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SUPPLEMENTAL MATERIAL

APPENDIX

Table A1. Rates of human Lyme disease cases per 100,000 habitants in Hudson River Valley counties (years 1994–2001).

County	1994	1995	1996	1997	1998	1999	2000	2001
Albany	4.7	2.7	2.3	2.6	8.3	4.9	19.5	22.4
Columbia	53	59.3	234.5	208	376	602.4	944.4	1025.5
Delaware	2.1	8.5	0	4.2	4.2	6.4	2.2	4.2
Dutchess	325	346.2	683.6	388	572	511.6	404.9	400.1
Fulton	5.5	0	3.7	5.5	0	5.5	1.9	1.8
Greene	17.2	4.3	29.9	29.5	46.3	64.4	200.6	197.1
Hamilton	18.5	0	0	18.2	0	0	19.3	0
Herkimer	0	0	0	1.5	0	0	0	1.6
Montgomery	1.9	0	0	0	1.9	0	4	2
Orange	91.5	77.3	81.3	78.2	120.3	132	182.8	155.8
Otsego	4.9	4.9	4.9	4.9	1.6	0	3.3	1.6
Putnam	378.8	312.9	384.9	170	258.2	193.3	305.8	220.4
Rensselaer	6.4	3.2	7.6	5.7	4.4	15	44.9	57.7
Rockland	44.3	42.8	16.7	30.5	36.3	19.6	24.6	33.8
Saratoga	3.1	3.1	3.1	2.5	1	0.5	5.5	7.5
Schenectady	2	2.7	3.3	1.3	4.7	4	4.9	2
Schoharie	9.1	9.1	0	5.9	5.9	0	0	6.3
Sullivan	12.9	24.4	11.4	4.3	8.6	4.3	20.2	10.8
Ulster	24.4	31	36.3	64.3	98.2	89.2	127.9	113.6
Warren	1.6	0	3.2	0	0	0	0	4.7
Washington	6.6	0	3.3	1.6	0	0	1.7	0
Westchester	151.4	78.2	77.7	32.4	62.2	60.5	30.9	44.7

Table A2. Rates of human Lyme disease cases per 100,000 habitants in Hudson River Valley counties (years 2002–2009).

County	2002	2003	2004	2005	2006	2007	2008	2009
Albany	56	33.4	75.9	102.9	117	143.5	213.2	214
Columbia	1583.4	1422.9	637.2	568.6	589.4	505.1	936.5	922.5
Delaware	4.2	0	4.2	12.7	4.2	8.5	19.4	19.5
Dutchess	614	445.9	369.9	476.5	315.4	186.7	389.8	334.3
Fulton	0	0	1.8	3.6	0	1.8	10.9	18.2
Greene	371.4	245.2	202.6	246	295.9	315.1	635.6	820.5
Hamilton	0	0	18.9	0	0	58.1	0	19.9
Herkimer	4.7	3.1	3.1	3.1	7.8	6.3	17.6	24.1
Montgomery	2	2	4.1	6.1	8.2	14.3	51.3	43.1
Orange	158.5	164.5	142.6	144.7	125.2	135.4	262.8	286.6
Otsego	4.9	3.2	1.6	0	0.8	12.8	22.4	21
Putnam	258	308.4	205.9	189.9	148.3	139.2	203	383.9
Rensselaer	80	102.4	129.9	135	174.6	224.7	349	283.4
Rockland	41.8	67.2	57	86.5	83	67.8	119.1	109.9
Saratoga	7.5	5.3	20	32.4	38.6	58.5	168.6	187.4
Schenectady	4.8	8.8	11.5	17.6	14.8	22.6	61.7	86.5
Schoharie	6.3	6.3	6.3	12.5	15.5	34.2	71.7	81.5
Sullivan	24.3	20.2	52	47.3	44.4	90.1	154.7	149.6
Ulster	187.9	166.7	162.9	220.1	196	197.6	427.8	320.4
Warren	1.6	0	13.9	18.4	18.3	30.3	30.2	142.5
Washington	1.6	8.2	27.5	35	88.9	131	291.7	312.1
Westchester	36.7	79.6	79.3	48.6	28	37.9	107.8	69.1

Table A3. List of all competitive models identified for nymph density, ranked by ΔAIC_c . The selected model, used in prediction, is indicated with boldface. All models included year, week, latitude, and longitude.

Nymph model; additional covariables included	Parameters	ΔAIC_c	R^2
Summer prec, min winter temp, forest	9	0	0.642
Summer prec, min winter temp, forest, forest border/area	10	0.8929	0.654
Summer prec, min winter temp, forest, forest border/area, area forest patch (100 m radio)	10	0.9238	0.653
Week ² , summer prec, min winter temp, forest	10	1.2927	0.651
Year ² , summer prec, min winter temp, forest	10	1.5904	0.648
Summer prec, min winter temp, forest ^{int} , forest border/area ^{int}	11	1.7230	0.665
Summer prec, min winter temp, forest, urban	10	1.9315	0.646

Notes: Abbreviations are: prec: precipitation; min: minimum; temp: temperature. Superscript *int* marks interactions between variables. Superscript 2 indicates additional quadratic term.

Table A4. List of all competitive models identified for adult density, ranked by ΔAIC_c . The selected model, used in prediction, is indicated with boldface. All models included year, week, latitude, and longitude.

Adult model; additional covariables included	Parameters	ΔAIC_c	R^2
Winter prec, min winter temp, forest^{int}, urban^{int}	11	0	0.622
Air temp during collection, winter prec, min winter temp, forest ^{int} , urban ^{int}	12	0.0328	0.633
Annual prec, min winter temp, forest ^{int} , urban ^{int}	11	0.3530	0.620
Air temp during collection, humidity during collection, winter prec, min winter temp, forest ^{int} , urban ^{int}	13	0.5026	0.643
Air temp during collection ^{int(1)} , humidity during collection ^{int(1)} , winter prec, min winter temp, forest ^{int(2)} , urban ^{int(2)}	14	0.6625	0.653
Winter prec, min winter temp, forest ^{int} , urban ^{int} , area forest patch (500 m radio)	12	0.7718	0.630
Year ² , week ² , winter prec, min winter temp, forest ^{int} , urban ^{int}	13	0.8805	0.641
Humidity during collection, winter prec, min winter temp, forest ^{int} , urban ^{int} , forest border/area	13	1.0536	0.64
Winter prec, min winter temp, forest ^{int} , urban ^{int} , area forest patch (50 m radio)	12	1.1198	0.628
Week ² , winter prec, min winter temp, forest ^{int} , urban ^{int}	12	1.2994	0.630
Air temp during collection, winter prec, min winter temp, forest ^{int} , urban ^{int} , forest border/area	13	1.3167	0.639
Winter prec, forest ^{int} , urban ^{int} , area forest patch (100 m radio)	12	1.3411	0.627
Annual prec, annual temp, forest ^{int} , urban ^{int}	11	1.4058	0.614
Winter prec ² , min winter temp, forest ^{int} , urban ^{int}	12	1.6074	0.625
Winter prec, annual temp, forest ^{int} , urban ^{int}	11	1.7159	0.613
Air temp during collection, humidity during collection, winter prec, min winter temp, forest border/area	14	1.7981	0.648
Week ² , air temp during collection ^{int(1)} , humidity during collection ^{int(1)} , winter prec, min winter temp, forest ^{int(2)} , urban ^{int(2)}	15	1.8734	0.659

Notes: Abbreviations are: prec, precipitation; min, minimum; temp, temperature. Superscript *int* marks interactions between variables. Superscript 2 indicates additional quadratic term.

Table A5. In order to assess the robustness of our models to uneven sampling, we randomly selected subsets from each dataset to create datasets with locations evenly stratified by latitude. These subsets represent 60.9% and 41.42% of the dataset originally used for model development of nymphs and adults, respectively. The parameters estimates obtained with such unbiased subsets are remarkably similar to those obtained with the full dataset. The unbiased nymph model (Regression model for nymph density estimates using a randomly selected subset evenly stratified by latitude; $R^2 = 0.604$, $F = 12.874$, $df = 58$, $P < 0.0001$), with roughly 60% of the data points, is practically identical to the original (see Table 2). Two of the covariables (longitude and summer precipitations) are not significant after Bonferroni corrections when compared with the original model. The unbiased adult model (Regression model for adult density estimates using a randomly selected subset evenly stratified by latitude; $R^2 = 0.76$, $F = 21.151$, $df = 60$, $P < 0.0001$), with roughly 40% of the data points, is similar to the original (see Table 2). Although exact parameters estimates and significance differ slightly, the relative effects and directions of each one are similar.

Regression models for density estimates	Estimate	SE	SS	F	P
Parameters of nymph model					
Intercept	-319.8237	152.4867			0.0403
Year	0.2960	0.0779	10.6165	14.4311	0.0003
Week	-0.1556	0.0299	19.9193	27.0763	<0.0001
Latitude	-3.8416	0.9308	12.5300	17.0321	0.0001
Longitude	1.2179	0.4773	4.7893	6.5101	0.0133
Forest	-2.3052	0.6356	9.6778	13.1550	0.0006
Min. winter temp	-0.0496	0.0134	10.0960	13.7235	0.0005
Summer prec	-0.0671	0.0270	4.5623	6.2015	0.0156
Parameters of adult model					
Intercept	-403.3528	200.2421			0.0485
Year	0.3813	0.0955	14.4560	15.9276	0.0002
Week	0.1162	0.0149	55.3410	60.9758	<0.0001
Latitude	-4.8962	1.4699	10.0701	11.0955	0.0015
Longitude	1.9922	0.6281	9.1301	10.0597	0.0024
Forest	-2.4995	0.8919	7.1274	7.8531	0.0068
Urban	1.6549	0.8959	3.0971	3.4125	0.0696
Forest × urban	-9.4495	3.3695	7.1380	7.8648	0.0068
Min winter temp	-0.0629	0.0307	3.7967	4.1834	0.0452
Winter prec	-0.0406	0.0170	5.1741	5.7009	0.0201

Notes: Abbreviations are: prec, precipitation; min, minimum; temp, temperature. Interaction is marked with × between variables.

Table A6. Equivalent Poisson multiple regression models to the linear multiple regression selected for nymph (df = 101) and adult (df = 159) densities. Statistics presented include the standard error term (SE), Z-value, and the probability value (*P*).

Regression models for density estimates	Estimate	SE	Z	<i>P</i>
Parameters of nymph model				
Intercept	7.8101	0.002043	3822.9	<0.0001
Year	0.2731	0.000532	513.0	<0.0001
Week	-0.2051	0.000201	-1020.3	<0.0001
Latitude	-4.1174	0.006662	-618.0	<0.0001
Longitude	1.1603	0.002869	404.5	<0.0001
Forest	-1.8964	0.004653	-407.5	<0.0001
Min winter temp	-0.0790	0.000173	-456.9	<0.0001
Summer prec	-0.0559	0.000125	-448.1	<0.0001
Parameters of adult model				
Intercept	8.8220	0.0010	8814.9	<0.0001
Year	0.2277	0.00044	515.0	<0.0001
Week	0.1088	0.00009	1164.6	<0.0001
Latitude	-3.8730	0.00599	-646.3	<0.0001
Longitude	1.9630	0.00298	658.7	<0.0001
Forest	-2.1120	0.00386	-547.7	<0.0001
Urban	-0.2678	0.00308	86.7	<0.0001
Forest × urban	-8.8070	0.01191	-739.8	<0.0001
Min winter temp	-0.0619	0.00014	-437.9	<0.0001
Winter prec	-0.0374	0.00006	-609.2	<0.0001

Notes: Abbreviations are: prec, precipitation; min, minimum; temp, temperature. Interaction is marked with × between variables.