



## **Integrating soil eDNA and camera-trapping improves mammal community assessment in the Foreste Casentinesi National Park**

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Reliable biodiversity assessment is essential to evaluate conservation effectiveness, yet individual survey methods often provide partial views of ecological communities. In this study, we integrated soil environmental DNA (eDNA) metabarcoding and camera-trapping data to assess mammal communities across 31 sites in the Foreste Casentinesi National Park, Central Italy. The two methods detected only partially overlapping communities: eDNA captured a broader range of taxa, particularly small and elusive species, whereas camera trapping primarily detected medium-to-large mammals. While camera-trap detection probability increased with species body mass, eDNA detectability was primarily driven by the frequency of recorded passages. Time since the last detection had a weak effect on eDNA, suggesting that soil samples reflect cumulative activity rather than recent presence, with an estimated detectability half-time of approximately 26 days. Integrating both datasets provided a more comprehensive ecological characterisation, highlighting a community structure driven by both exclusive and shared species. Our results demonstrate that combining eDNA and camera trapping offers a more robust assessment of mammal communities than either method alone. This integrated approach improves taxonomic sampling, supporting the use of multi-method frameworks to better inform biodiversity monitoring and conservation strategies.