

EFFECTS OF SHOOTING WITH HOUNDS ON SIZE OF RESTING RANGE OF WILD BOAR (*Sus scrofa* L.) GROUPS IN MEDITERRANEAN HABITAT

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Abstract: Resting sites of 8 Wild boar (*Sus scrofa* L.) groups were determined by radiotracking in the Montpellier garrigue. The locations of about 1,600 resting sites recorded during a 3 years period show that the animals have three seasonal ranges: May through August; September through December; January through April. There is a marked increase in area covered by the resting sites beginning in October, apparently induced by the onset of the hunting season, in mid-September. When the hunting season opens, mean distances between successive resting sites also increase, but decrease again after its closure. Analysis of these distances during the hunting season (September through December) revealed that movements were shorter (about 1,220 m) on days without shooting and longer (about 1,600 m) on days with driven game shooting. It confirms that shooting with hounds, a general practice in the South of France, is the main factor of Wild boar disturbance. Winter ranges (3,139 ha) were relatively large because of the wide-ranging movements of Wild boar groups returning from the areas where they had fled to, which were situated far from their initial summer ranges.

Keywords: Wild boar, *Sus scrofa*, Suidae, Home range, Hunting, Hounds, Resting sites.

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1. Introduction

Wild boar radio-tracking data and capture-recapture operations indicate that the Wild boar is a rather sedentary animal, even if some individuals undertake long movements (Andrzejewski & Jezierski, 1978; Boisaubert & Klein, 1984).

A comparison of various data obtained in France, however, indicates that in the North of the country Wild boar populations are extremely sedentary (Boisaubert & Klein, *op. cit.*; Vassant *et al.*, 1992) whereas they have more extensive home ranges in the South (Spitz *et al.*, 1984; Dardaillon, 1986; Dardaillon & Beugnon, 1987; Cargnelutti *et al.*, 1991).

Gerard *et al.* (1991) presented several hypotheses which might explain this phenomenon: hunting pressure, artificial diet feeding, population pressure, etc. According to Singer *et al.* (1981) and Belden and Pelton (1976), Wild boar sometimes makes true seasonal "migrations" in altitude to search for food.

Among all the factors we have analysed during our study, it seems that the main factor explaining the above-mentioned difference in behaviour are the conditions under which Wild boar shooting takes place (hunting methods and hunting pressure).

2. Study area

The study site is situated in the Montpellier garrigue area in the north-western part of the Hérault department (Fig. 1). It extends eastwards covering the garrigue in the Gard department, northwards over the Cévennes mountain massif and southwards over the wine-growing plain.

The vegetation in the study site is characteristic of the upper mesomediterranean stratum. The main woodland community in the garrigue is holly oak (*Quercus ilex*) representing 40% of the vegetation cover, followed by the treeless garrigue (16%), the pubescent oak *Quercus pubescens* (5%), and conifer *Pinus* sp. garrigues (6%), holly oak coppices (4%) and open or conifer-mixed hardwoods (8%). The other 21% of vegetation cover includes afforestations, pine groves and fallow lands (IFN, 1984).

Wild boar hunting is mostly a group sport involving pursuit with packs of big hounds. Each locality possesses 2 or 3 packs of hounds. Hunting is allowed on only three days a week (Wednesday, Saturday and Sunday), and on holidays, from mid-September to January first. About 20 hunters participate in each drive. The beaters cover some 200 to 400 ha of

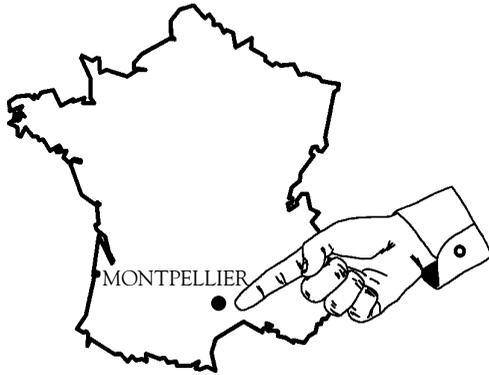


Figure 1 - Location of the study area.

ground per outing, the hunters being posted at strategic points, such as ridges, crossroads etc.

3. Material and methods

3.1. Capture

The animals were captured in mobile box traps (2 m x 1 m x 1 m) (Jullien *et al.*, 1988) after several days of observation. This allowed us to define the hierarchical position of each individual within the group. When possible, the sow and all her young were captured together (Fournier *et al.*, 1993). Sows were equipped with a transmitter collar of the Pulsar 2001 (146-148 MHz) type.

The data presented here concern 8 family groups averaging 9 individuals. Each group was monitored for a 5 to 18 months during 3 consecutive years (1990 to 1992).

3.2. Radio-tracking

The data analysed represent daily locations that were made when animals were on their diurnal resting site. A minimum of 3 bearings were taken from a vehicle equipped with a Yaesu (FT 290 RII) receiver linked to a directional 7 stranded Tonna antenna. The Lambert bearings were then calculated with the help of the LOCATE II computer programme.

In the present study two types of data are analysed:

- "area of resting range", which is the surface englobed by the resting sites, as measured by the convex-polygon method and calculated using RANGE II;

- "distance between two successive resting sites", which is the shortest distance between the resting sites of two consecutive days. This distance is not the total distance over which

the active Wild boar moved.

4. Results

Changes in resting polygon size between the non-shooting period (January through August) and the shooting season (September through December) are indicated for each Wild boar group in table 1.

The mean resting polygon size increased from 1,390 ha to 5,139 ha, which, according to the sign test ($P = 0.0039$ - Dagnelie, 1970) is highly significant. In fact, the increase was significant as soon as the hunting season started ($P = 0.035$) and extremely marked in October ($P = 0.004$) (Tab. 2).

Immediately after closure of the hunting season, area of resting ranges decreased. However, the number of collar-marked sows that were still alive ($n = 3$) was too small to qualify this decrease as significant.

Table 3 also indicates that the mean distances between successive resting sites were significantly larger during the hunting period. These movements decreased immediately after the hunting season (Tab. 2).

A comparison of the mean distances between resting sites on days without driven Wild boar shooting (1,217 m) and with driven shooting (1,598 m) over three hunting seasons shows a highly significant increase ($P = 0.002$) (Tab. 4). These results confirm the significant change in Wild boar behaviour during the hunting period.

5. Discussion

The present study indicates that Wild boar shooting with hounds is the main disturbance factor inducing changes in behaviour of Wild boar groups.

In fact, all animals react very rapidly to this type of shooting by increased mobility. The study of the size of resting ranges shows, however, that they have two types of reactions, according to the hunting pressure the group is subjected to.

- When the animals are frequently forced off their resting site, and this was the case for 6 out of 8 Wild boar groups, they will finally leave their summer range in search of more tranquil ranges. According to Jullien *et al.* (1991), in the Arc-en-Barrois forest, in 15 cases, 47% of the sows left their home range after a single drive hunt, moving on average 1,800 m. In our more closed and uninterrupted environment, Wild boar groups left their territories only after being disturbed several times within a rather

Table 1: Comparison of Wild boar resting range sizes between hunting and non-hunting season (P = 0.0039; sign test).

WILD BOAR GROUP N°	JANUARY - AUGUST (outside hunting season) (ha)	SEPTEMBER - DECEMBER (hunting season) (ha)
1	422 (n=87)	2036 (n=52)
2	5965 (n=212)	15440 (n=155)
3	3192 (n=135)	6213 (n=39)
4	281 (n=43)	6068 (n=102)
5	360 (n=92)	497 (n=92)
6	194 (n=16)	4785 (n=90)
7	139 (n=24)	4616 (n=86)
8	569 (n=256)	859 (n=110)
MEAN	1390 (n=865)	5139 (n=726)

short period (more than 3 disturbances per fortnight). If during their wanderings they find a quiet spot, they may stay there a few days or a few months until the next incident.

The case of Wild boar group n°2 shows that in mid-December, after one and a half month of roaming (Fig. 2), it settled, found a quiet sector, 15 km from its initial range, where it stayed throughout the month of January (Fig. 3). After a few tentative return movements, it reoccupied its former range definitively in April. Mauget *et al.* (1984) indicate that this phenomenon has been observed before by Spitz (pers. comm.) in two individuals (one male and one female) in the Grésigne forest, where drives with hounds took place two days per week.

Depending on the amount of disturbance, the increase in size of resting range during the hunting period may thus be important. All sows

that escaped shooting came back in March or April. For the Wild boar groups that we studied, three seasonal resting ranges can be defined, with the following average areas (6 Wild boar groups per season):

May-August	September-December	January-April
255 ha	6,626 ha	4,511 ha
n = 241	n = 589	n = 196

- If hunting pressure on the groups is less important, they will stay on their range, but nevertheless increase their movements. In this case, there is no displacement, but rather an increase in range size (Fig. 4) (average surface area of range for 2 groups).

May-August	September-December	January-April
203 ha	678 ha	394 ha
n = 213	n = 219	n = 110

Table 2: Monthly changes in mean resting range sizes (ha) and mean distances (m) between successive diurnal resting sites for 8 Wild boar groups (p; sign test).

MONTH	J	F	M	A	M	J	J	A	S	O	N	D
MEAN AREA (ha) OF RESTING RANGE	539	517	1670	291	80	139	260	134	365*	1274**	1813	2378
MEAN DISTANCE (m) BETWEEN RESTING SITES	523	734	691	649	446	665	891	729	997	1279	1391	1589
NUMBER OF WILD BOAR GROUPS	3	3	3	3	3	5	4	8	8	8	7	7
NUMBER OF RESTING SITES	18	60	81	87	81	119	97	170	219	191	138	121

* P < 0.035 (Aug. —> Sept.)

** P < 0.004 (Sept. —> Oct.)

Table 3: Comparison of mean distances (m) between successive Wild boar diurnal resting sites in hunting and non-hunting seasons ($P = 0.0039$; sign test).

WILD BOAR GROUP	OUTSIDE HUNTING	HUNTING
N°	SEASON (m)	SEASON (m)
1	1079 (n=80)	1443 (n=43)
2	622 (n=180)	1430 (n=137)
3	638 (n=117)	2364 (n=32)
4	1184 (n=41)	1214 (n=90)
5	892 (n=81)	895 (n=86)
6	704 (n=21)	1566 (n=76)
7	735 (n=11)	1599 (n=80)
8	558 (n=233)	819 (n=106)
MEAN	801 (n=764)	1416 (n=650)

Table 4: Effect of driven Wild boar shooting on mean distances between successive diurnal resting sites moved over by Wild boar groups from September to December ($P = 0.002$; sign test).

WILD BOAR GROUP N°	DAYS WITHOUT HUNTING (m)	DAYS WITH HUNTING (m)
1	1403 (n=26)	1503 (n=17)
2 (1991)	1389 (n=57)	1445 (n=48)
2 (1992)	677 (n=22)	1867 (n=9)
3	2010 (n=18)	2632 (n=15)
4	1090 (n=51)	1375 (n=39)
5	795 (n=51)	1040 (n=34)
6	1508 (n=45)	1648 (n=31)
7	1493 (n=47)	1750 (n=33)
8	591 (n=58)	1126 (n=48)
MEAN	1217 (n=375)	1598 (n=274)

It is interesting to note that the size of summer resting ranges of these 2 groups are almost the same and, above all, very small.

With regard to summer, our results agree with those of Kurz and Marchinton (1972), Mauget (1980), Douaud (1983), Spitz (1992), Boitani *et al.* (1992) etc., who found home ranges between 200 and 500 ha.

For autumn and winter ranges, only Janeau and Spitz's work (1984) in the Grésigne area can be compared to our study, because of the similar form of boar hunting conducted on the study sites. In fact, these authors indicated 4,000 to 6,000 ha annual home ranges for sows.

6. Conclusion

By daily monitoring of the 8 Wild boar groups, we were able to show that the hunting pressure in a Mediterranean environment with driven game shooting with hounds is a significant factor of seasonal modification in Wild boar behaviour.

The increase in areas of resting ranges and in the distances between two successive resting sites is significant from the opening of the hunting season and most marked in October after 3 to 4 weeks of shooting. Two behaviour patterns were observed:

- the animals subjected to a high hunting pressure left their original territory but returned later.

- with little disturbance, the animals stayed on their original range, although its size increased. The groups which temporarily altered their activity patterns and moved towards quieter ranges, all returned to their territory of origin for farrowing. Hunting pressure and the tendency to return to the same seasonal ranges observed in subadult or adult females is essential information for wise management of Wild boar populations.

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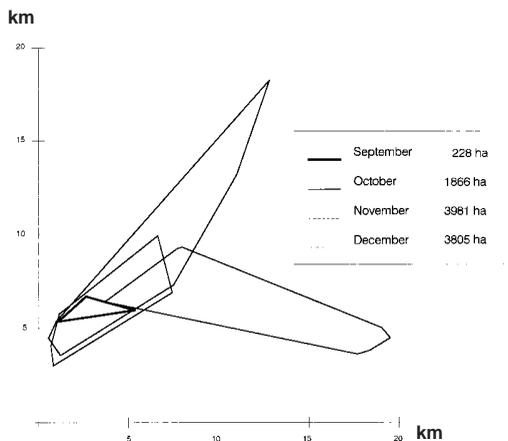


Figure 2 - Changes in monthly resting range size (ha) and configuration for Wild boar group n° 2, during the hunting season.

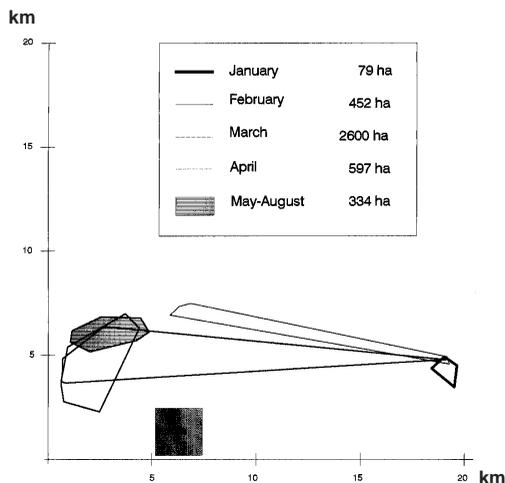


Figure 3 - Changes in monthly resting range size (ha) and configuration for Wild boar group n° 2, outside the hunting season.

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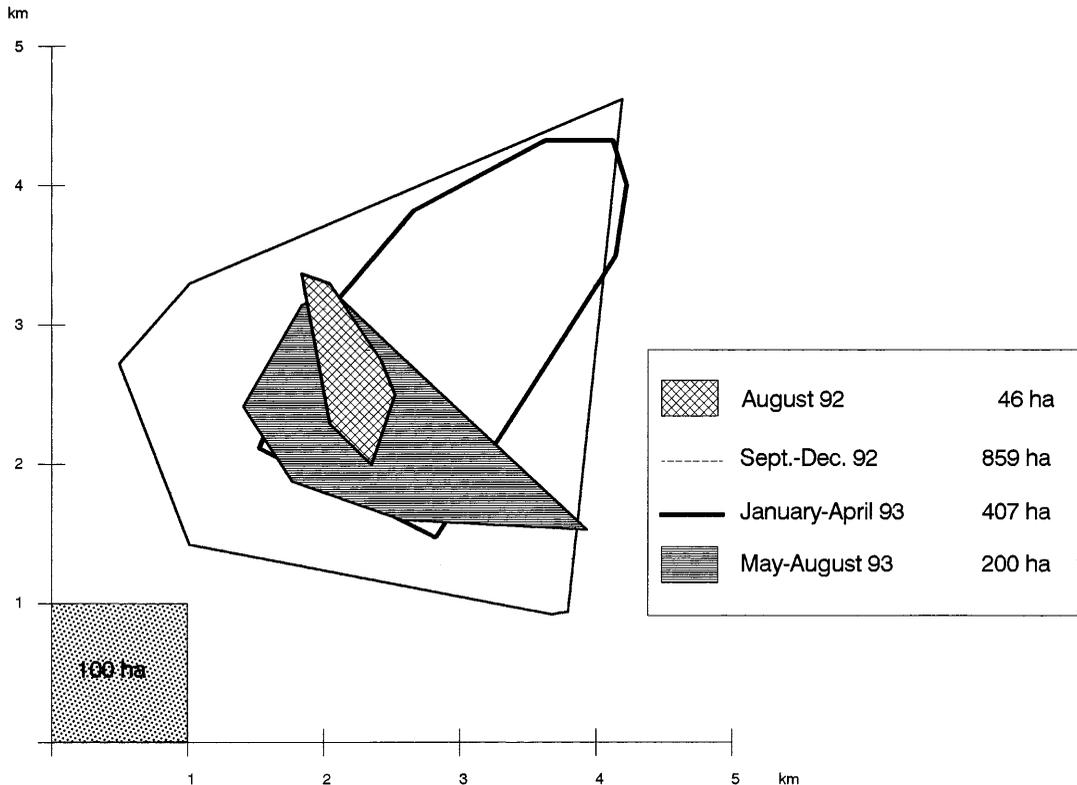


Figure 4 - Changes in seasonal resting range size (ha) and configuration for Wild boar group n° 8.

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