Use of sound recording devices in wildlife survey

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Advantages of call recognition

- non-invasive survey technique
- hardware easy to deploy
- multiple autonomous recording units (ARUs) can be deployed for long periods
- potentially increase survey efficiency greatly compared with traditional capture/survey methods

- particularly useful for cryptic species

Other considerations

- call libraries need be comprehensive and clean (note geographic variation)
- library identifications need be accurate
- robust identifiers/recognisers required
- good recording conditions (no wind/rain)
- skills required in sound recognition and operation of sound analysis software

Sound production/hearing

Birds hear ca 50 Hz to ca 12 kHz
Max sensitivity 1-5 kHz

Frogs <200 Hz to ca 4 kHz

Bat echolocation in search mode
ca 10 – >160 kHz

i.e. need different hardware and software for bats vs frogs and birds

Ultrasound (Bats) - equipment

- Recommend SM4Bat FS – full spectrum WAV file recording
- (Mark at FaunaTech will set unit up, can then use on other units)

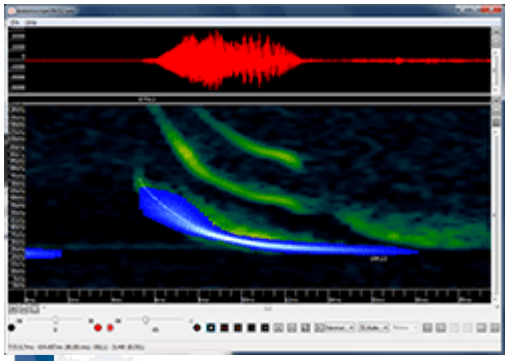
- 20dB signal-to-noise ratio advantage over zero-crossing recorders so you will record more bats with higher quality for analysis
- 250 to 450 hours recording time

Bats - deployment

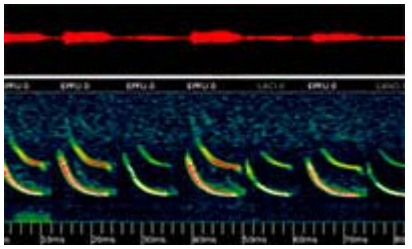
- Microphone - >1m from any surface
  - >0.5m (height)
  - >1m from water (horizontal)
  - in cave, mic along axis of cave
- Range –

  Hipposideros ater 384 KHz <2m

  Austronomus (*Tadarida*) ca 200 m (lower frequency)

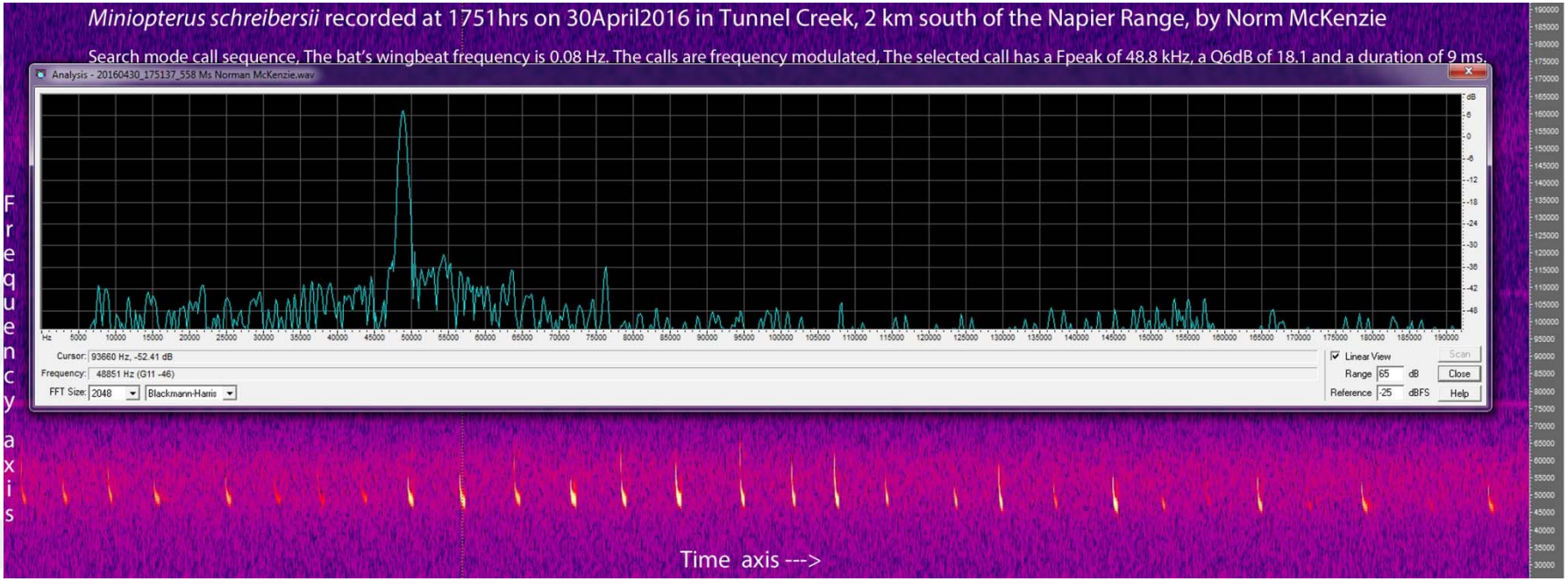


Bats - analysis



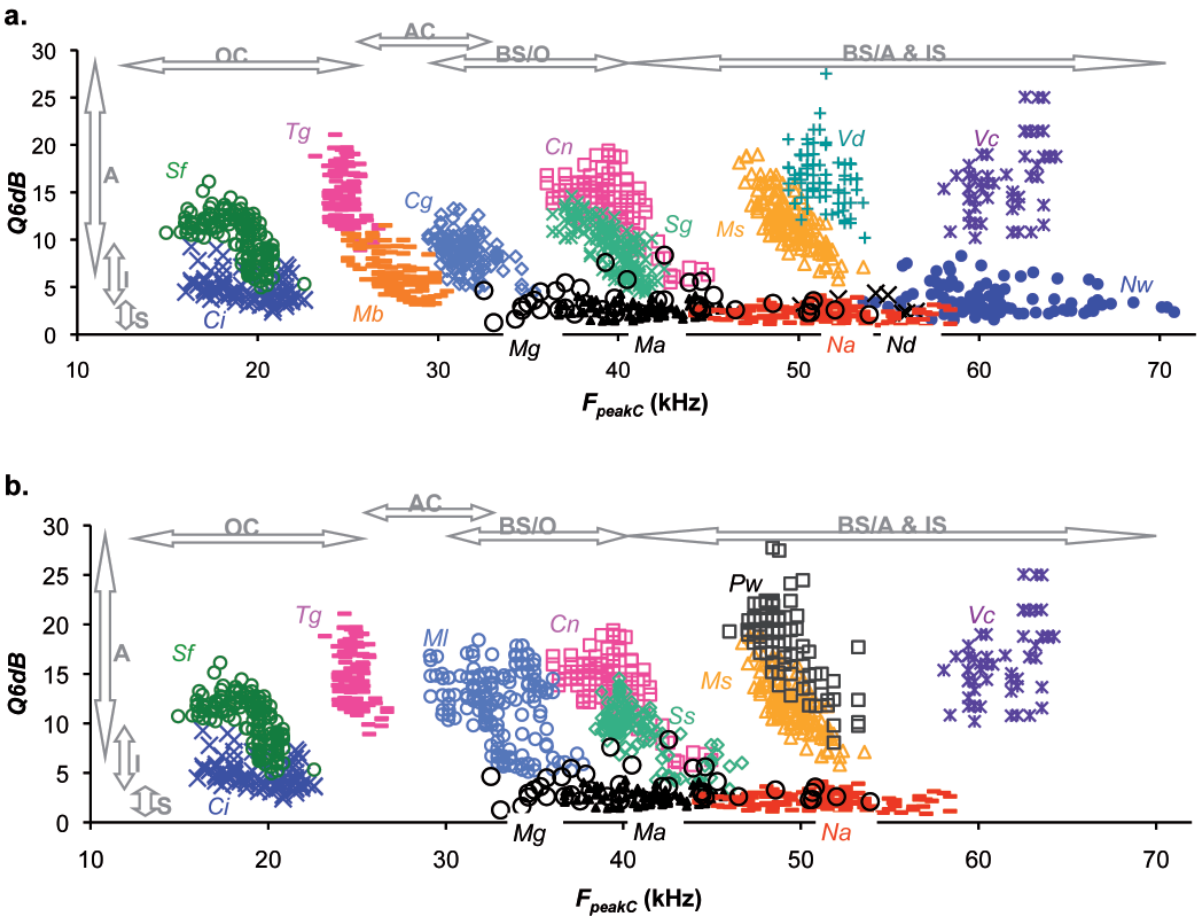
- Kaleidoscope software (Wildlife Acoustics)
  - will find call sequences (except for Ghost Bats, which have low intensity calls, <3msec, 'frequency agile' i.e. complex)
  - provides individual .wav files for each call (might get 0-1000 per night)
  - can set filters to focus on species of interest (but watch for harmonics)
- OR – send to a specialist such as Bob Bullen

Bats - analysis



From N. McKenzie/DPaW

Kimberley bats



Reference search-mode echolocation calls of selected Kimberley bats (from McKenzie & Bullen 2012) (a = land; b = mangroves)

Audible sound - equipment

Can use any reasonable quality recorder

But best to use commercially available autonomous recording units (ARUs) designed for wildlife survey – weatherproof, programmable

Audible sound - equipment

Wildlife Acoustics SongMeter

SM2 with external power source

SM4 and SM2

Audible sound - equipment

Wildlife Acoustics

SM3 with external microphone and external power source

Available in Australia from FaunaTech

Audible sound - equipment

Bioacoustic Audio Recorder (BAR)

www.frontierlabs.com.au

Brisbane

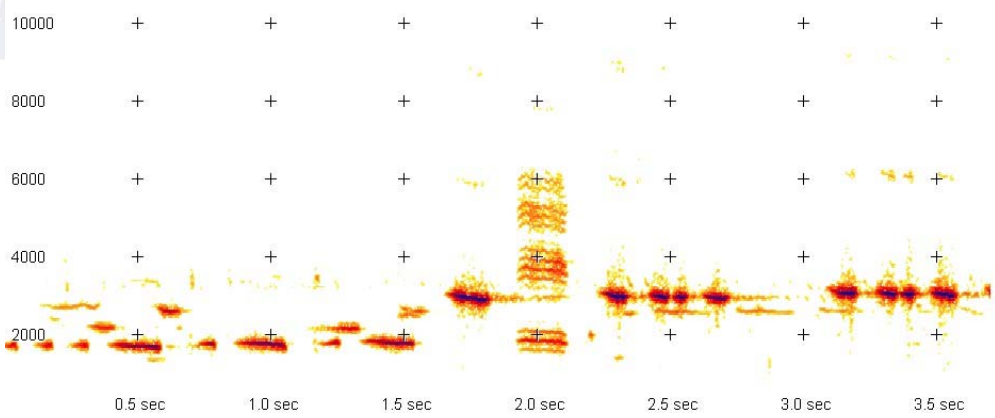
Frogs

- ARUs can be used effectively to detect species presence
- Note some subtle geographic variation (library needs to accommodate)
- Burrowing frogs utilise burrow morphology to alter call amplitude
- Call characteristics may vary with temperature
- If used for monitoring, note that only males will be calling

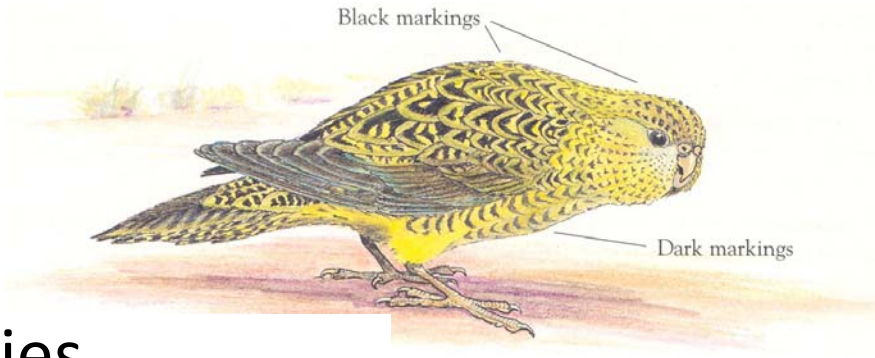
Birds

Photo: Alan Danks/DPaW

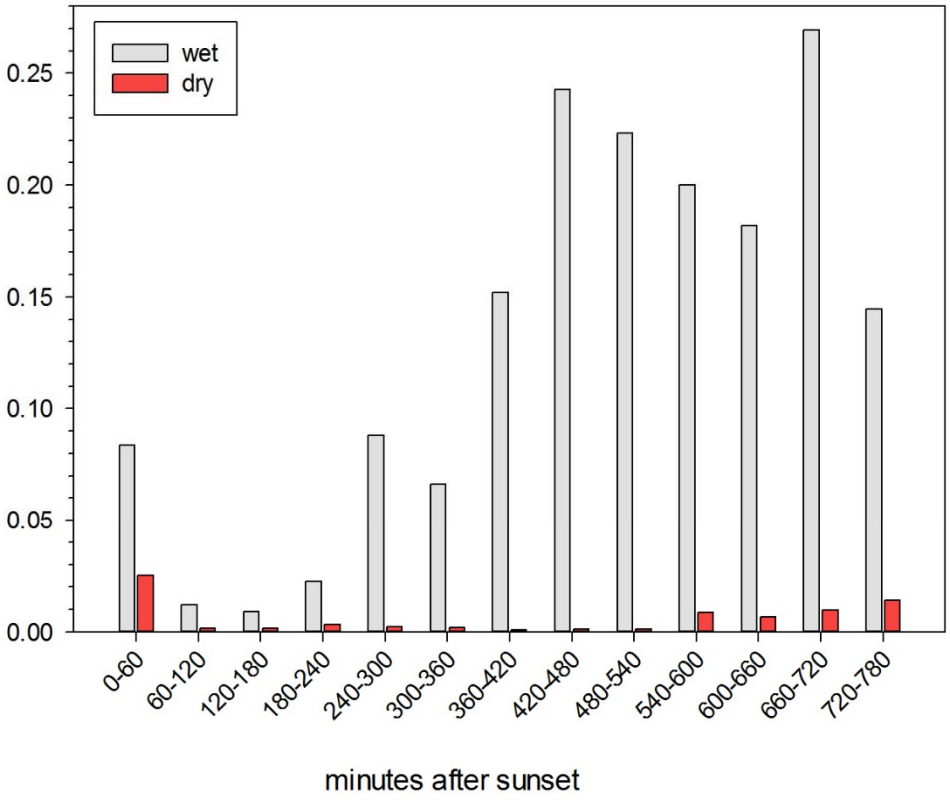
- ARUs can be used effectively to detect species presence
- Note sometimes marked geographic variation (call library needs to accommodate)
- Note sometimes marked individual variation (call library needs to accommodate)



Birds



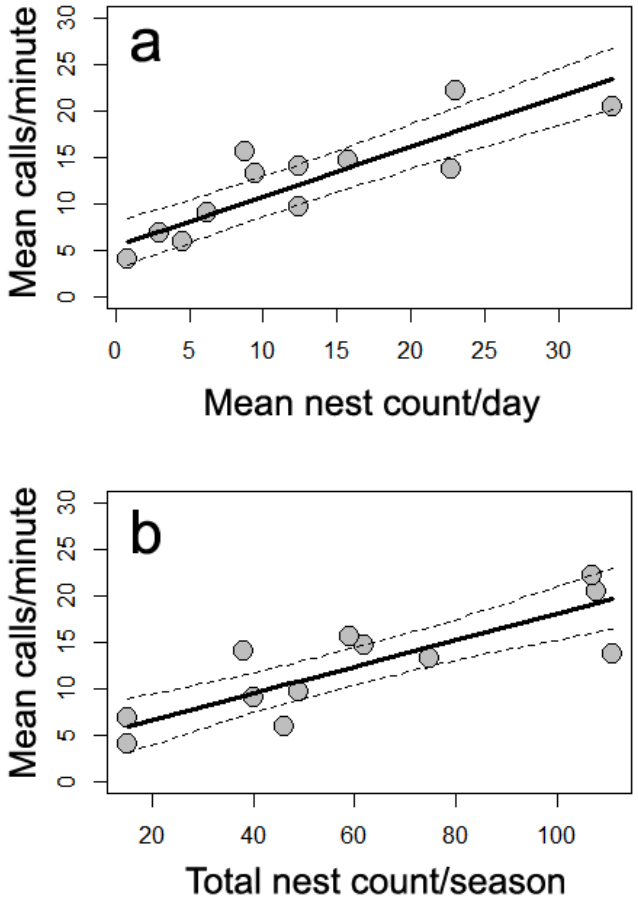
- ARUs can be used effectively to monitor species abundance/behaviour



Night Parrot calling behaviour.
Source: Steve Murphy

Birds

- ARUs can be used effectively to monitor species abundance/behaviour



e.g. Seabird nesting colony size – Forster's Tern
Source: Borker 2012

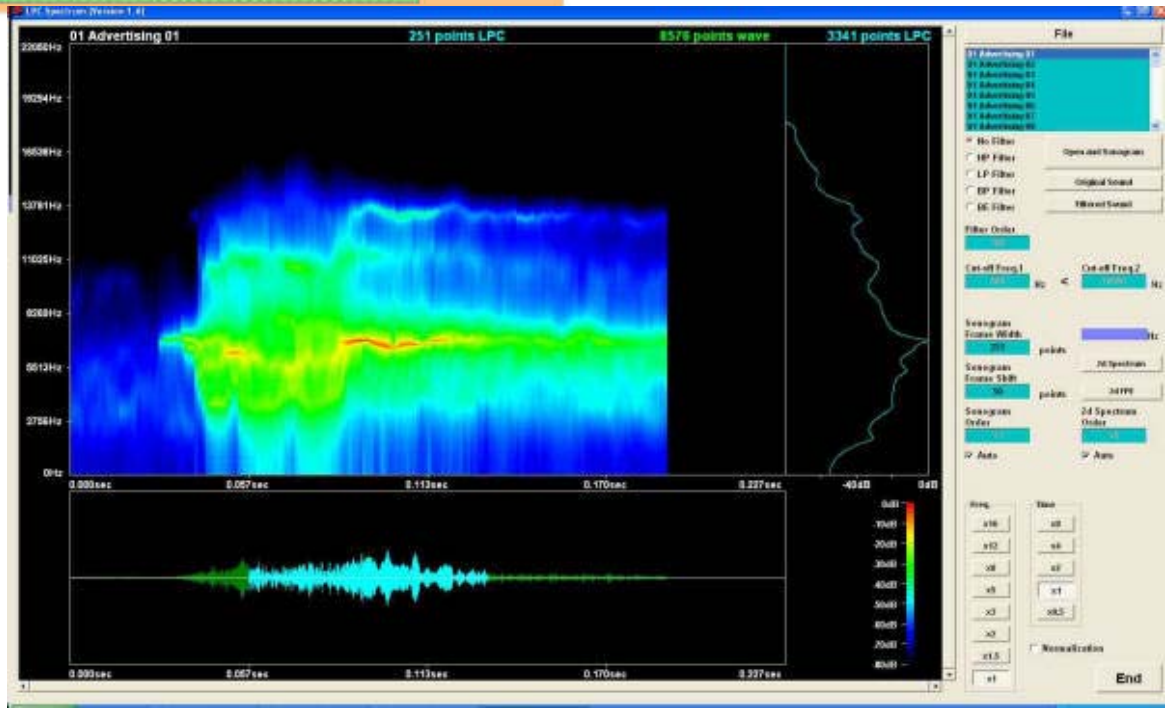
Software

Using any audio software that provides a spectrogram view is 10-20 times more efficient than listening to the file

Some commercial software can be used to develop recognisers – e.g. SongScope from Wildlife Acoustics

Software

SoundID



Conclusions

Audio recording devices not the answer to every situation

Ideal for cryptic species with predictable vocalisations

Can also work well in places that are difficult of access

Technology (hardware and software) evolving quickly