Detection dog-team outcompetes human fieldworkers in collecting pine marten scat

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Detection dog-team outcompetes human fieldworkers in collecting pine marten scat

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Introduction

Fecal samples are increasingly used in wildlife research to confirm species' presence and to estimate population densities, which could be promising to monitor the elusive pine marten (*Martes martes*) [1, 2]. Wildlife detection dogs can increase the sampling success by efficiently searching an area, generating a higher sample size and a more homogeneous data set [3]. Within a pilot study to estimate pine marten density in Baden-Wuerttemberg, Germany, we compared the effectiveness of trained fieldworkers versus a detection dog-team to collect pine marten scat samples.

We assumed that the dog-team detects

- a higher sample size of pine marten scat
- a higher rate of fresh scat samples
- samples in a higher variety of habitat structures

than the fieldworkers.

Material & Methods

The study was conducted in autumn 2021 at four forested areas (500 to 1000 ha) in Southwestern Germany (Fig. 1). Scat surveys were organized on 500 x 500 m units. Each unit was surveyed once following a 1.75 km transect by either a fieldworker or the dog-team in an offset arrangement. The dog-team consisted of the dog-handler and the dog. Fieldworkers and dog-handler were trained in the scat morphology of target and non-target (e.g. fox, stone marten) species. The dog's performance in detecting pine marten scats was tested in single-blind trials. All samples were genetically identified afterwards.

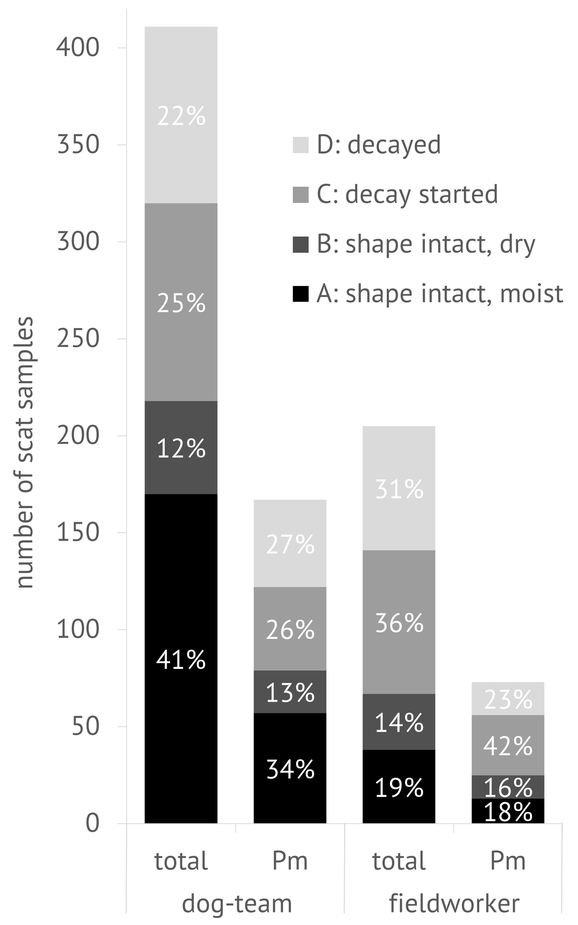

Fig. 2: Degradation categories defined for scat samples with increasing decay (A to D). All samples were either collected by a detection dog-team or fieldworkers. The second and fourth column displays samples that were genetically identified as pine marten (Pm) scat.

Preliminary results

- The dog-team collected more than twice as many pine marten samples (n = 167) than the fieldworkers (n = 73, Tab. 1).
- Pine martens were detected in 87 % of the units surveyed by the dog-team and in 60 % surveyed by fieldworkers (Tab.1).
- Fresh scat samples (Fig. 2, A) were predominantly found by the dog-team (34 %) while the fieldworkers collected rather more decayed (Fig.2, C) scat samples (42 %).
- Compared to the fieldworkers, the dog-team collected more pine marten scat samples on both linear structures and off-road (Fig. 3).
- With regard to the scat location the dog-team detected most samples on the ground while fieldworkers were more successful at lying trunks and tree stumps (Fig. 3). Especially off-road and on logging trails the fieldworkers found very few samples on the ground (Fig. 3).

Conclusions

Our results suggest that fieldworkers tend to miss a substantial amount of scat samples of important quality and from certain habitat structures. Given the lower sample size, this might decrease the number of individuals detected and fail to estimate robust population densities. Data collected by the dog-team may be particularly promising for further genotyping analysis planned within this study.

However, the suitability of sampling methods relies on the monitoring design, research question and the budget. Next steps will include cost calculations for both methods and additional camera trap data in comparison to the data quality accomplished.

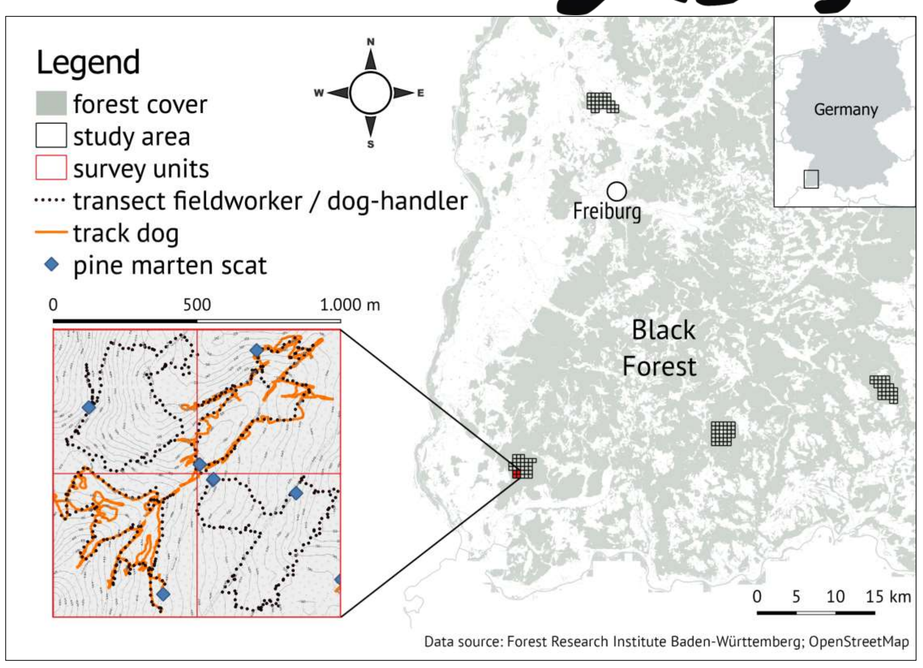

Fig. 1: Study design for pine marten scat surveys conducted in four forest areas, Baden-Wuerttemberg, Germany. Within each 500 x 500 m unit a 1.75 km transect was surveyed once, either by a fieldworker or a detection dog-team in an offset.

Tab. 1: Effort and outcome of pine marten (Pm) scat surveys are given for fieldworkers, the dog-team and as a combination of both methods. The actual distance (km) walked is given as a mean distance per unit. The detection dog alone covered on average 6.7 ±1.5 km. Scat samples were genetically analysed for species identification.

	Fieldworker	Dog-Team	Combined
N units surveyed	65	63	128
N putative scats found	205	413	618
N Pm scats confirmed	73 (36 %)	167 (41 %)	240 (39 %)
N units with Pm scat	39 (60 %)	55 (87 %)	94 (73 %)
Mean distance per unit (km)	2.9 ±0.4	2.7 ±0.4	2.8 ±0.4
Mean Pm scats per km	0.4 ±0.1	1.0 ±0.6	0.7 ±0.5

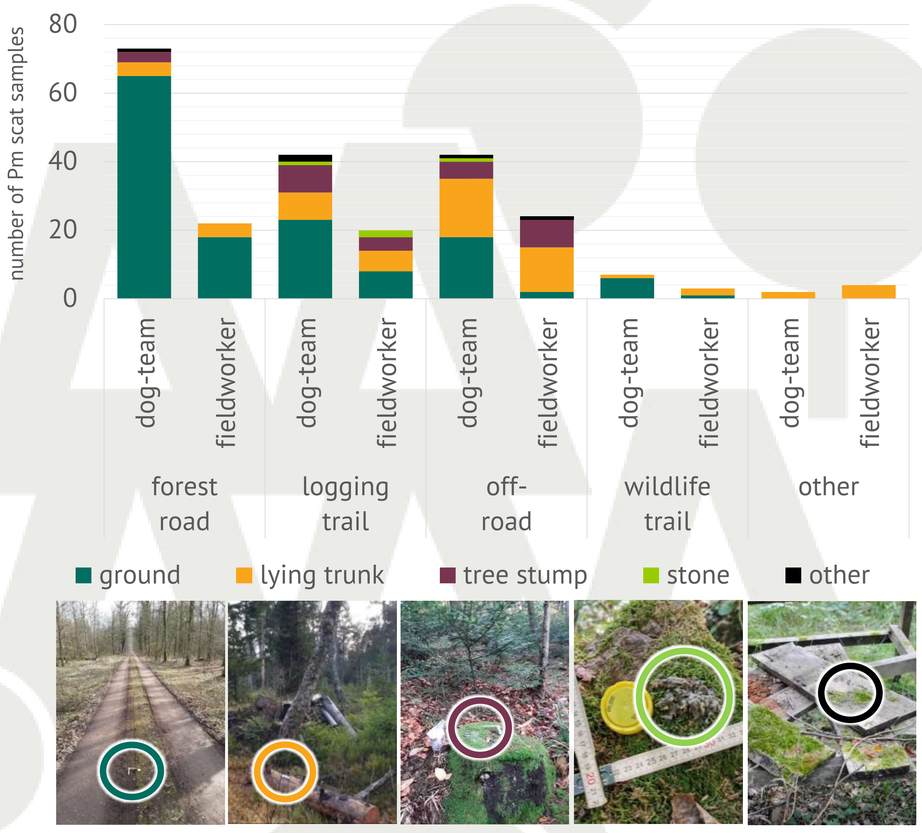

Fig. 3: Comparison of location of pine marten (Pm) scats found by the dog-team or fieldworkers. The transect followed either linear structures (e.g. forest roads, logging trails, wildlife trails) or was placed off-road within each survey unit. The structure type the scat was placed on was documented (i.e. ground, lying trunk, tree stump, stone or other).

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[3] Long RA, Donovan TM, MacKay P, Zielinski WJ, Buzas JS (2007) Effectiveness of Scat Detection Dogs for Detecting Forest Carnivores. Journal of Wildlife Management 71:2007–2017