

Ecosphere

Dark roads aid movement but increase mortality of a generalist herbivore in the American Southwest

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Appendix S1

Table S1: Distribution, including upper and lower 95% confidence interval bounds, of each covariate's calculated summary values at our determined the best fit model scale of 573 m around each road segment, or the value associated with the road segment itself

Season	Variable	Distribution
Summer	Nightlight (index)	Lower: -70.072, Mean: 76.6717, Upper: 223.4155 Min: 2.7794, Max: 381.1307
Summer	Housing Density (index)	Lower: 0.3243, Mean: 6.7454, Upper: 13.1666 Min: 0.0000, Max: 11.1551
Summer	Road Density (index)	Lower: -2.7302, Mean: 5.0457, Upper: 12.8216 Min: 0.0000, Max: 13.9430
Summer	Speed Limit (mph)	Lower: 12.3375, Mean: 26.3822, Upper: 40.4269 Min: 0, Max: 65
Summer	Seg. Length (m)	Lower: -88.2163, Mean: 238.7439, Upper: 565.7041 Min: 0.0311, Max: 500
Summer	Elevation (m)	Lower: 1261.6858, Mean: 1642.9477, Upper: 2024.2096 Min: 1372.216, Max: 2851.9923
Summer	Terr. Roughness (index)	Lower: -5.8365, Mean: 7.9156, Upper: 21.6678 Min: 1.7262, Max: 37.9661
Summer	NDVI (index)	Lower: 0.207, Mean: 0.3683, Upper: 0.5296 Min: 0.1794, Max: 0.6919
Summer	Forest (proportion)	Lower: -0.276, Mean: 0.0615, Upper: 0.399 Min: 0, Max: 1
Summer	Shrub (proportion)	Lower: -0.2687, Mean: 0.3243, Upper: 0.9173 Min: 0, Max: 1
Summer	Developed/Urban (proportion)	Lower: -0.3127, Mean: 0.485, Upper: 1.2828 Min: 0, Max: 1
Summer	Agriculture (proportion)	Lower: -0.0897, Mean: 0.0278, Upper: 0.1454 Min: 0, Max: 0.7146
Summer	Open/Natural (proportion)	Lower: -0.2166, Mean: 0.1013, Upper: 0.4192 Min: 0, Max: 0.9966
Winter	Nightlight (index)	Lower: -98.6245, Mean: 102.4861, Upper: 303.5967 Min: 2.411, Max: 813.751
Winter	Housing Density (index)	Lower: -1.1443, Mean: 4.7159, Upper: 10.5761 Min: 0, Max: 12

Winter	Road Density (index)	Lower: -1.8455, Mean: 3.93, Upper: 9.7055 Min: 0, Max: 13.9397
Winter	Speed Limit (mph)	Lower: 5.3062, Mean: 24.511, Upper: 43.7158 Min: 0, Max: 65
Winter	Seg. Length (m)	Lower: -100.4026, Mean: 218.117, Upper: 536.6366 Min: 0.0175, Max: 500
Winter	Elevation (m)	Lower: 1197.5148, Mean: 1549.898, Upper: 1902.2812 Min: 1286.7925, Max: 2851.3688
Winter	Terr. Roughness (index)	Lower: -4.9839, Mean: 5.3209, Upper: 15.6258 Min: 1.2806, Max: 38.6979
Winter	Snow Cover (index)	Lower: 5.2098, Mean: 29.6989, Upper: 54.188 Min: 0, Max: 77.5488
Winter	NDVI (index)	Lower: 0.0852, Mean: 0.1872, Upper: 0.2891 Min: 0.0285, Max: 0.4741
Winter	Forest (proportion)	Lower: -0.2449, Mean: 0.0387, Upper: 0.3224 Min: 0, Max: 1
Winter	Shrub (proportion)	Lower: -0.2693, Mean: 0.2613, Upper: 0.7919 Min: 0, Max: 1
Winter	Developed/Urban (proportion)	Lower: -0.2325, Mean: 0.4625, Upper: 1.1574 Min: 0, Max: 1
Winter	Agriculture (proportion)	Lower: -0.3291, Mean: 0.1391, Upper: 0.6073 Min: 0, Max: 1
Winter	Open/Natural (proportion)	Lower: -0.2312, Mean: 0.0984, Upper: 0.428 Min: 0, Max: 1

Figure S1: Nonaligned systematic sampling of $n = 1,000$ points in the 55 m buffer around a road segment, demonstrated over land cover (NLCD) data.

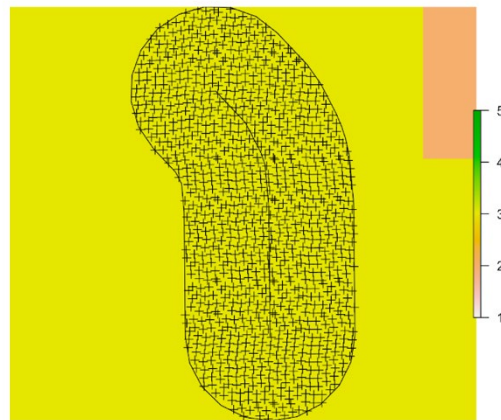


Table S2: Correlation coefficients calculated using Pearson's r between all variables included in the regression models for crossing probability, crossing intensity, and mortality

probability. Values were derived using the summary statistics calculated for each road segment aggregated for both the summer and winter ranges.

a) Summer road crossing and intensity 573 m covariate correlation values

	Speed Limit	Elevation	Terr. Roughness	Road Density	VIIRS	NLCD 1	NLCD 2	NLCD 3	NLCD 4	NLCD 5	NDVI	Seg. Length
Speed Limit	1	0.0321 2716	0.1095 4379	- 0.0794 2015	- 0.0725 4606	0.0819 4688	0.1184 7009	- 0.1067 539	- 0.0442 7574	- 0.0237 1627	- 0.0284 4426	0.1524 0969
Elevation	0.0321 2716	1	0.8384 9434	- 0.4421 0329	- 0.4192 2073	0.8629 1631	0.2463 1896	- 0.4844 9814	- 0.1990 8106	- 0.0861 1686	0.4699 7477	0.2966 4499
Terr. Roughness	0.1095 4379	0.8384 9434	1	- 0.5586 1768	- 0.5071 1174	0.7887 8696	0.4083 6981	- 0.6439 0808	- 0.2248 6834	0.0998 7112	0.3806 5218	0.3491 5453
Road Density	- 0.0794 2015	- 0.4421 0329	- 0.5586 1768	1	0.7460 5	- 0.3706 6523	- 0.6913 8352	0.8659 1912	- 0.0458 4183	- 0.4728 7994	0.1885 0317	- 0.4375 5196
VIIRS	- 0.0725 4606	- 0.4192 2073	- 0.5071 1174	0.7460 5	1	- 0.3358 8406	- 0.6910 9385	0.8244 4969	- 0.0746 5199	- 0.3956 2614	0.0197 0112	- 0.3880 8729
NLCD 1	0.0819 4688	0.8629 1631	0.7887 8696	- 0.3706 6523	- 0.3358 8406	1	0.0855 0639	- 0.4166 2155	- 0.1616 0499	- 0.1158 7055	0.4787 9394	0.2629 1693
NLCD 2	0.1184 7009	0.2463 1896	0.4083 6981	- 0.6913 8352	- 0.6910 9385	0.0855 0639	1	- 0.8383 8836	- 0.1059 7277	0.1869 8582	- 0.2990 9452	0.4148 3392
NLCD 3	- 0.1067 539	- 0.4844 9814	- 0.6439 0808	0.8659 1912	0.8244 4969	- 0.4166 2155	- 0.8383 8836	1	- 0.0201 6738	- 0.4958 4373	0.1467 9931	- 0.5242 2636
NLCD 4	- 0.0442 7574	- 0.1990 8106	- 0.2248 6834	- 0.0458 4183	- 0.0746 5199	- 0.1616 0499	- 0.1059 7277	- 0.0201 6738	1	0.0500 9857	0.0442 1592	- 0.0302 003
NLCD 5	- 0.0237 1627	- 0.0861 1686	0.0998 7112	- 0.4728 7994	- 0.3956 2614	- 0.1158 7055	0.1869 8582	- 0.4958 4373	0.0500 9857	1	- 0.3351 2606	0.2737 7416
NDVI	- 0.0284 4426	0.4699 7477	0.3806 5218	0.1885 0317	0.0197 0112	0.4787 9394	- 0.2990 9452	0.1467 9931	0.0442 1592	- 0.3351 2606	1	- 0.0374 3098
Seg. Length	0.1524 0969	0.2966 4499	0.3491 5453	- 0.4375 5196	- 0.3880 8729	0.2629 1693	0.4148 3392	- 0.5242 2636	- 0.0302 003	0.2737 7416	- 0.0374 3098	1

Note: Boldface shows where the threshold of $|r| > 0.70$ was exceeded.

b) Winter road crossing and intensity 573 m covariate correlation values. Red coloration shows where the threshold of $|r| > 0.70$ was exceeded.

	Speed Limit	Elevation	Terr. Roughness	Road Density	VIIRS	NLCD 1	NLCD 2	NLCD 3	NLCD 4	NLCD 5	NDVI	Snow Cover	Seg. Length
Speed Limit	1	0.0671 2552	0.0948 2494	0.0547 8196	0.0749 6002	0.0612 2452	0.0060 39558	0.0808 2924	- 0.209 2352	0.0644 3468	0.1000 5611	- 0.0783 6487	0.2478 6799
Elevation	0.0671 25523	1	0.8072 1507	- 0.1975 9259	- 0.3125 9981	0.7957 7577	0.3148 91484	- 0.3754 3073	- 0.260 6113	- 0.0300 0619	0.0620 4006	0.0181 8568	0.2955 1547
Terr. Roughness	0.0948 24943	0.8072 1507	1	- 0.3119 5346	- 0.3389 0511	0.7197 1261	0.3913 98031	- 0.4519 8448	- 0.300 2222	0.1300 1161	0.0810 6903	0.0146 7406	0.3219 286
Road Density	0.0547 81961	- 0.1975 9259	- 0.3119 5346	1	0.5482 0924	- 0.2272 0543	- 0.4296 89305	0.7077 1118	- 0.198 4081	- 0.3230 7637	0.1353 01	- 0.0406 3872	- 0.2555 7861
VIIRS	0.0749 60023	- 0.3125 9981	- 0.3389 0511	0.5482 0924	1	- 0.2461 3787	- 0.5381 49432	0.7537 2982	- 0.140 6486	- 0.3112 3935	- 0.0689 2496	- 0.1808 8662	- 0.3009 9058
NLCD 1	0.0612 24522	0.7957 7577	0.7197 1261	- 0.2272 0543	- 0.2461 3787	1	0.0897 4509	- 0.3322 0557	- 0.154 9472	- 0.0845 3248	0.1815 234	0.0514 8483	0.2263 619
NLCD 2	0.0060 39558	0.3148 9148	0.3913 9803	- 0.4296 8931	- 0.5381 4943	0.0897 4509	1	- 0.6224 0016	- 0.322 1971	0.0827 9499	- 0.0630 5136	0.0302 1137	0.3156 3307
NLCD 3	0.0808 29239	- 0.3754 3073	- 0.4519 8448	0.7077 1118	0.7537 2982	- 0.3322 0557	- 0.6224 00158	1	- 0.294 1104	- 0.4027 9008	0.0523 2609	- 0.1033 7908	- 0.3902 3762
NLCD 4	- 0.2092 35172	- 0.2606 1127	- 0.3002 2221	- 0.1984 0805	- 0.1406 4862	- 0.1549 4715	- 0.3221 97106	- 0.2941 1038	1	- 0.1484 9023	- 0.1762 9463	0.1150 3537	- 0.1086 9202
NLCD 5	0.0644 34681	- 0.0300 0619	0.1300 1161	- 0.3230 7637	- 0.3112 3935	- 0.0845 3248	0.0827 94988	- 0.4027 9008	- 0.148 4902	1	0.0854 5451	- 0.0384 1588	0.2743 2315
NDVI	0.1000 56107	0.0620 4006	0.0810 6903	0.1353 01	- 0.0689 2496	0.1815 234	- 0.0630 5136	0.0523 2609	- 0.176 2946	0.0854 5451	1	- 0.0861 4212	0.0758 6084
Snow Cover	- 0.0783 64867	0.0181 8568	0.0146 7406	- 0.0406 3872	- 0.1808 8662	0.0514 8483	0.0302 11368	- 0.1033 7908	0.115 0354	- 0.0384 1588	- 0.0861 4212	1	0.0292 5612
Seg. Length	0.2478 67993	0.2955 1547	0.3219 286	- 0.2555 7861	- 0.3009 9058	0.2263 619	0.3156 3307	- 0.3902 3762	- 0.108 692	0.2743 2315	0.0758 6084	0.0292 5612	1

Note: Boldface shows where the threshold of $|r| > 0.70$ was exceeded.

c) Summer road mortality 573 m covariate correlation values.

	Speed Limit	Terr. Roughness	Road Density	VIIRS	NLCD 1	NLCD 2	NLCD 3	NLCD 4	NLCD 5	NDVI	Seg. Length
Speed Limit	1	- 0.1954 6524	- 0.1191 8375	- 0.0884 3352	- 0.233101 7018	0.2036 791	- 0.15800 0569	- 0.09940 5236	0.2903 1266	- 0.5056 579	0.271765 6854
Terr. Roughness	- 0.1954 6524	1	- 0.4284 3859	- 0.4613 8925	0.813657 096	0.3035 755	- 0.52088 8904	- 0.26747 1697	- 0.0024 9439	0.6052 0265	0.098966 0475
Road Density	- 0.1191 8375	- 0.4284 3859	1	0.7528 8043	- 0.302507 616	- 0.6997 74	0.85471 5141	0.04308 1842	- 0.4512 7575	0.1055 3757	- 0.316680 0585
VIIRS	- 0.0884 3352	- 0.4613 8925	0.7528 8043	1	- 0.268368 672	- 0.6967 267	0.83753 0073	0.02952 4069	- 0.4425 3818	- 0.0303 4356	- 0.243717 1801
NLCD 1	- 0.2331 017	0.8136 571	- 0.3025 0762	- 0.2683 6867	1	0.0196 687	- 0.32840 7509	- 0.15534 123	- 0.1785 8699	0.6796 2293	- 0.000504 6594
NLCD 2	0.2036 7914	0.3035 7545	- 0.6997 7397	- 0.6967 2674	0.019668 6977	1	- 0.82489 5566	- 0.26772 1884	0.2074 7682	- 0.2261 9015	0.351339 7349
NLCD 3	- 0.1580 0057	- 0.5208 889	0.8547 1514	0.8375 3007	- 0.328407 5093	- 0.8248 956	1	0.00579 0068	- 0.5171 3072	0.0119 1917	- 0.367203 0841
NLCD 4	- 0.0994 0524	- 0.2674 717	0.0430 8184	0.0295 2407	- 0.155341 2305	- 0.2677 219	0.00579 0068	1	0.1087 1094	0.0344 7041	- 0.010731 5906
NLCD 5	0.2903 1266	- 0.0024 9439	- 0.4512 7575	- 0.4425 3818	- 0.178586 9885	0.2074 768	- 0.51713 0725	0.10871 0941	1	- 0.3122 1452	0.225599 2662
NDVI	- 0.5056 579	0.6052 0265	0.1055 3757	- 0.0303 4356	0.679622 9316	- 0.2261 902	0.01191 9172	0.03447 0409	- 0.3122 1452	1	- 0.078069 2665
Seg. Length	0.2717 6569	0.0989 6605	- 0.3166 8006	- 0.2437 1718	- 0.000504 6594	0.3513 397	- 0.36720 3084	- 0.01073 1591	0.2255 9927	- 0.0780 6927	1

Note: Boldface shows where the threshold of $|r| > 0.70$ was exceeded.

d) Winter road mortality 573 m covariate correlation values.

	Speed Limit	Terr. Roughness	Road Density	VIIRS	NLCD 1	NLCD 2	NLCD 3	NLCD 4	NLCD 5	NDVI	Snow Cover	Seg. Length
Speed Limit	1	0.1963 5571	- 0.3494 2721	- 0.169 77	0.0887 0264	0.3184 9727	- 0.386 7326	- 0.0717 9087	0.3532 7119	- 0.0863 4906	- 0.10140 80139	0.40080 78876
Terr. Roughness	0.1963 5571	1	- 0.1116 9623	- 0.201 5708	0.5904 5711	0.5902 5217	- 0.324 3274	- 0.3713 1148	0.0122 9171	- 0.0990 9976	- 0.01037 55221	0.10995 69615

Road Density	-0.3494 2721	-0.1116 9623	1	0.585 3757	-0.1056 452	-0.4576 0769	0.737 9905	-0.2843 9051	-0.3856 1533	0.1719 0267	-0.07668 01125	-0.33115 32949
VIIRS	-0.1697 7001	-0.2015 7085	0.5853 7565	1	-0.1714 7623	-0.4598 9108	0.666 0243	-0.1807 7369	-0.3461 1491	-0.1220 5088	-0.23866 35434	-0.18575 78281
NLCD 1	0.0887 0264	0.5904 5711	-0.1056 452	-0.171 4762	1	0.2103 1565	-0.208 4673	-0.1296 7029	-0.0888 0396	0.0856 9275	0.06213 73583	0.09068 85649
NLCD 2	0.3184 9727	0.5902 5217	-0.4576 0769	-0.459 8911	0.2103 1565	1	-0.656 6422	-0.2933 41	0.0842 7158	-0.2058 1668	0.10736 17707	0.25295 4318
NLCD 3	-0.3867 3263	-0.3243 2737	0.7379 9055	0.666 0243	-0.2084 6732	-0.6566 4216	1	-0.3490 0865	-0.4894 1847	0.1529 4275	-0.13471 61528	-0.38028 98937
NLCD 4	-0.0717 9087	-0.3713 1148	-0.2843 9051	-0.180 7737	-0.1296 7029	-0.2933 41	-0.349 0087	1	-0.0789 344	-0.1043 4238	0.11760 05666	0.10361 88916
NLCD 5	0.3532 7119	0.0122 9171	-0.3856 1533	-0.346 1149	-0.0888 0396	0.0842 7158	-0.489 4185	-0.0789 344	1	0.1139 0212	-0.06692 32572	0.21469 38423
NDVI	-0.0863 4906	-0.0990 9976	0.1719 0267	-0.122 0509	0.0856 9275	-0.2058 1668	0.152 9427	-0.1043 4238	0.1139 0212	1	-0.09141 33315	-0.15102 24612
Snow Cover	-0.1014 0801	-0.0103 7552	-0.0766 8011	-0.238 6635	0.0621 3736	0.1073 6177	-0.134 7162	0.1176 0057	-0.0669 2326	-0.0914 1333	1	-0.00010 19542
Seg. Length	0.4008 0789	0.1099 5696	-0.3311 5329	-0.185 7578	0.0906 8856	0.2529 5432	-0.380 2899	0.1036 1889	0.2146 9384	-0.1510 2246	-0.00010 19542	1

Note: Boldface shows where the threshold of $|r| > 0.70$ was exceeded.

Table S3: Summary of results of testing for spatial autocorrelation in our models using Moran's I, where the alternative hypothesis is that spatial autocorrelation is present. As most models showed significant spatial autocorrelation, we accounted for spatial effects in all.

Model	573 m Moran's I	55 m Moran's I	20 m Moran's I
Summer Day Crossing Intensity	observed = 0.0471, expected = -0.0017, sd = 0.0073, p-value = 2.731e-11	observed = 0.0390, expected = -0.0017, sd = 0.0073, p-value = 2.795e-08	observed = 0.0383230, expected = -0.0017, sd = 0.0073, p-value = 4.83e-08
Summer Crepuscular Crossing Intensity	observed = -0.0047, expected = -0.0011, sd = 0.0061, p-value = 0.5605	observed = -0.0024, expected = -0.0011, sd = 0.0061, p-value = 0.8283	observed = -0.0009, expected = -0.0011, sd = 0.0061, p-value = 0.9759

Summer Day Crossing Probability	observed = 0.0062, expected = -0.0002, sd = 0.0019, p-value = 0.0007	observed = 0.0032, expected = -0.0002, sd = 0.0019, p-value = 0.0752	observed = 0.0010, expected = -0.0002, sd = 0.0019, p-value = 0.505
Summer Crepuscular Crossing Probability	observed = 0.0096, expected = -0.0002, sd = 0.0019, p-value = 2.679e-07	observed = 0.0094, expected = -0.0002, sd = 0.0019, p-value = 4.003e-07	observed = 0.0079, expected = -0.0002, sd = 0.0019, p-value = 2.19e-05
Winter Crepuscular Crossing Intensity	observed = 0.0226, expected = -0.0007, sd = 0.0041, p-value = 1.606e-08	observed = 0.0226, expected = -0.0007, sd = 0.0041, p-value = 1.753e-08	observed = 0.0234, expected = -0.0007, sd = 0.0041, p-value = 5.293e-09
Winter Night Crossing Intensity	observed = 0.0090, expected = -0.0010, sd = 0.0051, p-value = 0.04912	observed = 0.0054, expected = -0.0010, sd = 0.0051, p-value = 0.2068	observed = 0.0054, expected = -0.0010, sd = 0.0051, p-value = 0.2104
Winter Crepuscular Crossing Probability	observed = 1.3244e-02, expected = -5.0904e-05, sd = 4.3290e-04, p-value < 2.2e-16	observed = 9.5006e-03, expected = -5.0904e-05, sd = 4.3290e-04, p-value < 2.2e-16	observed = 8.9089e-03, expected = -5.0904e-05, sd = 4.3290e-04, p-value < 2.2e-16
Winter Night Crossing Probability	observed = 7.1344e-03, expected = -5.0904e-05, sd = 4.3290e-04, p-value < 2.2e-16	observed = 7.3257e-03, expected = -5.0904e-05, sd = 4.3290e-04, p-value < 2.2e-16	observed = 6.0911e-03, expected = -5.0904e-05, sd = 4.3290e-04, p-value < 2.2e-16

Table S4: Summary of all models fit for our data set and their associated AIC values. All models (except Summer Crossing Intensity) had a best fit scale of 573 m, so that scale was selected for the final analysis, as well as for performing the road mortality analysis.

Model	573 m AIC	55 m AIC	20 m AIC
Summer Day Crossing Intensity	1651.3	1652.5	1651.2
Summer Crepuscular Crossing Intensity	3288.7	3287.1	3295.4
Summer Day Crossing Probability	4423	4581.3	4604.9
Summer Crepuscular Crossing Probability	5464.6	5644.4	5669
Winter Crepuscular Crossing Intensity	6087	6109.6	6120.8
Winter Night Crossing Intensity	3304.8	3312.4	3315.6
Winter Crepuscular Crossing Probability	13067.7	13441.9	13508.2
Winter Night Crossing Probability	9566.6	9758.8	9819.7

Note: Values in boldface indicate the best performing scale for a given model (by row)

Table S5: Full model results for the determined best spatial scale of 573 m. A ‘1’ or ‘2’ following a variable’s name is a byproduct of modeling using cubic splines and indicates whether the coefficient represents the slope of the line before or after its inflection point.

a) Summer Day Crossing Intensity

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-3.76571	0.27206	-13.841	< 2e-16
Speed Limit 1	-0.09121	0.36945	-0.247	0.804998
Speed Limit 2	-0.31065	0.22927	-1.355	0.175436
Terr. Roughness 1	-0.72646	0.26546	-2.737	0.006208
Terr. Roughness 2	-0.71746	0.3436	-2.088	0.036792
Nightlight 1	-1.45741	0.26308	-5.54	3.03E-08
Nightlight 2	-0.71885	0.3056	-2.352	0.018662
Shrubland	-0.05619	0.04724	-1.189	0.234259
Agriculture	-0.08174	0.02988	-2.736	0.006219
Open/Natural	-0.07028	0.03348	-2.099	0.035834
NDVI 1	0.9769	0.28328	3.449	0.000564
NDVI 2	0.20022	0.38902	0.515	0.606777
Seg. Length 1	0.86375	0.21957	3.934	8.36E-05
Seg. Length 2	0.33548	0.07531	4.455	8.39E-06

b) Summer Crepuscular Crossing Intensity

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-4.70879	0.22224	-21.188	< 2e-16
Speed Limit 1	-0.16276	0.34294	-0.475	0.635065
Speed Limit 2	-0.19664	0.21454	-0.917	0.359377
Terr. Roughness 1	-0.75297	0.22213	-3.39	0.000699
Terr. Roughness 2	-0.72886	0.30231	-2.411	0.015909
Nightlight 1	0.08265	0.24466	0.338	0.735516
Nightlight 2	0.05937	0.4317	0.138	0.890607
Shrubland	0.20039	0.03988	5.025	5.04E-07
Agriculture	-0.05905	0.02945	-2.005	0.044953
Open/Natural	0.12758	0.032	3.986	6.71E-05
NDVI 1	1.08723	0.24239	4.485	7.28E-06
NDVI 2	0.33771	0.26353	1.282	0.200014
Seg. Length 1	1.35236	0.22449	6.024	1.70E-09
Seg. Length 2	0.39255	0.08047	4.878	1.07E-06

c) Winter Crepuscular Crossing Intensity

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-4.05168	0.224123	-18.078	< 2e-16
Speed Limit 1	-0.096351	0.182326	-0.528	0.59718
Speed Limit 2	-0.172429	0.12373	-1.394	0.16344
Terr. Roughness 1	-0.091488	0.141771	-0.645	0.51872
Terr. Roughness 2	-0.8221	0.280623	-2.93	0.00339
Nightlight 1	0.73165	0.174701	4.188	2.81E-05
Nightlight 2	0.148527	0.218637	0.679	0.49693
Shrubland	0.182488	0.033106	5.512	3.54E-08
Agriculture	-0.007091	0.020263	-0.35	0.72636
Open/Natural	0.107372	0.025864	4.151	3.30E-05
NDVI 1	0.064485	0.23867	0.27	0.78702
NDVI 2	0.155078	0.174145	0.891	0.37319
Snow Cover 1	-0.402015	0.15811	-2.543	0.011
Snow Cover 2	0.269884	0.154059	1.752	0.07981
Seg. Length 1	1.001679	0.155311	6.45	1.12E-10
Seg. Length 2	0.406129	0.049831	8.15	3.63E-16

d) Winter Night Crossing Intensity

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-4.38381	0.26562	-16.504	< 2e-16
Speed Limit 1	-0.29594	0.20793	-1.423	0.1547
Speed Limit 2	-0.16331	0.1349	-1.211	0.2261
Terr. Roughness 1	0.77367	0.30365	2.548	0.0108
Terr. Roughness 2	-0.17792	0.29445	-0.604	0.5457
Nightlight 1	0.07438	0.45892	0.162	0.8712
Nightlight 2	-0.28509	0.4683	-0.609	0.5427
Shrubland	0.01159	0.05968	0.194	0.846
Agriculture	-0.01215	0.03024	-0.402	0.6879
Open/Natural	0.0605	0.04559	1.327	0.1845
NDVI 1	0.57075	0.34045	1.676	0.0936
NDVI 2	0.44544	0.22726	1.96	0.05
Snow Cover 1	-0.05134	0.20485	-0.251	0.8021

Snow Cover 2	0.2322	0.17225	1.348	0.1776
Seg. Length 1	0.97444	0.13632	7.148	8.79E-13
Seg. Length 2	0.36195	0.04764	7.598	3.01E-14

e) Summer Day Crossing Probability

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-3.011	0.32773	-9.187	< 2e-16
Speed Limit	-0.13473	0.03742	-3.601	0.000318
Terr. Roughness	-0.32234	0.06711	-4.803	1.56E-06
Nightlight	-0.16764	0.11305	-1.483	0.138113
Shrubland	0.92292	0.07455	12.38	< 2e-16
Agriculture	0.0488	0.04672	1.044	0.296262
Open/Natural	0.06465	0.05547	1.165	0.243818
NDVI	0.1957	0.06414	3.051	0.00228
Seg. Length	0.44123	0.04312	10.233	< 2e-16
Easting	0.28318	0.09528	2.972	0.002957
Northing	0.06807	0.04759	1.43	0.15267

f) Summer Crepuscular Crossing Probability

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-2.61818	0.32815	-7.979	1.48E-15
Speed Limit	-0.18501	0.03169	-5.838	5.27E-09
Terr. Roughness	-0.1323	0.05499	-2.406	0.0161
Nightlight	-0.60274	0.11139	-5.411	6.26E-08
Shrubland	0.7977	0.06426	12.413	< 2e-16
Agriculture	-0.04467	0.04348	-1.027	0.3043
Open/Natural	0.11037	0.04481	2.463	0.0138
NDVI	0.08225	0.05462	1.506	0.1321
Seg. Length	0.44026	0.03693	11.921	< 2e-16
Easting	0.18344	0.07806	2.35	0.0188
Northing	0.19417	0.04533	4.284	1.84E-05

g) Winter Crepuscular Crossing Probability

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-3.14692	0.35257	-8.926	< 2e-16
Speed Limit	-0.057	0.02625	-2.171	0.0299
Terr. Roughness	-0.05004	0.02194	-2.281	0.02253
Nightlight	-0.29373	0.06608	-4.445	8.78E-06
Shrubland	0.66054	0.03568	18.515	< 2e-16
Agriculture	-0.21064	0.06471	-3.255	0.00113
Open/Natural	0.0327	0.02783	1.175	0.2399
NDVI	-0.20575	0.03261	-6.31	2.80E-10
Snow Cover	0.12472	0.02898	4.303	1.68E-05
Seg. Length	0.41964	0.02456	17.089	< 2e-16
Easting	-0.07913	0.03616	-2.188	0.02865
Northing	0.47503	0.04344	10.934	< 2e-16

h) Winter Night Crossing Probability

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-4.66621	0.84564	-5.518	3.43E-08
Speed Limit	-0.07448	0.03169	-2.351	0.0187
Terr. Roughness	-0.03397	0.0252	-1.348	0.1777
Nightlight	-0.31827	0.07753	-4.105	4.04E-05
Shrubland	0.56211	0.04078	13.785	< 2e-16
Agriculture	-0.42821	0.08736	-4.901	9.52E-07
Open/Natural	-0.16142	0.035	-4.612	4.00E-06
NDVI	-0.21837	0.03788	-5.764	8.21E-09
Snow Cover	0.05481	0.03616	1.516	0.1296
Seg. Length	0.41011	0.0293	13.997	< 2e-16
Easting	-0.08897	0.04151	-2.143	0.0321
Northing	0.51886	0.05385	9.635	< 2e-16

i) Summer Road Mortality Probability

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-2.2572	0.30926	-7.299	2.91E-13
Speed Limit	0.14956	0.20467	0.731	0.464921

Terr. Roughness	-0.03096	0.30001	-0.103	0.917795
Nightlight	-0.52842	0.27603	-1.914	0.055576
Shrubland	-0.78114	0.29912	-2.611	0.009016
Agriculture	-0.10357	0.16148	-0.641	0.52128
Open/Natural	-0.16084	0.2133	-0.754	0.450802
NDVI	-0.12614	0.3272	-0.386	0.699849
Seg. Length	0.55224	0.16736	3.3	0.000968
Easting	0.19309	0.28238	0.684	0.494111
Northing	0.15511	0.14742	1.052	0.292717

j) Winter Road Mortality Probability

Variable	β Estimate	Standard Error	z value	Pr (> z)
Intercept	-1.949906	0.136437	-14.292	< 2e-16
Speed Limit	0.168019	0.079879	2.103	0.035429
Terr. Roughness	-0.008784	0.075499	-0.116	0.907379
Nightlight	-0.207505	0.112744	-1.84	0.065695
Shrubland	0.016143	0.101726	0.159	0.873914
Agriculture	-0.245426	0.094443	-2.599	0.009359
Open/Natural	-0.055512	0.078942	-0.703	0.481926
NDVI	-0.097677	0.095644	-1.021	0.307133
Snow Cover	-0.015282	0.076822	-0.199	0.842317
Seg. Length	0.597576	0.083727	7.137	9.53E-13
Easting	-0.223047	0.090506	-2.464	0.013723
Northing	0.272869	0.082284	3.316	0.000912