Wild boar population control needs more than recreational hunting

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Abstract

This perspective addresses the challenges of wild boar (*Sus scrofa*) population control in two different scenarios: reactive management to control disease epidemics and proactive management of wild boar populations at larger geographic scales. Intense but silent wild boar culling can significantly contribute to local outbreak control. Larger wild boar free buffer zones might work in front-like disease expansion settings or to protect pig farming hotspots. However, long-term proactive management based only on hunting, predation and diseases cannot compensate the population growth favoured by increasing forest surface and irrigated crops and disappearing competition by livestock. Addressing these drivers would imply profound agricultural and environmental policy changes which often are beyond the reach of wildlife managers and animal health authorities.

Background

The Eurasian wild boar (*Sus scrofa*) is an opportunistic species with high reproductive potential, currently increasing and spreading throughout Eurasia and Northern Africa. In its native range, the wild boar plays social and ecological roles as ecosystem engineer, prey for large carnivores, and game species. Growing wild boar populations can impact conservation, including adverse effects on ground-dwelling vertebrates; affect human well-being through crop-damage and negative interactions with livestock farming, including infection transmission; and colonize urban areas, creating conflicts regarding road traffic and urban safety and enhancing zoonotic risk. Thus, high wild boar population densities often meet the requirements to be defined as overabundant (Gortázar & Fernández-de-Simón 2022).

These concerns generate the need to control wild boar populations. This is mostly addressed by increasing wild boar extraction by non-professional hunters through recreational hunting. However, while hunting may dampen wild boar population growth, it is generally not enough to curb the population trend of a species capable to increase even when 50% of the population is eliminated annually (Toïgo et al. 2008). This perspective addresses the challenges and limitations of wild boar population control in two different scenarios: (1) reactive management required to control disease epidemics, differentiating between (1A) complete depopulation in a core outbreak area where disease will already cause mortality and (1B) generating wild boar-free buffer zones to contain epidemics; and (2) proactive management of wild boar populations at larger geographic scales in the absence of epidemics.

1. Reactive wild boar control in disease outbreaks

While disease spread in wild boar populations has never been halted in front-like epidemic waves, management of focal outbreaks including containment, reducing environmental transmission, and depopulation might be successful as demonstrated in several point introductions of ASF (EFSA et al. 2022 and references therein). Wild boar culling in or close to the infected core zone can be challenging, especially when this zone includes urban habitats, and alternative methods suitable for such environments are preferred (Escobar-González et al. 2024).

<u>1A. Depopulation in core areas after disease-induced mortality</u>

When trying to contain a lethal disease after a focal outbreak, recreative hunting actions in the core area might facilitate wild boar movements or biosecurity breaches and consequent disease spread (Jo and Gortázar 2021). Instead, professional culling should be carried out after disease-induced mortality (EFSA et al. 2022). The intensity of the complementary culling effort depends on the disease-induced mortality, the remaining wild boar population density, and the area to be depopulated.

Silent methods, such as live trapping followed by culling, snipers with thermal imaging and silencers, or even trained bow-hunters should be preferred to avoid wild boar disturbance and the probability of individuals existing the core area as much as possible, either if it is completely fenced or not. The successful experiences in previous ASF outbreaks demonstrated that intense, local, silent wild boar culling can significantly contribute to outbreak control.

<u>1B. Generating wild boar free zones to contain epidemics</u>

The mixed disease plus culling depopulation of the core area described in 1A must be completed with wild boar depopulation in areas at risk surrounding the infected zones (the so-called buffer or white zones). This has been regularly applied around point introductions in Europe and modelling suggests that such zones might also work in front-like disease expansion settings (EFSA et al. 2022). Depending on habitat characteristics, 8-20 km-wide peripheral/surrounding depopulation zones should be effective to prevent infected individuals exiting a risk zone (Wielgus et al. 2025). Wild boar-free zones might also be desirable to protect pig farming hotspots, especially in regions with prevailing open-air farming systems.

However, culling all or almost all wild boar in a large area represents a formidable challenge, accounting also for the fact that in these buffer zones no significant disease-induced mortality is supposed to occur. For instance, a 10 km-wide white zone surrounding a 20 km radius risk zone would affect 1570 km^2. Since wild boar density in most of continental Europe ranges between 3 and 10 individuals/km^2, this implies culling between 5250 and 15700 wild boars in a relatively short time. Should the culling effort be prolonged over time because of logistical of practical constraints, an even higher number of wild boars should be eliminated given the capacity of wild boar populations to respond to intense harvest through reproduction and immigration (Toïgo et al. 2008). Furthermore, the depopulated areas need to be maintained, possibly by combining further culling with fencing. Sustaining such an effort would possibly imply engaging recreational hunters as a necessary but probably not sufficient requirement.

2. Proactive management of wild boar populations at large geographic scales

The two scenarios described above represent smaller or larger local depopulation efforts reactive to epidemics. However, the issues and risks generated by overabundant wild boar populations exist also in absence of epidemics and require long-term action at a large, eventually country-wide scale. At such a large scale, wild boar population size is not only driven by mortality, but also by habitat quality including forest surface, food resources, competitors, and anthropisation (González-Crespo et al. 2018). Like in any wild mammal, wild boar population size is essentially driven by the balance between mortality (top-down regulation) and recruitment (bottom-up regulation). Mortality is caused by (1) hunting; (2) predation; and (3) diseases, while recruitment (defined by reproduction and juvenile survival) depends on (4) habitat quality, including forest surface and productivity; (5) access to anthropogenic food resources, including irrigated crops; and (6) resource competition from other species, including ruminant livestock.

Only subsistence hunting (Bragina et al. 2015) or highly lethal diseases such as ASF (EFSA et al. 2022) can increase wild boar mortality to the extent of causing significant and long-lasting population declines. By contrast, while recreative hunting contributes to dampening wild boar population growth, it does not reach the high (>60%) mortality rate needed to cause a population decline, and the same holds for large predators (Toïgo et al. 2008; Gortázar & Simón 2022). Moreover, the effect of mortality on wild boar population dynamics is not only quantitative but qualitative, i.e., it depends not only on the proportion eliminated but also on the sex and age-class composition of the hunting bag (González-Crespo et al. 2018).

Regarding recruitment, the Spanish situation is an illustrative example. According to the Ministry of Agriculture, between 1990 and 2022 the wooded area has grown by 34% and irrigated croplands by 24%, while sheep numbers declined by 43% (from 24 to 14 million) during the same period. The increase in food resources and refuge availability and the decrease of competitors explain that wild boar numbers keep growing, from a hunting harvest of 32,000 in 1985 to 450,000 in 2022, a 14-fold increase (Figure 1). Moreover, this increase in hunting harvest occurred despite a massive decline in hunter numbers (Gaspar et al. 2025).

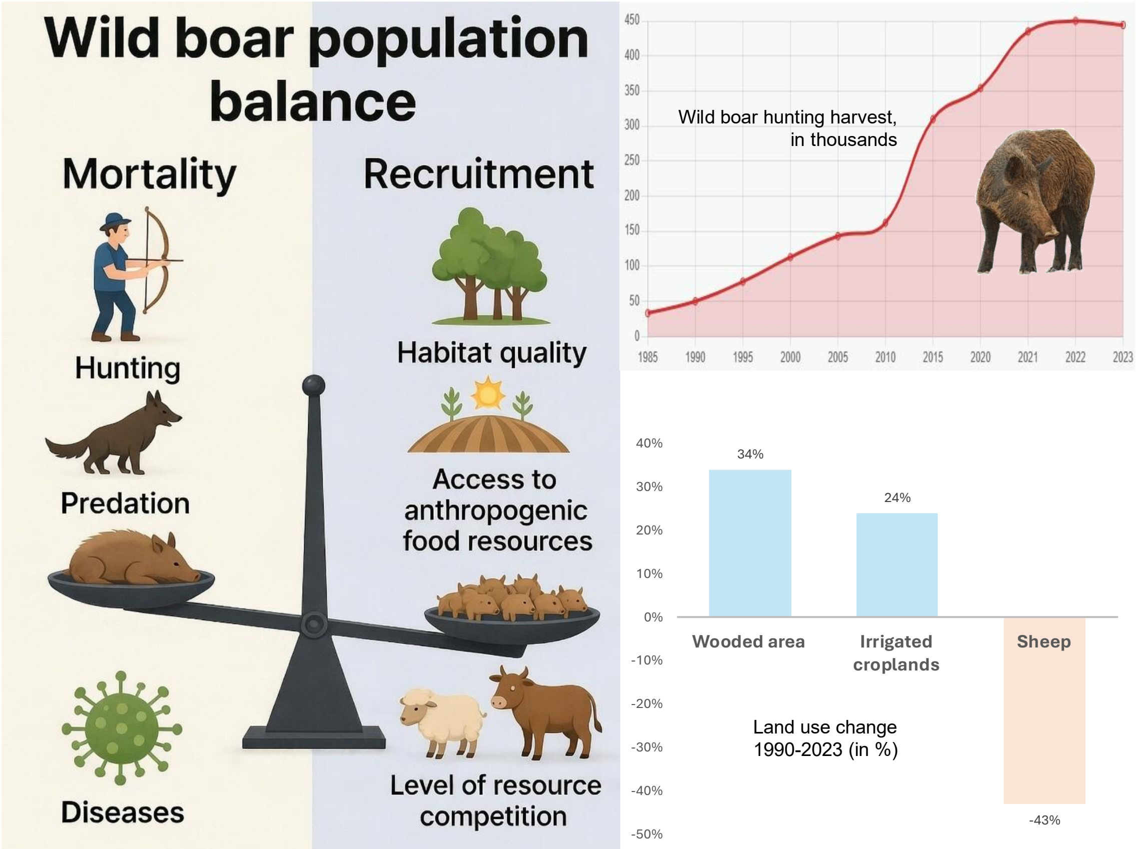

Figure 1.- Wild boar population dynamics are driven top-down by mortality and bottom-up by recruitment (Left panel). In Spain (as in most European countries), the imbalance between mortality and recruitment derived in a sustained increase of the annual wild boar hunting harvest, an indicator of abundance (Top right panel). At the same time, wooded areas and irrigated crops increased while the sheep population decreased (Low right panel). The left and the top right panels were AI-assisted.

Reducing overabundant wild boar populations would have positive consequences for conservation, road safety, agriculture, and animal and human health. However, facing that challenge by addressing just one of the six drivers, namely hunting, might not be enough to sustainably manage overabundant wild boar at large spatial scales. Moreover, boosting the effect of recreational hunting on wild boar dynamics faces regulatory, practical, and social challenges. In Spain, for instance, the potential of recreational hunting for wild boar population control is not fully exploited. Although there is variability between regions, the contribution of recreational wild boar hunting to population control is hampered by regulations on hunting seasons and on the number of hunters and hunting dogs participating in driven hunts, but locally also by self-imposed seasonal restrictions and hunting quotas that further limit its efficiency. There are also restrictions on hunting in protected natural areas, which may act as wild boar reserves. The weapons regulations and the natural heritage law limit the use of technologies that improve hunting efficiency such as sound suppressors, radio headphones or artificial light sources.

Additionally, the disposal of the hunted wild boars for commerce or self-consumption requires hygienically adequate slaughter areas, storage chambers, and game collection centres. Despite initiatives seeking to enhance the social value of venison, public administrations underestimate its potential and are delayed in providing the sector with innovative solutions. Social, cultural, and anthropologic factors also condition the performance of recreative hunting to control wild boar populations. Such factors range from hunter habituation to locally traditional hunting practices, reluctance to innovate and practice different hunting methods, and moral values to preserve game resources, to animal rights activism opposing hunting and complicating social and political support to wild boar population control. To overcome such issues it is essential to raise awareness among the hunting community of the need for wild boar population control, while promoting social support for hunting through specific communication policies.

Even if the efficiency and efficacy of hunting can be improved by targeting the most population-sensitive sex and age-classes and combining and refining hunting methods (González-Crespo et al. 2018, Escobar-González et al. 2024), reaching and maintaining a high mortality through recreational hunting is hardly feasible and would require an intense effort, difficult to maintain over time (Keuling et al. 2016). This should also include population monitoring to evaluate its effectiveness. Yet, addressing all six drivers of wild boar population dynamics is a mostly unexplored management option implying profound agricultural and environmental policy changes which often are beyond the reach of wildlife managers and animal health authorities. Integrated targeting of the factors involved both in wild boar mortality and recruitment is probably the only approach with a reasonable success probability. The current management, almost exclusively focused on mortality, is not capable to compensate the environmental and social factors favouring wild boar population growth. This would however demand a true science-based wildlife policy (Vicente et al. 2019).

Declarations

Conflict of interest

CG is the Editor-in-Chief, JLO is an Associate Editor, and DR is a Guest Editor of the thematic collection “Management of Wild Boar and Other Suids” of the journal EJWR.

Authors' contributions

CG and JLO prepared the manuscript, and NU and DR contributed to its review and editing.

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Use of AI

Figure 1 was created using the Grok (X) assistant.

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