Encounters with common warthogs along the B1 highway in north-central Namibia

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Introduction

Common warthog (*Phacochoerus africanus*) occur throughout Namibia except the far south, southeast, arid west (i.e., Namib Desert), and the densely populated north-central communal areas. Their Namibian conservation and legal status lists warthog as "secure and huntable game" (Griffin & Coetzee, 2005). Although seemingly ubiquitous, often alongside major roads where they are viewed as a nuisance to drivers, little has been published regarding their local ecology and/or numbers.

During 2013, Namibia experienced a widespread drought with warthog lured to road verges with better grazing. Their numbers seemed astounding at times – e.g. 391 individuals on a 146 km stretch of the B1 highway between Okahandja and Otjiwarongo in central Namibia on 7 October 2013 between 17h00 and 19h00 (this study). Mean average annual rainfall for this area varies from 300 mm in the south (Okahandja area) to 450 mm in the north (Otjiwarongo area) mainly between January and April. Coefficient of variation in rainfall of 30-40% (Mendelsohn et al., 2002) mainly between January and April. During the 2012/2013 rainy season these areas received between 100-200 mm.

Whilst travelling this route for other purposes, I kept note of warthog numbers along this section of the B1 Highway, including anthropomorphic activities potentially affecting warthog distribution. This note highlights some of these findings and although not attempted as a formal scientific study it does raise interesting questions.

Methods

The Okahandja and Otjiwarongo route is termed the B1 Highway and is a tarmac road linking the north of Namibia to the capital – Windhoek – and the rest of the country.

Warthog were counted, group size documented, and groups classified as adults, sub-adults and juveniles (although not sexed).

This section of the B1 highway is freehold (commercial) cattle farming and fenced accordingly. A number of game farms with game proof fencing – jumping game – are also located along this route. The fences were classified as cattle fencing (either side); game fencing (game proof fencing either side), and mixed fencing (cattle and/or game proof fencing).

As grass is often cut and baled by some farmers alongside the road the habitat was classified as cut, uncut, and road verge. Road verge was the ca. 2 m strip alongside the tarmac road. This was usually with short grass and maintained by local authorities to increase visibility to prevent wildlife related accidents.

Data were collected on 8, 14 and 16 July; 8 and 9 September; 7 and 10 October, and 9 and 11 December 2013. The data were grouped as winter (July), spring (September and October), and summer (December). Observations were conducted either during early morning (07:00-09:00 h) or late afternoon (17:00-19:00 h).

The road strip count formula of Bothma (1989) was used to determine warthog numbers – i.e. N = Nh/h, where N = number of warthog estimated in area, n = number of warthog on the strip, H =

surface area, and h = surface area of the counted strip.
Strip length was 146 km and the strip width was 100 m. Strip width includes tarmac, road verge, boundary between road, and fence and visible area into veld. As the area is bush thickened (encroached), the strip width is small. The speed travelled was 120 km/h.
Mean daily foraging distance for the common warthog in the Eastern Cape, South Africa, is 1,690 ± 347.5 m (Somers et al., 1994) while Clough & Hassam (1970) indicate 7 km as the distance travelled per day in the Queen Elizabeth National Park, Uganda. These are however not straight lines. To determine warthog numbers, I used the surface area (H) (which is usually the size of a farm/ranch) as an arbitrarily 2.5 km strip along the length of the tarmac as the distance warthog potentially travel to the roadside foraging area during a drought (i.e. 36,500 ha) and within the range of the above mentioned authors. The surface area of the strip (h) was 1,460 ha (i.e. 146 km x 100 m).

Results

The total number of warthog sightings during this study was 1,020 individuals in 534 groups or sounders. Adult warthog sightings increased from 68.1% of all warthogs sighted during winter (July) to 94.4% of all warthogs sighted during summer (December), while juveniles decreased from 18.9% during winter to 0 during summer (Figure 1).

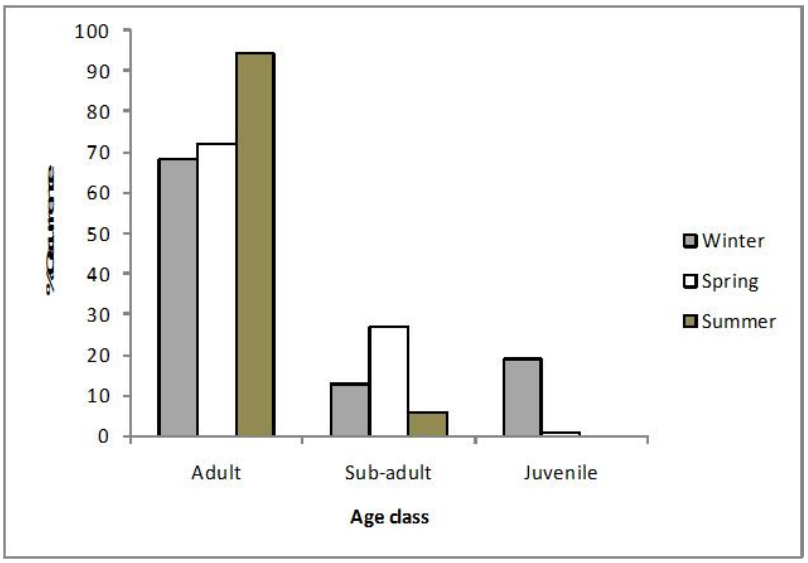

Fig. 1. Warthog age classes during winter, spring and summer (n = 1,020 individuals in 534 sounders).

Solitary individuals accounted for 46.4% of all sightings with the highest during summer (73.8%), while during winter and spring they accounted for 31.3% and 43.1% of the warthogs sighted, respectively (Figure 2).

Mean group size varied between 2.2 individuals during winter (July 2013) to 1.3 individuals during summer (December 2013) (Table 1). The largest group was 12 individuals observed on 7 October 2013 at 18h24 (10 adults and 2 sub-adults).

The majority of the warthog were seen in association with cattle farming practices – i.e. cattle fences on either side of the road or on one side – compared to purely game farming practices (Figure 3). There is a highly significant differences between warthog associated with cattle fences compared to game fences (p=0.006), cattle fences compared to mixed fences (p=0.19), and game fences compared to mixed fences (p=0.073) during spring than during winter and summer.

Warthog spent more time on areas that had been cut during spring (64.5%) and on uncut areas during winter (65.35) and summer (59.4%) (Figures 4 to 6). Time spent on the road verge – i.e. within 2 m of the tarmac on short grass – increased from 15.4% during winter to 24.5% during

spring and 34.3% during summer. There is a highly significant difference between warthog associated with cut areas compared to uncut areas (p=0.003) during spring (September/October), and no significant differences during winter and summer.

Density estimates were highest during spring (September/October) with 4.05 warthog/km followed by 1.95 warthog/km during July and lowest during December with 0.97 warthog/km.

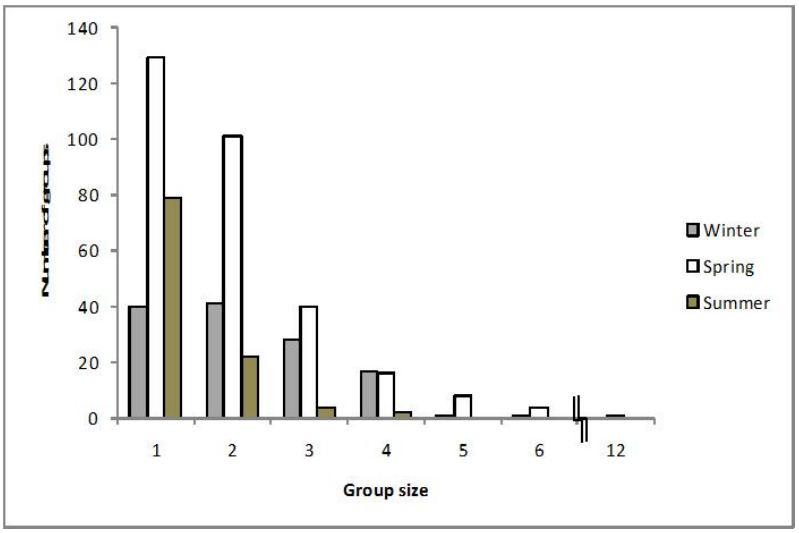

Fig. 2. Distribution of group size during winter (n = 128 sounders), spring (n = 299 sounders) and summer (n = 107 sounders).

Table 1 Mean group size of warthogs during winter, spring and summer in central Namibia (n = 534 sounders).

	Mean group size	SE	Range	n
July	2.22	0.09	1 to 6	128
Sep/Oct	1.98	0.07	1 to 12	299
Dec	1.33	0.06	1 to 4	107

Table 2 indicates warthog numbers using the road strip count formula by Bothma (1989) – i.e. N = Nh/h (See methods). The maximum number of warthog in the 2.5 km strip along the route is 14,800 during spring (September/October) and 1,075 during summer (December).

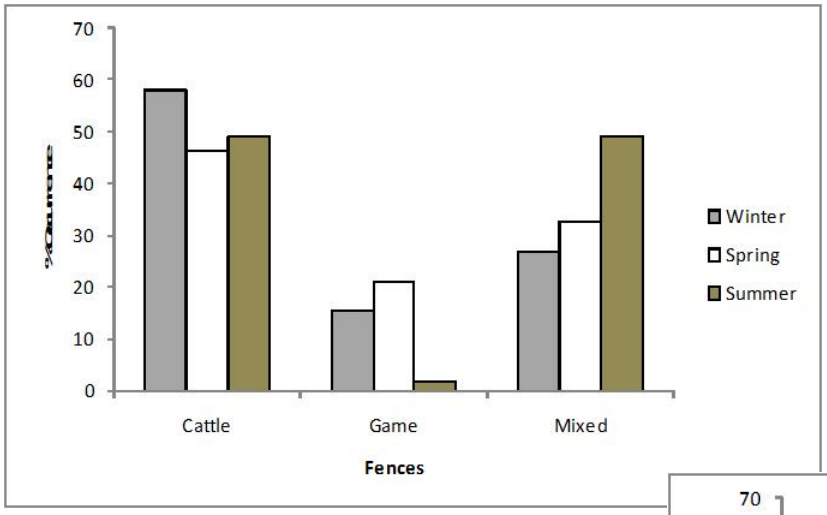

Fig. 3. Warthog association with land use – i.e. fencing – in central Namibia.

Discussion

The major decrease in juvenile sightings from 54 individuals during winter (July) to 6 individuals during spring (September/October) – i.e. 2-3 months later – and none during summer (December) are probably due to the majority having succumbed as a result of the drought and associated decline in female body condition during this period

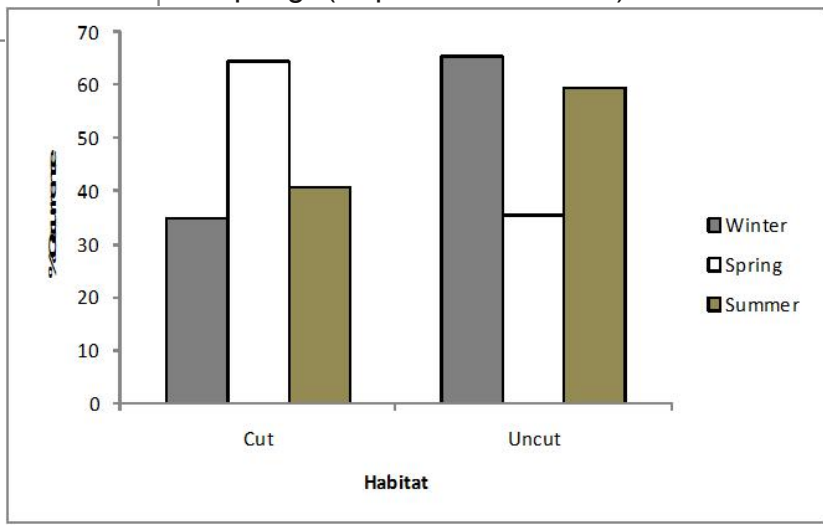

Fig. 4. Warthog association with habitat in central Namibia.

Fig. 5. Warthog grazing on cut area adjacent a game proof fence.

(pers. obs.) rather than them moving into the next age class. Mason (1990) found drought-associated mortality to be between 80-90% in KwaZulu-Natal in South Africa. Bradley (1968) reports a mortality rate of 50% during the first 6 months of life in Kenya. Having probably been born during early 2013, the overall dry conditions experienced in central Namibia during the rainy season probably led to considerable mortality among juvenile warthog with limited recruitment.

Group include up to 16 warthogs, but typically number 5 or less (Estes, 1995). This is similar to the findings of this study. Sightings of solitary warthog during this study accounted for 46.4% of all sightings (n = 534 sounders). This is similar to the Eastern Cape (Somers et al. 1995) with 45% although differs from Zimbabwe with 27% (Cumming, 1975). Groups of 1 or 2 individuals accounted for 77.2% of all sightings with only one group having more than 6 individuals. Mean group size of 2.22 during winter (July) is similar to that by Somers et al. (1995) in the Eastern Cape (2.2), but less than the 3.3 given by Mason (1982) in KwaZulu-Natal in South Africa. Mean group sizes of 1.33 and 1.98 during summer (December) and spring (September/October) is less, but probably as a result of the drought conditions experienced during this study.

Fig. 6. Uncut area with cattle fence in the background. Note the road verge with short grass.

The strong association of warthog with cattle farming rather than purely game farming is interesting. This is probably a result of trophy hunting on game farms, especially during winter, or actively being targeted as “problem animals” due to their burrowing under game proof fences allowing access to potential predators (e.g. cheetah, leopard) that in turn target high value trophy species (e.g. roan, sable, etc.). This would, however, have to be investigated as cattle farmers also shoot warthog, albeit throughout the year, for staff rations. Warthog could also be

Table 2. Warthog numbers using an arbitrary strip along the B1 highway in central Namibia.

	N	n	H (ha)	h (ha)
July	7,125	285	36,500	1,460
Sep/Oct	14,800	592		
Dec	1,075	143		

favouring cattle farms because of the mineral licks (and supplementary feed) farmers supply their cattle during the dry season – i.e. winter months. Warthog scavenge around troughs during this period (pers. obs.). Another reason could be the difference in veld condition of game farms versus cattle farms with the first mentioned often visibly more over-grazed than the latter (pers. obs.). This is probably due to poor management practices.

The reason warthog favour cut areas to uncut areas, especially during spring (September/October), can probably be ascribed to the drought conditions with "better" forage associated with the cut areas as this typically stimulates regrowth. As warthog favour short fresh green grass (Mason, 1982; Skinner & Chimimba, 2005) the cut areas also serve as an attraction during adverse conditions. This can be problematic as wildlife associated vehicle accidents – e.g. warthog and kudu – are rife in Namibia. The cost-benefit of short grass attracting warthog but increasing visibility along a highway is weighed. Grass cutting is viewed as diversification and an addition source of income to many farmers in this area. Denying them this opportunity would also seem unreasonable. Road signs indicating warthog as a potential threat (See Figure 7) do not seem to be effective in reducing accidents, but then neither do the speed limit signs. As warthog densities along this section of the B1 highway increase during spring, especially on cut grass along cattle fences, increased awareness and vigilance should be encouraged to avoid warthog related accidents.

Fig. 7. Warthog warning sign used along roads in Namibia. Note the short road verge and cut area towards the fence which is obscured by dense Acacia bush.

The maximum population estimates of 14,800 individuals (or 1/2.47 ha) during spring (September/October), 7,125 individuals (or 1/5.12 ha) during winter (July), and 1,075 individuals

(or 1/34 ha) during summer (December) are probably over-estimates due to the high number of animals lured to the roadside during this dry period. Stein et al. (2013) estimated warthog density as 2/km² on farmland in the Otjiwarongo area. Using this estimate, a total of 1,460 individuals (or 1/25 ha) occur in the area. Although home range was not determined during this study, this varies between 23.8±7.8 ha in the Eastern Cape (Somers et al., 1994) and 176.1±91.5 ha in Zimbabwe and KwaZulu Natal (Cumming, 1975; Mason, 1982). Home ranges overlap widely. Cumming (1975) found that home ranges tend to be larger and population densities lower during droughts. Using the maximum density of 4.05 warthog/km to estimate maximum numbers result in 591.3 warthog over the 146 km (the actual highest count was 391 individuals). Determining wildlife numbers is complex and tricky, with trend typically a rather more cost-effective and time-effective tool for management than actual numbers.

Using the B1 highway, and other similar routes, to determine trends in warthog densities during different seasons and/or annually would be an easy way to assist farmers, managers, and authorities on determining the effect of rainfall as well harvesting quotas for hunting purposes without negatively affecting the population dynamics of the species.

Acknowledgements

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