

## NOTES

ACTIVITY PATTERNS OF WILD BOARS (*SUS SCROFA*) IN SOUTHERN TEXAS

TYLER A. CAMPBELL\* AND DAVID B. LONG

*United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services, National Wildlife Research Center, Texas A&M University-Kingsville, Kingsville, TX 78363*

\*Correspondent: [tyler.a.campbell@aphis.usda.gov](mailto:tyler.a.campbell@aphis.usda.gov)

**ABSTRACT**—Wild boars (*Sus scrofa*) are increasing in abundance and geographic distribution throughout North America. Our objectives were to determine daily and hourly activity patterns. We placed global-positioning-system collars on 25 wild boars from two sites in southern Texas. Wild boars at both sites displayed highly nocturnal activity patterns, and during the dormant and early growing season, activity increased with rising temperatures.

**RESUMEN**—Los jabalís (*Sus scrofa*) están incrementando su abundancia y distribución geográfica en toda Norteamérica. Nuestros objetivos fueron determinar los patrones de actividad por día y por hora. Colocamos collares con sistemas de posicionamiento global en 25 jabalís en dos sitios al sur de Texas. Jabalís en ambos sitios mostraron patrones de alta actividad nocturna, y durante la temporada de inactividad y crecimiento temprano, la actividad se incrementó con el aumento de la temperatura.

Free-ranging *Sus scrofa*, also known as wild boars (Wilson and Reeder, 2005), are increasing in abundance and geographic distribution throughout North America; established populations occur in the southwestern states of Arizona, California, Colorado, Kansas, Nevada, New Mexico, Oklahoma, and Texas (National Feral Swine Mapping System, <http://feralswinemap.org>). Information on their natural history, such as daily and seasonal activity patterns, is not available from much of this region and there is evidence that these patterns may vary by region. For example, in Australia, wild boars primarily are nocturnal (Saunders and Kay, 1991; Caley, 1997) and, in Tennessee and Texas, they primarily are crepuscular (Singer et al., 1981; Ilse and Hellgren, 1995). However, in South Carolina, wild boars shifted periods of activity from primarily diurnal during autumn, winter, and spring to primarily nocturnal during summer (Kurz and Marchinton, 1972). Plasticity in activity patterns has been noted in populations of wild boars in Italy (Boitani et al., 1994).

Limited evidence suggests that activity patterns of wild boars may be influenced by temperature in parts of eastern and southern Texas (Wyckoff et al., 2006). However, this relationship has not been

demonstrated. Our objectives were to determine daily and hourly activity patterns and to evaluate the hypothesis that temperature influences activity of wild boars in southern Texas.

Our study was conducted in mixed-shrub rangelands in Kleberg and San Patricio counties, Texas. Our study site in Kleberg County was ca. 3,700 ha, it was on the Laureles Division of the King Ranch (27°29'N, 97°37'W), and it received an average of 67 cm of rainfall annually. Our study site in San Patricio County was ca. 3,100 ha, it was on the Rob and Bessie Welder Wildlife Foundation (28°06'N, 97°22'W), and it received an average of 79 cm of rainfall annually.

We trapped wild boars in Kleberg County during January 2008 and in San Patricio County during May 2008 using box traps. We restrained, determined sex, and placed ear-tags in all wild boars captured. We placed global-positioning-system (GPS) collars (GPS 3300S, Lotek Wireless, Inc., Newmarket, Ontario, Canada) on animals  $\geq 82$  kg. Our procedures were approved by the National Wildlife Research Center Institutional Animal Care and Use Committee (QA-1528).

We placed collars on wild boars for  $\leq 15$  weeks and programmed collars to store locations at

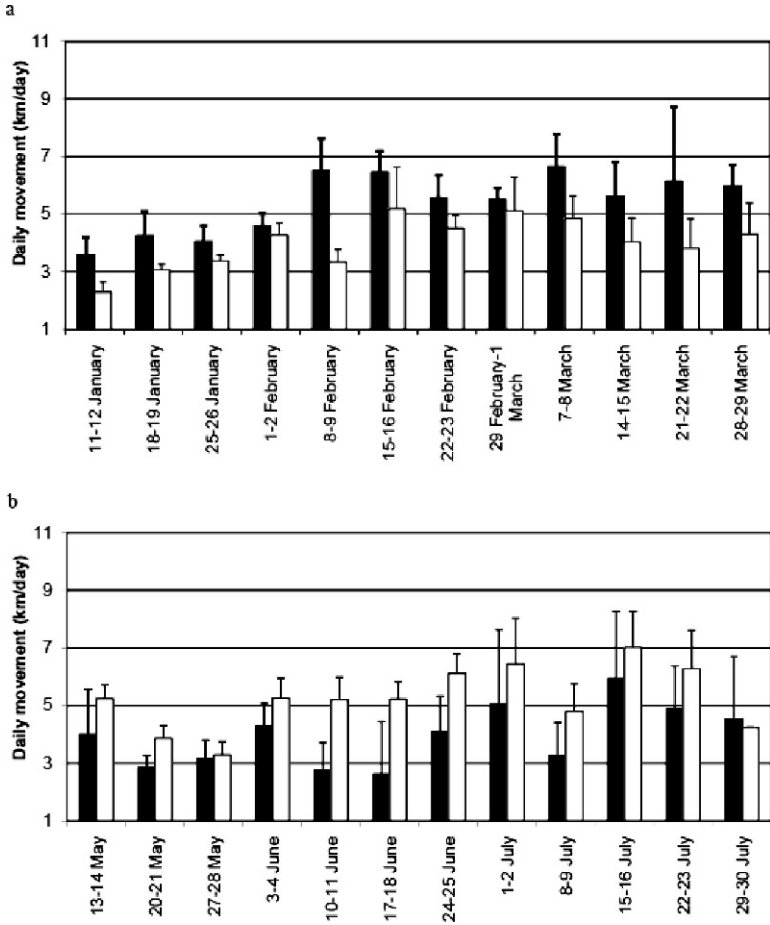


FIG. 1—Average ( $\pm$  SE) daily movement (km/day) of male (closed bars) and female (open bars) wild boars (*Sus scrofa*) in (a) Kleberg and (b) San Patricio counties, Texas, 2008.

15-min intervals on 2 consecutive days during each week. We recovered collars by a radio-controlled drop-off device in mid-April 2008 in Kleberg County and mid-August 2008 in San Patricio County. We overlaid data onto coverage maps of the study areas using ARCVIEW (Environmental Systems Research Institute, 1999). We recorded high and low temperatures daily from study sites during the time that collars were deployed. We generated a daily temperature index by calculating the mean of the daily high and low temperatures.

As a conservative measure of activity, we determined rates of movement from sequential locations of wild boars. We used the Animal Movement Extension of ARCVIEW to calculate distance between sequential locations. We calculated mean distance moved per hour. We report

mean daily movement (km/day) and mean hourly movement (m/h) by sex for study sites. We performed linear regression (PROC REG; SAS Institute, Inc., Cary, North Carolina) with index of mean daily temperature as an independent variable and mean daily distance moved per hour as a dependent variable by study site.

We trapped and ear-tagged 76 wild boars in Kleberg County and 67 in San Patricio County. We placed collars on nine males and four females in Kleberg County and five males and seven females in San Patricio. We downloaded 24,065 GPS locations from collars in Kleberg County and 16,041 locations from collars in San Patricio County. In Kleberg County, males tended to move greater distances per day than females; whereas in San Patricio County, females tended to move greater distances per day than males (Fig. 1).

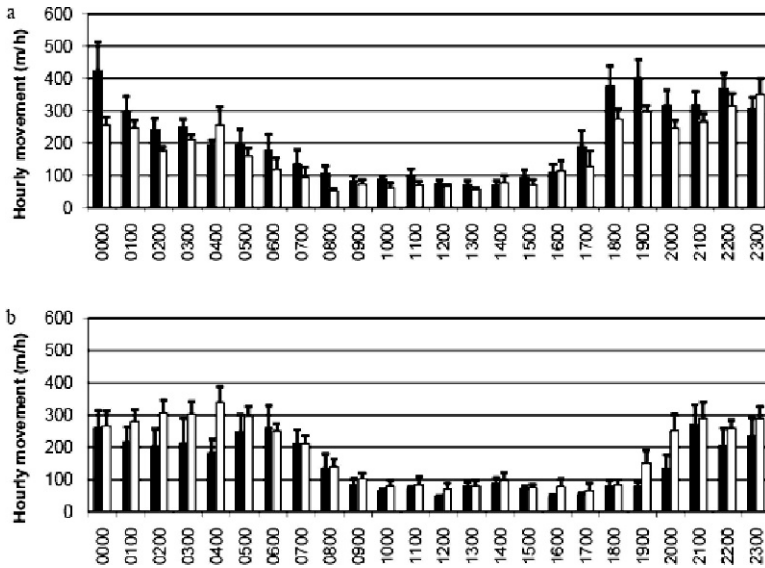


FIG. 2—Average ( $\pm$  SE) hourly movement (m/h) of male (closed bars) and female (open bars) wild boars (*Sus scrofa*) in (a) Kleberg (January–March) and (b) San Patricio (May–July) counties, Texas, 2008.

Additionally, no pattern was evident relative to daily activity over time (Fig. 1). Hourly movements in both study sites suggested nocturnal activity (Fig. 2). Activity in Kleberg County increased with rising temperatures ( $n = 14$ ,  $y = 146.37 + 3.403x$ ,  $r^2 = 0.262$ ,  $P = 0.06$ ). However, we did not observe this in San Patricio County, where we detected no relationship between activity and temperature ( $n = 15$ ,  $y = -66.97 + 7.214x$ ,  $r^2 = 0.076$ ,  $P = 0.32$ ).

With our  $\leq 15$ -week period of GPS monitoring on each study site, we detected no within-season trend in activity. Rates of movement were relatively constant throughout our assessment on each site. Our observations in Kleberg County that males generally moved greater distances per day than females indicated that males were more active than females, which is consistent with observations of wild boars in Australia (Saunders and Kay, 1991; Caley, 1997). However, our data from San Patricio County were surprising and suggested there was less activity by males than by females. In fact, mean daily movement of ca. 7 km/day for females during 15–16 July in San Patricio County was the greatest we observed at both sites and for both sexes. An explanation for this elevated activity by females in San Patricio County may involve differences in the reproductive cycle. For example, females in San Patricio County may have been raising young during our

study; thereby, displaying greater activity than solitary males (Sweeney et al., 2003).

Using telemetry techniques, previous work in Tennessee (Singer et al., 1981) and Australia (Dexter, 1996; Caley, 1997) reported wild boars to be primarily nocturnal. Our data for hourly movements concur with these findings; overall, wild boars in southern Texas appear to be nocturnal. Additionally, our observations in Kleberg County validate a previous report of nocturnal activity determined from visitation to scent stations within the county (Campbell and Long, 2008). Furthermore, we did not observe shifts in periods of activity (Kurz and Marchinton, 1972). In Kleberg County, peaks in activity for males and females occurred during 0000 and 2300 h, respectively. In San Patricio County, peaks in activity for males and females occurred during 2100 and 0400 h, respectively.

Our data related to temperature suggest that during the dormant and early growing season (January–March) wild boars increase activity during warmer periods. However, our data for summer (May–July) suggest no influence of temperature. This observation is counter to data (i.e., trapping success) reported from eastern and southern Texas (Wyckoff et al., 2006). We believe that reductions in trapping success were observed during summer because of availability of alternative forage associated with the growing season

and, therefore, not directly related to temperature. In fact, during summer droughts, we believe that trapping success can be increased above other times of the year by targeting trapping effort near sources of water (Webb et al., 2006).

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