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Wildlife Research

Supplementary Material

Conservation of black bear (*Ursus americanus*) in Mexico through GPS tracking: crossing and roadkill sites

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Supplementary material

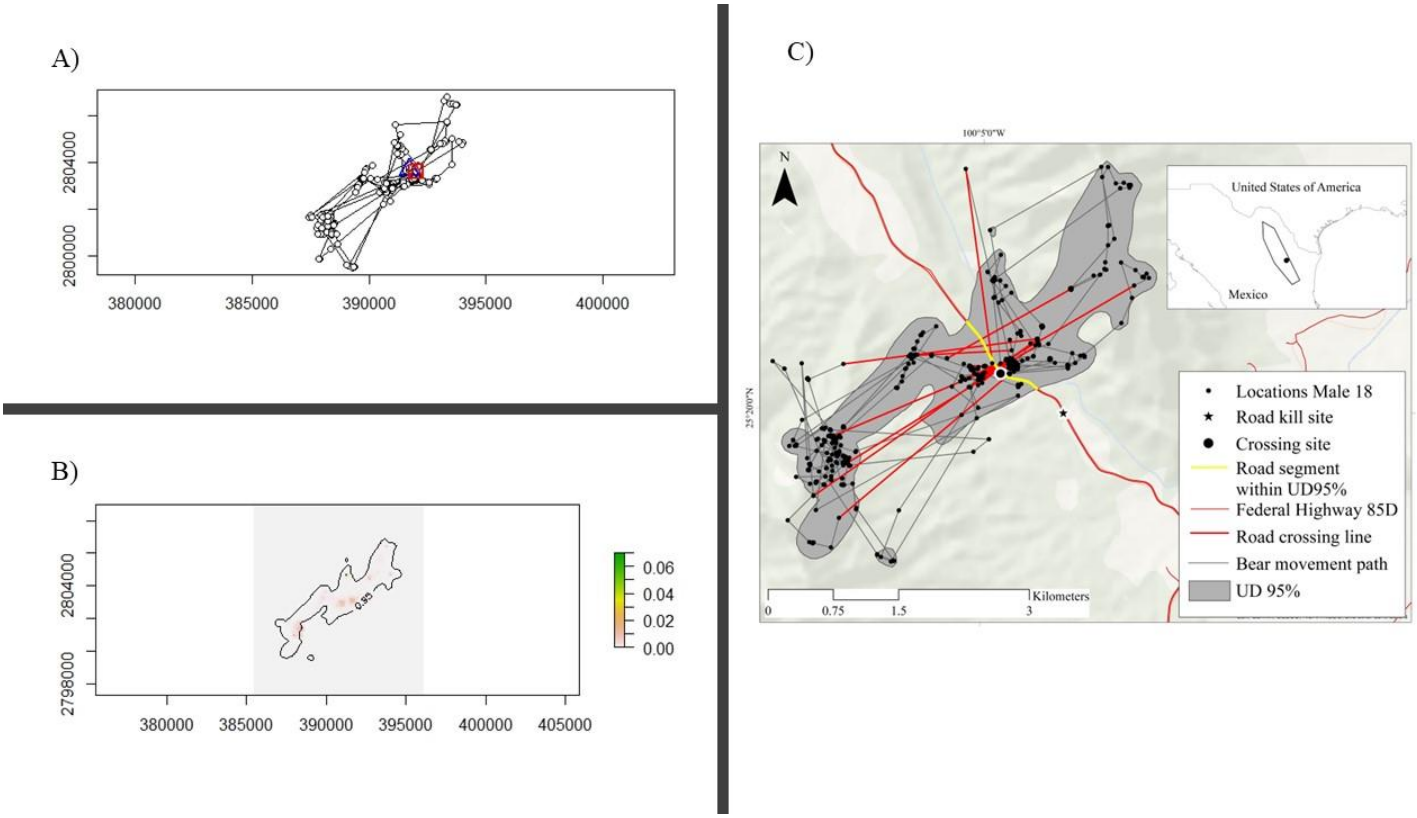


Figure S1. Process for the location of crossing sites. A) First, we obtained the route of the individuals with the GPS records of the collars. B) We calculated the dBBMM (95%) on the routes that crossed the roads and C) We overlaid the dBBMM polygons with the road network to identify the crossing sites.

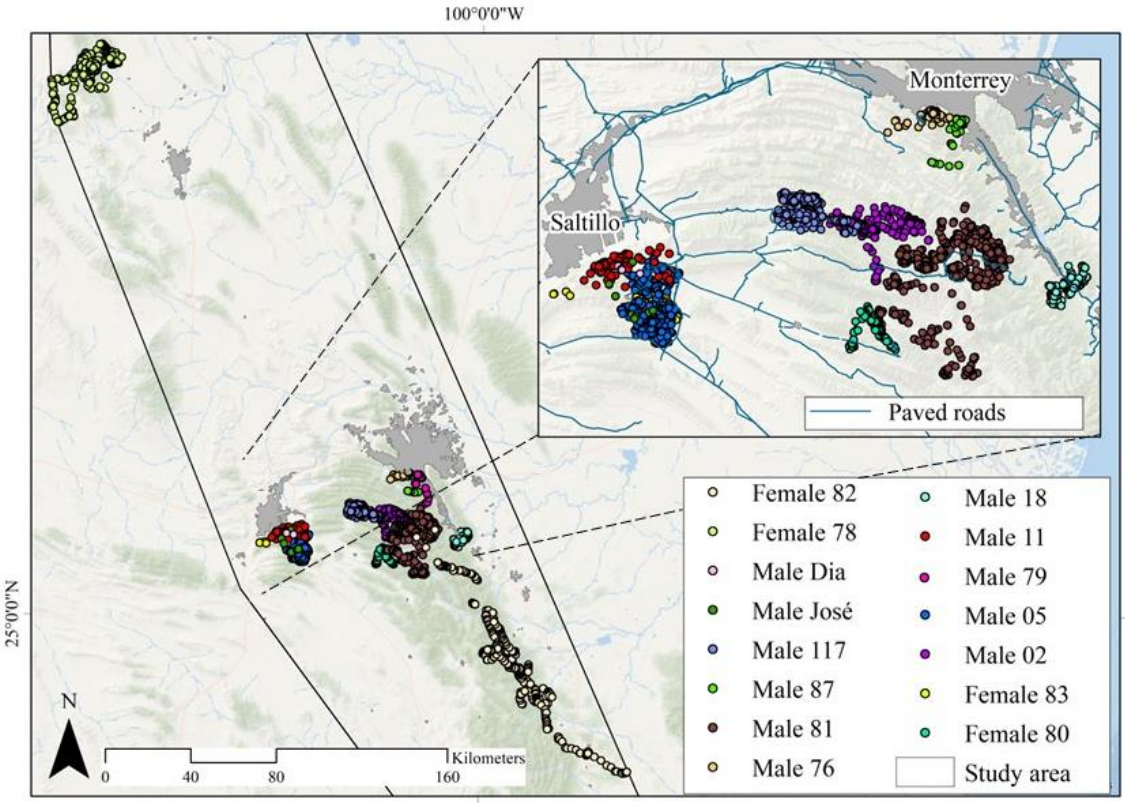


Figure S2. Locations of the 15 black bears captured and monitored in this study.

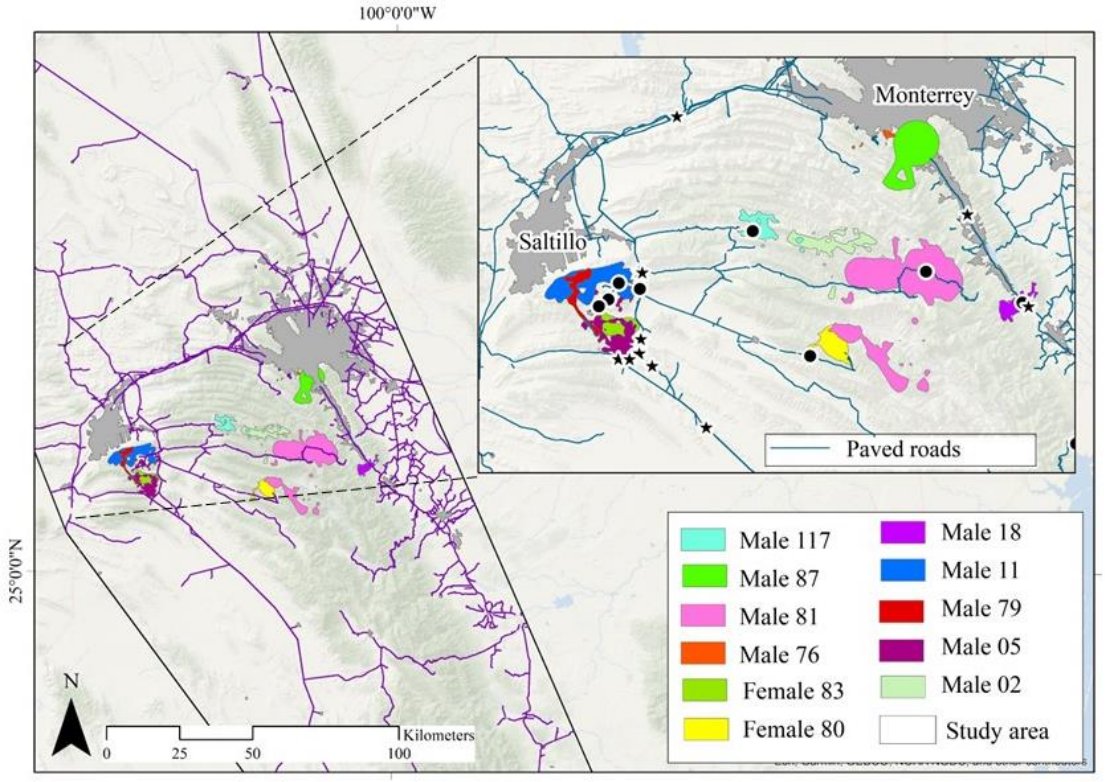


Figure S3. UD (95%) of some of the monitored individuals.

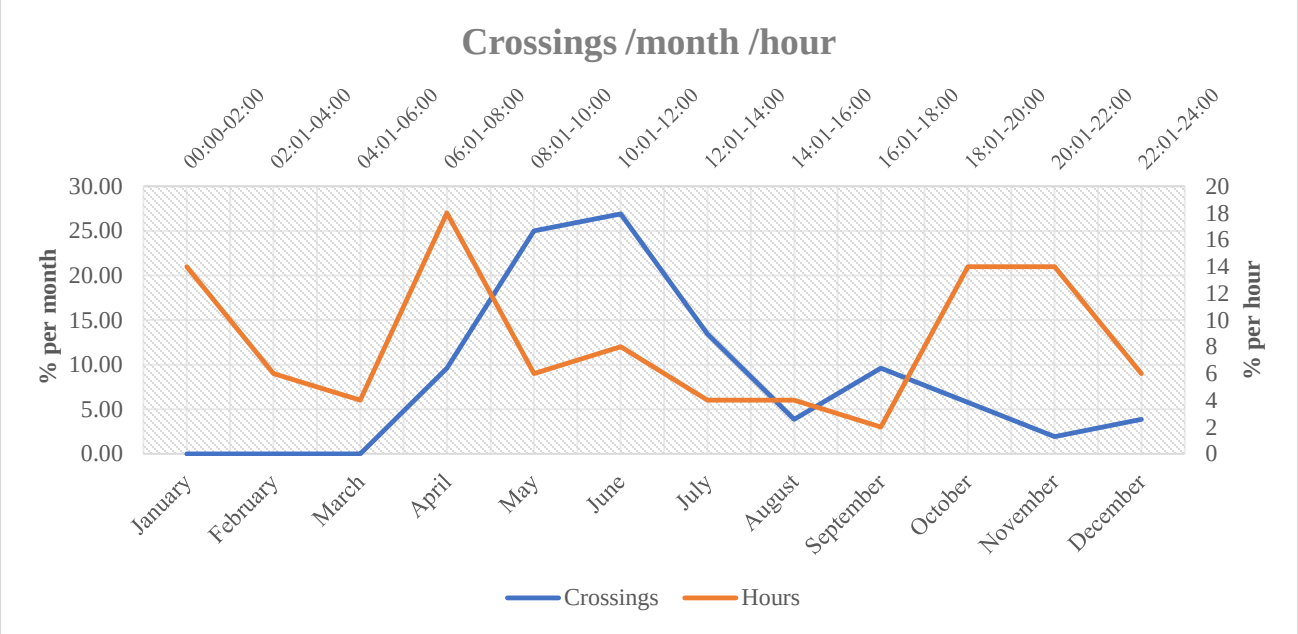


Figure S4. Percentage of crossings recorded per month and per hour.

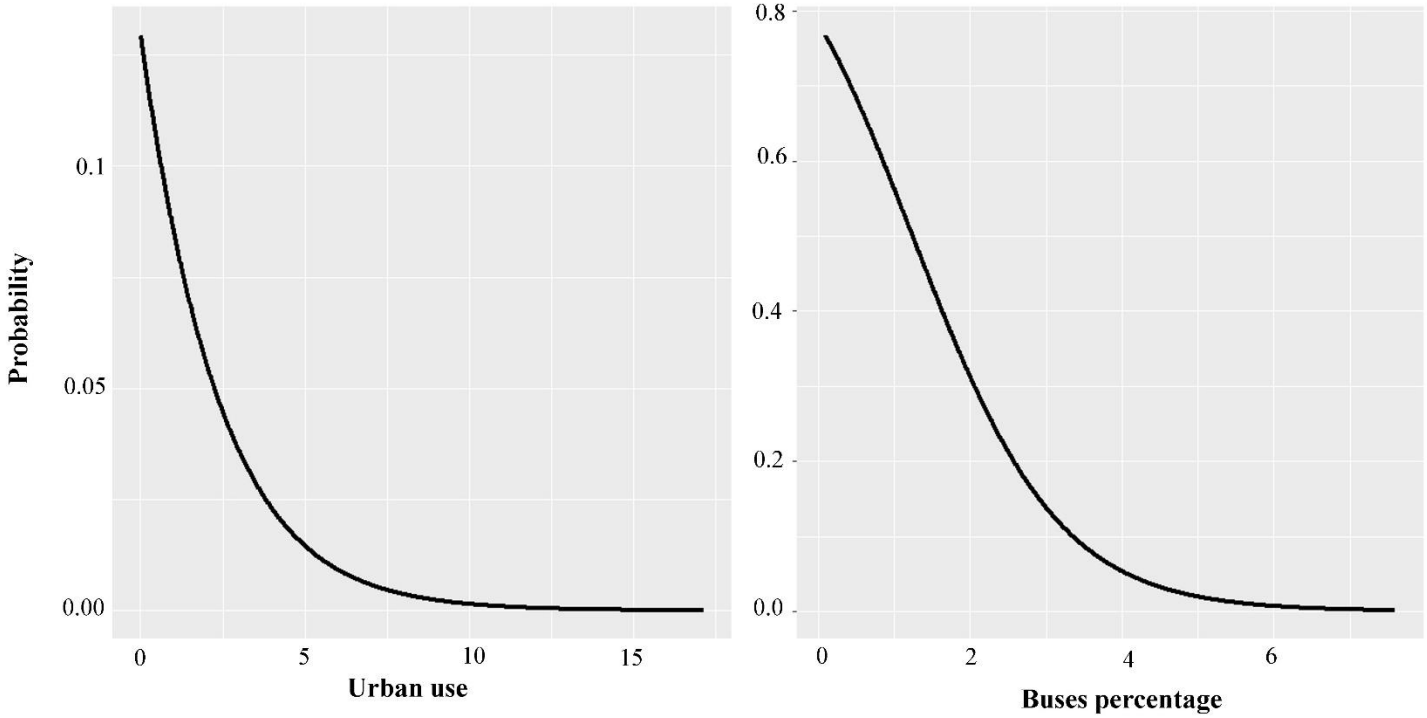
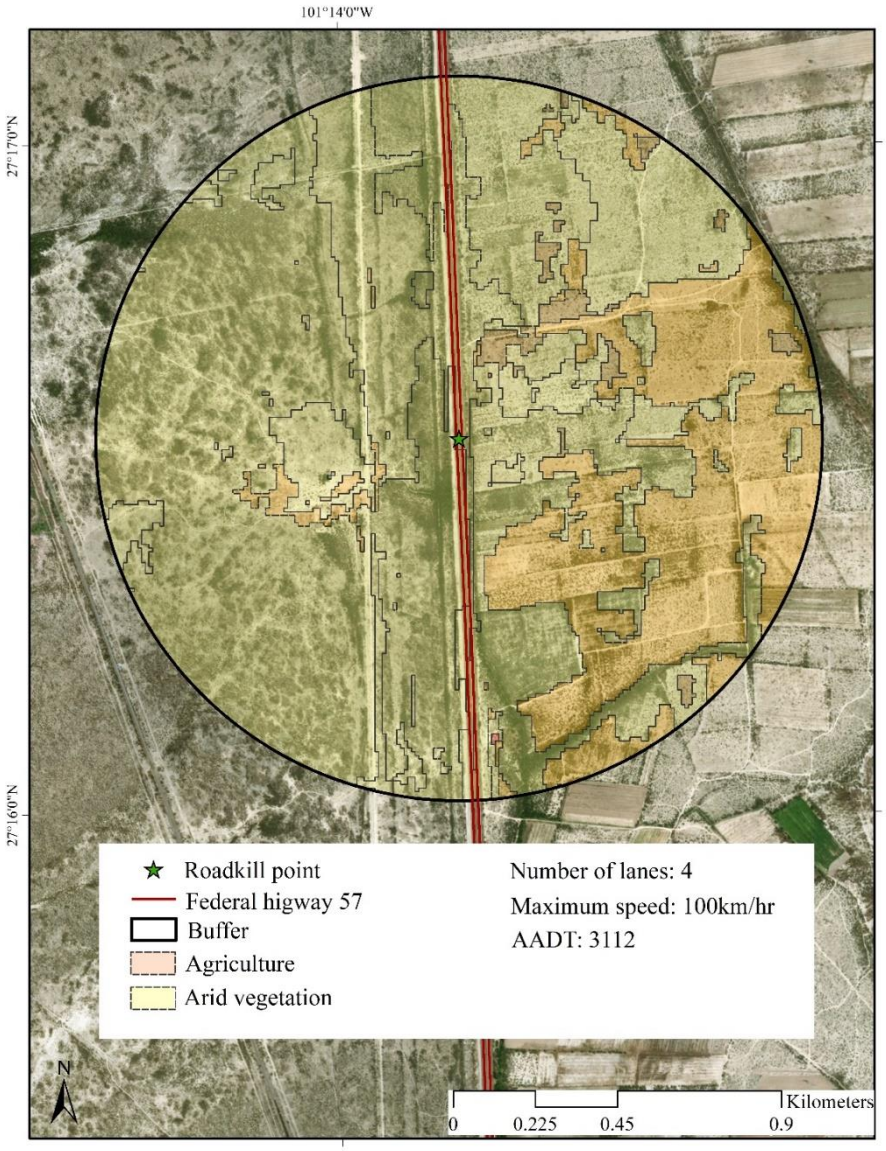
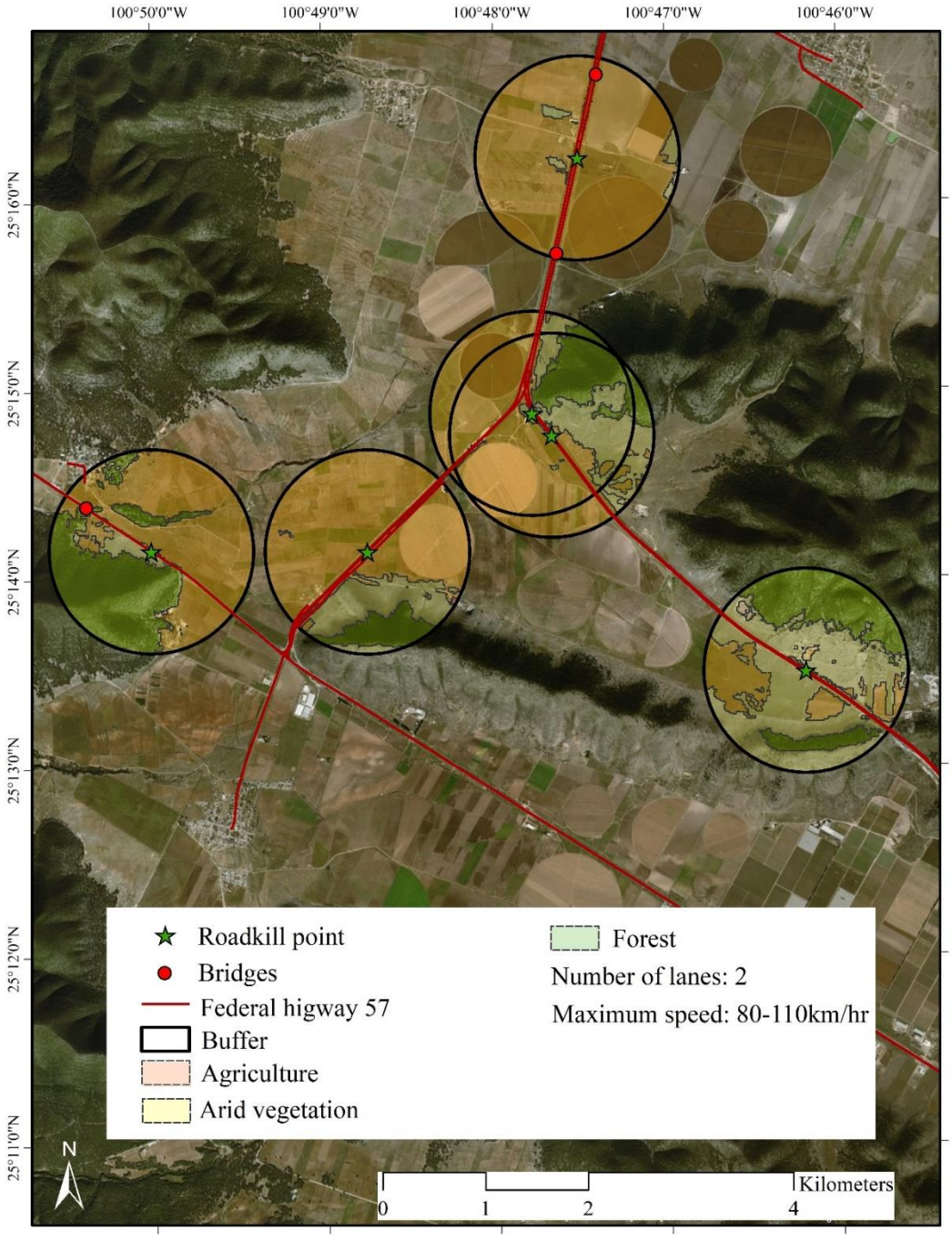


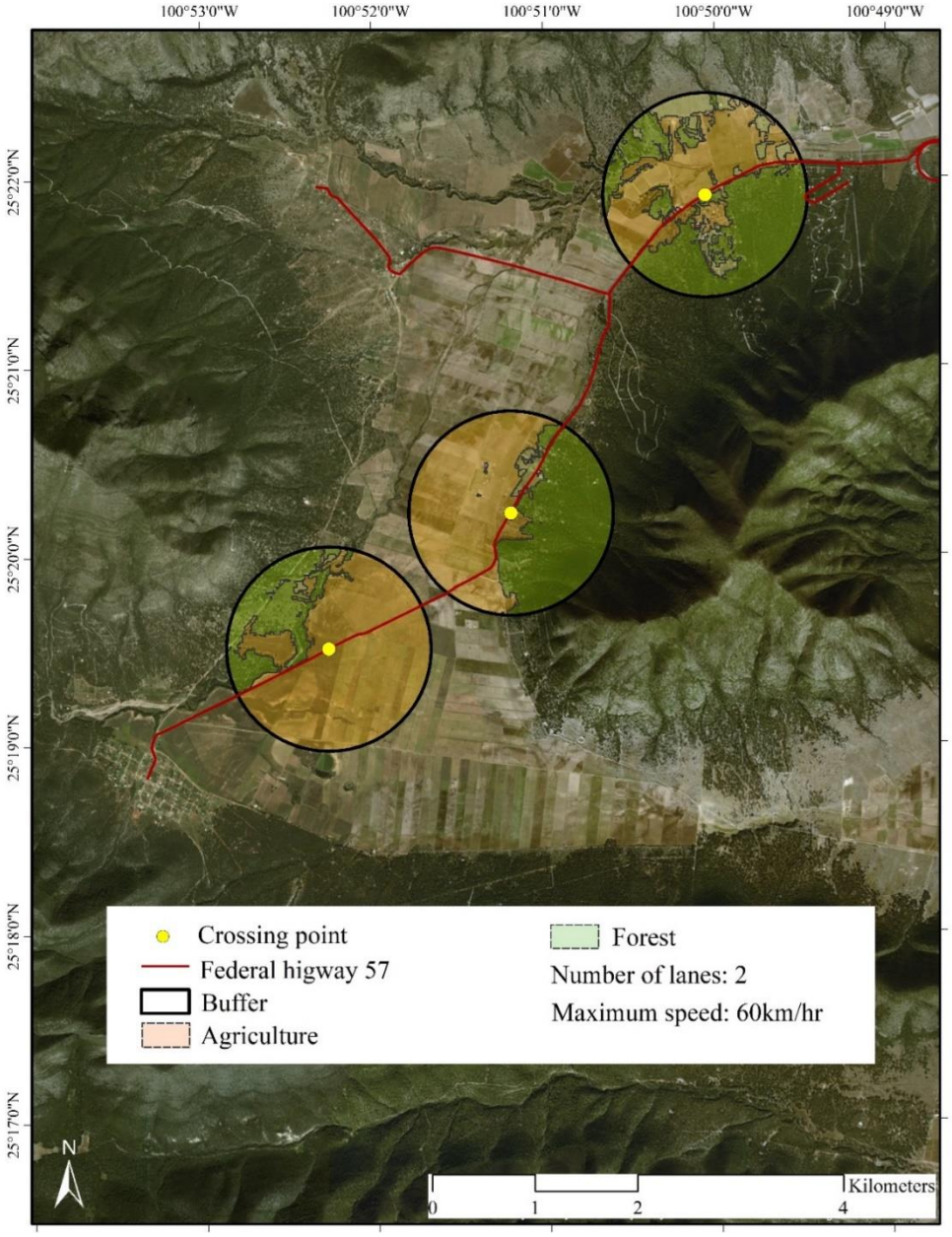
Figure S5. Response of variables influencing the probability that a roadway segment is a crossing site. The probability of crossing decreases as the percentage of urban and bus use decreases.

We carry out field trips (June 2019) to verify different sites, both crossing and roadkill. We evaluate the real speed and the presence of structures such as a medium barrier, ridges or a containment bar. These are some of the characterized points, the surrounding vegetation and some characteristics of the roads are shown. We also include photos of the sites, some taken from Google Earth and some of our own. Finally, considering the observed characteristics, we suggest some strategies that can help mitigate the impacts of the roads.

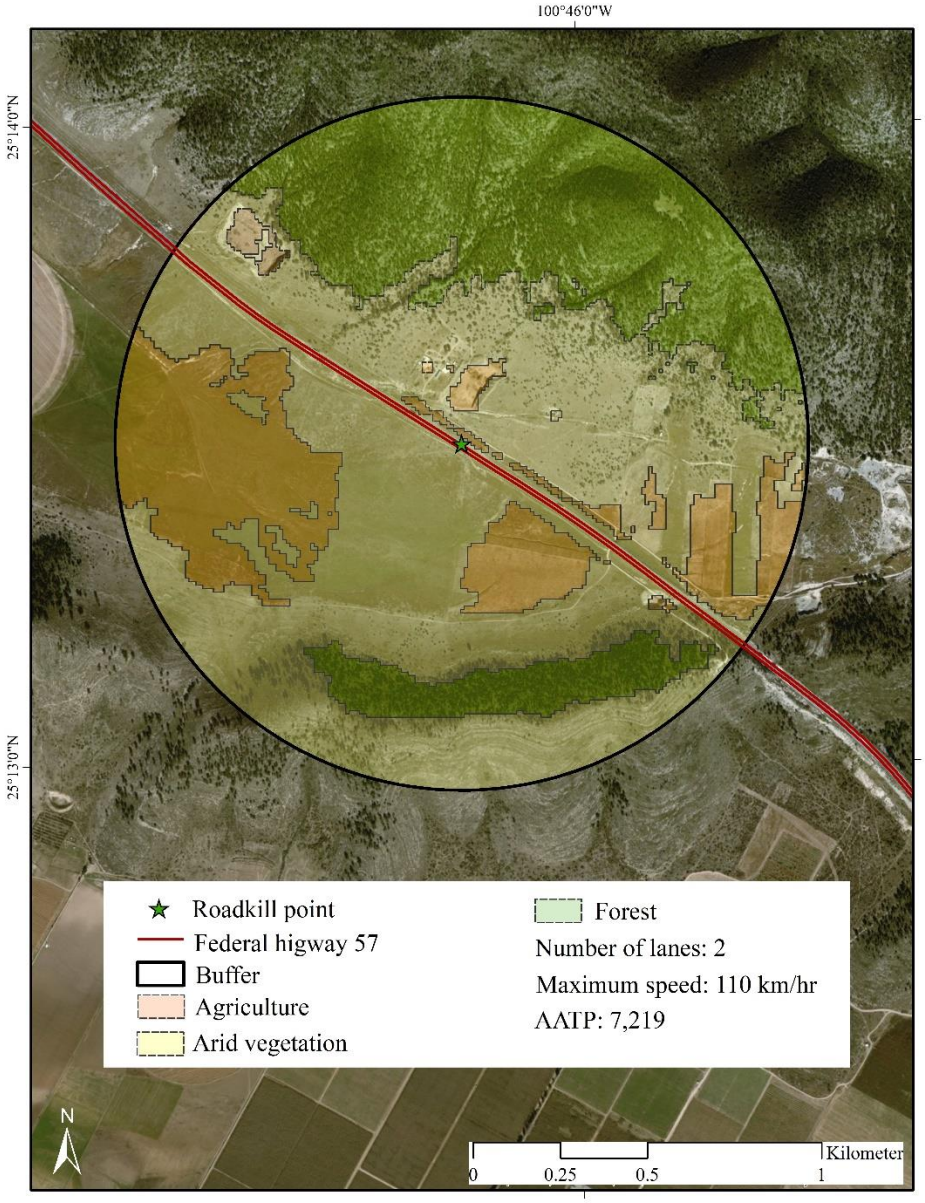


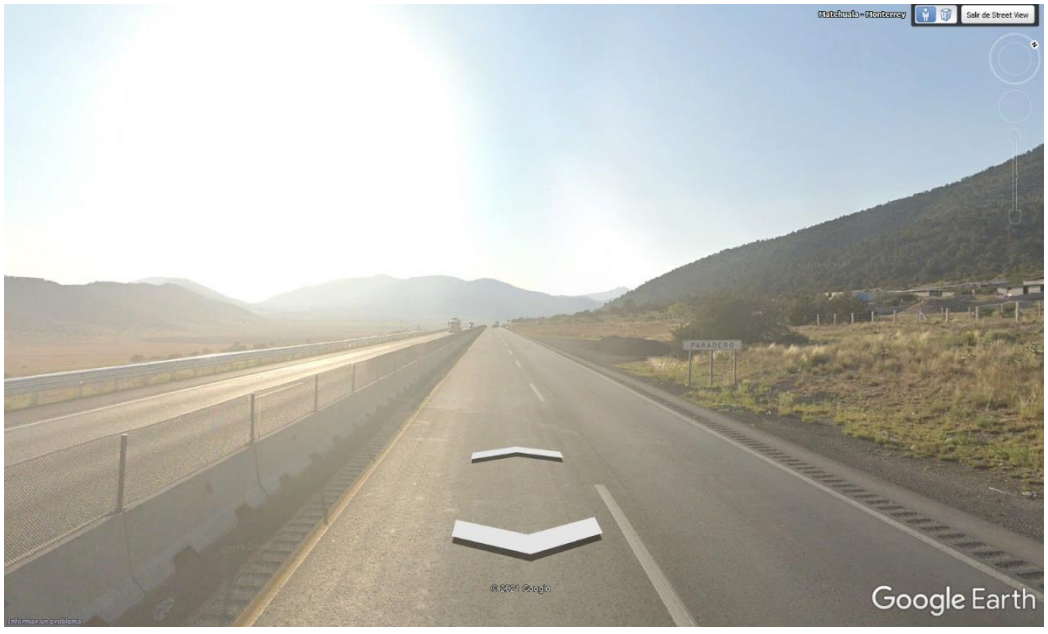


Many of the roadkill sites have a high percentage of agricultural coverage, this may be due to the fact that in this region there is a strong conflict between farmers and ranchers, which results in the lethal control of individuals (Nuñez-Torres et al. 2020).



These are some of the crossing sites, it is a road whose maximum speed does not exceed 60 km/hr and with a fairly low vehicle volume (around 1,500 vehicles on average per year). There are no nearby bridges, so we suggest placing speed bumps and signs of the presence and crossing of black bear.


100°46'0"W
25°14'0"N
25°13'0"N
Roadkill point
Federal higway 57
Buffer
Agriculture
Arid vegetation
Forest
Number of lanes: 2
Maximum speed: 110 km/hr
AATP: 7,219
N
0
0.25
0.5
1
Kilometer


Google Earth

In this, with other roadkill sites, we find structures such as the middle concrete barrier that provides safety to drivers to avoid frontal collisions, however, if they do not have safe crossings for wildlife, it can increase the barrier effect and increase the risk of roadkill once individuals enter the pavement strip.

Table S1. Monitoring days (after depurating) per individual and number of crossings.

	Id	*Sex*	*Beginning date*	*End date*	*Days active*	*Crossings*
1	Bear 76	M	28/08/2016	01/01/2017	126	0
2	Bear 18	M	11/08/2017	03/11/2017	84	5
3	Bear 79	M	10/04/2016	03/08/2016	115	0
4	Bear 87	M	28/07/2016	16/09/2016	50	0
5	Bear 117	M	06/06/2017	11/05/2018	339	3
6	Bear 78	F	01/08/2017	02/12/2017	123	0
7	Bear 83	F	09/09/2017	09/12/2017	91	0
8	Bear 05	M	24/04/2018	21/06/2018	58	16
9	Bear 11	M	11/05/2018	20/06/2018	40	0
10	Bear 81	M	26/08/2015	25/07/2016	334	13
11	Bear 80	F	01/10/2014	17/12/2014	77	3
12	Bear 82	F	27/10/2014	07/07/2014	112	9
13	Bear 02	M	27/08/2015	24/11/2015	89	1
14	Bear Diamante	M	23/04/2018	14/05/2018	21	0
15	Bear José	M	10/05/2018	14/05/2018	4	0
				Total	1663	50