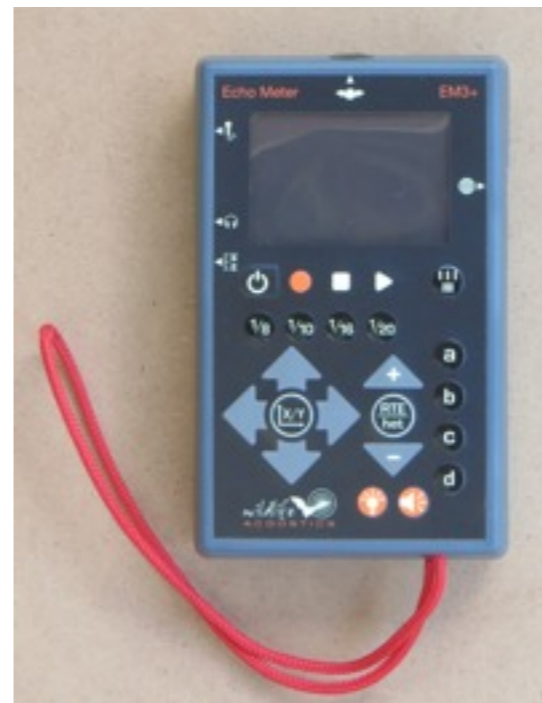


3. Bat Detector Comparisons

Q1: Are all detectors equal?

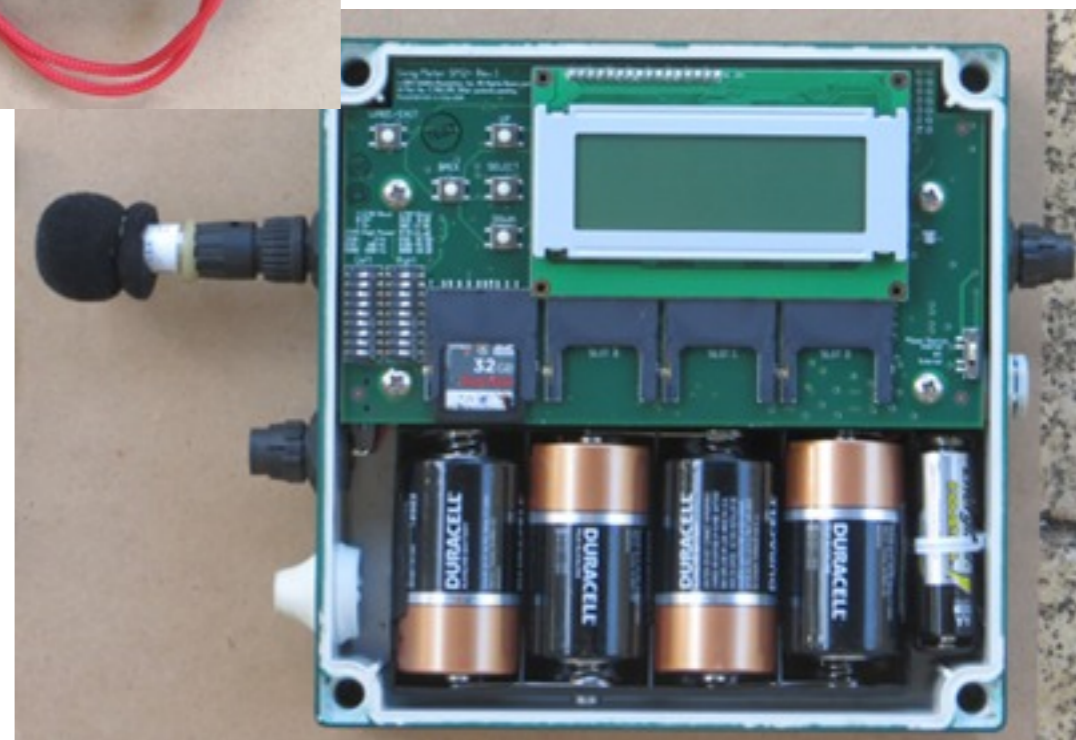
Q2: If not, what are their operational ranges?

Pettersson
DI000X



Wildlife Acoustics
Echo Meter

Song Meter w/
SMX-US mic



3. Bat Detector Comparisons Field Assessment



Yard =
controlled
calibration tone

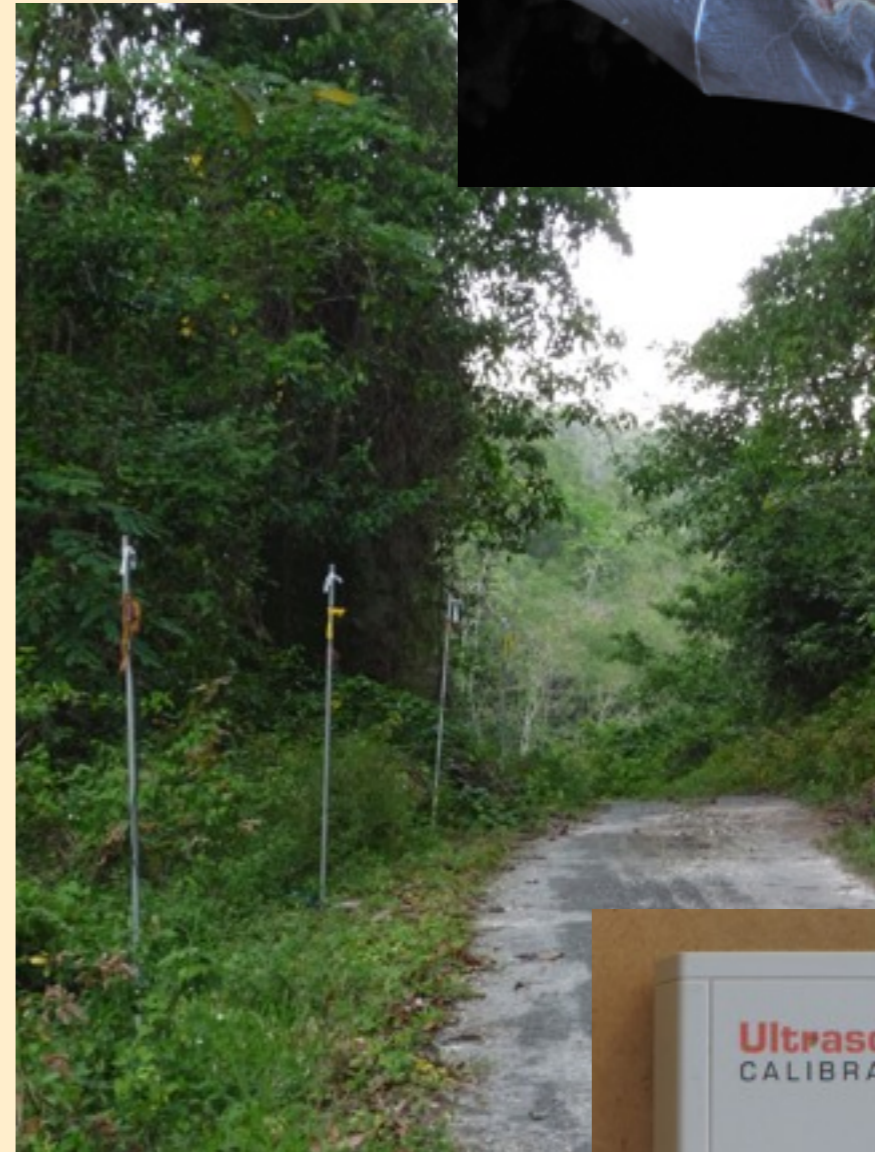


Wild =
uncontrolled
bats



3. Bat Detector Comparisons

Field Assessment



	Pet	EM	SM
Sampling Rate (kHz)	384	384	384
Max. Freq.	192	192	192
Spectrum (Broadband / Heterodyne)	BB	BB	BB
Trigger (dB)	6	6	6
Microphone	Uni	Uni	Omni

3. Bat Detector Comparisons

Field Assessment



	Pet	EM	SM
Sampling Rate (kHz)	384	384	384
Max. Freq.	192	192	192
Spectrum (Broadband / Heterodyne)	BB	BB	BB
Trigger (dB)	6	6	6
Microphone	Uni	Uni	Omni



Specifications for the Echo Meter EM3+

Power:

- ▶ Four AA rechargeable NiMH batteries included with battery charger

Storage:

- ▶ One SDHC/XC card slot supporting up to 128GB

Operating Temperature Range:

- ▶ -4°F to +185°F (-20°C to +85°C)

Battery Run Time:

- ▶ Up to 12 hours on a single charge

Battery Charge Time:

- ▶ 4 hours

Audio Sample Rate:

- ▶ 256kHz or 384kHz

Recording Bandwidth:

- ▶ Up to 192kHz

Effective Microphone Bandwidth:

- ▶ 1kHz to 192kHz

Microphone Directionality:

- ▶ Optimal signal is $\pm 30^\circ$ vertically and $\pm 60^\circ$ horizontally

MODE 2 Frequency division

Divide by 10

Dynamic input waveform tracking circuit

Tape out: line level to left channel only

Range : 17kHz –125kHz

Ref: Momentary voice commentary button to left channel

GENERAL

Suitable recording formats: MP3, DAT, MiniDisc, compact cassette

Speaker: weatherproof 35mm

Amplifier: 350mW (max)

Power supply: 1 x 9v PP3

Quiescent current: 22mA

Wrist strap: high-strength polyester woven cord

Case: fitted soft nylon micro-weave with zip and belt loop

Dimensions: 125 x 69 x 32 (mm)

Weight: 147gm (without battery)

Due to continuing improvements, specifications may change without notice.

(Windows is a trademark of the Microsoft Corporation)

Batbox Duet is made in England by **Batbox Ltd**

Batbox Ltd

2A Chanctonfold • Horsham Road • Steyning
West Sussex • BN44 3AA

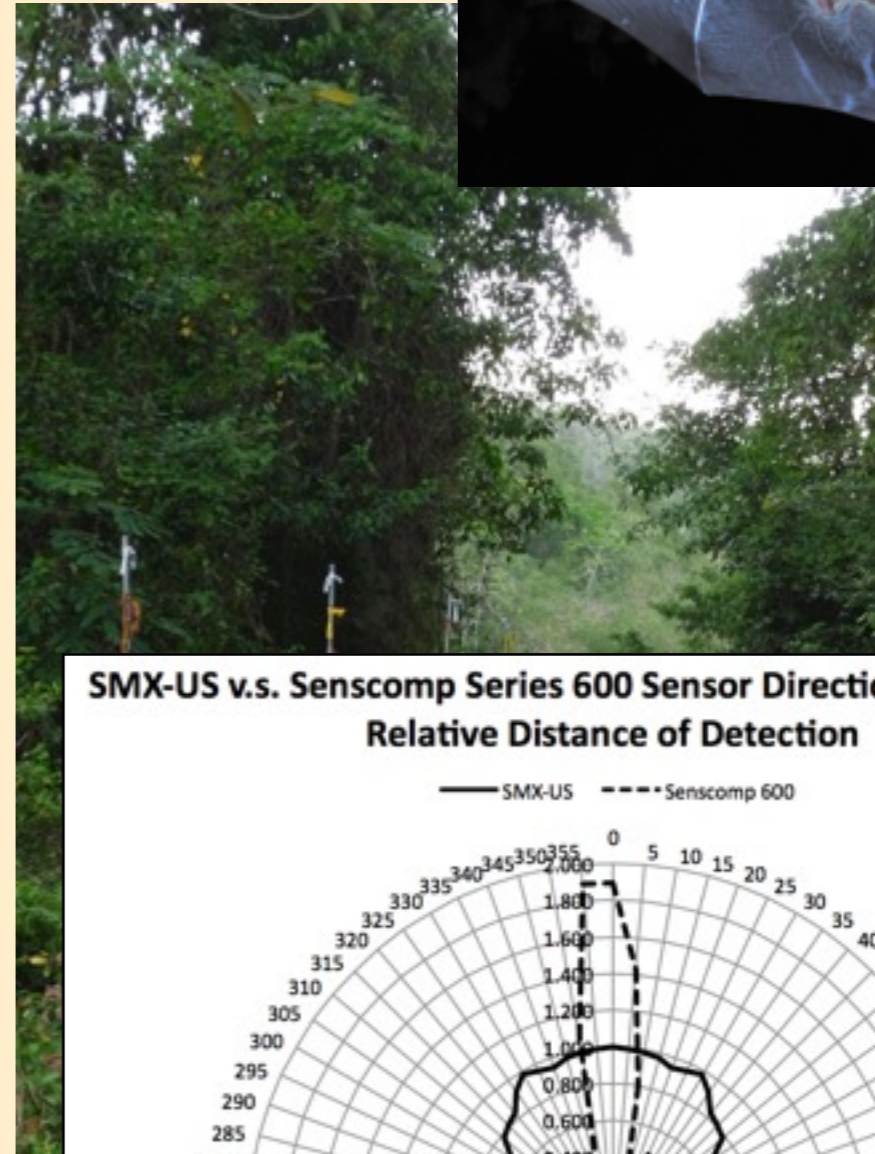
Tel: **01903 816298**

BatBOX • LTD

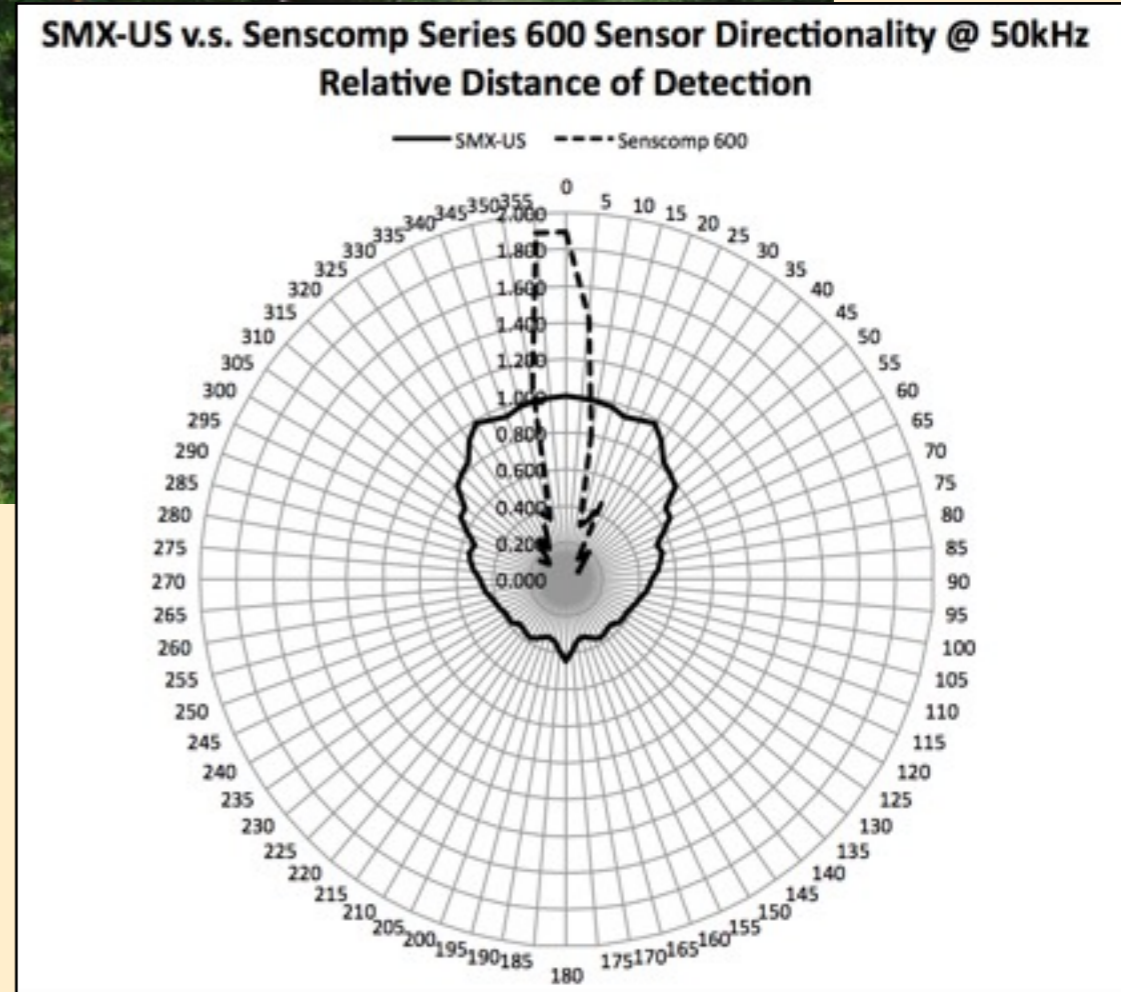
www.batbox.com • email: sales@batbox.com

3. Bat Detector Comparisons

Field Assessment (Ultrasound detection)



	Pet	EM	SM
Sampling Rate (kHz)	384	384	384
Max. Freq.	192	192	192
Spectrum (Broadband / Heterodyne)	BB	BB	BB
Trigger (dB)	6	6	6
Microphone	Uni	Uni	Omni



3. Bat Detector Comparisons

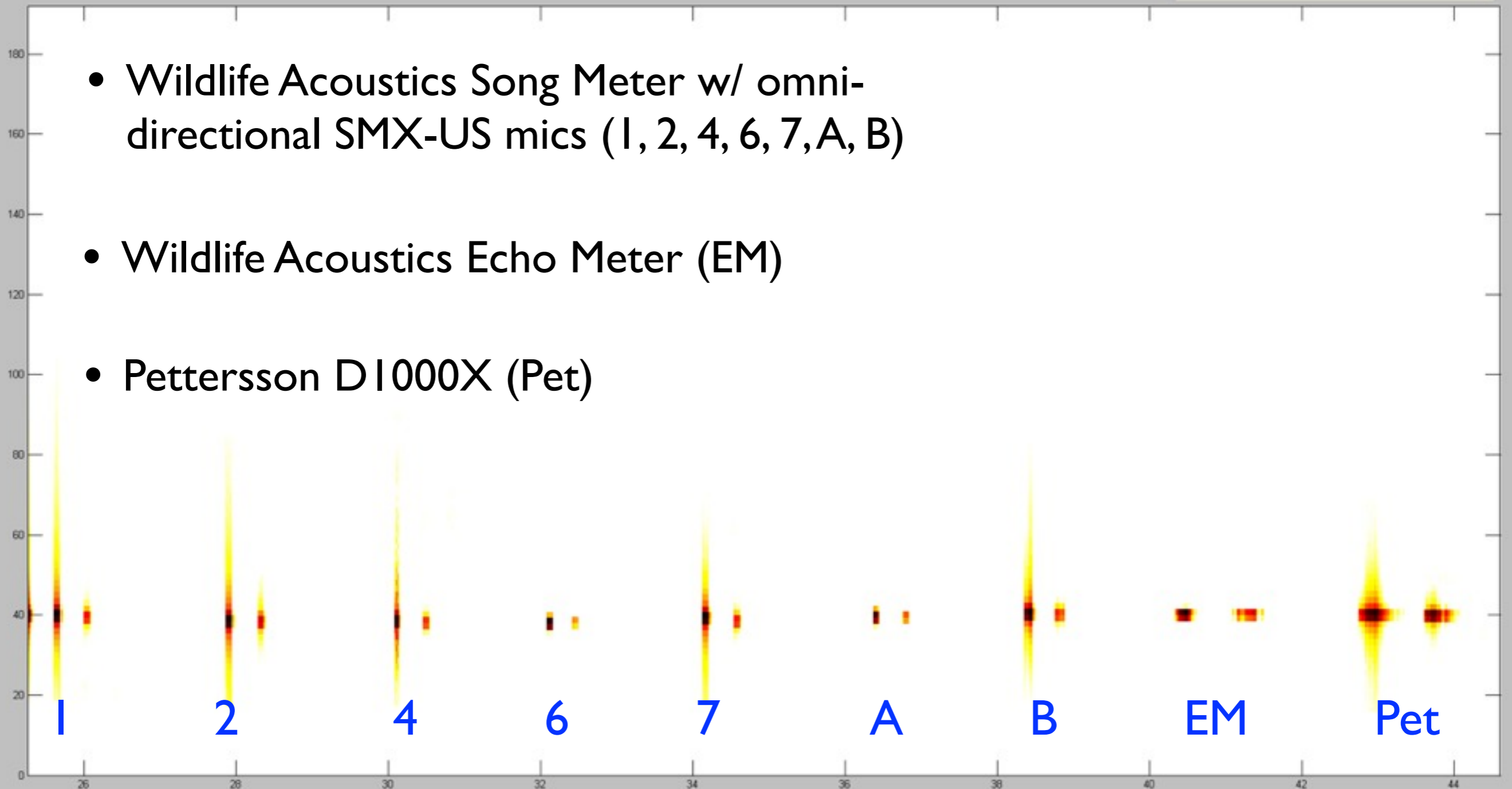
(callViewer dB comparisons @ 5 & 10 m)



Z:\Bat Recordings-SongMeter & Pettersson/Microphone comparisons\2015-02-21_Mic A and 6 (problem)\5864-116864W_20150221_113000.wav

28374.6 ms, 2.3 kHz, 25.0 dB

- Wildlife Acoustics Song Meter w/ omnidirectional SMX-US mics (1, 2, 4, 6, 7, A, B)
- Wildlife Acoustics Echo Meter (EM)
- Pettersson D1000X (Pet)



3. Bat Detector Comparisons

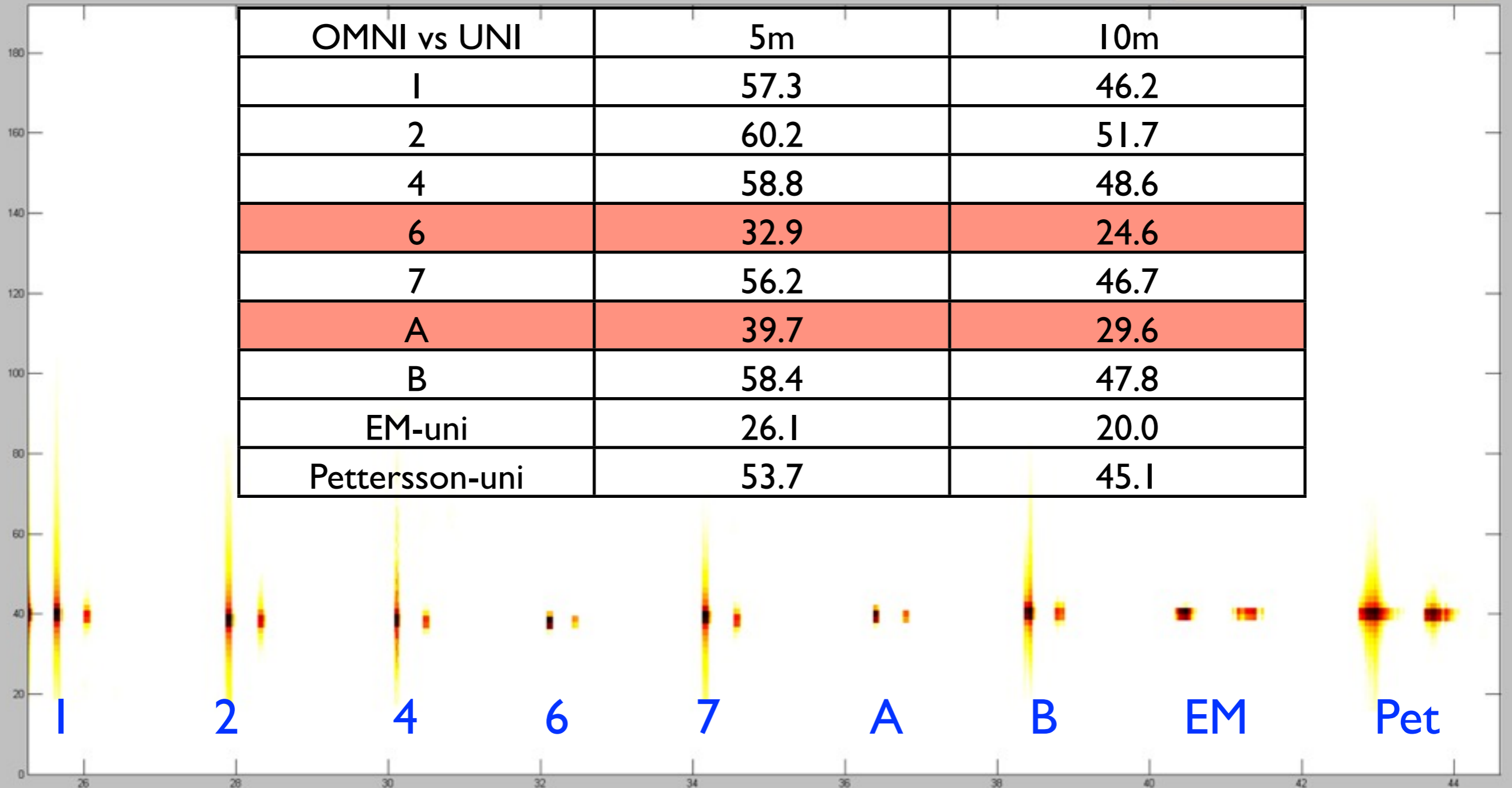
(callViewer dB comparisons @ 5 & 10 m)



Z:\Bat Recordings-SongMeter & Pettersson\Microphone comparisons\2015-02-21_Mic A and 6 (problem)\5864-115864W_20150221_113000.wav

28374.6 ms, 2.3 kHz, 25.0 dB

OMNI vs UNI	5m	10m
1	57.3	46.2
2	60.2	51.7
4	58.8	48.6
6	32.9	24.6
7	56.2	46.7
A	39.7	29.6
B	58.4	47.8
EM-uni	26.1	20.0
Pettersson-uni	53.7	45.1



3. Bat Detector Comparisons

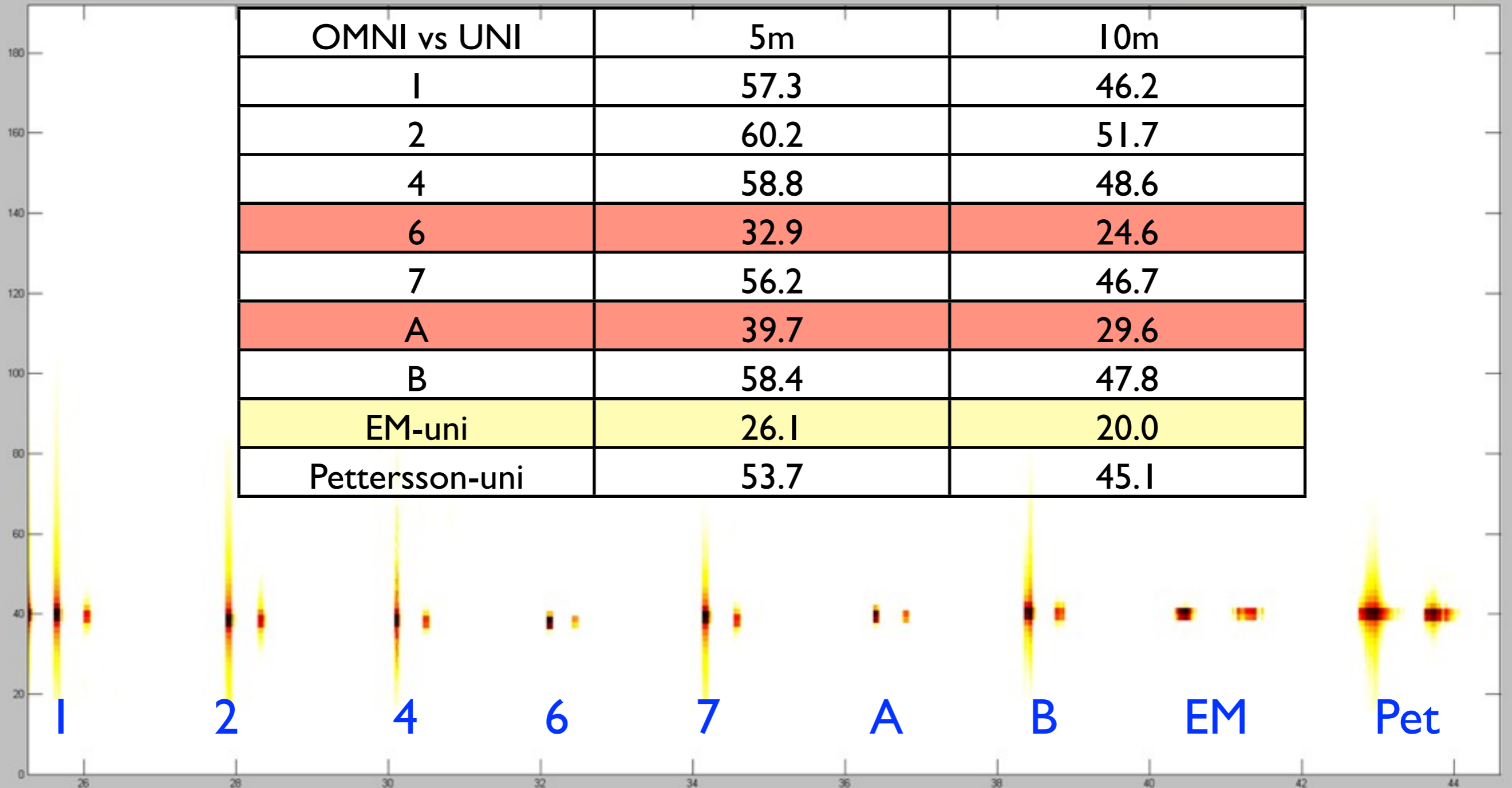
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Z:\Bat Recordings-SongMeter & Pettersson\Microphone comparisons\2015-02-21_Mic A and 6 (problem)\6864-116864W_20150221_113000.wav

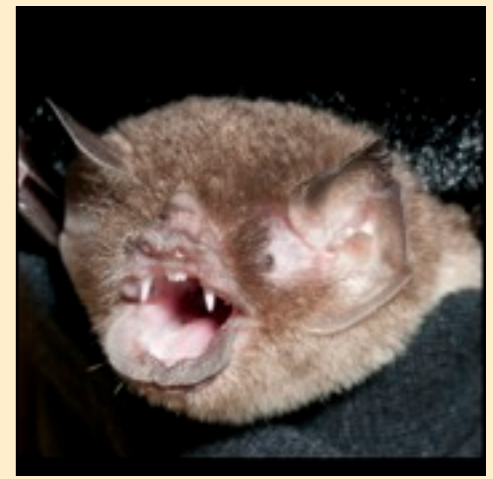
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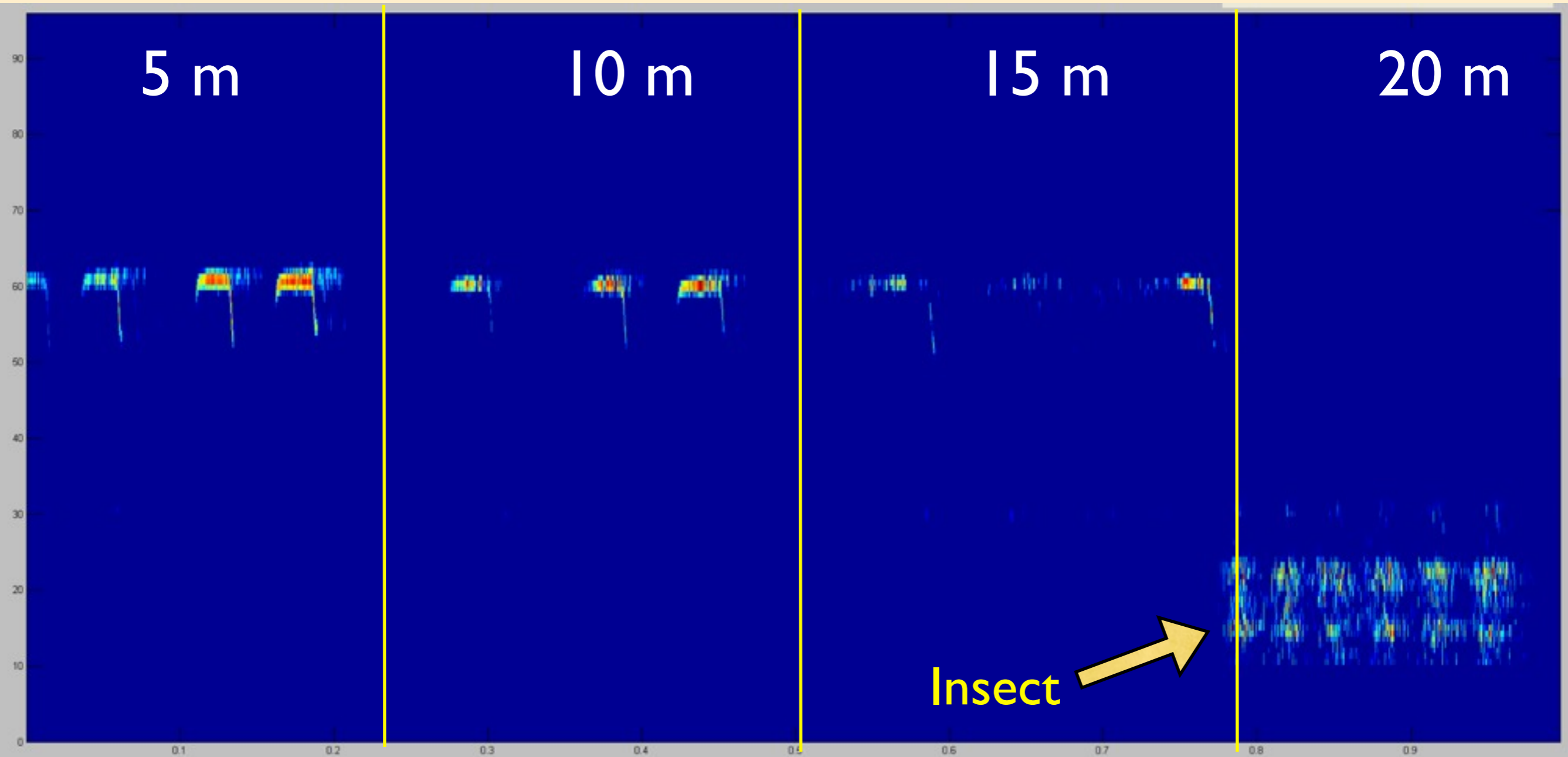


3. Bat Detector Comparisons

(callViewer dB comparisons
@ 5, 10, 15, & 20 m)



Pteronotus parnellii



3. Bat Detector Comparisons

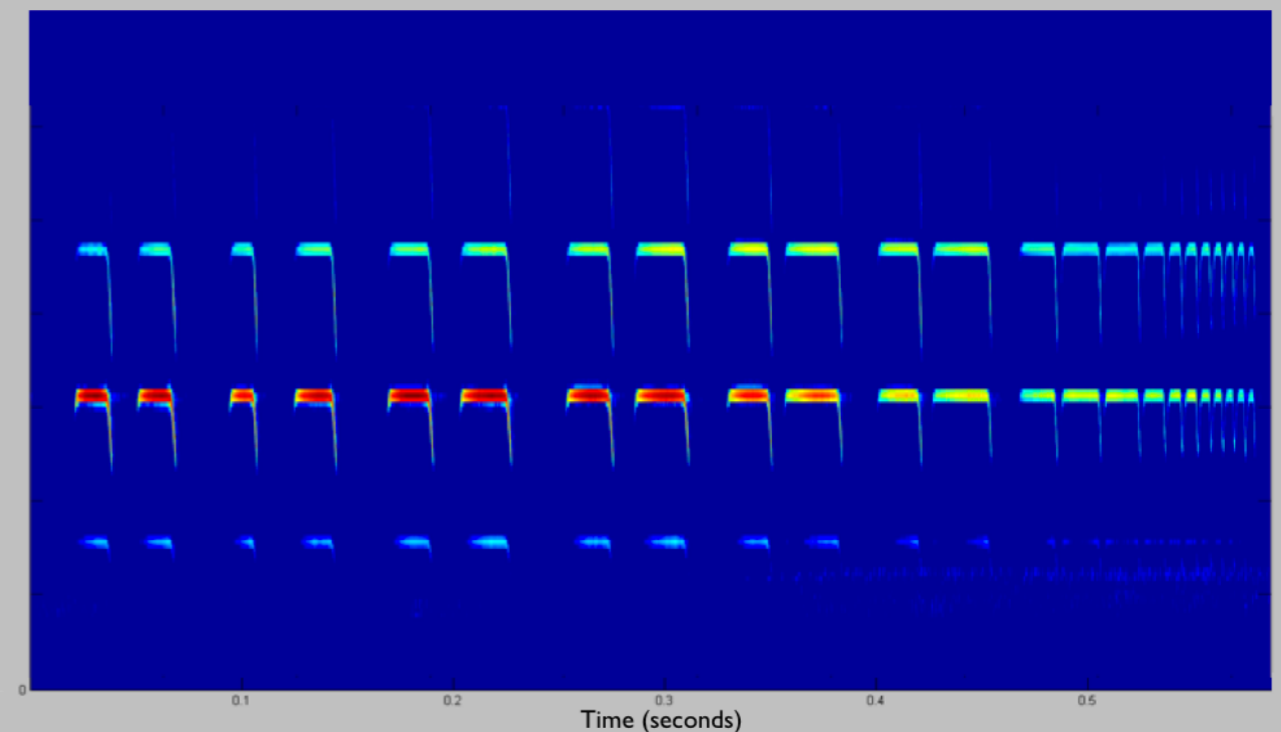
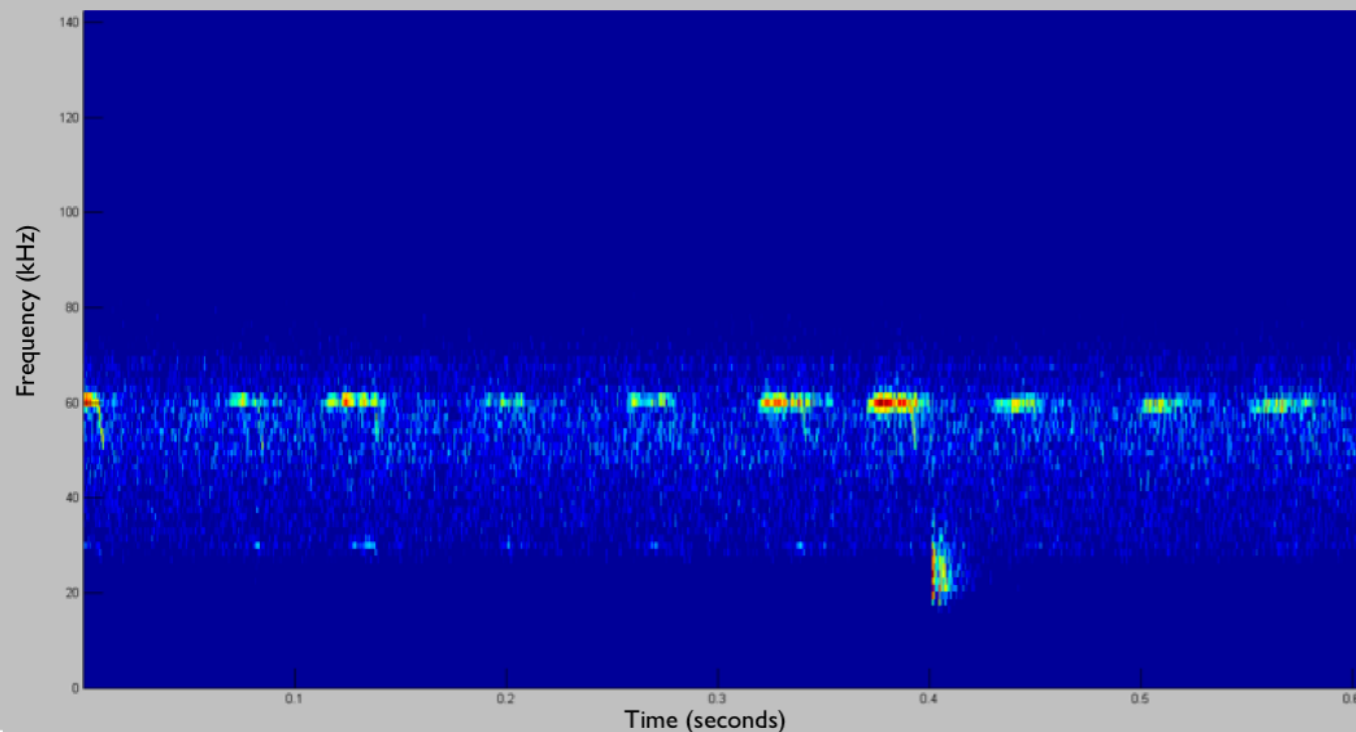
Wildlife Acoustics vs Avisoft
@ 5 m



Pteronotus parnellii

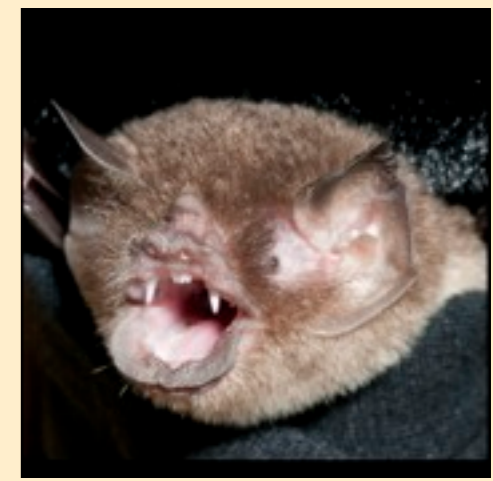
Wildlife Acoustics SM2BAT-384kHz logger (USD 850) with SMX-US omni-directional, Electret microphone (USD 150)

Avisoft UltraSound CM16/CMPA uni-directional, Condensor microphone (USD 4,000 with UltraSoundGate interface (USD 2,000) [+ laptop required])



3. Bat Detector Comparisons

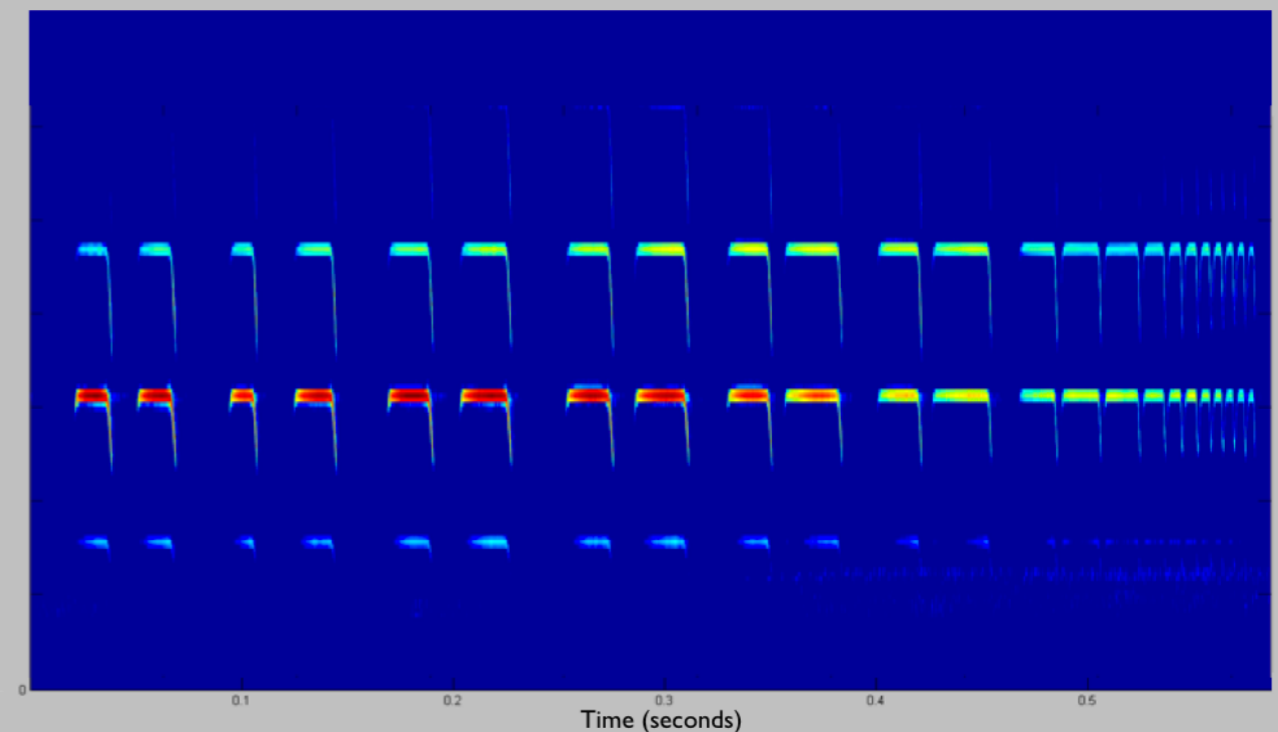
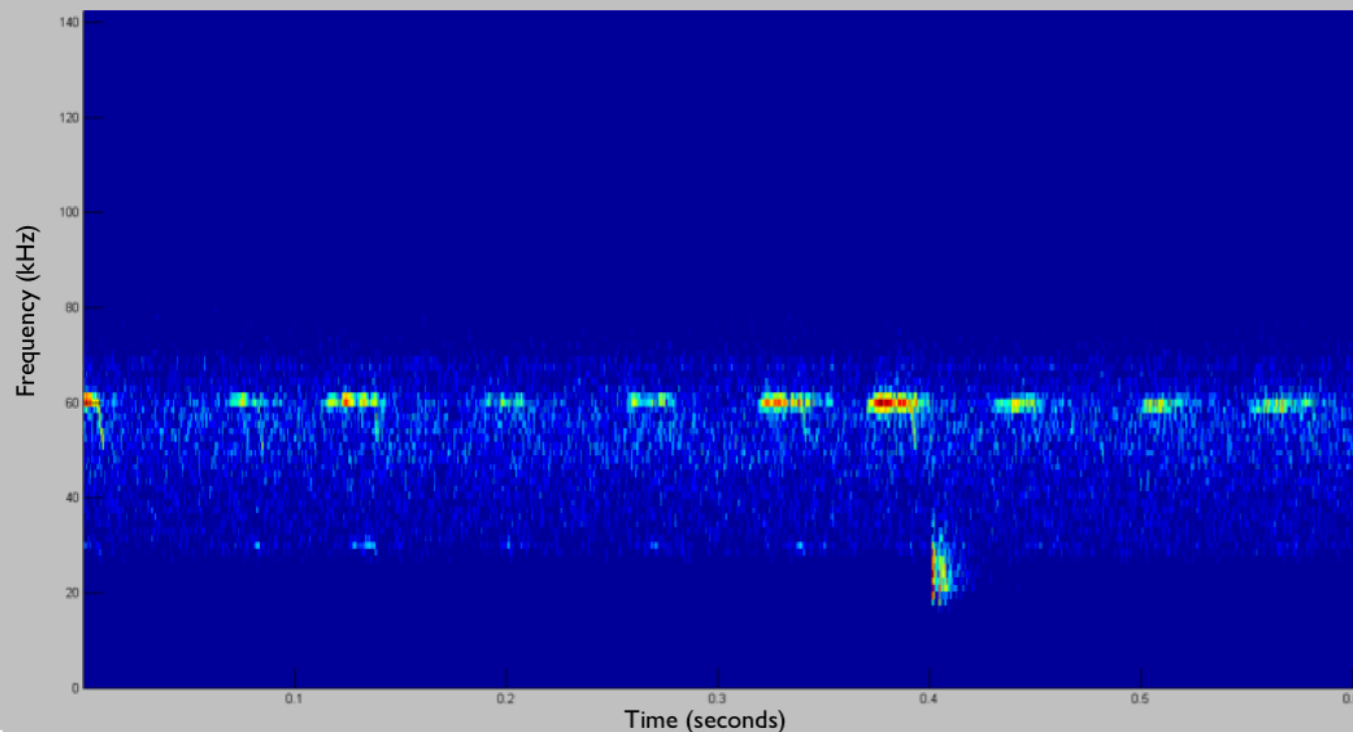
Avisoft clearly makes higher-quality recordings. Does this matter since we can still identify the species of bat and note “flew past microphone” for an activity index?



Pteronotus parnellii

Wildlife Acoustics SM2BAT-384kHz logger (USD 850) with SMX-US omni-directional, Electret microphone (USD 150)

Avisoft UltraSound CM16/CM16PA uni-directional, Condensator microphone (USD 4,000 with UltraSoundGate interface (USD 2,000) [+ laptop required])



3. Bat Detector Comparisons

Examples from other studies

Methods in Ecology and Evolution



Methods in Ecology and Evolution 2012, 3, 992–998

doi: 10.1111/j.2041-210X.2012.00244.x

Do you hear what I hear? Implications of detector selection for acoustic monitoring of bats

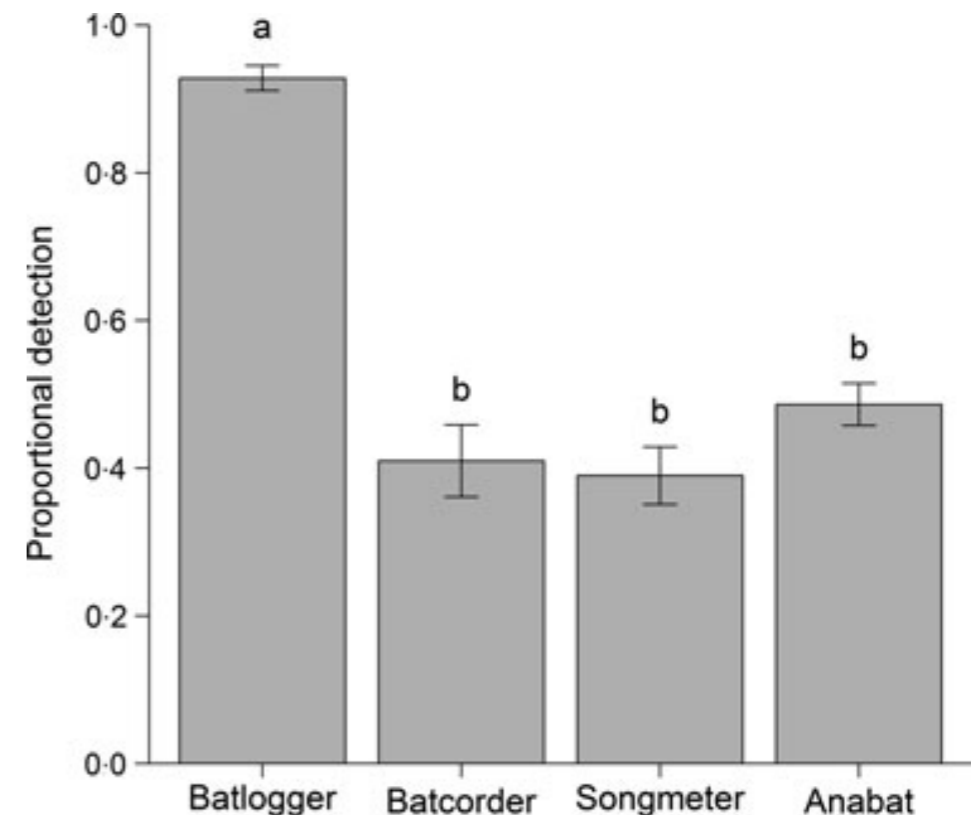
Amanda M. Adams*, Meredith K. Jantzen, Rachel M. Hamilton and Melville Brockett Fenton

Department of Biology, University of Western Ontario, London, ON, N6A 5B7, Canada

In a field comparison of Hoary Bats (*Lasiurus cinereus*) in Canada, wild bats flew past test microphones 26 times, with a minimum of seven consecutive calls per pass. Avisoft, Batlogger, and Songmeter all recorded the full number of passes; AnaBat and Batcorder failed to detect two of the 26 passes. Avisoft detected more calls than any of the other detectors: using Avisoft data as the baseline, Batcorder, Songmeter, and AnaBat detected fewer than 50% of the calls in the passes which Avisoft detected.

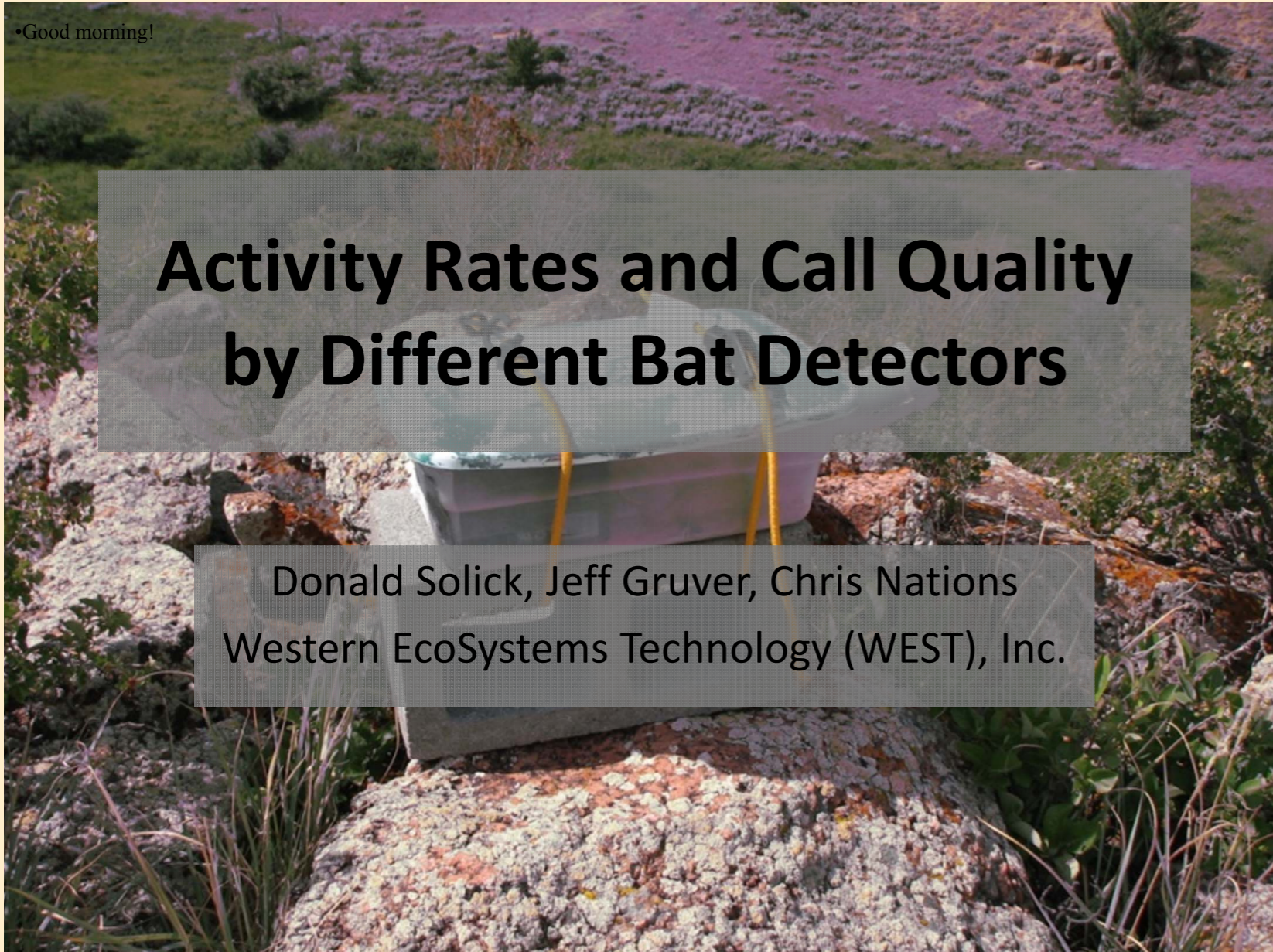
Fig. 4. Mean number of calls \pm SE per pass relative to Avisoft for each bat detector from recordings of free-flying *Lasiurus cinereus* on three nights. Batlogger detected more calls than any of the other systems (detectors with the same letter superscript were not significantly different from each other).

Batlogger (Elekon AG)
Avisoft
Batcorder (ecoObs)
SongMeter (Wildlife Ac.)
Anabat (Titley)



3. Bat Detector Comparisons

Examples from other studies



Activity Rates and Call Quality by Different Bat Detectors

Donald Solick, Jeff Gruver, Chris Nations
Western EcoSystems Technology (WEST), Inc.

Anabat (Titley)
D500X (Pettersson)
SongMeter (Wildlife Ac.)
ARI25/FRI25 (B.A.T)

Which bat detector is best?

	Anabat	D500x	SM2	B.A.T.
Activity rate	n/a	Questionable	Comparable	Questionable
Call quality	n/a	Good	Questionable	Good
Detection distance	35 m	Not tested	45 m	45 m
Data/power burden	Low	High	High	High
Weatherproof	No	Mostly	Yes	No
Remote download	Yes	No	No	Yes
Cost, single	\$2,100	\$2,100	\$1,100	\$1,800
Cost, paired	\$4,600	\$4,900	\$1,500	\$4,000

Susan Koenig attests to the fact that
Wildlife Acoustics' Song Meters are
weatherproof ... and even "riverproof"!

This detector was stolen
and dumped into the Martha
Brae. Found 6 months later,
filled with river-sludge, the
night's data were retrieved
from the SD card, we
cleaned it up with de-ionized
water, and it worked for
another 3 months before
finally giving up the ghost!

