The impact of wild pig hunting outfitters on pig populations across the Southeast.

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Wild pigs (*Sus scrofa)* are a non-native invasive species brought to the United States in the 1500s by Spanish explorers. In the United States, estimated damage to agriculture and other property attributable to wild pigs exceeds 1.5 billion dollars a year (Pimentel 2007). Wild pigs are habitat generalists. The combination of habitat availability, high fecundity rates, translocation by humans, dispersal from shooting preserves, and natural population expansion, has resulted in wild pig populations in 33 of 50 states (USDA 2018).

Wild pig in a wallow Photo: US FWS.gov

State and federal agencies actively discourage the translocation of live wild pigs through regulations. Hunting regulations are complex and confusing. Some states (e.g., TN and NC) have banned hunting of wild pigs to reduce the incentive for hunters to continue spreading wild pigs – although shooting on private land as a control operation is generally allowed. Tennessee offers a reward up to $3,500 for information leading to the conviction of persons moving and releasing live wild pigs within the state (TWRA 2018). Wild pigs can be shot on private property in several states such as North Carolina (NCWRC 2018) and Georgia (GA WRD 2018).

Wild pig damage to suburban yard Photo Credit: M. T. Mengak

Wild pigs may be the most abundant free-ranging nonnative ungulate in the United States. Despite widespread efforts to discourage movement of pigs and efforts to eradicate local populations, there exists a significant hunting culture surrounding wild pigs which includes not only personal recreational hunting but also preserve shooting businesses and guiding (hereafter called outfitters) that provide fee-based opportunities for shooting or hunting wild pigs.

The Southeastern United States holds the largest continuous distribution of wild pigs in the country (USDA 2018) and the greatest number of commercial hunting operations for wild pigs. Generally a commercial hunting operation includes a guided hunt on private property for a fee or a fee-based hunt inside a fence (or “high-fence”). To better understand the role of these businesses in wild pig hunting culture, we conducted a survey of commercial hunting operations. We defined “outfitter” as an operation which may include at least 1 individual who assists a hunter or client in the harvest of a wild pig.

Speaking with outfitters can provide wildlife professionals a better understanding of how many commercial hunting operations are active in the Southeastern United States and baseline data for comparing possible impacts (biological and economic) of future policies regarding wild pigs.

Methods

To determine the number of outfitters in 12 southeastern states: (West Virginia, Tennessee, Kentucky, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas) and two northern states (Ohio and Pennsylvania), we used the internet to obtain contact information for outfitters advertising wild pig hunting. Ohio and Pennsylvania were included in this study because USDA Wildlife Services personnel recommended obtaining data from these two states. The selection of states was arbitrary, and Texas and Oklahoma were excluded.

Contact information was obtained from the internet and local outdoor magazines. We randomly selected at least 20% of outfitters per state to call, however, multiple outfitters in the same county were not called until after we exhausted attempts to contact outfitters throughout the state in order to get an even distribution of outfitters. For states with ≤ 4 outfitters, we called at least one. To ensure outfitter responses were not biased toward higher harvest rates, outfitters were informed that this was a research activity and we were not potential hunting clients.

If the outfitter did not answer our call, we left a voice message and called the next outfitter on the list. If the phone number was disconnected, we assumed the outfitter was no longer in business and recorded this. Questions included: county of operation; number of pigs harvested per year; number of pigs seen per hunt; fence enclosure present (if yes - height of fence and percent area enclosed); total acreage hunted; total number of clients per year; hunting fees; if the land was personal, private, or leased; and, if the operation was a full- or part-time business for the operator. We calculated state statistics (e.g., means, standard deviation) only if we had at least 2 outfitters per state. All outfitter data was used to compute regional statistics.

Data analysis was conducted using SPSS (Version 25, IBM Corporation) software. For statistical tests, we accepted significance at the 5% probability level. The University of Georgia Human Subjects Office determined that this activity is not research involving human subjects (letter dated 22 Nov 2016; IRB ID #00004231).

Results

Distribution of outfitters

Internet searches proved to be the best way to gain access to contact information. One hundred fifty-four outfitters were identified across the 14 states via internet searches (**Figure 1**). Twenty-four outfitters were no longer in business. We contacted 122 outfitters; 37 (30.3%) were willing to take the phone survey, four (3.3%) did not want to participate in the survey, and 82 (67.2%) did not answer our call nor did they call back in response to our voice message (**Table 1)**. As a comparison, a search in the March-April 2018 issue of the magazine *Bugle* (Rocky Mountain Elk Foundation) produced a list of 208 elk and/or big game outfitters in the United States excluding Alaska.

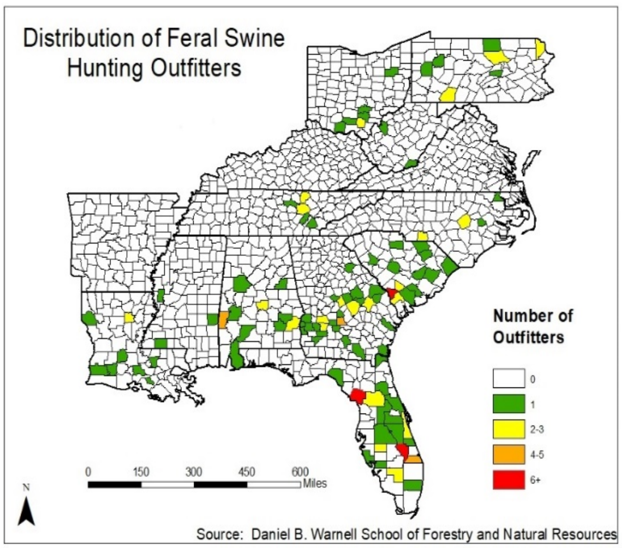

Figure 1. County level distribution of the 154 outfitters offering wild pig hunts in the 14 states we surveyed in February 2017.

Arkansas, Mississippi, and Ohio had only one outfitter per state willing to participate in our survey. Three states (KY, VA, WV) had no outfitters and were dropped from our survey (**Table 1**). Having few outfitters per state limits the conclusions that can be drawn on an individual state basis.

Average number of pigs harvested by state

The total number of pigs harvested by outfitters in our survey during 2016 was 16,216 (**Table 2**). Georgia and Florida reported the most harvested pigs with a combined total of 11,460 (70.7%) pigs harvested. States with very low harvest numbers are likely the result of few outfitters present in the state and few outfitters answering our phone call. For example, Florida had 36 advertised outfitters on the internet and Louisiana had three. With a limited number of outfitters to contact, it was difficult to obtain reliable harvest numbers for some states. Consequently, our results are likely an underestimate of wild pig harvest from this segment of the hunting community.

Table 1. The number of wild pig hunting outfitters we located in each state based on an internet search conducted in February 2017 and the number willing to participate in our phone survey.		
State	**Outfitters[1]**	**Participants[2]**
Alabama	17	4
Arkansas	2	1
Florida	36	7
Georgia	29	8
Kentucky	1	0
Louisiana	9	2
Mississippi	3	1
North Carolina	5	2
Ohio	6	1
Pennsylvania	10	2
South Carolina	22	5
Tennessee	9	4
Virginia	0	0
West Virginia	2	0

[1] Total number of outfitters located in each state via internet searches.
[2] We attempted to randomly contact $\geq$ 20% of the outfitters in each state.

High Fence Operations

Of the 37 outfitters who responded, 11 (29.7%) were hunting on fenced property (high-fence), 23 (62.2%) were not using high-fence operations, and 3 (8.1%) reported offering both fenced and free-range hunts. Fence height varied from 4 feet to 9 feet 10 inches, although a 4 foot fence is hardly a "high" fence. Average fence height was 6.8 feet (SD = 2.1 feet). Outfitters reported operating on a total of 14,095 acres of fenced property. Average fenced acreage was 1,006 acres per outfitter (SD = 1, 022; range = 80 – 3000 acres).

No operators in Alabama, Georgia, or North Carolina had high-fence operations. This does not imply there are no wild pig hunting outfitters that hunt behind high-fence operations in these states. It only means that the outfitters responding to our survey were not operating under high fence conditions. States that contained both high-fence and free-range included: Florida, Louisiana, and South Carolina. States with only high-fence operations included: Tennessee and Pennsylvania.

High-fence operations averaged more clients per year ($\overline{x} = 323.6$ clients, SD = 412.4) than no-fence hunting outfitters ($\overline{x}$ = 120.0 clients, SD = 97.4; P=0.03). We suspect hunters wanting to increase their chance of success chose the high-fence operation, even if the price was higher. Also, high fence outfitters may have been more active in recruiting hunters because of the higher costs to maintain the high fence operation.

Costs to pursue wild pigs varied not only by state, but also the type of operation being conducted (high-fence vs. free-range). The average price for a free-range hunt across the southeast was $410 (n = 19; SD = $211) per hunt (range = $150 - $1,000), and was not statistically different than the average price for a high-fence hunt at $474 (n = 7; SD = $215) per hunt (range = $200 - $795).

Number of wild pigs seen and harvested per outfitter

Twenty-two of the 37 outfitters provided an estimate of the number of wild pigs seen per hunt. The mean number of wild pigs seen per hunt was 19.8 (SD = 22.9; range = 2 - 85). Mean number of pigs harvested annually per outfitter (n=36 outfitters) was 450 pigs (SD = 660.8; range = 10 – 3,475). Outfitter success varied greatly within each state. However, only a few states had a large enough sample to make comparisons. For example, in Georgia the annual number of pigs harvested per outfitter (8 outfitters) ranged from 28 pigs to 3,475 pigs, while in Florida (7 outfitters) the annual reported harvest ranged from 25 pigs to 1,500 pigs (**Table 2**).

This large variability in harvests was likely due to the size of the outfitter's operation (i.e., number of hunters per season), local abundance of wild pigs, and the type of landscapes they were hunting. We did not target specific outfitters based on the success advertised on their website. We simply tried to get an even distribution throughout each state. In areas with abnormally high harvest (e.g., 3,450 wild pigs harvested in Georgia), we typically saw that these outfitters were hunting on agricultural fields, or a combination of hunting agricultural fields and deploying multiple hunters per hunt.

Table 2. Summary of information from the wild pig outfitter phone survey conducted across 14 states during February 2017. Data, except total harvest, are averages for the state. Sample size, range, and standard deviation data are available from the authors.

State	Total Harvest	Harvest/Outfitter	Urban Clients (%)	Clients/year	Fee/Hunt ($)
Alabama	355	88.8	71.3	88	312
Arkansas	800	800.0	85.0	325	350
Florida	5,405	776.4	72.1	305	233
Georgia	6,060	754.4	66.9	140	471
Louisiana	85	42.5	67.5	32	600
Mississippi	65	65	85	30	400
North Carolina	90	45	70	65	287
Ohio	60				
Pennsylvania	580	290.0	82.5	290	
South Carolina	1,006	201.2	68.0	131	413
Tennessee	1,710	515.0	86.3	525	760

Across the states, outfitters with free-range operations harvested an average of 460.9 pigs annually (SD = 739.6; range = 10 – 3,475) per outfitter. Outfitters with high-fence operations harvested an average of 384.0 pigs annually (SD = 456.7; range = 10 – 1,500) per outfitter. Annual reported harvest rates between free-range and high-fence operations were not statistically different. Outfitters with free-range operations reported seeing an average of 18.6

pigs per hunt (SD = 17.5; range = 2 – 60). Outfitters with high-fence operations reported seeing 26.5 pigs per hunt (SD = 36.5; range = 2 – 85). This difference was not statistically significant.

Clients and Cost per Outfitter

Tennessee outfitters averaged the largest number of clients with 525 clients per outfitter. Florida averaged the second largest number of clients with 306. Outfitters reported that the majority of their clients were from urban areas. We did not define "urban" but rather asked the outfitter to tell us the percentage of their clients that were from urban areas. It is likely that different outfitters had varying interpretations of "urban". The majority of clients were considered urban (**Table 2**). The range of urban clients varied from 68% in GA, LA, and SC to 85% in MS and 86% in TN.

Generally, hunts were offered as a flat-rate daily fee (per hunt fee) for 1-2 clients per hunt. Only 9 of the 37 outfitters charge a per pig fee. Flat-rate daily fees ranged from an average of $200 in Ohio to $760 in Tennessee. Generally the client could harvest 1-2 pigs (only 14 outfitters answered this question). Only 4 outfitters offered unlimited harvest for the fee charged. Twenty-one outfitters (56.8%) had an extra charge for additional pigs over the hunt minimum. The cost per extra pig varied from $100 in Alabama to $725 in Pennsylvania. It is worth noting that in Pennsylvania, both operations were high-fence and the fee charged for one pig was $725.

Table 3. Mean acreage hunted per state by outfitters contacted in February 2017.

State	Acres
Florida	19,095
Georgia	14,813
South Carolina	4,510
Louisiana	4,370
Alabama	3,250
North Carolina	1,600
Tennessee	525
Pennsylvania	115

Acres of land used to pursue wild pigs

The acreage used to hunt wild pigs in the southern portion of the region was largest and began to decline in the more northeastern portion (**Table 3)**. Florida averaged the most land used per outfitter - 19,095 acres. The range of acreage was between 160 acres and 80,000 acres. Outfitters in Georgia accessed second highest acreage (14,813 acres). The amount of land used in Georgia ranged between 1,000 and 50,000 acres. South Carolina ranged between 850 - 12,000 acres, Louisiana 240 - 8,500 acres, Alabama 2,000 - 6,000 acres, North Carolina 1,200 - 2,000, Tennessee 125 - 3,250 acres, and Pennsylvania ranged from 80 - 150 acres.

Full time vs. Part time outfitters

Of the 36 outfitters that answered this question, half were operating as full-time and half were operating as a side-endeavor. Eight outfitters were operating a full-time high-fence operation but only 3 were operating as a side-endeavor high-fence operation. Two full-time and one side endeavor operation offered both high-fence and free range hunts. There were 8 outfitters operating as a full-time, free-range operation and 14 operators operating as side-endeavor, free-range operations.

Summary

Overall, the cooperation of outfitters was better than expected. We located contact information for 151 wild pig hunting outfitters via internet searches and contacted 122 outfitters. Thirty percent of those were willing to respond to our phone survey. States with little or no data collected include: Kentucky, West Virginia, Ohio, Mississippi, and Arkansas due to the low numbers of outfitters per state and the number of outfitters not answering our phone calls. Because most outfitters did not answer our calls, we could not determine if they are currently in business but assumed they were no longer operating. Because we identified ourselves as researchers and not clients, some may have chosen to not return our voice message. It seems that wild pig hunting outfitters have little to no impact on pig populations or control on a landscape level. However, if some outfitters are as successful as they claim, they may be making an impact on a localized (per farm), short-term basis.

The impact of wild pig hunting outfitters is likely minimal in terms of population control. However, the secondary impacts associated with the ill-advised and perhaps illegal capture-transport-release of wild pigs should not be overlooked. States such as Tennessee and North Carolina have outlawed wild pig hunting with the intent of limited the illegal movement of wild pigs. Georgia has recently enacted legislation to restrict movement of wild pigs and proposed regulations would mandate that people moving wild pigs have permits and release only into an approved enclosure that was subject to inspection and fence requirements.

Outfitters may contribute to movement of wild pigs as they seek hunting opportunities for their clients. There is little incentive to shoot out a farm or any acreage and then not have a place to carry the next client. Therefore, outfitters likely have little long-term impact on local wild pig populations. Weather, economics, access to private land and other factors affect the impact of wild pig guide hunting operations. While we assume outfitters replied to our questions with accurate answers, the incentive to over-inflate success ratios should not be overlooked when viewing outfitter advertisements.

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