

# Analysis of reproductive performance in brown bears (*Ursus arctos*) by staining placental scars



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## Background

The Swedish brown bear population is protected, but managed with legally defined hunting seasons. Management decisions are frequently changed and should be based on knowledge about demographic parameters. However, collecting sufficient data in the field is time consuming and expensive. An efficient method to collect data on reproductive output could be counting placental scars in the uteri of harvested female brown bears. We evaluated the benefits of staining uteri to increase placental scar visibility. Furthermore, we assessed the reliability of placental scar counts to determine reproductive performance by counting the number of young of radio-collared female brown bears and comparing that with placental scar counts after those females were harvested.

## Methods



For this study, we used only the reproductive organs of female brown bears  $\geq 3$  years ( $n = 109$ ) harvested from 1997 – 2005, most of them killed between the beginning of August and the end of October during the regular hunting season. To stain the uteri, we used a method based on the Turnbull blue reaction following Salewski (1964, <https://doi.org/10.1007/BF02308461>).

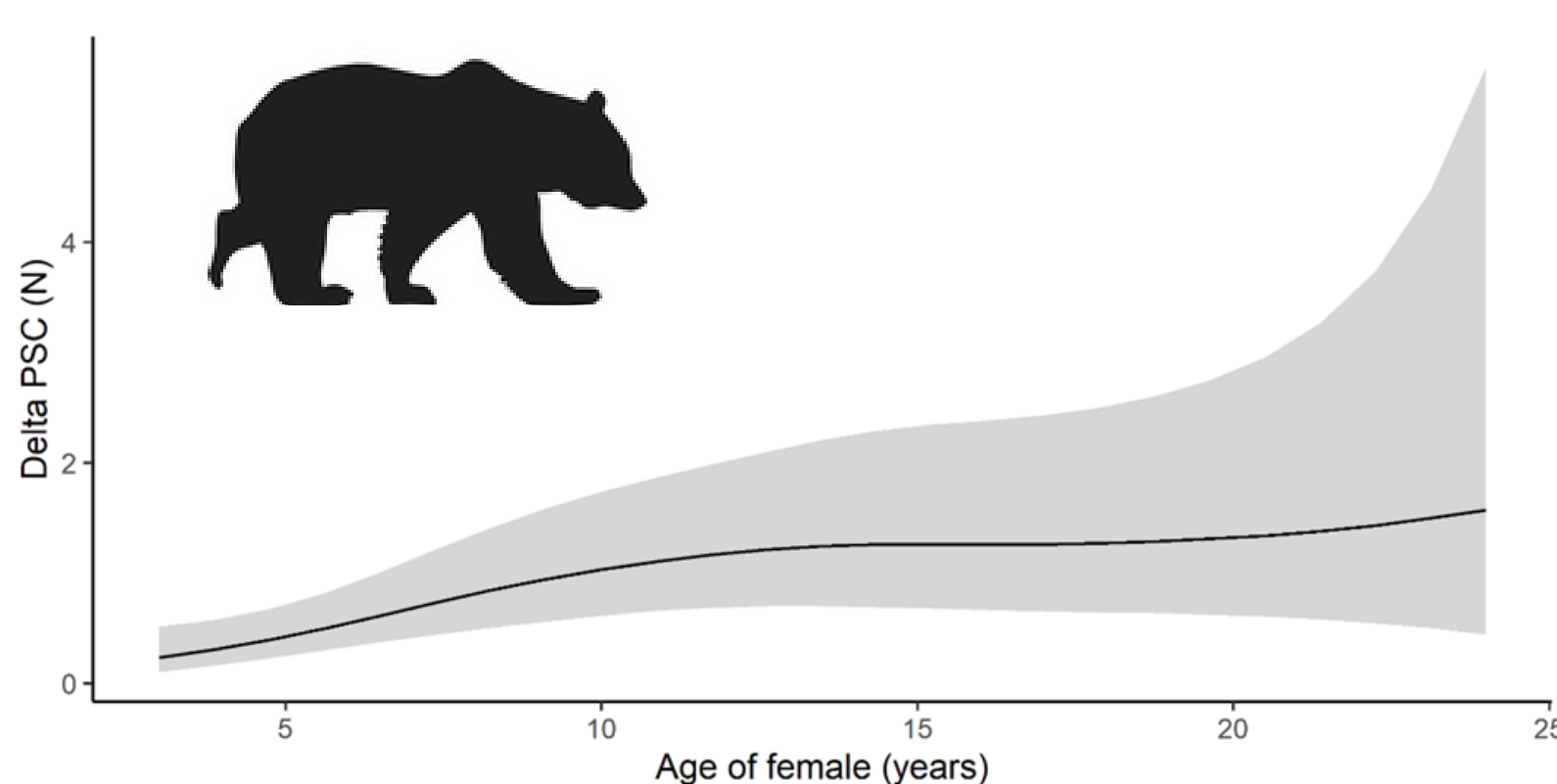
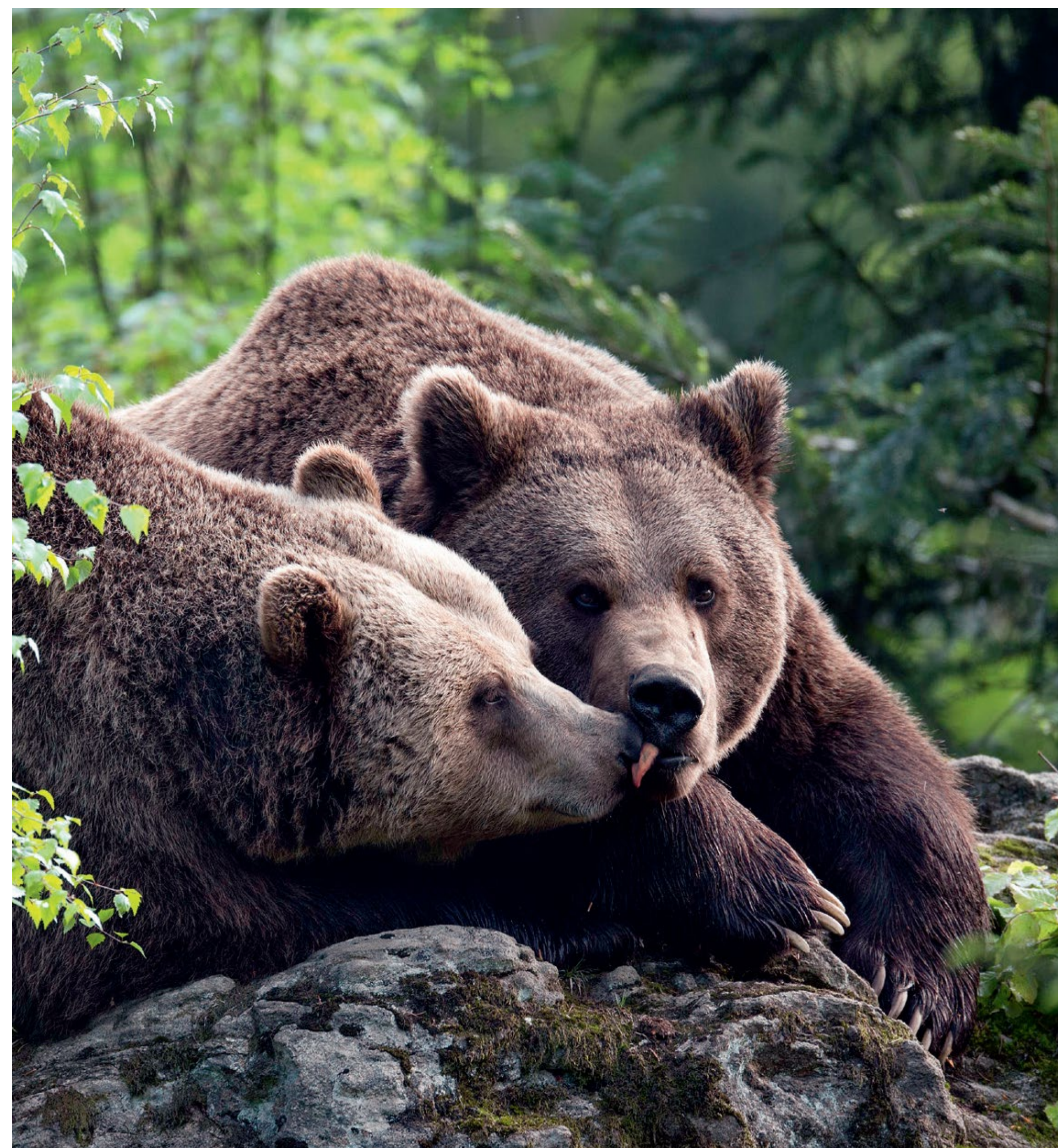


Fig. 2: Estimated smoothing curve for variation in the absolute difference between number of placental scars counted before and after staining the uteri (delta PSC) in relation to the age of female brown bears. The solid line represents the smoother and the gray bands represent the 95% confidence interval bands.



(Photo: Eugène Reiter)

**Placental scar counts in brown bears can provide accurate information on age of primiparity, evidence for reproductive aging (senescence), and reproductive productivity and therefore inform decisions regarding adaptive management, sustainable hunting, and conservation.**

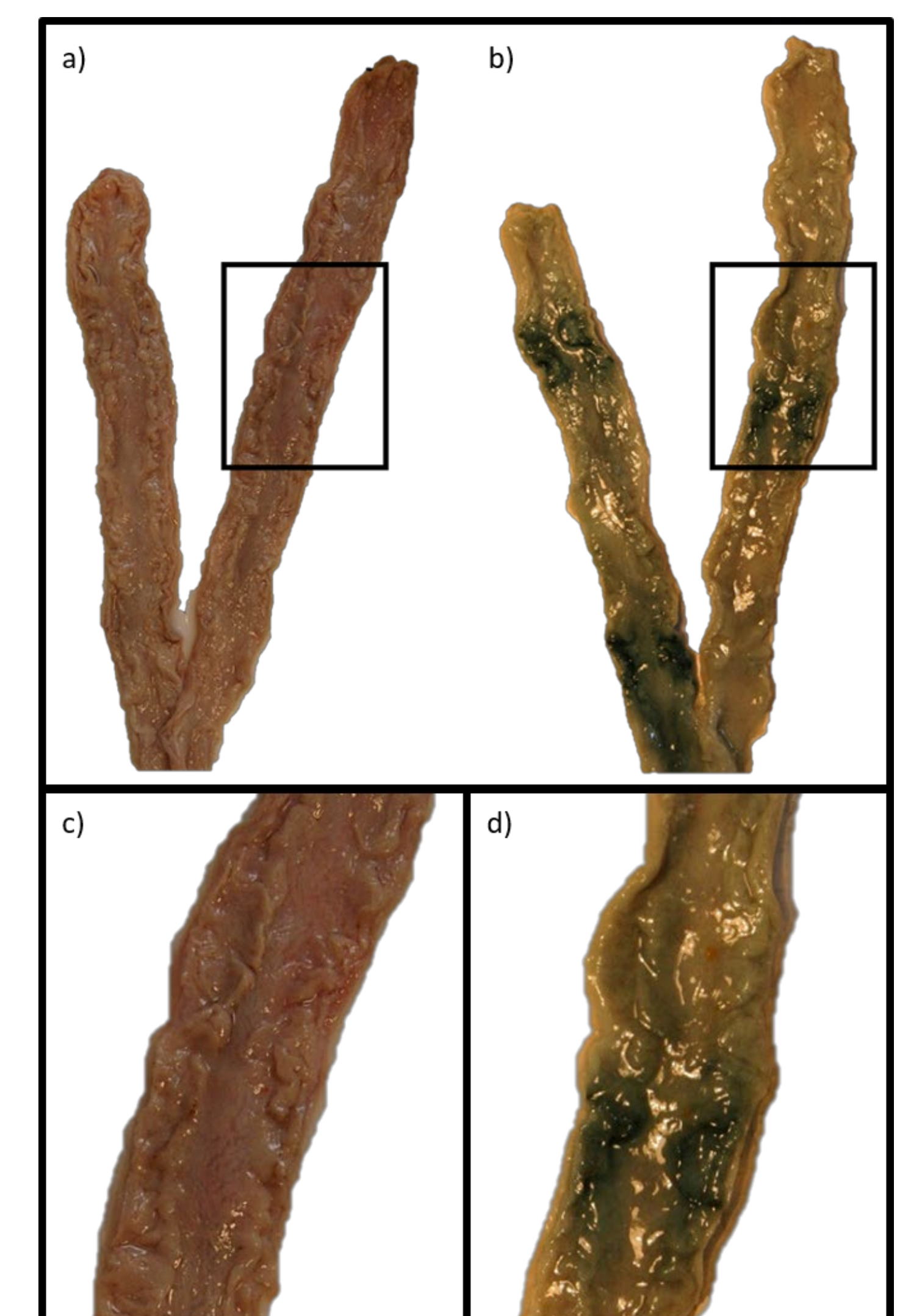


Fig. 1: Uterine horns of brown bears were opened longitudinally on the antimesometrial side, and placental scars were counted before a), c) and after b), d) staining. Detection of placental scars was improved after staining the uterine tissue.



## Acknowledgments

We thank the hunters and official inspectors who collected the samples and Arne Söderberg from the National Veterinary Institute of Norway (SVA) for providing them.

## Results and Discussion



We found that staining uteri improved the detection of placental scars (Fig. 1). In uteri with at least one visible scar, the average number of placental scars increased significantly by 13% after staining. Detectability of placental scars, described by the difference between number of scars detected before and after staining the uteri, increased significantly with female age (Fig.2). We found a significant positive relationship between the total number of scars counted in stained uteri and the total number of cubs-of-the-year accompanying the female two and three years before being killed. Small deviations between number of placental scars and number of observed cubs-of-the-year accompanying females might have occurred because of postpartum cub mortality prior to leaving the den.