Modelling the Parameters of Brown Bear Population in Slovenia – a Tool in the Conservation Management of Threatened Species

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In the course of extended research on brown bear *(Ursus arctos)* in Slovenia, we studied demographic parameters of the population, spatial expansion in post-World War II period and habitat suitability for brown bears. Since field collection of data on the level of State is time consuming and costly, we analysed existing data on sex and age structure of harvested bears, monitored reproduction rates, etc. and used them in the building of corresponding models.
The range and distribution of suitable habitats are among essential knowledge of successful species conservation strategy. The knowledge base (in the form of a decision tree) for the expert system for identifying suitable habitat of brown bear, was induced by automated machine learning from recorded bear sightings in Slovenia in post-1990 period, and then linked to the GIS thematic layers for subsequent habitat / non-habitat classification of the entire study area. Special attention was paid to the locations of female bears, due to their role in reproduction and continuous expansion of the population. Thus derived area of reproductive habitat covers about 2500 km^2, or 12% of Slovenia. This area is to be protected and moderately used if current population size of brown bears should be preserved. Maximal potential habitat area, which already is, or might be in future settled by brown bears, covers about 5400 km^2.
Reliable data on shooting and sighting of brown bears, out of core area in the period 1945-2000 have been located in Gauss-Krueger coordinate system and used in the reconstruction of the species expansion in Slovenia. Kernell home range method was used to define periodic home ranges and step-by step extensions of newly formed bear population units. Some of the units disappeared due to changes in conservation policy, another increased and have been transformed into stable metapopulations. The reconstruction proved that core management area for brown bears, established in 1966 was a political, but not scientifically based decision.
Modelling of reliable size of brown bear population was also among important tasks of our study. The model was built with the use of sex ratio and age structure of extracted bears, share of reproductive females in two,10 and 15 years monitored sample areas inside core population range and an expert estimation of the population size in 1957. Due to changing variables on individual reproduction, and mortality more scenarios have been provided. Thus calculated population size of brown bears in Slovenia is among 375 and 425 animals.