EVALUATION OF CAMERA TRAP-BASED POPULATION ESTIMATION APPROACHES FOR WILDLIFE RESEARCH IN TÜRKİYE

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Abstract

Wildlife camera trapping has evolved from early wire-triggered mechanical systems to modern motion-sensitive technologies, becoming an essential tool in ecological research. Since the 2000s, camera traps have rapidly developed, diversified, and become widely used across the world. In Türkiye, their application in wildlife studies dates back approximately two decades, with early research focusing on human–wildlife conflict, species occurrence, activity patterns, habitat use, and basic population assessments.

Population estimation, however, remains a major challenge due to the labor, cost, and effort required by conventional methods. Camera trap-based approaches offer effective alternatives and are broadly classified according to whether individuals can be morphologically identified. Methods developed for marked populations, where individuals can be distinguished based on unique traits, provide robust and reliable estimates. In contrast, frameworks for unmarked populations offer flexible and increasingly adopted solutions across a wider range of species and ecological contexts, particularly where individual recognition is not feasible.

Although widely used globally, the application of advanced population estimation models remains limited in Türkiye. This study provides an evaluation of camera trap-based population estimation approaches, synthesizing current methodologies and assessing their applicability under different ecological conditions in Türkiye.

Integrating camera trap-based density models with traditional survey techniques has the potential to improve the accuracy and reliability of population estimates by reducing bias and increasing data efficiency. Such improvements can support more informed decision-making in wildlife management, particularly for game species, large predators, and conservation planning.

Keywords: Camera trapping, density estimation models, marked and unmarked populations, wildlife management.