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June 16, 2017

Memo to: Mike Armstrong, Andrew King and Robyn Niver

From: Mark Ford *Mark*

Subject: Kaleidoscope 4.3.1 Test on Expanded Data

Below are the returned MLE *p*-values on the estimates of presence or absence of bat community composition datasets (also with runs of northern long-eared bats *Myotis septentrionalis* removed or Indiana bats *Myotis sodalis* removed) for the 0 sensitivity settings over ten independent and randomly generated test libraries for 30 tests. At this setting, Kaleidoscope 4.3.1 performed less well than the 4.2.0 version with data containing both northern long-eared bats and Indiana bats as well as runs with either species removed (Table 1). Across these tests, false negatives were returned in 4 of 20 tests where northern long-eared bats were present (orange). The software returned 9 of 10 false positives when Indiana bats were removed (red). Examining the user's accuracy (Table 2), all calls identified as northern long-eared bat by the program were correct and false negatives were a result of low software confidence in the MLE score. However, the producer's accuracy (Table 3) shows that many northern long-eared bats were inaccurately identified. Indiana bat misclassification as little brown bat (*Myotis lucifugus*) persists. As such, this version would fail to meet U.S. Fish and Wildlife MLE standards for use.

cc: A. Silvis

Table 1. Kaleidoscope 4.3.1 MLE *p*-values at -1 setting in expanded random draw (10) datasets. Results are shown for each test for the full library (all), the library without *Myotis septentrionalis* (no MYSE), and the library without *M. sodalis* (no MYSO). Cells highlighted in green show MLE values correctly indicating species presence or absence of *M. septentrionalis* or *M. sodalis* in the test library at MLE < 0.05. Cells highlighted in orange indicate incorrect assessment of absence at MLE > 0.05.. Cells highlighted in red indicate incorrect assessment of presence at MLE < 0.05.

KALEIDOSCOPE 4.3.1														
Bats of North America 4.3.0 S/A: 0			EPFU	LABO	LACI	LANO	MYAU	MYGR	MYLE	MYLU	MYSE	MYSO	NYHU	PESU
	test 1													
		all	0.0000323	0	0	0.383022	0.286705	0	0	0	0.0135052	0	0.000192	0
		no MYSE	0.0000665	0	0	0.402616	0.147264	0	0	0	1	0	0.000403	0
		no MYSO	0.0000321	0	0	0.384445	0.273633	0	0	0	0.0013934	0.0009579	0.000218	0
	test 2													
		all	0.0000088	0	0	0.232975	0.001945	0	0	0	0.000255	0	0.050924	0
		no MYSE	0.0000098	0	0	0.255886	0.000069	0	0	0	1	0	0.107699	0
		no MYSO	0.0000086	0	0	0.231617	0.001757	0	0	0	0.0000113	0.001311	0.053454	0
	test 3													
		all	0	0	0	0.69195	0.01515	0	0	0	0.117358	0	0.071188	0
		no MYSE	0	0	0	0.732769	0.004214	0	0	0	1	0	0.157279	0
		no MYSO	0	0	0	0.692708	0.014923	0	0	0	0.0302784	0.0099566	0.074123	0
	test 4													
		all	0.0000013	0	0	0.090435	0.013988	0	0	0	0.2937833	0.000061	0.001133	0
		no MYSE	0.0000033	0	0	0.094082	0.154281	0	0	0	1	0.0000213	0.001624	0
		no MYSO	0.0000013	0	0	0.089745	0.011722	0	0	0	0.102477	0.0906951	0.001263	0
	test 5													
		all	0	0	0	0.113398	0.277606	0	0	0	0.011449	0	0.007226	0
		no MYSE	0.0000001	0	0	0.127892	0.132482	0	0	0	1	0	0.012573	0
		no MYSO	0	0	0	0.114008	0.268214	0	0	0	0.0012903	0.0001532	0.007619	0
	test 6													
		all	0.0000084	0	0	0.209387	0.031723	0	0	0	0.0008672	0	0.11397	0
		no MYSE	0.000012	0	0	0.20402	0.133476	0	0	0	1	0	0.120967	0
		no MYSO	0.0000125	0	0	0.209244	0.030477	0	0	0	0.0000628	0.0000109	0.118852	0
	test 7													
		all	0	0	0	0.200433	0.018992	0	0	0	0.0242852	0.0000001	0.124868	0
		no MYSE	0	0	0	0.219718	0.004634	0	0	0	1	0	0.148143	0
		no MYSO	0	0	0	0.202055	0.017329	0	0	0	0.0029685	0.0185661	0.130509	0
	test 8													
		all	0.0000001	0	0	0.788732	0.294297	0	0	0	0.001189	0	0.123838	0
		no MYSE	0.0000001	0	0	0.793432	0.118692	0	0	0	1	0	0.135069	0
		no MYSO	0.0000001	0	0	0.78949	0.280308	0	0	0	0.0000302	0.0171145	0.129726	0
	test 9													
		all	0.0000002	0	0	0.9058	1	0	0	0	0.0080126	0	0.074436	0
		no MYSE	0.0000002	0	0	0.905712	1	0	0	0	1	0	0.077919	0
		no MYSO	0.0000002	0	0	0.905698	1	0	0	0	0.0007921	0.0003589	0.075708	0
	test 10													
		all	0	0	0	0.494044	0.008165	0	0	0	0.6528617	0	0.05398	0
		no MYSE	0	0	0	0.552835	0.004266	0	0	0	1	0	0.129676	0
		no MYSO	0	0	0	0.49549	0.007304	0	0	0	0.3188244	0.0001258	0.058119	0

Table 2. Mean Kaleidoscope 4.3.1 user's file-level classification rates (specificity) at 0 setting in expanded random draw (10) datasets.

Of files identified				
Species	% correct	SD	Most common mis-ID	Most common mis-ID (species only)
EPFU	54	59	LANO	LANO
LABO	57	73	NYHU	NYHU
LACI	6	12	Noise	EPFU
LANO	36	24	Noise	EPFU
MYAU	0	0	MYLE	MYLE
MYGR	80	69	PESU	PESU
MYLE	100	-	-	-
MYLU	61	53	MYSO	MYSO
MYSE	100	-	-	-
MYSO	50	47	MYLU	MYLU
NYHU	55	30	LABO	LABO
PESU	62	53	Feeding buzz	LABO

Table 3. Mean Kaleidoscope 4.3.1 producer's file-level classification rates (sensitivity) at 0 setting in expanded random draw (10) datasets.

Species	% found	SD	Most common mis-ID	Most common mis-ID (species only)
EPFU	67	48	No ID	LACI
LABO	46	49	No ID	NYHU
LACI	58	55	No ID	LANO
LANO	29	31	No ID	EPFU
MYAU	0	0	No ID	MYLU
MYGR	88	76	No ID	PESU
MYLE	14	23	No ID	MYAU
MYLU	55	61	No ID	MYSO
MYSE	21	26	No ID	MYLU
MYSO	33	32	MYLU	MYLU
NYHU	50	53	LABO	LABO
PESU	82	63	No ID	MYGR