

## **Presence and Distribution of the Brown Bear (*Ursus arctos*) in Friuli Venezia Giulia, from 2004 to 2011, through non-invasive genetic monitoring and conservation implications.**

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After having disappeared at the beginning of 1900, the brown bear has started in a late 1960s a slow process of recolonization of the north-eastern Alps, through an expansion of Dinaric population. At the end of the 1990s the University of Udine began the occasional monitoring of the species and from 2004 non-invasive genetic monitoring became systematic. In the last 8 years 217 hair traps have been activated in the region to monitor: Natisone Valleys, the Julian and Carnic Alps and Prealps. Twenty-six hair traps were monitored in all years, whereas 40 were observed only in 2004, 2007 and 2011. The 26 hair traps constantly monitored from 2004 to 2011 showed 17% of average success of hair's collecting (brown bear samples collected/day control: BBSD). The 40 hair traps, monitored in the window period, showed 12% of BBSD. The BBSD value varied in relation to both season (highest in spring) and year, with a dramatic decline from 2008, and interaction between year and area. From 2004, 13 genotypes, through systematic hair traps monitoring, were identified, while only 2 genotypes were sampled opportunistically. It was observed a high turnover of the genotypes: only 7 genotypes were sampled for more than 2 years (47% of total), 4 genotypes (27% of the total) were sampled for 3 years or more. The annual attendance of bear have been constant from 2004 to 2007, with 5-6 genotypes present every year. In the period between 2008 and 2010 there was a drastic decrease in the successful collection at the hair traps, with an average of 1-2 animals genotyped per year. However, opportunistic samples have increased in the recent times, probably due to the arrivals of 3 genotypes from Trentino (KJ2G2 in 2009 and DG2 and MJ4 in 2011). The year 2011 showed a further increase in the presence of bears with 5 animals genotyped in Friuli Venezia Giulia. Three of these animals belonged to the Slovenian population, while the other 2 genotypes were from the Trentino population. The results seem to confirm the exchange of some individuals between the Dinaric and central alpine population. As an example, the dinaric bear M5 was genotyped in Friuli Venezia Giulia in 2008 and then sampled in 2009 and captured in 2010 in Trentino and finally shot in Slovenia in 2011. The distribution in the alpine and prealpine areas has changed year by year: from the 2004 to 2007 the Natisone Valley and the Julian prealpine areas along the border with Slovenia were the areas more used, whilst from 2009 there was an apparent higher presence of bears in the Carnian Prealps and Alps, and in the Julian Alps. This shift could be due to human disturbance (i.e hunting management), control of the species carried out in neighbouring Slovenia, with a decreasing of immigrant from dinaric populations, and new immigration of bears from the central Alps. The present work has highlighted the necessity for a trans-regional and cross-border management of the species, especially in consideration to the population control applied in Slovenia, which seem to limit the Dinaric population expansion in the Alps, and furthermore the philopatry behaviour of bear females, which implies the absence of females in Friuli Venezia Giulia and induces a movement back to Slovenia (at least 3 bears genotyped in Italy were shot in Slovenia). All these elements seem to exert important limitations to the consolidation and stabilization of the population of brown bears in north-eastern Alps. From the methodological point of view the protocol of systematic non-invasive genetic monitoring, shared at the trans-regional and trans-boundary level, is fundamental to monitor the dynamics and distribution of bear; the protocol should follow a systematic experimental design and should be integrated with a efficient opportunistic data collection.