



United States Department of the Interior
U.S. Geological Survey
Ecosystems Division

Virginia Cooperative Fish and Wildlife Research Unit
106 Cheatham Hall
Virginia Tech
Blacksburg, VA 24061

Fax: (540) 231-7580
Phone: (540) 231-5927
Email: wmford@vt.edu

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Memo to: Mike Armstrong, Andrew King and Robyn Niver

From: W. Mark Ford *Mark*

Subject: Kaleidoscope 5.2.1beta1 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 northern long-eared bats using $\text{MLE} \leq 0.05$ as the threshold with no false positives or false negatives. For the Indiana bat, at all settings, presence was correctly noted in the 20 runs where Indiana bats were actually present. However, false positives were noted in the datasets where Indiana bats were removed in all runs for settings -1, 0, and +1. Accordingly, this version would not be acceptable for use with Indiana bats per the testing guidelines. This software is continuing to perform poorly for correctly identifying Southeastern myotis (*Myotis austroriparius*) presence at all settings, however other species are showing improvement over previous versions.

cc: A. Silvis

TEST SUMMARY: BCID version 5.2.1 beta1

KEY:	PASS	FAIL
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SETTING: -1

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

TEST LIBRARY	MYSO		
	Test Set		
	ALL	NO MYSE	NO MYSO
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
No. Correct:	10	10	0
% Correct:	100%	100%	0%

SETTING: 0

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

TEST LIBRARY	MYSO		
	Test Set		
	ALL	NO MYSE	NO MYSO
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
No. Correct:	10	10	0
% Correct:	100%	100%	0%

SETTING: +1

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

TEST LIBRARY	MYSO		
	Test Set		
	ALL	NO MYSE	NO MYSO
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
No. Correct:	10	10	0
% Correct:	100%	100%	0%

Table 1. Maximum likelihood estimator P-values for -1 setting by species. Green shading = correct with U.S. Fish and Wildlife standards. Pink shading = false positive.

KALEIDOSCOPE 5.2.1beta1		EPTFUS	LASBOR	LASCIN	LASNOC	MYOAUS	MYOGRI	MYOLEI	MYOLUC	MYOSEP	MYOSOD	NYCHUM	PERSUB
test 1	all	0	0	0	0.3108	0	0	0.0001	0	0	0	0.0343	0
	no MYOSEP	0	0	0	0.2534	0	0	0.0015	0	1	0	0.0174	0
	no MYOSOD	0	0	0	0.308	0	0	0	0	0	0.0008	0.0367	0
test 2	all	0	0	0	0.8872	0	0	0.0002	0	0	0	0.2499	0
	no MYOSEP	0	0	0	0.9081	0	0	0.0015	0	1	0	0.3841	0
	no MYOSOD	0	0	0	0.8875	0	0	0	0	0	0	0.2639	0
test 3	all	0	0	0	0.0677	0	0	0.0003	0	0	0	0.0068	0
	no MYOSEP	0	0	0	0.0654	0	0	0.002	0	1	0	0.0044	0
	no MYOSOD	0	0	0	0.0664	0	0	0	0	0	0.0001	0.0076	0
test 4	all	0	0	0	0.9642	0	0	0.0025	0	0	0	0.047	0
	no MYOSEP	0	0	0	0.9621	0	0	0.0416	0	1	0	0.038	0
	no MYOSOD	0	0	0	0.9643	0	0	0.0021	0	0	0.0003	0.0512	0
test 5	all	0	0	0	1	0	0	0	0	0	0	0.0198	0
	no MYOSEP	0	0	0	1	0	0	0.0001	0	1	0	0.0226	0
	no MYOSOD	0	0	0	1	0	0	0	0	0	0	0.0393	0
test 6	all	0	0	0	0.2931	0	0	0	0	0	0	0.0016	0
	no MYOSEP	0	0	0	0.2614	0	0	0	0	1	0	0.0053	0
	no MYOSOD	0	0	0	0.2927	0	0	0	0	0	0.0011	0.0029	0
test 7	all	0	0	0	0.5388	0	0	0	0	0	0	0.1908	0
	no MYOSEP	0	0	0	0.5105	0	0	0.0001	0	1	0	0.1646	0
	no MYOSOD	0	0	0	0.5458	0	0	0	0	0	0	0.208	0
test 8	all	0	0	0	0.9902	0	0	0.0032	0	0	0	0.0009	0
	no MYOSEP	0	0	0	0.9902	0	0	0.0065	0	1	0	0.001	0
	no MYOSOD	0	0	0	0.9902	0	0	0.0007	0	0	0	0.0012	0
test 9	all	0	0	0	0.9947	0	0	0.0003	0	0	0	0.383	0
	no MYOSEP	0	0	0	0.9957	0	0	0.0003	0	1	0	0.4731	0
	no MYOSOD	0	0	0	0.9947	0	0	0.0002	0	0	0	0.3993	0
test 10	all	0	0	0	0.2663	0	0	0.0007	0	0	0	0.0372	0
	no MYOSEP	0	0	0	0.2092	0	0	0.0035	0	1	0	0.0215	0
	no MYOSOD	0	0	0	0.2659	0	0	0.0006	0	0	0	0.0405	0

Table 2. Producer's and user's accuracy rates for KALEIDOSCOPE 5.2.1beta1 for -1 setting.

	Producer	SD	Common Mis-ID	User	SD	Common Mis-ID
EPTFUS	0.8161	0.6077	NOID	0.5917	0.5567	NOID
LASBOR	0.5798	0.3037	NYCHUM	0.6765	0.358	NYCHUM
LASCIN	0.95	0.8616	Glaucomys	0.0896	0.1581	NOID
LASNOC	0.4675	0.3441	EPTFUS	0.375	0.2093	EPTFUS
MYOAUS	0.0761	0.0913	MYOLUC	0.0673	0.0536	NOID
MYOGRI	0.3684	0.2561	MYOAUS	0.2692	0.2258	MYOAUS
MYOLEI	0.4	0.3342	MYOAUS	0.8235	0.5161	MYOAUS
MYOLUC	0.6351	0.4987	MYOSOD	0.6264	0.5165	MYOSOD
MYOSEP	0.6389	0.4176	MYOAUS	0.6815	0.4426	MYOAUS
MYOSOD	0.5644	0.6236	MYOLUC	0.481	0.4494	MYOLUC
NYCHUM	0.8372	0.6878	LASBOR	0.4635	0.3052	NOID
PERSUB	0.8222	0.6061	NOID	0.6453	0.5806	NOID

Table 3. Maximum likelihood estimator P-values for 0 setting by species. Green shading = correct with U.S. Fish and Wildlife standards. Pink shading = false positive.

KALEIDOSCOPE 5.2.1beta1		EPTFUS	LASBOR	LASCIN	LASNOC	MYOAUS	MYOGRI	MYOLEI	MYOLUC	MYOSEP	MYOSOD	NYCHUM	PERSUB
test 1	all	0	0	0	0.4088	0.0141	0	0.003	0	0	0	0.0001	0
	no MYOSEP	0	0	0	0.4076	0.0009	0	0.1073	0	1	0	0.0001	0
	no MYOSOD	0	0	0	0.4113	0.0031	0	0.0022	0	0	0.0479	0.0001	0
test 2	all	0	0	0	0.9669	0	0	0.1183	0	0	0	0.0559	0
	no MYOSEP	0	0	0	0.9653	0	0	0.1158	0	1	0	0.0581	0
	no MYOSOD	0	0	0	0.9671	0	0	0.0961	0	0	0.008	0.0586	0
test 3	all	0	0	0	0.068	0	0	0.1221	0	0	0	0	0
	no MYOSEP	0	0	0	0.0686	0	0	0.1222	0	0.9189	0	0	0
	no MYOSOD	0	0	0	0.0692	0	0	0.1052	0	0	0.0018	0	0
test 4	all	0	0	0	1	0.0007	0	0.0043	0	0	0	0.0018	0
	no MYOSEP	0	0	0	1	0	0	0.1278	0	0.8918	0	0.0014	0
	no MYOSOD	0	0	0	1	0.0001	0	0.0029	0	0	0.001	0.0019	0
test 5	all	0	0	0	1	0.0001	0	0.1096	0	0	0	0.0003	0
	no MYOSEP	0	0	0	1	0	0	0.1097	0	0.5116	0	0.0003	0
	no MYOSOD	0	0	0	1	0	0	0.0857	0	0	0.0083	0.0003	0
test 6	all	0	0	0	0.5719	0.0026	0	0.0044	0	0	0	0.0007	0
	no MYOSEP	0	0	0	0.5726	0.0006	0	0.0044	0	0.9811	0	0.0007	0
	no MYOSOD	0	0	0	0.5739	0.0005	0	0.0032	0	0	0.034	0.0008	0
test 7	all	0	0	0	0.8879	0.0004	0	0.0028	0	0	0	0.0035	0
	no MYOSEP	0	0	0	0.8881	0.0001	0	0.0027	0	0.5138	0	0.0034	0
	no MYOSOD	0	0	0	0.8885	0	0	0.0019	0	0	0.0005	0.0037	0
test 8	all	0	0	0	0.9147	0.0352	0	1	0	0	0	0	0
	no MYOSEP	0	0	0	0.915	0.0044	0	1	0	0.4268	0	0	0
	no MYOSOD	0	0	0	0.9165	0.0084	0	1	0	0	0	0	0
test 9	all	0	0	0	1	0	0	0.0035	0	0	0	0.1708	0
	no MYOSEP	0	0	0	1	0	0	0.0035	0	0.8931	0	0.1649	0
	no MYOSOD	0	0	0	1	0	0	0.0025	0	0	0.0002	0.1727	0
test 10	all	0	0	0	0.2693	0	0	0.1055	0	0	0	0.0009	0
	no MYOSEP	0	0	0	0.2702	0	0	0.1056	0	0.3176	0	0.0009	0
	no MYOSOD	0	0	0	0.2717	0	0	0.0884	0	0	0.0001	0.0009	0

Table 4. Producer's and user's accuracy rates for KALEIDOSCOPE 5.2.1beta1 for 0 setting.

	Producer	SD	Common Mis-ID	User	SD	Common Mis-ID
EPTFUS	0.7356	0.5643	NOID	0.6095	0.5864	LASNOC
LASBOR	0.5336	0.3372	NOID	0.7697	0.5229	NYCHUM
LASCIN	0.9	0.7637	Glaucomys	0.0918	0.1672	LASNOC
LASNOC	0.3506	0.4059	EPTFUS	0.3649	0.2354	EPTFUS
MYOAUS	0	0	MYOLUC	0	0	MYOGRI
MYOGRI	0.3684	0.2503	NOID	0.4242	0.3529	MYOAUS
MYOLEI	0.0381	0.1327	NOID	0.8	0.6202	MYOAUS
MYOLUC	0.4958	0.4417	NOID	0.6642	0.5448	MYOSOD
MYOSEP	0.3056	0.3736	NOID	0.6471	0.5429	NOID
MYOSOD	0.3911	0.446	MYOLUC	0.6031	0.6088	MYOLUC
NYCHUM	0.5116	0.4085	LASBOR	0.528	0.2544	LASBOR
PERSUB	0.763	0.5909	NOID	0.7203	0.6129	MYOGRI

Table 5. Maximum likelihood estimator P-values for +1 setting by species. Green shading = correct with U.S. Fish and Wildlife standards. Pink shading = false positive.

KALEIDOSCOPE 5.2.1beta1														
Bats of North America 5.2.1 S/A:+1			EPTFUS	LASBOR	LASCIN	LASNOC	MYOAUS	MYOGRI	MYOLEI	MYOLUC	MYOSEP	MYOSOD	NYCHUM	PERSUB
test 1	all		0	0	0	0.994	0.0141	0	0.0031	0	0	0	0.024	0
	no MYOSEP		0	0	0	0.994	0.0014	0	0.1062	0	1	0	0.0239	0
	no MYOSOD		0	0	0	0.994	0.0023	0	0.0024	0	0	0.0459	0.0244	0
test 2	all		0	0	0	1	0	0	0.1158	0	0	0	0.7716	0
	no MYOSEP		0	0	0	1	0	0	0.1118	0	1	0	0.7709	0
	no MYOSOD		0	0	0	1	0	0	0.101	0	0	0.0098	0.7755	0
test 3	all		0	0	0	0.328	0	0	0.1234	0	0	0	0.0101	0
	no MYOSEP		0	0	0	0.328	0	0	0.1235	0	0.8963	0	0.0101	0
	no MYOSOD		0	0	0	0.3281	0	0	0.1107	0	0	0.0025	0.0103	0
test 4	all		0	0	0	0.8469	0.0005	0	0.0042	0	0	0	0.0848	0
	no MYOSEP		0	0	0	0.8469	0	0	0.1261	0	0.8415	0	0.0848	0
	no MYOSOD		0	0	0	0.847	0.0001	0	0.0033	0	0	0.0014	0.0861	0
test 5	all		0	0	0	0.9676	0.0001	0	0.1019	0	0	0	0.0407	0
	no MYOSEP		0	0	0	0.9676	0	0	0.102	0	0.4277	0	0.0407	0
	no MYOSOD		0	0	0	0.9676	0	0	0.0869	0	0	0.0091	0.0415	0
test 6	all		0	0	0	0.7767	0.0022	0	0.0042	0	0	0	0.1698	0
	no MYOSEP		0	0	0	0.7767	0.0005	0	0.0042	0	1	0	0.1696	0
	no MYOSOD		0	0	0	0.7768	0.0004	0	0.0034	0	0	0.0339	0.172	0
test 7	all		0	0	0	1	0.0003	0	0.0027	0	0	0	0.3367	0
	no MYOSEP		0	0	0	1	0.0001	0	0.0026	0	0.7504	0	0.3371	0
	no MYOSOD		0	0	0	1	0	0	0.0021	0	0	0.0006	0.3391	0
test 8	all		0	0	0	1	0.0267	0	1	0	0	0	0.0004	0
	no MYOSEP		0	0	0	1	0.0039	0	1	0	0.6195	0	0.0004	0
	no MYOSOD		0	0	0	1	0.0066	0	1	0	0	0	0.0004	0
test 9	all		0	0	0	1	0	0	0.0034	0	0	0	0.5651	0
	no MYOSEP		0	0	0	1	0	0	0.0034	0	0.9949	0	0.5651	0
	no MYOSOD		0	0	0	1	0	0	0.0027	0	0	0.0002	0.5689	0
test 10	all		0	0	0	1	0	0	0.1058	0	0	0	0.1339	0
	no MYOSEP		0	0	0	1	0	0	0.1059	0	0.3128	0	0.134	0
	no MYOSOD		0	0	0	1	0	0	0.0929	0	0	0.0002	0.1356	0

Table 6. Producer's and user's accuracy rates for KALEIDOSCOPE 5.2.1beta1 for +1 setting.

	Producer	SD	Common Mis-ID	User	SD	Common Mis-ID
EPTFUS	0.4943	0.4364	NOID	0.6324	0.6032	LASNOC
LASBOR	0.5294	0.3649	NOID	0.8025	0.6008	NYCHUM
LASCIN	0.9	0.7637	LASNOC	0.1731	0.2311	LASNOC
LASNOC	0.3377	0.4118	NOID	0.5532	0.3588	EPTFUS
MYOAUS	0	0	MYOLUC	0	0	MYOGRI
MYOGRI	0.3684	0.2503	NOID	0.4242	0.3529	MYOAUS
MYOLEI	0.0381	0.1327	NOID	0.8	0.6202	MYOAUS
MYOLUC	0.4791	0.4139	NOID	0.6908	0.5538	MYOSOD
MYOSEP	0.2847	0.3452	NOID	0.6508	0.5689	NOID
MYOSOD	0.3218	0.4436	NOID	0.5556	0.0922	MYOLUC
NYCHUM	0.4884	0.3414	LASBOR	0.6	0.2838	LASBOR
PERSUB	0.7481	0.6004	NOID	0.7372	0.6816	MYOGRI