

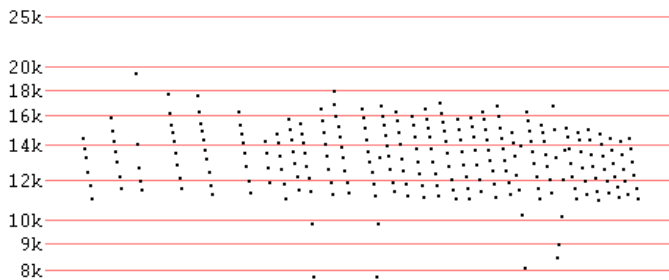
Wyoming ANABAT Call Key (2011 DRAFT)

*Developed by
Douglas A. Keinath*

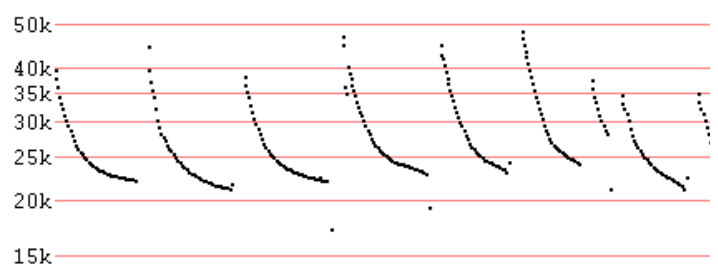
NOTE: Anabat[®] is a system designed to help users find and identify echolocating bats by digitally recording those calls and plotting them on a computer (for more information see: <http://users.lmi.net/corben/anabat.htm#Anabat%20Contents>). Before employing this key, users should be familiar with general principals of call analysis (e.g., <http://users.lmi.net/corben/glossary.htm#Glossary>). With such background information, this key can be used to roughly classify calls. Questionable calls, calls of difficult to distinguish species, or calls that represent new occurrences in an area should always be viewed by local Anabat[®] experts. In Wyoming, people should contact the Wyoming Natural Diversity Database (Doug Keinath: 307-766-3013, dkeinath@uwyo.edu) or the Wyoming Game and Fish Department (Martin Grenier).

<u>Fmin (kHz)</u>	<u>Description</u>	<u>ID</u>
< 10	1. Calls steep and sparse. Usually beginning above 10 and ending below 8. Calls can be heard audibly with unaided ear; sounds like two pebbles being struck together.	EUMA
16 – 20	2. Calls usually low slope & can be hook-shaped. Calls tend to jump around in Fmin, but typically ~20k or lower. Calls tend to vary in curvature throughout the sequence. Often give several calls at a higher freq, but with same shape.	LACI
~ 25	Fmin ~25 and with distinct tail. Two possibilities (LANO or EPFU), which are difficult to distinguish from each other, especially in clutter. Many call files must be reported simply as “aB25k”	a25k
	3. Calls are more bilinear than EPFU. Slope of tail is more variable than EPFU. Min Δslope often ~10 and Δslope plots usually “dribble off” rather than forming “fish-hook” ends. Calls rarely fall below 25k. Calls very regularly spaced (“metronome”).	LANO
	4. Calls are more curvilinear than LANO, but can be more bilinear when they are short in sweep (i.e., ~25-40). Slope of tail is very consistent. On flat calls, Δslope plots may show many calls with “fish-hook” ends. Fmin often not uniform, with some calls falling below 25k. Calls sometimes irregularly spaced (“heart beat”).	EPFU

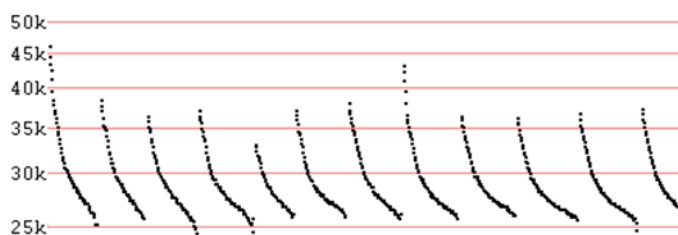
1. EUMA (Div16, F7)



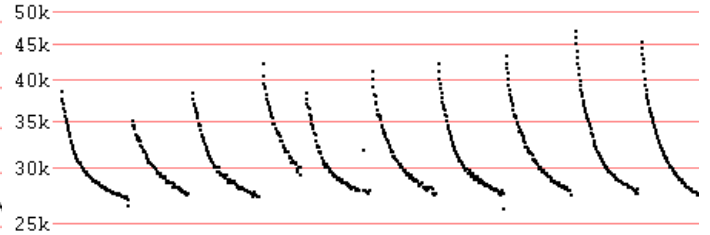
2. LACI (Div16, F7; stock file)



3. LANO (Div16, F6)

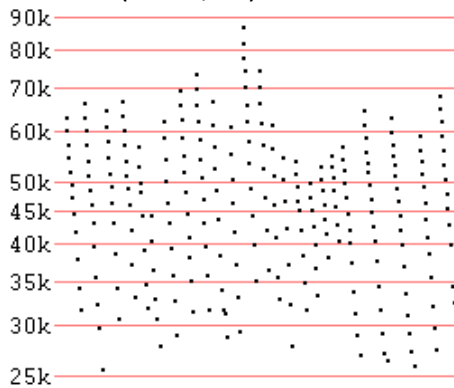


4. EPFU (Div16, F6)

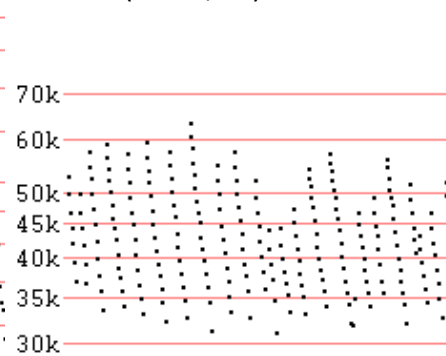


Fmin (kHz)	Description	ID
~ 25 - 30	F-min 25 – 30 and calls very steep with little tail. Four possibilities (MYTH, MYEV, COTO, ANPA). If sequences are not long and clean, many of these can be difficult to tell apart and must then be reported simply as “ aB30k ”.	aB30k
	5. Calls very steep (Δ slope ≥ 100) with huge freq. range (usu. > 50 and up to 20-100 in same call) and no tail. Variable Fmin with some calls usu. dropping to or below 25.	MYTH
	6. Calls very steep (Δ slope usu > 150 ; often 300) and very sparse, with no tail. Fmin usu ~ 35 , but varies within sequence, seldom dropping below 30. Freq range usu ~ 30 .	MYEV
	7. Calls steep, but often slightly more curved than MYTH or MYEV and somewhat “thicker”. Very little tail, but sometime “dribbling off” in a “lazy S” shape. Fmin ~ 30 k and Fmax ≥ 50 . Can also be difficult to tell from EPFU in clutter, which will usu. have time between calls of < 100 ms	ANPA
	8. Calls steep, weak, have two harmonics . Fmin usu ~ 30 , but can be ≤ 25 . Harmonic-break often bet. 40-50. Sometimes only one harmonic captured: Upper can look like 50k myotis; lower can look like steep 25k getting thinner at tail	COTO
	9. Unique in its variability; calls vary between flat to steep in same sequence. Flat calls usually sweep 28-25 kHz, while steep usually sweep 60-27kHz. <u>Behavior</u> : open habitat, flying straight for moths and large insects.	TABR

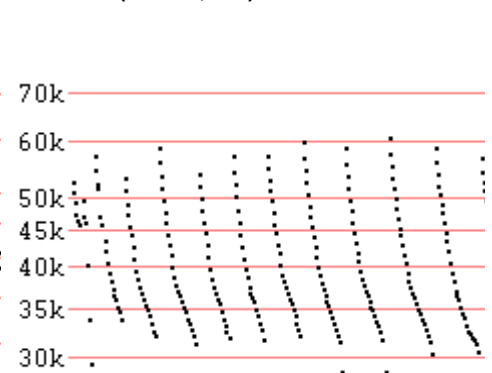
5. MYTH (Div16, F7)



6. MYEV (Div16, F7)

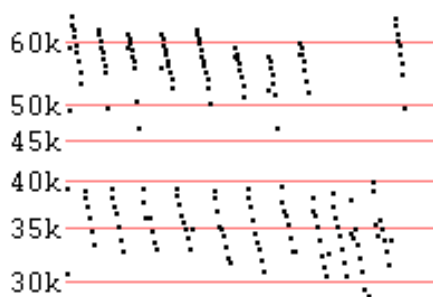


7. ANPA (Div16, F7)



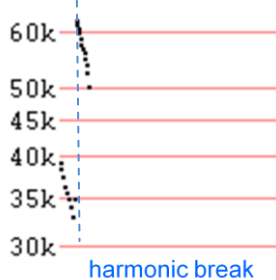
8a. COTO

(Div16, F7, compressed)



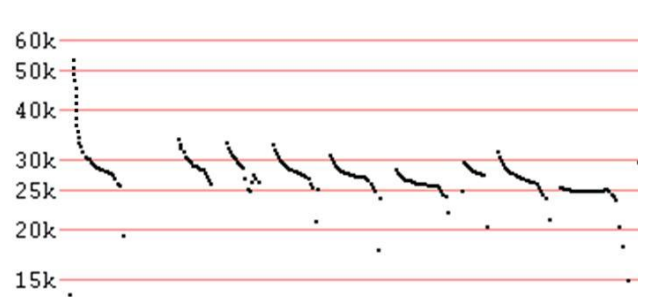
8b. COTO


(Div16, F7, real-time)



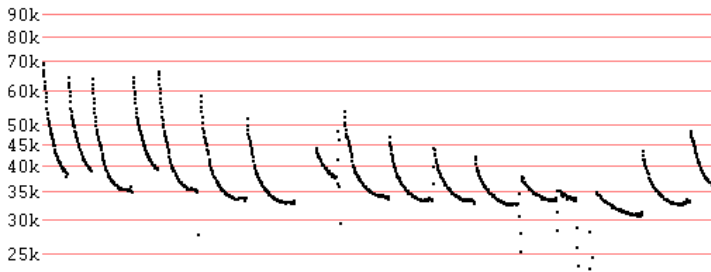
9. TABR

(Div16, F7, stock file)

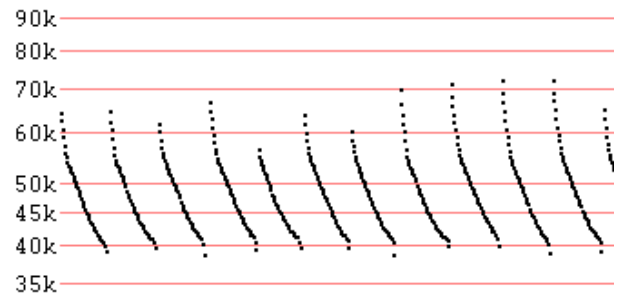


<u>Fmin (kHz)</u>	<u>Description</u>	<u>ID</u>
~ 27 - 35	10. Calls increases in frequency at end, creating a slight hook shape (like hoary bat). Calls sweep steeply from over 50k to just below 40k, with numerous calls often shifted downward so Fmin can be as low as 27k.	LABO
~ 40	Fmin usually at 40k, with some potentially falling above or below. Four possibilities (MYLU, MYCI, MYSE, MYVO). 40k myotis are very difficult to distinguish from each other, especially in clutter. Many call files must be reported simply as "aM40k".	aM40k
	11. Gently curved slope throughout call (but often get more bilinear in clutter and may "dribble off" at the end). Clean calls often sweep from ~100 to just over 40. On clean calls, Δ slope/min can be as low as 40, but usually higher. Sometimes alternate curved call with a more linear one. <u>Behavior</u> : MYLU classically feed over water, which can result in "wobbly" calls."	MYLU
	12. Calls steep and regularly have a small "toe" at or just before the end, resulting in a "golfclub" or "S" shaped call. Even with a toe, calls usually have Δ slope/min near 80. Clean calls usually straighter than MYLU, but can be more curvilinear than MYVO. Calls can have a wobble in the middle of the call (usually $\leq 50k$). <u>Behavior</u> : MYCI feed around vegetation, like MYCA.	MYCI 
	13. Calls look similar to MYEV, but lower frequency limit is roughly 40kHz. Calls typically sweep from 80kHz to just over 40kHz. Clean calls are straighter than MYLU and MYCI and less vertical than MYVO. <u>Behavior</u> : MYSE feed around vegetation, often forests, gleaning and aerially pursuing insects.	MYSE
	14. Calls steep often with "wiggly look"; like MYLU in clutter, but greater call spacing. Calls tend to be more linear (or bilinear) than MYLU and have less "toe" than MYCI. Calls can have a wobble high in the sweep (usually $\geq 50k$). Δ slope is usually high (~100) but can drop to ~60. Difficult to distinguish from other 40k myotis	MYVO

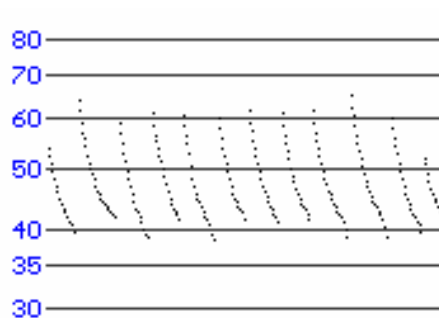
10. LABO (Div8, F7)



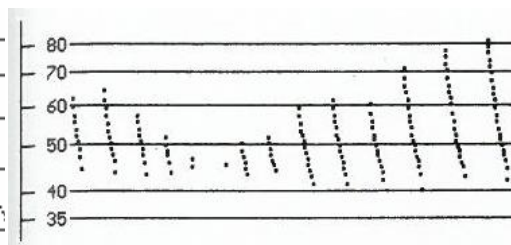
11. MYLU (Div16, F7)



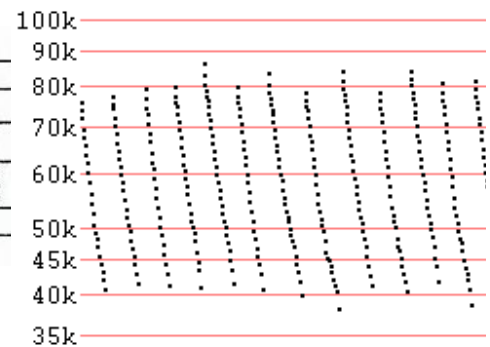
12. MYCI (Div16, F7)



13. MYSE (from Adams 2003)

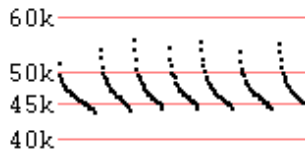


14. MYVO (Div 16, F7)

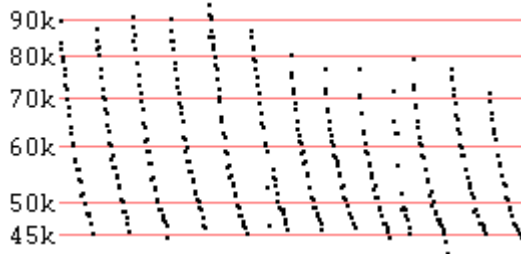


<u>Fmin (kHz)</u>	<u>Description</u>	<u>ID</u>
~50	15. Usually starting around 50 and often ending below (~45). Thick calls with flat tails often with a drooping tail. Duration>5.0ms.	PEHE
~ 50	Steeper than PIHE and usu. Fmin at or just below 50k. Single calls can drop to 40k, but not whole series (consistently above 43k). Difficult to distinguish from each other, especially in clutter, and many must be reported simply as "aM50k".	aM50k
	16. Often show calls dropping below 50k (~45k). Call shape similar to MYLU, but thicker tail. Calls often "dribble-off", rather than having constant toes. Dribble calls can have Δ slope down to 40. In a series, there is often one call that is flatter than the rest. <i>Behavior</i> : MYYU often feed over water.	MYYU
	17. Calls frequently have a flat "toe" at the end, rather than dribbling off. Toed calls usually have Min. Δ slope of 30ish. "Dribbling calls" usually have Min. Δ slope greater than MYYU (i.e., above 40). <i>Behavior</i> : MYCA typically feed by hugging vegetation.	MYCA

14. PEHE (Div16, F7)



15. MYCA (Div16, F7)



16. MYYU (Div 16, F7)

