Use of a spatially explicit individual-based model to predict population trajectories and habitat connectivity for a reintroduced ursid

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SUPPLEMENTARY TABLE 1 Environmental variables data used in the resource selection function model for *Ursus thibetanus* in South Korea.

Factor	Type	Range	Source
Elevation	Continuous	16 – 1783 meters	Digital Elevation Model (DEM; GMTED provided by USGS) smoothed using focal statistics
Ruggedness	Continuous	0.039 – 9.15	Derived from DEM – standard deviation of slope using focal statistics
Road	Categorical	0 or 1	500 meter buffer on either side of roads (DIVA-GIS)
Alpine	Categorical	0 or 1	Derived from DEM – elevations above 1,200 meters categorized as alpine
Riparian	Categorical	0 or 1	Derived from DEM using the Hydrology toolbox in ArcMap
Greenness	Continuous	-0.0654 – 0.361	Derived using Tasselled Cap transformation of corrected Landsat reflectance imagery
Wetness	Continuous	-0.231 – 0.142	Derived using Tasselled Cap transformation of corrected Landsat reflectance imagery
NDVI*	Continuous	-0.252 – 0.869	Derived using the NDVI calculation of corrected Landsat reflectance imagery $NDVI = \frac{NIR - Red}{NIR + Red}$

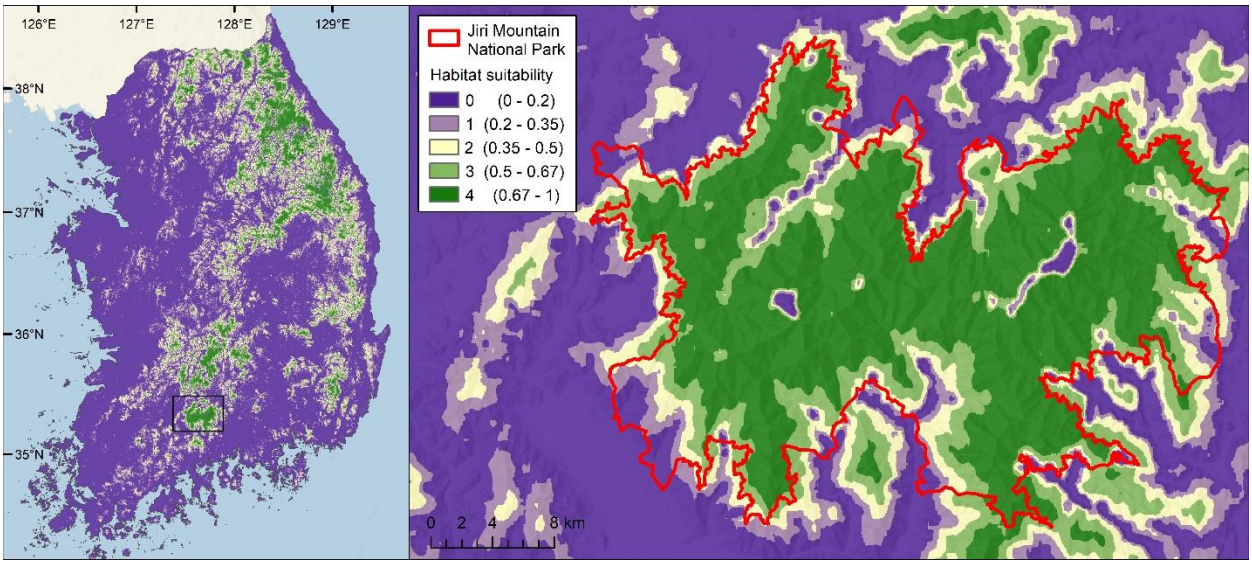
*Not tested in the final model, as NDVI is highly correlated with greenness and wetness

SUPPLEMENTARY TABLE 2 Population parameters in HexSim for a reintroduced population of *Ursus thibetanus* in the Republic of Korea. Note that these parameters relate to specific inputs of the HexSim modelling software.

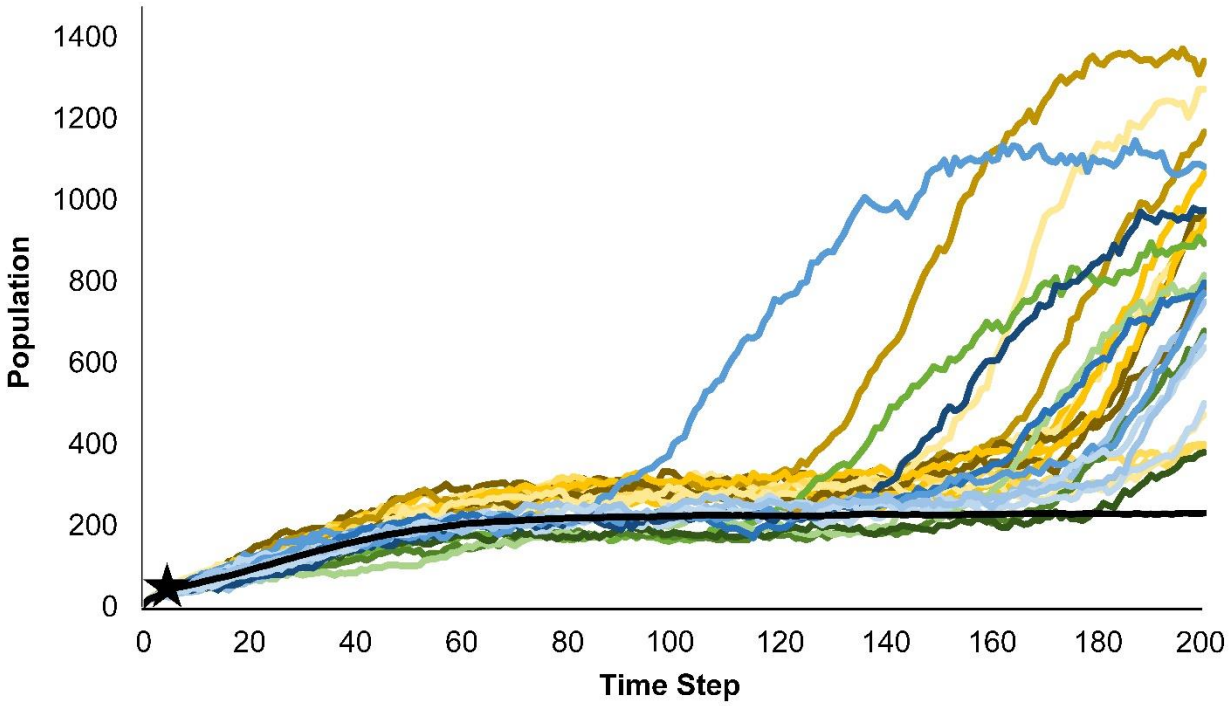
Initial Population	47			
	Parameter name		Value	Explanation
Range data	**Maximum range area**		30000 hectares	Maximum yearly range
	Maximum range span		40000 meters	Maximum lateral distance of range
	Maximum group members		300 hexagons	Maximum shared hexagons
	Hexagon range eligible if >		1	Minimum resource class eligible for range
	Minimum range resource		80	Minimum resource requirement for individual
	Resource target (Requirement)	Juvenile Male	530±91	Calculated using sums of classified hexagon values within yearly core ranges. These core ranges account for 80-90% of each individual's total yearly home range and are therefore a good indicator of target resource requirements without including areas that do not represent significant use of home range. Simulations were run at average resource requirement and at plus and minus one standard error.
		Juvenile Female	707±182	
		Subadult Male	881±150	
		Subadult Female	813±103	
		Adult Male	1224±146	
		Adult Female	494±66	

SUPPLEMENTARY TABLE 3 HexSim model parameters for a reintroduced population of *Ursus thibetanus* in the Republic of Korea. Note that these parameters relate to specific inputs of the HexSim modelling software.

Type	Name	Specifications					
Accumulate	**Increment Age**	Individuals accumulate age					
Reproduction	**Reproduction**	**Maximum number of births**			**3**		
		Birth Rates	**0**	**1**	**2**	**3**	**Expected**
		Juvenile, low resource	1	0	0	0	0
		Juvenile, high resource	1	0	0	0	0
		Subadult, low resource	1	0	0	0	0
		Subadult, high resource	1	0	0	0	0
		Adult, low resource	0.67	0.22	0.11	0	0.44
		Adult, high resource	0.62	0.24	0.12	0.02	0.54
Floater Creation	**Floater**	Individuals not sharing resources with other individuals, adults have highest likelihood of becoming floaters, subadults have medium likelihood, and juveniles have lowest likelihood.					
Movement	**Dispersal**	Minimum dispersal: 1 kilometre; Maximum dispersal: 80 kilometres					
Set Group Affinity	**Grouping**	Minimum dispersal: 0 kilometres; Maximum dispersal: 80 kilometres					
Accumulate	**Evaluate Resources**	Resources are accumulated by individuals (territory)					
Survival	**Survival**	**Class**			**Survival Rate**		
		Juvenile Male, low resource			0.7		
		Juvenile Female, low resource			0.6		
		Juvenile Male, high resource			0.8		
		Juvenile Female, high resource			0.7		
		Subadult Male, low resource			0.8		
		Subadult Female, low resource			0.8		
		Subadult Male, high resource			0.942		
		Subadult Female, high resource			0.907		
		Adult Male, low resource			0.88		
		Adult Female, low resource			0.88		
		Adult Male, high resource			0.98		
		Adult Female, high resource			0.938		
Probabilistic	**Sex**	**Sex**	**Initial (%)**		**Birth (%)**		
		Male	56		60		
		Female	44		40		



SUPPLEMENTARY FIG. 1 Map of resource suitability index for *Ursus thibetanus* over the Republic of Korea (left) and Jiri Mountain National Park (right), from Resource Selection Function model. Areas with NDVI values less than 0.65 were removed, representing the cut-off at which bear activity is significantly reduced.



SUPPLEMENTARY FIG. 2 Carrying capacity of the Republic of Korea for *Ursus thibetanus*, without additional reintroduction. All simulations representing establishment of viable populations outside of the southern Sobaek Mountain Range over 200 time steps (~400-600 years), without further reintroductions. There is an 8.0% chance (24 of 300 simulations) of establishment within 200 time steps, and a 0.3% chance (1 of 300 simulations) of establishment within 100 time steps. Yellow lines represent low resource requirement simulations, blue represent average resource, and green represent high resource. The black line is the average of all simulations where viable populations were not established outside of the southern Sobaek Mountain Range. The initial reintroduction event is marked by a black star.