

Supplemental Information

Table S1. Characteristics of the seven microsatellite loci used in this study to estimate gene flow between three populations of *Ambystoma opacum*.

Locus	Annealing temp ^a	Number of alleles	Allelic range	Repeat type ^b	H_e ^c	H_o ^d
Aop2	51.7 °C	5	174-194	tetra	0.712	0.709
Aop6	52.8 °C	3	275-291	tetra	0.335	0.267
Aop7 ^e	52.8 °C	7	140-156	di	0.373	0.593 (0.244)
Aop31 ^f	56 °C	23	140-240	tetra	0.883	0.702
Aop37	52.8 °C	7	245-259	di	0.719	0.747
AjeD23	52.8 °C	14	210-262	tetra	0.874	0.886
AjeD162	step-down	14	157-209	tetra	0.875	0.816

^a Protocols outlined by Purrenhage et al. (2009) and the step-down from Rahman et al. (2000).

^b Repeat type refers to whether the microsatellite was a dinucleotide (di) or tetranucleotide (tetra) repeat.

^c H_e refers to expected heterozygosity.

^d H_o refers to observed heterozygosity.

^e Locus had null alleles. Corrected observed heterozygosity values calculated using adjusted genotypes for loci that exhibited null alleles are reported in parentheses.

^f Loci showed evidence of being in linkage disequilibrium. Therefore, only Aop31 was retained for genetic analyses.

Table S2. Relative costs assigned to pond border, forest, and clear-cut habitats derived from field and genetic estimates of connectivity used to predict dispersal routes.

Habitat	Cost based	Cost based on
	on field data	genetic data
Pond Border	100	100
Forest	100	100
Clearcut	230 (2.3x)	105 (1.05x)

Table S3. Geographic properties of the 110 least-cost paths constructed from field and genetic based habitat costs for *Ambystoma opacum* in the Maple Flats Sinkhole Complex.

Paths ^a	Habitat ^b	Field			Genetic		
		LCP	Straight-line Distance	Sinuosity	LCP	Straight-line Distance	Sinuosity
DP-KM	cl + for	614.31	562.13	0.92	602.69	551.55	0.92
DP-MP	cl + for	289.81	278.21	0.96	289.81	272.64	0.94
DP-OP	cl + for	389.85	357.56	0.92	357.75	353.15	0.99
DP-P14	forest	547.07	545.88	1.00	547.07	541.65	0.99
DP-P19	cl + for	685.00	629.23	0.92	654.32	631.35	0.96
DP-P5	cl + for	744.22	593.61	0.80	599.67	551.95	0.92
DP-P4	cl + for	664.97	617.02	0.93	651.85	628.85	0.96
DP-P2	clearcut	403.95	271.30	0.67	260.65	241.54	0.93
DP-SP	forest	477.99	416.72	0.87	437.49	398.82	0.91
DP-TP	forest	245.92	232.24	0.94	240.47	236.03	0.98
KM-DP	cl + for	614.31	562.13	0.92	604.15	555.98	0.92
KM-MP	forest	391.82	385.22	0.98	391.82	382.84	0.98
KM-OP	cl + for	844.28	777.33	0.92	798.16	761.31	0.95
KM-P14	cl + for	116.21	105.47	0.91	111.75	109.42	0.98
KM-P19	forest	336.27	314.95	0.94	336.27	317.00	0.94
KM-P5	cl + for	814.01	717.73	0.88	765.81	691.14	0.90
KM-P4	cl + for	719.06	657.38	0.91	706.81	654.64	0.93
KM-P2	cl + for	999.72	875.28	0.88	941.57	858.82	0.91
KM-SP	cl + for	303.70	274.54	0.90	279.67	252.77	0.90
KM-TP	cl + for	614.67	507.59	0.83	505.63	497.12	0.98
MP-DP	cl + for	290.67	269.57	0.93	291.27	273.49	0.94
MP-KM	forest	396.21	384.56	0.97	396.21	384.56	0.97
MP-OP	forest	705.06	658.71	0.93	704.45	660.05	0.94
MP-P14	cl + for	564.76	478.15	0.85	511.43	475.48	0.93
MP-P19	cl + for	405.97	326.64	0.80	330.22	321.01	0.97
MP-P5	cl + for	932.44	799.58	0.86	814.40	759.39	0.93
MP-P4	cl + for	853.20	792.87	0.93	854.25	787.65	0.92
MP-P2	cl + for	719.16	565.26	0.79	571.44	553.96	0.97
MP-SP	cl + for	492.70	436.59	0.89	464.46	437.45	0.94
MP-TP	forest	538.70	444.33	0.82	450.00	449.84	1.00
OP-DP	cl + for	384.25	362.34	0.94	361.29	353.78	0.98
OP-KM	cl + for	844.28	776.92	0.92	798.16	761.31	0.95
OP-MP	forest	703.60	658.71	0.94	703.60	657.11	0.93
OP-P14	forest	703.26	659.08	0.94	703.26	659.08	0.94
OP-P19	cl + for	1078.26	984.59	0.91	1067.60	984.59	0.92
OP-P5	cl + for	332.03	286.69	0.86	289.79	257.88	0.89
OP-P4	cl + for	429.35	394.39	0.92	410.67	369.36	0.90

OP-P2	forest	328.80	329.28	1.00	328.80	329.28	1.00
OP-SP	forest	441.98	352.49	0.80	382.28	352.49	0.92
OP-TP	forest	123.14	118.64	0.96	123.14	118.64	0.96
P14-DP	forest	545.61	536.69	0.98	563.64	538.20	0.95
P14-KM	cl + for	111.64	105.47	0.94	111.64	105.47	0.94
P14-MP	cl + for	560.36	476.51	0.85	507.04	478.06	0.94
P14-OP	forest	701.79	659.08	0.94	701.85	659.08	0.94
P14-P19	cl + for	601.13	547.87	0.91	580.24	529.44	0.91
P14-P5	cl + for	633.30	575.18	0.91	632.53	559.14	0.88
P14-P4	cl + for	538.35	493.47	0.92	537.70	491.86	0.91
P14-P2	cl + for	898.09	826.51	0.92	873.53	829.32	0.95
P14-SP	forest	128.14	121.45	0.95	123.74	118.44	0.96
P14-TP	forest	477.59	396.24	0.83	428.45	396.24	0.92
P19-DP	cl + for	685.00	629.86	0.92	654.32	633.05	0.97
P19-KM	forest	336.27	312.02	0.93	336.27	312.22	0.93
P19-MP	cl + for	404.51	326.64	0.81	329.87	316.52	0.96
P19-OP	cl + for	1078.26	982.72	0.91	1067.00	985.01	0.92
P19-P14	cl + for	601.13	542.99	0.90	580.24	529.44	0.91
P19-P5	cl + for	1163.43	1041.45	0.90	1076.52	1020.04	0.95
P19-P4	cl + for	1084.19	1017.99	0.94	1055.54	1017.96	0.96
P19-P2	cl + for	1092.36	923.00	0.84	941.56	913.28	0.97
P19-SP	cl + for	701.03	614.17	0.88	624.78	614.22	0.98
P19-TP	cl + for	906.75	745.47	0.82	798.05	738.76	0.93
P5-DP	cl + for	744.22	593.61	0.80	597.98	549.03	0.92
P5-KM	cl + for	810.91	729.25	0.90	758.64	691.14	0.91
P5-MP	cl + for	932.44	785.53	0.84	808.10	759.76	0.94
P5-OP	cl + for	333.49	292.43	0.88	281.48	255.62	0.91
P5-P14	cl + for	634.77	569.71	0.90	622.16	549.91	0.88
P5-P19	cl + for	1164.90	1053.66	0.90	1070.67	1020.05	0.95
P5-P4	forest	90.00	85.03	0.94	90.00	85.08	0.95
P5-P2	cl + for	767.05	673.88	0.88	682.01	638.46	0.94
P5-SP	clearcut	273.85	232.37	0.85	222.39	215.37	0.97
P5-TP	cl + for	495.88	317.97	0.64	196.52	183.77	0.94
P4-DP	cl + for	663.51	617.02	0.93	650.15	615.25	0.95
P4-KM	cl + for	714.48	658.67	0.92	702.85	654.83	0.93
P4-MP	cl + for	851.73	787.65	0.92	851.73	787.65	0.92
P4-OP	cl + for	429.35	394.39	0.92	408.80	372.76	0.91
P4-P14	cl + for	538.35	491.86	0.91	535.20	493.47	0.92
P4-P19	cl + for	1084.19	1017.96	0.94	1050.35	1017.36	0.97
P4-P5	Forest	88.54	85.13	0.96	96.82	86.83	0.90
P4-P2	cl + for	862.90	772.59	0.90	805.20	742.82	0.92
P4-SP	forest	180.71	163.01	0.90	169.14	163.64	0.97
P4-TP	cl + for	431.73	325.58	0.75	287.23	269.28	0.94
P2-DP	clearcut	399.81	286.13	0.72	262.26	241.54	0.92

P2-KM	cl + for	999.72	875.28	0.88	943.04	858.82	0.91
P2-MP	cl + for	719.16	565.26	0.79	572.91	552.50	0.96
P2-OP	forest	332.34	329.28	0.99	332.34	329.70	0.99
P2-P14	cl + for	899.56	826.51	0.92	874.99	823.63	0.94
P2-P19	cl + for	1093.82	927.60	0.85	941.56	911.74	0.97
P2-P5	cl + for	765.58	673.88	0.88	687.85	639.59	0.93
P2-P4	cl + for	862.90	772.59	0.90	806.67	742.82	0.92
P2-SP	cl + for	705.77	637.49	0.90	661.57	640.49	0.97
P2-TP	forest	497.55	409.30	0.82	431.27	397.22	0.92
SP-DP	forest	436.02	398.82	0.91	438.95	398.82	0.91
SP-KM	cl + for	286.70	268.81	0.94	278.21	252.77	0.91
SP-MP	cl + for	470.02	442.47	0.94	463.00	436.59	0.94
SP-OP	forest	382.89	352.49	0.92	380.87	352.49	0.93
SP-P14	forest	125.21	118.44	0.95	125.21	118.44	0.95
SP-P19	cl + for	661.27	620.96	0.94	624.78	614.22	0.98
SP-P5	clearcut	264.10	232.37	0.88	231.77	213.76	0.92
SP-P4	forest	169.14	165.42	0.98	171.21	164.95	0.96
SP-P2	cl + for	660.10	640.49	0.97	660.10	640.49	0.97
SP-TP	forest	176.67	144.02	0.82	150.96	140.99	0.93
TP-DP	forest	234.81	230.76	0.98	238.77	236.03	0.99
TP-KM	cl + for	574.72	511.41	0.89	505.63	497.12	0.98
TP-MP	forest	447.50	444.33	0.99	447.50	444.33	0.99
TP-OP	forest	121.67	118.64	0.98	121.72	118.64	0.97
TP-P14	forest	429.91	396.23	0.92	429.91	396.24	0.92
TP-P19	cl + for	808.70	740.77	0.92	798.05	737.59	0.92
TP-P5	cl + for	393.96	195.53	0.50	208.34	188.91	0.91
TP-P4	cl + for	369.71	310.62	0.84	291.33	281.45	0.97
TP-P2	forest	429.81	397.22	0.92	429.81	397.22	0.92
TP-SP	forest	186.42	151.49	0.81	152.43	140.99	0.92

^a Pond IDs: Oak Pond (OP), Deep Pond (DP), Pond Two (P2), Pond 19 (P19), Mystery

Pond (MP), Kennedy Mountain Meadows (KM), Spring Pond (SP), Twin Pond (TP),

Pond 14 (P14), Pond 5 (P5) and Pond 4 (P4).