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Memo to: Mike Armstrong, Andrew King and Robyn Niver

From: W. Mark Ford *Mark*

Subject: Kaleidoscope 5.4.0beta0 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, -1 and +1 settings over ten independent and randomly generated test libraries as well as associated producer's and user's accuracy (Tables 1-6). At all settings (30 runs), this version fully passed for both northern long-eared bats and Indiana bats using MLE $\leq$ 0.05 as the threshold with no false positives or false negatives. Accordingly, this version would be acceptable for use with both species per the testing guidelines. However, continued improvement on other species should be a priority in forthcoming versions as performance on species such as the Southeastern myotis (*Myotis austroriparius*) continues to be poor.

cc: J. De La Cruz
A. Silvis
E. Thorne

TEST SUMMARY: BCID version 5.4.0 beta0

KEY:	PASS	FAIL

SETTING: -1

	MYSE			MYSO		
	Test Set			Test Set		
TEST LIBRARY	ALL	NO MYSE	NO MYSO	ALL	NO MYSE	NO MYSO
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
No. Correct:	10	10	10	10	10	10
% Correct:	100%	100%	100%	100%	100%	100%

SETTING: 0

	MYSE			MYSO		
	Test Set			Test Set		
TEST LIBRARY	ALL	NO MYSE	NO MYSO	ALL	NO MYSE	NO MYSO
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
No. Correct:	10	10	10	10	10	10
% Correct:	100%	100%	100%	100%	100%	100%

SETTING: +1

	MYSE			MYSO		
	Test Set			Test Set		
TEST LIBRARY	ALL	NO MYSE	NO MYSO	ALL	NO MYSE	NO MYSO
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
No. Correct:	10	10	10	10	10	10
% Correct:	100%	100%	100%	100%	100%	100%

Table 3. Maximum likelihood estimator P-values for -1 setting bat species. Green shading = correct with U.S. Fish and Wildlife Standards.

KALEIDOSCOPE 5.4.0beta2

Bats of North America 5.4.0 S/A:-1			EPTFUS	LASBOR	LASCIN	LASNOC	MYOAUS	MYOGRI	MYOLEI	MYOLUC	MYOSEP	MYOSOD	NYCHUM	PERSUB
	test 1	all	0.0000	0.0000	0.0000	0.7257	0.0593	0.0000	0.4810	0.0000	0.0000	0.0022	0.8728	0.0000
		no MYOSEP	0.0000	0.0000	0.0000	0.7214	0.0572	0.0000	0.2675	0.0000	0.8782	0.0011	0.8738	0.0000
		no MYOSOD	0.0000	0.0000	0.0000	0.7241	0.0691	0.0000	0.4305	0.0000	0.0000	0.7038	0.8805	0.0000
	test 2	all	0.0000	0.0000	0.0000	0.4531	0.0051	0.0000	0.9377	0.0000	0.0015	0.0122	0.0589	0.0001
		no MYOSEP	0.0000	0.0000	0.0000	0.3927	0.0191	0.0000	0.7681	0.0000	1.0000	0.0076	0.0423	0.0001
		no MYOSOD	0.0000	0.0000	0.0000	0.4395	0.0776	0.0000	0.5716	0.0000	0.0002	1.0000	0.0537	0.0001
	test 3	all	0.0000	0.0000	0.0000	0.7656	0.1182	0.0000	0.4914	0.0000	0.0011	0.0000	0.0081	0.0000
		no MYOSEP	0.0000	0.0000	0.0000	0.7329	0.3307	0.0000	0.3175	0.0000	1.0000	0.0000	0.0043	0.0000
		no MYOSOD	0.0000	0.0000	0.0000	0.7696	0.3101	0.0000	0.1353	0.0000	0.0000	0.1583	0.0084	0.0000
	test 4	all	0.0000	0.0000	0.0000	0.7196	0.4856	0.0000	0.1018	0.0000	0.0000	0.0001	0.2054	0.0212
		no MYOSEP	0.0000	0.0000	0.0000	0.6950	0.4196	0.0000	0.0897	0.0000	1.0000	0.0000	0.1706	0.0179
		no MYOSOD	0.0000	0.0000	0.0000	0.7277	0.6517	0.0000	0.0107	0.0000	0.0000	0.6690	0.2110	0.0205
	test 5	all	0.0000	0.0000	0.0000	0.7175	0.7322	0.0000	0.0311	0.0000	0.0000	0.0001	0.0012	0.0000
		no MYOSEP	0.0000	0.0000	0.0000	0.7098	0.8004	0.0000	0.0252	0.0000	1.0000	0.0001	0.0033	0.0000
		no MYOSOD	0.0000	0.0000	0.0000	0.7188	0.7696	0.0000	0.0038	0.0000	0.0000	0.3836	0.0014	0.0000
	test 6	all	0.0000	0.0000	0.0000	0.3854	0.5553	0.0000	0.5080	0.0000	0.0000	0.0000	0.2770	0.0000
		no MYOSEP	0.0000	0.0000	0.0000	0.3780	0.4414	0.0000	0.3238	0.0000	0.9516	0.0000	0.2732	0.0000
		no MYOSOD	0.0000	0.0000	0.0000	0.3780	0.7932	0.0000	0.3505	0.0000	0.0000	0.2854	0.2770	0.0000
	test 7	all	0.0000	0.0000	0.0000	0.9879	0.0356	0.0001	0.3504	0.0000	0.0000	0.0000	0.2351	0.0001
		no MYOSEP	0.0000	0.0000	0.0000	0.9892	0.0352	0.0001	0.1777	0.0000	1.0000	0.0000	0.2377	0.0001
		no MYOSOD	0.0000	0.0000	0.0000	0.9880	0.0497	0.0000	0.0759	0.0000	0.0000	0.5984	0.2440	0.0001
	test 8	all	0.0000	0.0000	0.0000	1.0000	0.2285	0.0000	0.0841	0.0000	0.0000	0.0040	0.2418	0.0009
		no MYOSEP	0.0000	0.0000	0.0000	1.0000	0.2813	0.0000	0.0356	0.0000	0.8289	0.0008	0.2381	0.0009
		no MYOSOD	0.0000	0.0000	0.0000	1.0000	0.5409	0.0000	0.0311	0.0000	0.0000	0.9462	0.2423	0.0009
	test 9	all	0.0000	0.0000	0.0000	0.0792	0.9104	0.0000	0.2325	0.0000	0.0000	0.0004	0.7418	0.0026
		no MYOSEP	0.0000	0.0000	0.0000	0.0785	0.7524	0.0000	0.0919	0.0000	0.8983	0.0002	0.7456	0.0025
		no MYOSOD	0.0000	0.0000	0.0000	0.0591	1.0000	0.0000	0.0414	0.0000	0.0000	0.8283	0.7423	0.0021
	test 10	all	0.0000	0.0000	0.0000	0.9422	0.0152	0.0000	1.0000	0.0000	0.0000	0.0000	0.0027	0.0000
		no MYOSEP	0.0000	0.0001	0.0000	0.9248	0.0483	0.0000	0.9511	0.0000	1.0000	0.0000	0.0031	0.0000
		no MYOSOD	0.0000	0.0000	0.0000	0.9436	0.0133	0.0000	0.7514	0.0000	0.0000	0.3601	0.0029	0.0000

Table 2. Producer's and user's accuracy rates for the -1 setting.

	Producer	SD	Common Mis-ID	User	SD	Common Mis-ID
EPTFUS	0.7500	0.5325	LASNOC	0.7500	0.3247	LASNOC
LASBOR	0.4833	0.2766	NYCHUM	0.4833	0.3555	NYCHUM MYOGRI
LASCIN	0.8750	0.6810	NOID	0.8750	0.1095	NOISE
LASNOC	0.5660	0.3919	EPTFUS	0.5660	0.2960	EPTFUS
MYOAUS	0.0222	0.0762	MYOLUC	0.0222	0.0747	MYOSOD
MYOGRI	0.8462	0.6750	MYOAUS	0.8462	0.2451	MYOAUS
MYOLEI	0.2875	0.1334	MYOSEP	0.2875	0.4777	MYOAUS
MYOLUC	0.7098	0.2887	MYOSOD	0.7098	0.2615	MYOSOD
MYOSEP	0.6322	0.1483	NOID	0.6322	0.4289	MYOAUS
MYOSOD	0.5455	0.0663	MYOLUC	0.5455	0.4120	MYOLUC
NYCHUM	0.8636	0.5698	LASBOR	0.8636	0.1810	LASBOR
PERSUB	0.7681	0.4315	NOID	0.7681	0.3886	MYOGRI

Table 3. Maximum likelihood estimator P-values for 0 setting bat species. Green shading = correct with U.S. Fish and Wildlife Standards.

KALEIDOSCOPE 5.4.0beta2														
Bats of North America 5.4.0 S/A: 0			EPTFUS	LASBOR	LASCIN	LASNOC	MYOAUS	MYOGRI	MYOLEI	MYOLUC	MYOSEP	MYOSOD	NYCHUM	PERSUB
	test 1	all	0	0	0	1	0.6684	0	0.3266	0	0	0	1	0
		no MYSE	0	0	0	1	0.6046	0	0.345	0	0.9123	0	1	0
		no MYSO	0	0	0	1	0.4879	0	0.019	0	0	0.9433	1	0
	test 2	all	0	0	0	0.8638	0.035	0	0.7524	0	0	0.0005	0.6127	0
		no MYSE	0	0	0	0.8638	0.0243	0	0.7435	0	0.9832	0.0002	0.6124	0
		no MYSO	0	0	0	0.8638	0.0571	0	0.1877	0	0	0.9882	0.6121	0
	test 3	all	0	0	0	1	0.369	0	0.3933	0	0.0339	0	0.0317	0
		no MYSE	0	0	0	1	0.388	0	0.3861	0	1	0	0.0325	0
		no MYSO	0	0	0	1	0.2247	0	0.0327	0	0.0128	0.6774	0.0316	0
	test 4	all	0	0	0	0.997	0.1698	0	0.2726	0	0	0.0001	0.5607	0
		no MYSE	0	0	0	0.997	0.082	0	0.7858	0	1	0	0.5624	0
		no MYSO	0	0	0	0.997	0.1031	0	0.0193	0	0	0.9417	0.5599	0
	test 5	all	0	0	0	0.8974	0.5402	0	0.0169	0	0.0002	0	0.2384	0
		no MYSE	0	0	0	0.8974	0.3958	0	0.0806	0	1	0	0.2398	0
		no MYSO	0	0	0	0.8974	0.4137	0	0.0005	0	0	0.4718	0.2376	0
	test 6	all	0	0	0	0.9905	0.664	0.0032	0.105	0	0	0	0.6372	0
		no MYSE	0	0	0	0.9905	0.6199	0.003	0.111	0	1	0	0.6384	0
		no MYSO	0	0	0	0.9905	0.4759	0.0029	0.0025	0	0	0.7815	0.6366	0
	test 7	all	0	0	0	1	0.001	0	0.9534	0	0	0	0.6608	0
		no MYSE	0	0	0	1	0.0006	0	0.9627	0	1	0	0.6606	0
		no MYSO	0	0	0	1	0.0008	0	0.2513	0	0	0.8407	0.6602	0
	test 8	all	0	0	0	1	0.0691	0	0.3787	0	0	0	0.3658	0
		no MYSE	0	0	0	1	0.058	0	0.3946	0	0.6992	0	0.3655	0
		no MYSO	0	0	0	1	0.1064	0	0.0761	0	0	0.1828	0.3653	0
	test 9	all	0	0	0	0.7908	0.9523	0	0.8296	0	0	0	0.9821	0
		no MYSE	0	0	0	0.7908	0.9202	0	0.8477	0	1	0	0.9823	0
		no MYSO	0	0	0	0.7908	1	0	0.102	0	0	1	0.9822	0
	test 10	all	0	0	0	1	0.1303	0.0001	0.4617	0	0	0	0.0878	0
		no MYSE	0	0	0	1	0.1107	0.0001	0.4736	0	1	0	0.0884	0
		no MYSO	0	0	0	1	0.0576	0.0001	0.0409	0	0	0.5916	0.0875	0

Table 4. Producer's and user's accuracy rates for the 0 setting.

	Producer	SD	Common Mis-ID	User	SD	Common Mis-ID
EPTFUS	0.7222	0.5367	LASNOC	0.5417	0.4921	LASNOC
LASBOR	0.4833	0.3061	NOID	0.7838	0.4920	NYCHUM
LASCIN	0.8750	0.6810	NOISE	0.0854	0.1232	NOISE
LASNOC	0.2264	0.2124	EPTFUS	0.3429	0.2407	EPTFUS
MYOAUS	0.0000	0.0000	MYOLUC	0.0000	0.0000	MYOLUC
MYOGRI	0.3077	0.2932	NOID	0.4000	0.2899	MYOAUS
MYOLEI	0.0750	0.1781	NOID	1.0000	1.0000	MYOAUS
MYOLUC	0.4352	0.2922	NOID	0.6462	0.3195	MYOSOD
MYOSEP	0.3448	0.3086	NOID	0.9091	0.7208	NOID
MYOSOD	0.4273	0.4033	NOID	0.8103	0.5985	MYOLUC
NYCHUM	0.3939	0.3919	NOID	0.5000	0.2519	LASBOR
PERSUB	0.6667	0.3874	NOISE	0.6571	0.5423	NYCHUM

Table 5. Maximum likelihood estimator P-values for +1 setting bat species. Green shading = correct with U.S. Fish and Wildlife Standards.

KALEIDOSCOPE 5.4.0beta2														
Bats of North America 5.4.0 S/A:+1			**EPTFUS**	**LASBOR**	**LASCIN**	**LASNOC**	**MYOAUS**	**MYOGRI**	**MYOLEI**	**MYOLUC**	**MYOSEP**	**MYOSOD**	**NYCHUM**	**PERSUB**
	test 1	**all**	0.0000	0.0000	0.0000	1.0000	1.0000	0.0000	0.1889	0.0000	0.0000	0.0002	1.0000	0.0000
		no MYSE	0.0000	0.0000	0.0000	1.0000	1.0000	0.0000	0.1970	0.0000	0.6639	0.0000	1.0000	0.0000
		no MYSO	0.0000	0.0000	0.0000	1.0000	1.0000	0.0000	0.0145	0.0000	0.0000	0.9116	1.0000	0.0000
	test 2	**all**	0.0000	0.0000	0.0000	1.0000	0.5032	0.0000	0.5252	0.0000	0.0000	0.0111	0.7234	0.0000
		no MYSE	0.0000	0.0000	0.0000	1.0000	0.4192	0.0000	0.5085	0.0000	1.0000	0.0085	0.7248	0.0000
		no MYSO	0.0000	0.0000	0.0000	1.0000	0.8113	0.0000	0.1736	0.0000	0.0000	0.9586	0.7238	0.0000
	test 3	**all**	0.0004	0.0000	0.0000	1.0000	0.9086	0.0000	0.2029	0.0000	0.0068	0.0000	0.1006	0.0000
		no MYSE	0.0004	0.0000	0.0000	1.0000	0.9117	0.0000	0.2040	0.0000	1.0000	0.0000	0.1037	0.0000
		no MYSO	0.0004	0.0000	0.0000	1.0000	0.8035	0.0000	0.0153	0.0000	0.0034	0.8973	0.1010	0.0000
	test 4	**all**	0.0000	0.0000	0.0000	1.0000	0.6635	0.0000	0.2003	0.0000	0.0000	0.0000	0.6006	0.0001
		no MYSE	0.0000	0.0000	0.0000	1.0000	0.4706	0.0000	0.7013	0.0000	1.0000	0.0000	0.6010	0.0001
		no MYSO	0.0000	0.0000	0.0000	1.0000	0.5353	0.0000	0.0147	0.0000	0.0000	0.8961	0.6020	0.0001
	test 5	**all**	0.0000	0.0000	0.0000	1.0000	0.7043	0.0000	0.0036	0.0000	0.0001	0.0018	0.6045	0.0000
		no MYSE	0.0000	0.0000	0.0000	1.0000	0.5401	0.0000	0.0256	0.0000	1.0000	0.0009	0.6065	0.0000
		no MYSO	0.0000	0.0000	0.0000	1.0000	0.6242	0.0000	0.0002	0.0000	0.0000	0.4758	0.6071	0.0000
	test 6	**all**	0.0003	0.0000	0.0000	1.0000	0.9074	0.0004	0.0558	0.0000	0.0000	0.0000	0.7224	0.0000
		no MYSE	0.0003	0.0000	0.0000	1.0000	0.8657	0.0004	0.0592	0.0000	1.0000	0.0000	0.7225	0.0000
		no MYSO	0.0003	0.0000	0.0000	1.0000	0.7819	0.0004	0.0016	0.0000	0.0000	0.7287	0.7238	0.0000
	test 7	**all**	0.0000	0.0000	0.0000	1.0000	0.0776	0.0000	0.7882	0.0000	0.0000	0.0000	0.8141	0.0001
		no MYSE	0.0000	0.0000	0.0000	1.0000	0.0596	0.0000	0.8004	0.0000	1.0000	0.0000	0.8161	0.0001
		no MYSO	0.0000	0.0000	0.0000	1.0000	0.1264	0.0000	0.2315	0.0000	0.0000	0.7395	0.8150	0.0001
	test 8	**all**	0.0000	0.0000	0.0000	1.0000	0.2892	0.0000	0.2391	0.0000	0.0001	0.0000	0.7913	0.0000
		no MYSE	0.0000	0.0000	0.0000	1.0000	0.2516	0.0000	0.2491	0.0000	0.8389	0.0000	0.7917	0.0000
		no MYSO	0.0000	0.0000	0.0000	1.0000	0.4886	0.0000	0.0548	0.0000	0.0000	0.1662	0.7919	0.0000
	test 9	**all**	0.0000	0.0000	0.0000	1.0000	1.0000	0.0000	0.6332	0.0000	0.0000	0.0004	1.0000	0.0000
		no MYSE	0.0000	0.0000	0.0000	1.0000	1.0000	0.0000	0.6498	0.0000	0.9913	0.0001	1.0000	0.0000
		no MYSO	0.0000	0.0000	0.0000	1.0000	1.0000	0.0000	0.1047	0.0000	0.0000	1.0000	1.0000	0.0000
	test 10	**all**	0.0000	0.0000	0.0000	1.0000	0.2349	0.0000	0.2777	0.0000	0.0000	0.0000	0.2025	0.0000
		no MYSE	0.0000	0.0000	0.0000	1.0000	0.1835	0.0000	0.2924	0.0000	1.0000	0.0000	0.2038	0.0000
		no MYSO	0.0000	0.0000	0.0000	1.0000	0.1353	0.0000	0.0199	0.0000	0.0000	0.8203	0.2037	0.0000

Table 6. Producer's and user's accuracy rates for the +1 setting.

	Producer	SD	Common Mis-ID	User	SD	Common Mis-ID
EPTFUS	0.4167	0.4129	LASNOC	0.4167	0.4361	LASNOC
LASBOR	0.4667	0.3186	NOID	0.8116	0.6226	NYCHUM
LASCIN	0.8750	0.6810	NOISE	0.1207	0.1328	NOISE
LASNOC	0.2264	0.2074	EPTFUS	0.5714	0.3690	EPTFUS
MYOAUS	0.0000	0.0000	MYOLUC	0.0000	0.0000	MYOLUC
MYOGRI	0.3077	0.3710	NOID	0.4444	0.3081	NOID
MYOLEI	0.0750	0.1978	NOID	1.0000	1.0000	NOID
MYOLUC	0.4249	0.2909	NOID	0.6777	0.3512	NOID
MYOSEP	0.3103	0.3151	NOID	0.9000	0.7215	NOID
MYOSOD	0.3273	0.3572	NOID	0.7660	0.5629	NOID
NYCHUM	0.3939	0.3919	NOID	0.5200	0.2676	LASBOR
PERSUB	0.6087	0.3823	NOID	0.6563	0.5593	MYOGRI