Bat Acoustic Species-Pair Matrix

Eastern US/Canada

'NARROWBAND' Species

	EUFL	LACI	EPFU	LANO	TABR	LAIN	LAEG	LASE	LABO	NYHU	PESU
EUFL		G		G							
LACI	G		P	P	1					P	
EPFU		P		2	3	P	P	P	P		
LANO	G	P	2		4	P	P	P	P		
TABR		1	3	4		S					
LAIN			P	P	S						
LAEG			P	P						P	P
LASE			P	P					X	P	P
LABO			P	P				X		P	P
NYHU		P				P	P	P	P		
PESU							P	P	P		

EUFL	Florida Bonneted Bat
LACI	Hoary Bat
EPFU	Big Brown Bat
LANO	Silver-haired Bat
TABR	Brazilian Free-tailed Bat
LAIN	Northern Yellow Bat
LAEG	Southern Yellow Bat
LASE	Seminole Bat
LABO	Eastern Red Bat
NYHU	Evening Bat
PESU	Tricolored Bat

Colors:

	Fmin standard deviation overlaps; separate based on other characters
	Fmin range overlaps, but not standard deviation, so can separate using K-Shape rule* (& other characters if listed)
	Fmin ranges do not overlap, or n/a

**K-Shape rule: 'within the Fmin range of a species, lower Fmin have flatter calls while higher Fmin have steeper calls'*

Other characters:

P	Pattern (steady vs bouncy Fmin)
G	Geography (distributions do not overlap)
S	Shape (molossid vs vespertilionid shape)
X	indistinguishable

1	TABR vs LACI; TABR has molossid call shape and carrot-shaped oscillogram; LACI has evenly distributed power in oscillogram
2	EPFU vs LANO; EPFU has Fmax ≥60 kHz; LANO has Fmax <60 kHz + <6 ms + harmonic OR LANO has flat call ≥25 kHz
3	EPFU vs TABR; TABR has molossid call shape; EPFU call shape lacks upswing into call
4	LANO vs TABR; LANO has flat call ≥25 kHz, power evenly distirbuted through oscillogram, and usually upsweep out of call; TABR has flat call < 25 kHz, carrot-shaped oscillogram, and molossid call shape

**Note that all narrowband species are capable of making broadband calls in cluttered habitat.*
Assess your detector deployment when vetting.

Bat Acoustic Species-Pair Matrix

Eastern US/Canada

BROADBAND Species

	CORA	COTOv	COTOi	MYSE	MYLU	MYSO	LASP	MYAU	MYLE	MYGR	PESU
CORA		X	G								
COTOv	X		G								
COTOi	G	G									
MYSE					B	B	B	B	B	B	S
MYLU				B		1	2				
MYSO				B	1		2				S
LASP				B	2	2		P	P	P	P
MYAU				B			P		X	S	S
MYLE				B			P	X		S	S
MYGR				B			P	S	S		S
PESU				S		S	P	S	S	S	

CORA Rafinesque's Big-eared Bat
COTOv Virginia Big-eared Bat
COTOi Ozark Big-eared Bat
MYSE Northern Long-eared Bat
MYLU Little Brown Bat
MYSO Indiana Bat
LASP Eastern Red/Seminole Bat
MYAU Southeastern Bat
MYLE Eastern Small-footed Bat
MYGR Gray Bat
PESU Tricolored Bat

**PESU is included due to possible confusion with MYGR long duration calls*

Colors:

	Fc standard deviation overlaps; separate based on other characters
	Fc standard deviation does not overlap, so can likely separate using K-Shape rule*
	Fmin ranges do not overlap, or n/a

**Fmin ranges overlap for most broadband species, but Fmin is a less reliable characteristic for Myotis. Characteristic frequency (Fc) is better for separating Myotis, and has a similar relationship with shape as Fmin (within the Fc standard deviation of a species, lower Fc have longer duration calls while higher Fc have steeper calls).*

Other characters:

B	Bandwidth (>75 kHz vs ≤75 kHz)
P	Pattern (steady vs bouncy Fmin)
G	Geography (ranges do not overlap)
S	Shape (for *Myotis* smooth curves vs inflections; for PESU no tail)
X	indistinguishable

1	MYSO vs MYLU; separate based on minimum slope in AnalookW or Anabat Insight
2	LASP vs MYSO/MYLU; broadband LASP calls have Fmin >40 kHz and bouncy Fmin

Vesper Bat Detection Services