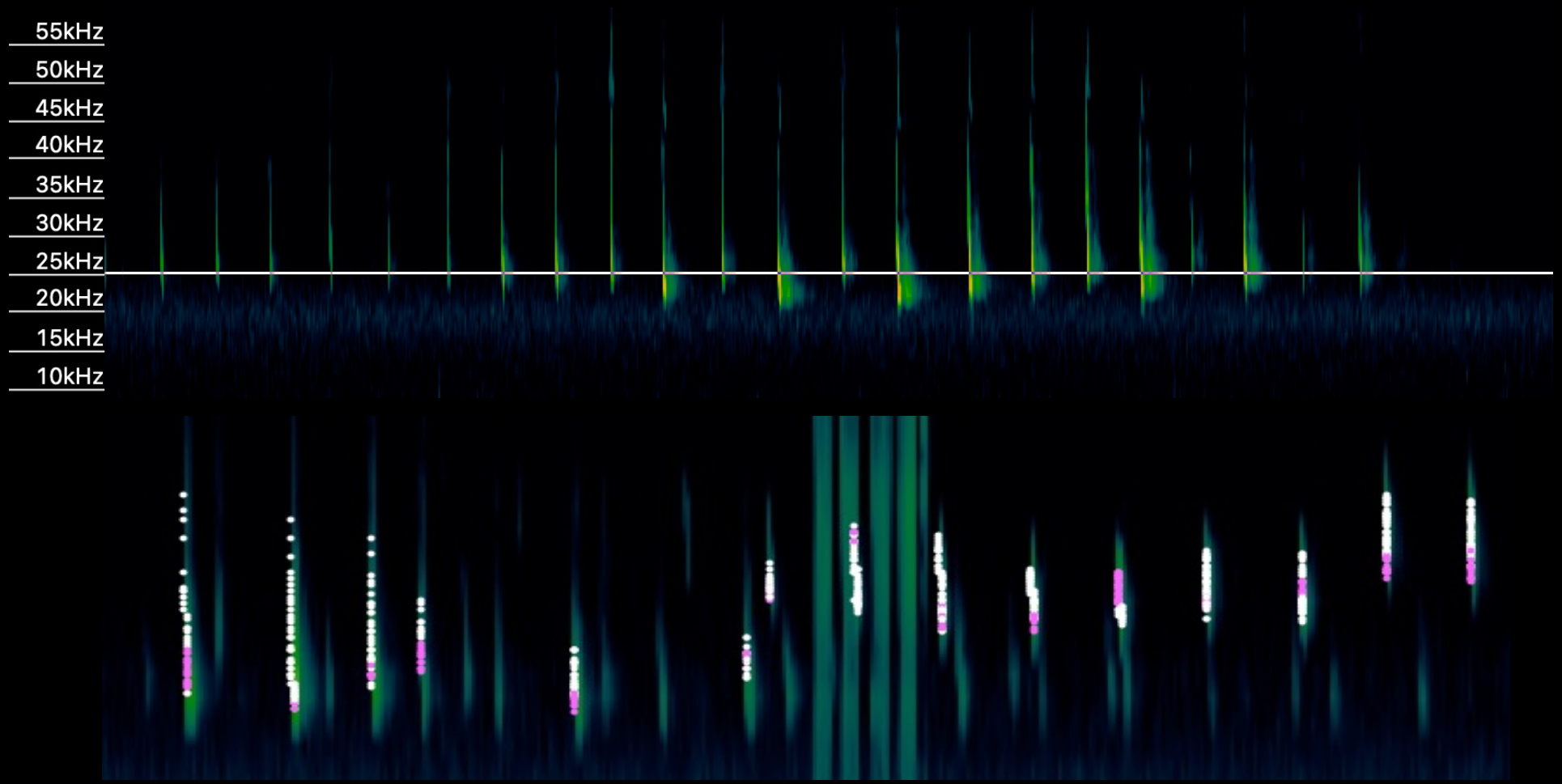
How to ID a bat call: Frequency



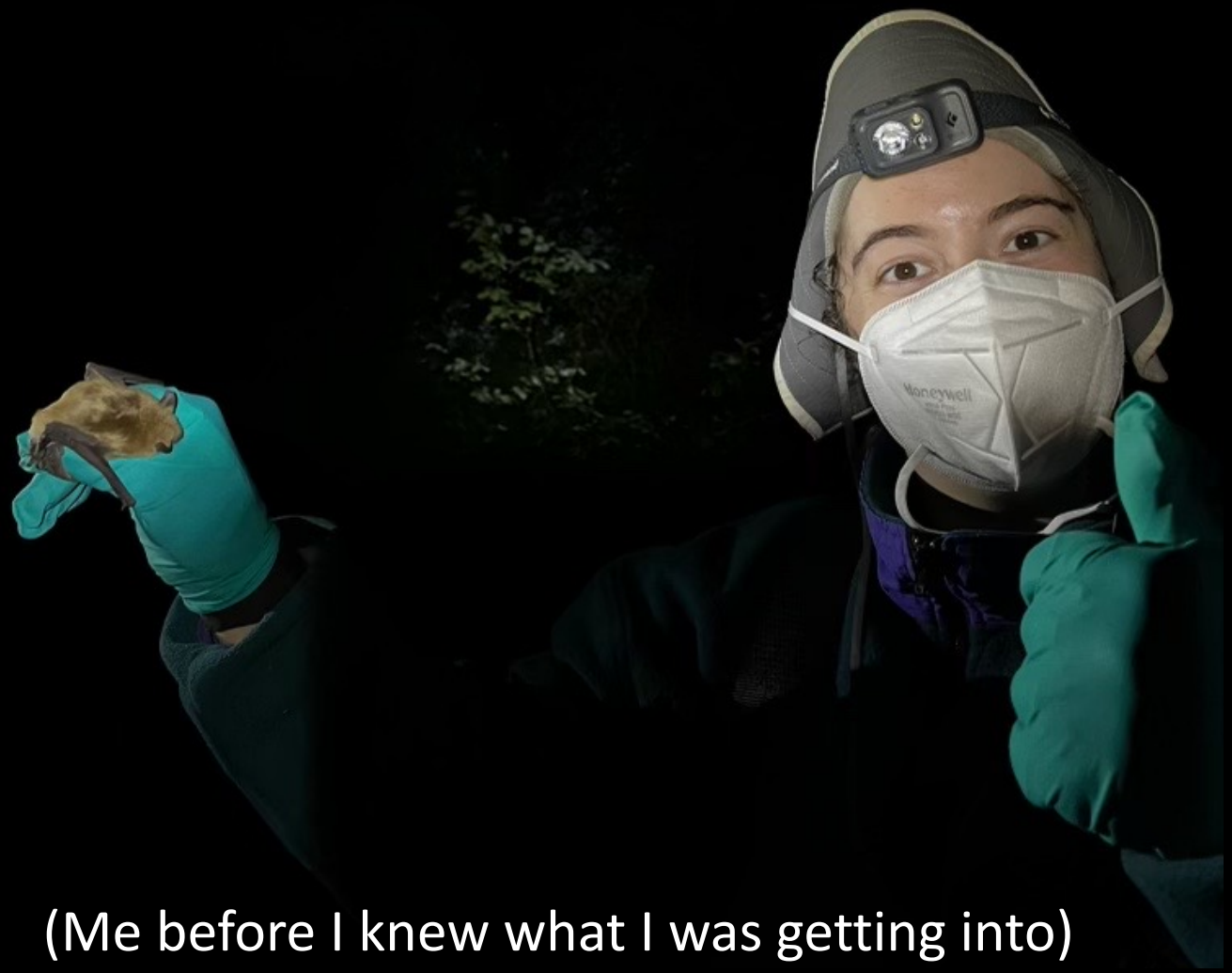
How to ID a bat call: Shape



How to ID a bat call: Pattern



How to ID a bat call: Experience



(Me before I knew what I was getting into)

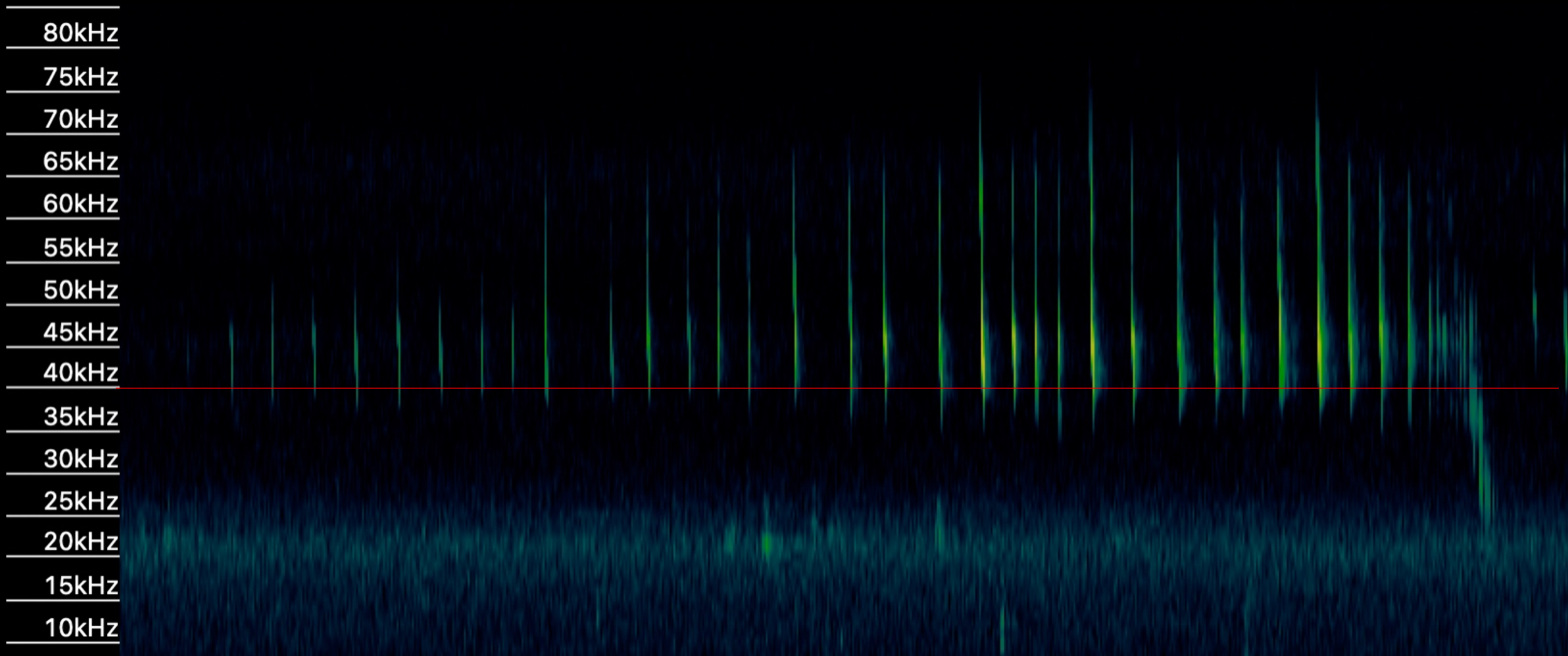
ID a bat call: Practice

Fmin: ~18
Pattern: Bouncy
Shape: Varies

Fmin: ~30
Pattern: Bouncy
Shape: Varies

Fmin: ~38
Pattern: Straight
Shape: steep

Species ID


80kHz
75kHz
70kHz
65kHz
60kHz
55kHz
50kHz
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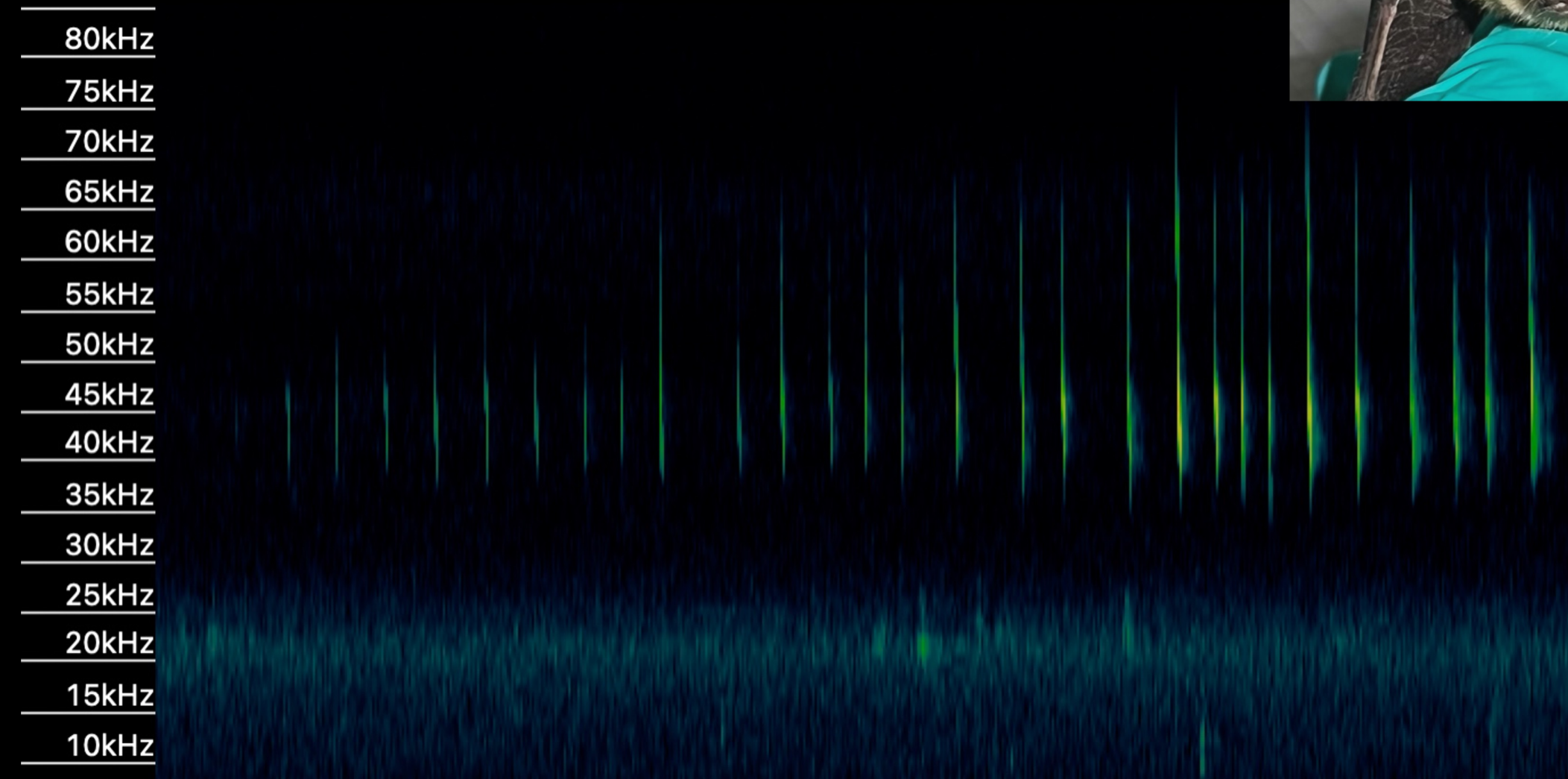
35kHz
30kHz
25kHz
20kHz
15kHz
10kHz

Species ID


80kHz
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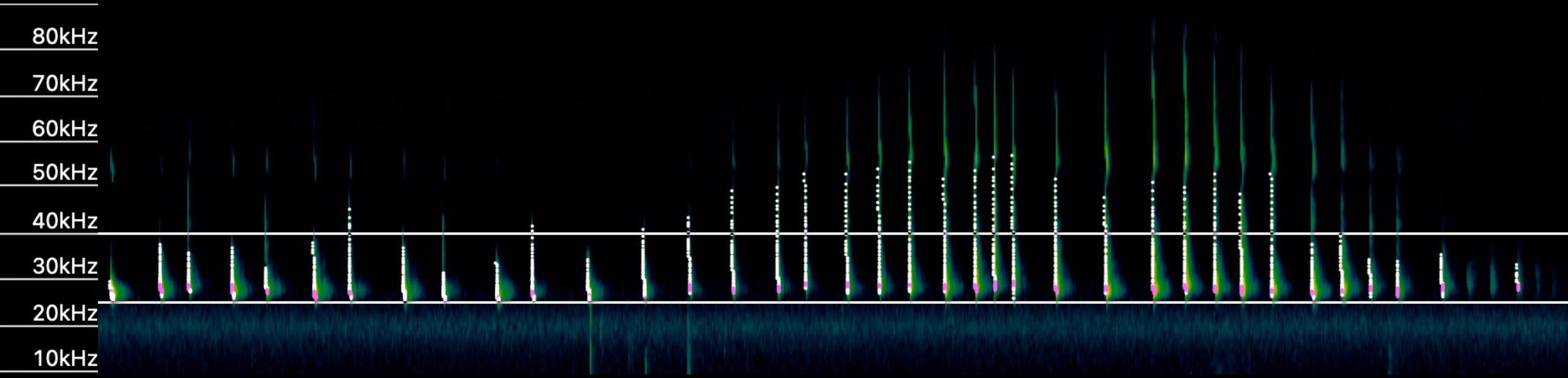
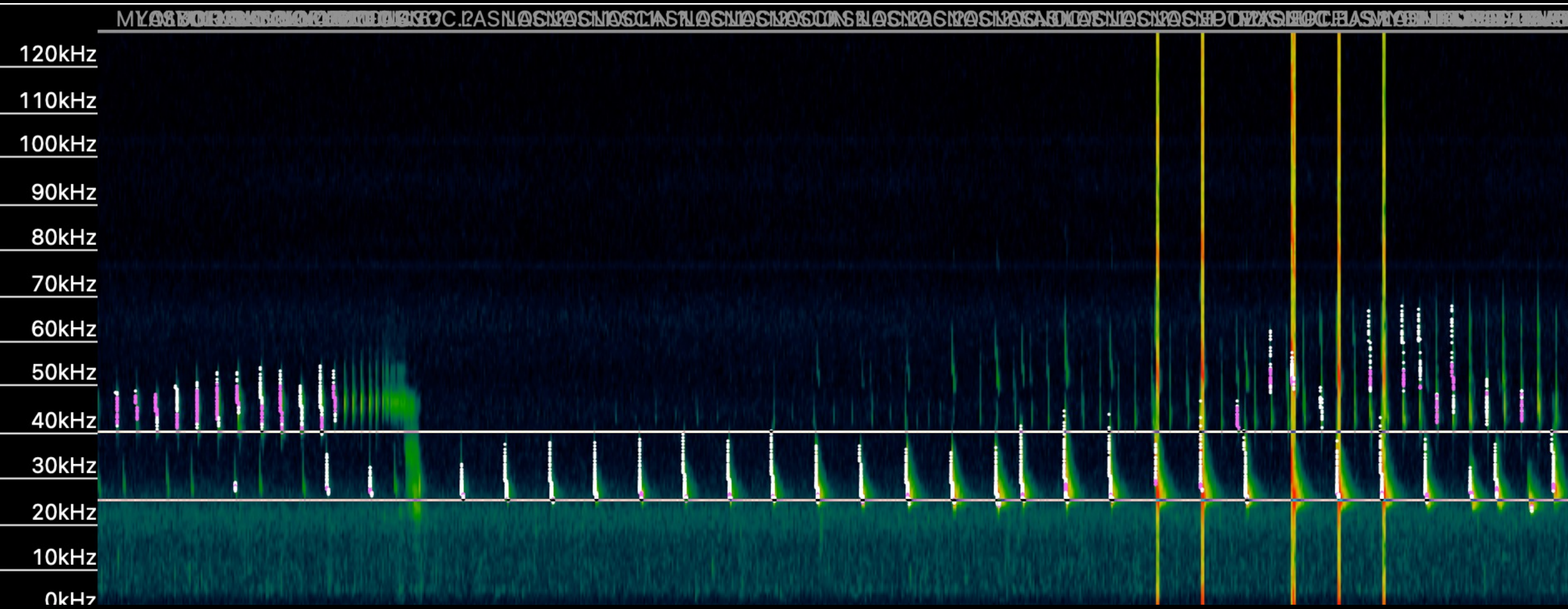
Species ID



Species abundance



Site selection

Site selection

Timing

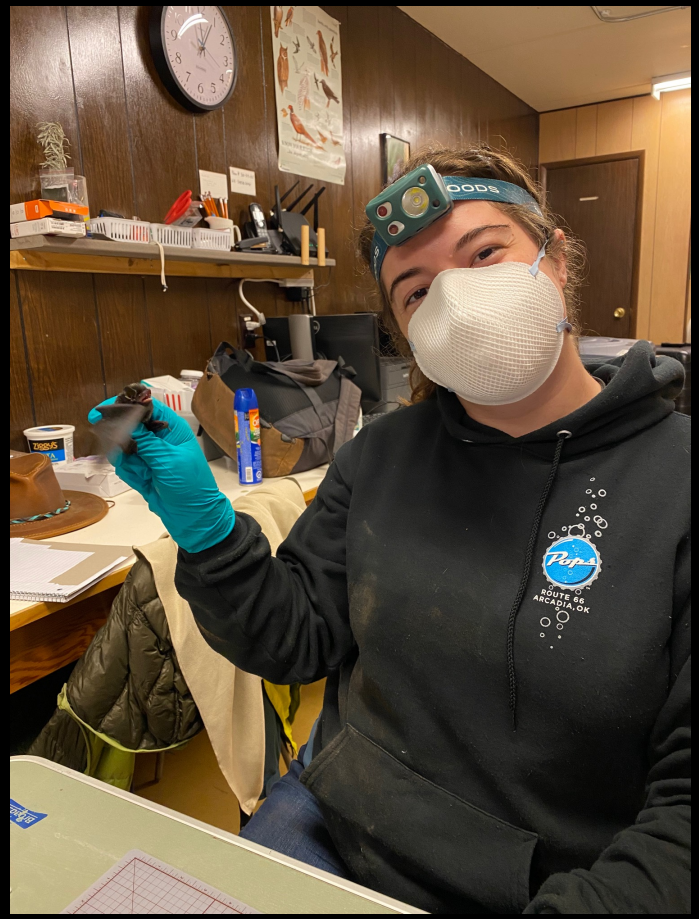
Setting up detectors is hard

Equipment: speakers (SURPRISE!)

Playback experiments: Feeding behavior

Distress calls

Conclusion



Questions?

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Faculty of Science
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