

PRIVATE FOREST LANDOWNERS' PERSPECTIVES ON FERAL HOG MANAGEMENT AND CONTROL IN ARKANSAS, LOUISIANA, AND EAST TEXAS

Alyssa Mineau, Nana Tian, Jianbang Gan, and Gordon Holley

ABSTRACT

Feral hogs (*Sus scrofa*) are a rapidly increasingly nonnative invasive species that has spread widely across the Southern United States, impacting water quality and causing severe damage to tree regeneration. As a result, controlling feral hogs is an urgent issue for many forest landowners and silviculturists. To provide land managers in the Western Gulf Region (WGR) with a better sense of the extent of feral hog damage and landowner perspectives on controlling this invasive species, we sent 4,500 mail surveys in the summer of 2021 to randomly selected landowners in Arkansas, Louisiana, and east Texas. A subsample of private forest landowners was selected for this study to explore their perceptions of feral hogs in this region. Results indicated that most private forest landowners are familiar with feral hogs, especially Texas forest landowners (>90 percent reported familiar), and generally have overwhelmingly negative attitudes toward them. Regarding the control and management methods, trapping and shooting are the most acceptable and effective methods among the private forest landowners in the WGR. These findings will help silviculturists better understand private forest landowners' perspectives on feral hogs and the most acceptable control and management methods. For example, exploring suitable silvicultural practices (such as trapping the planting area, substituting appropriate tree species, and more) to avoid feral hog damage is not only a key topic among silviculturists but also among private forest landowners. Understanding forest landowners' concerns and motivations for feral hog control should also lead to the development and deployment of more effective management tools, control policies, and educational programs for feral hogs in the study area.

INTRODUCTION

Feral hogs (*Sus scrofa*) are an invasive species that have spread widely since they were first introduced to North America by European colonists (Conover and Vail 2007). Prolific and quick to mature, the difficult-to-eradicate feral hogs have spread rapidly to 47 States, especially in the last 3–4 decades (Mayer 2014, USDA APHIS 2020). Despite their recreational benefits for some hunters in certain areas (Centner and Shuman 2015), feral hogs are a particularly destructive invasive species in the United States, causing agricultural, forestry, and other environmental losses estimated at around \$1.5 billion per year (Mississippi State University 2013).

Feral hogs cause severe and widespread damage to row crops, livestock, water quality, forest regeneration, and infrastructure (Harper and others 2014). Feral hogs feed on various plants and animals across many geographic regions (Barrios-Garcia and Ballari 2012), compete for food with livestock and native wildlife, and carry many infectious diseases that could affect other animals and humans. Though rare, there are even some reports of feral hogs attacking farmers, golfers, hikers, and picnickers (USDA APHIS 2020). Feral hogs can cause severe damage to natural habitats by wallowing, removal of tree bark by “tusking” (Mayer 2009), and foraging.

Alyssa Mineau, Graduate Student, College of Forestry, Agriculture and Natural Resources, University of Arkansas at Monticello, Monticello, AR 71656

Nana Tian, Assistant Professor, Arkansas Forest Resources Center, College of Forestry, Agriculture and Natural Resources, University of Arkansas at Monticello, Monticello, AR 71656

Jianbang Gan, Professor, Department of Ecology and Conservation Biology, Texas A&M University, College Station, TX 77843

Gordon Holley, Professor, Department of Agricultural Sciences and Forestry, Louisiana Tech University, Ruston, LA 71272

Indeed, feral hog foraging can cause widespread tree regeneration failures, especially in recently established pines (*Pinus* spp.) and hardwoods (Campbell and others 2010). As their primary method of food acquisition, rooting is the most widespread and observed type of damage caused by feral hogs (Mayer 2009). Rooting can have disastrous effects on many different landscape types. In the Southern United States, feral hog depredation of newly planted tree seedlings has become a major concern, affecting pines (Fern and others 2020) and hardwood species such as cherrybark oak (*Quercus pagoda*), swamp chestnut oak (*Q. michauxii*), water hickory (*Carya aquatica*), and swamp tupelo (*Nyssa sylvatica* var. *biflora*) (Mayer and others 2000). When available, a staple of feral hog diet is acorns (Elston and Hewitt 2010), and their foraging reduces acorn availability for germination and forest regeneration (Loggins and others 2002).

Given the widespread and costly damages they inflict, controlling feral hogs is an urgent issue for farmers, rural landowners, wildlife managers, and silviculturists. However, feral hogs have a high reproductive capacity and early maturation, which makes their eradication difficult once established. In addition, feral hogs are intelligent and adaptable, which can diminish the efficacy of feral hog control measures. Furthermore, there is no single feral hog control measure that meets the objectives of every stakeholder. Thus, private landowners and natural resources managers use a variety of tools to aid in controlling feral hogs.

Control methods can be divided generally into two categories: nonlethal and lethal. Nonlethal controls are generally centered around reducing the harm feral hogs cause, while lethal controls are generally focused on population reduction or eradication. Nonlethal controls mainly include diversionary feeding, fencing, repellants, and translocation. Lethal controls are used more often than nonlethal controls for reducing feral hog damages. These methods include ground shooting (at daytime or night, with or without hunting dogs), trapping and euthanasia, snares, and aerial gunning.

Understanding the private forest landowners' perspectives on feral hogs and exploring the most acceptable control and management methods is the key to effectively managing the feral hog population. To that end, the specific objective of this study was to survey people in the Western Gulf Region (WGR; this area included Arkansas, Louisiana, and east Texas) to 1) understand private forest landowners' perspectives on feral hogs and 2) examine their support and acceptability for different management and control methods.

METHODS

We developed and conducted a mail-in survey in 2021 across the WGR. The survey questions centered around landowner attitudes towards feral hogs, as well as the control methods they supported or found effective. We generated survey questions based on similar surveys from nearby States (Capelnor and others 2017, Harper and others 2014, Mengak 2012, Tanger and others 2015) and created new questions with the guidance of subject matter experts from the WGR. We followed the Dillman Tailored Design method, including a survey cover page assuring landowners of the confidentiality of their responses and their participation was voluntary (Dillman 2000). The University of Arkansas at Monticello's Institutional Review Board (IRB# FNRf-01) reviewed and approved the survey questionnaire and protocol.

We mailed 4,500 surveys in three States: 2,000 surveys in Arkansas, 1,500 in Louisiana, and 1,000 in east Texas. The surveys were sent to landowners of ≥ 30 acres of land (including all types of land such as agricultural land, forest land, and more). For this study, we only used surveys from private forest landowners.

Descriptive statistics were used to summarize the responses and analysis of variance (ANOVA) was utilized to test for the differences in private forest landowners' perspectives on feral hogs and their control across the three States. All statistical results are reported at a significance level of 5 percent ($\alpha = 0.05$).

RESULTS

We removed 285 of the questionnaires in Arkansas, 175 in Louisiana, and 86 in east Texas due to ineligibility (e.g., undeliverable addresses, death). The number of usable questionnaires was 361 in Arkansas, 319 in Louisiana, and 226 in east Texas, yielding a response rate of 21 percent (Arkansas), 24 percent (Louisiana), and 25 percent (east Texas), and the overall adjusted response rate was 23 percent for all three States. The response rate for the focal group for this study (those who reported owning forest land) was 27 percent in Arkansas ($n = 97$), 28 percent in Louisiana ($n = 90$), and 14 percent in east Texas ($n = 31$).

When forest landowners were asked about their initial (presurvey) familiarity level with feral hogs, over half (54 percent) of Arkansas respondents indicated that they were very familiar with feral hogs, while it was as high as 70 percent in Louisiana; in east Texas, 94 percent of respondents indicated that they were very familiar with feral hogs.

No significant differences were found in the agreement level in the WGR for most feral hog statements (table 1). Respondents agreed that feral hogs should be eliminated wherever possible, that feral hogs have a negative impact on the natural environment, and that feral hogs harm the economy through damage to crops and livestock.

Respondents felt obligated to eradicate feral hogs on their property and were willing to cooperate with neighbors to control feral hogs. Additionally, respondents disagreed with the statement “The problems related to feral hogs are exaggerated.”

However, there was a significant difference in agreement level for the statement “Feral hogs are a nuisance and a threat” among the respondents in the three States ($P < 0.05$). Respondents from Louisiana agreed more on this statement than other States, but Arkansas and Texas still “strongly agreed.” Significant differences were also found in the responses to the statements “The laws to control feral hogs on private land in Arkansas/Louisiana/Texas are adequate” ($P < 0.05$) as well as “Feral hogs should be managed to a level that does not damage the environment” ($P < 0.05$). East Texas respondents were significantly more likely to disagree with the statement that current laws are adequate to control feral hogs than those in Arkansas and Louisiana. Respondents in Louisiana were more likely to support tighter control regulations than respondents in Arkansas and east Texas.

Support for various control methods varied among the States (table 2). States agreed on their support of capturing and killing feral hogs, as well as wanting technical assistance to control feral hogs. Louisiana respondents showed a statistically significant greater level of support

Table 1—Mean survey scores for respondents’ perspectives on different feral hog statements in Arkansas, Louisiana, and east Texas

Survey statements	Arkansas	Louisiana	East Texas
Feral hogs are a nuisance and threat	1.23a	1.05b	1.26a
Feral hogs should be eliminated wherever possible	1.33	1.21	1.33
Feral hogs have a negative impact on the natural environment	1.42	1.25	1.39
Crops and livestock damage caused by feral hogs will harm the economy	1.49	1.26	1.29
The laws to control feral hogs on private land in AR/LA/TX are adequate	2.45a	2.78a	3.06b
I would like to learn more about feral hogs and control methods	2.03	1.99	2.06
The problems related to feral hogs are exaggerated in AR/LA/TX	4.07	4.14	4.07
Feral hogs should be managed to a level that does not damage the environment	1.87a	1.53a	2.24b
I support tighter feral hogs control regulations in AR/LA/TX	2.01a	1.90b	2.25a
I feel obligated to eradicate feral hogs on my property	1.46	1.43	1.69
I am willing to cooperate with my neighbors to control feral hogs together	1.38	1.26	1.38

Survey responses were 1 = strongly agree, 2 = somewhat agree, 3 = neither agree nor disagree, 4 = somewhat disagree, and 5 = strongly disagree. Means in a row with different letters were statistically different at the 5-percent significance level.

Table 2—Mean survey scores for respondents’ support for feral hog control methods

Feral hog control method	Arkansas	Louisiana	East Texas
Do not do anything	4.61	4.80	4.29
Capture and remove using trained dogs	2.26a	2.15a	2.93b
Targeted sharpshooting on the ground over bait sites	1.89a	1.68b	1.97a
Capture and relocate	4.12	4.18	4.24
Capture and kill	1.36	1.25	1.45
Aerial control using helicopters	1.87	1.89	2.28
Use legal toxicants (i.e., warfarin)	2.27a	2.09b	2.28a
Allow sales of feral hogs	3.37a	2.98b	2.31c
Educate people on how to prevent damage	1.70	1.62	1.83
Provide technical assistance for landowners/farmers to control feral hogs	1.47	1.41	1.62
Offer money rewards (bounties) to whoever controlling feral hogs	1.71	1.85	1.93
Provide subsidies (compensations) to landowners/farmers for feral hog damage	2.13	2.03	2.48

Survey responses were 1 = strongly agree, 2 = somewhat agree, 3 = neither agree nor disagree, 4 = somewhat disagree, and 5 = strongly disagree.

Means in a row with different letters were statistically different at the 5-percent significance level.

for targeted sharpshooting and the use of toxicants. All three States’ respondents disagreed with the statement “Do not do anything” to manage feral hogs.

In terms of implementing feral hog control measures on private forest land across the WGR, the use and perceived efficacy of the methods varied widely (table 3). The most commonly used methods and the ones with the highest efficacy

were trapping hogs and shooting hogs, with 65 percent (for trapping) and 52 percent (for shooting) of respondents reporting those methods to be effective or extremely effective. The method with the lowest perceived efficacy was “Use repellents (e.g., scents, pepper spray)” and “Put up fences”; specifically, over two-thirds of respondents reported those two methods to be either slightly or not at all effective.

Table 3—Mean survey score and percent in each response category for use and perceived efficacy of feral hog control measures

Feral hog control measures	n	Mean survey score	Extremely effective	Effective	Neutral	Slightly effective	Not at all effective
Shoot hogs	153	2.65	24.2	28.1	13.7	26.1	7.8
Trap hogs	127	2.45	23.6	40.9	11.0	15.7	8.7
Hunt with trained dogs	76	2.91	17.1	22.4	26.3	21.1	13.2
Hunt without dogs	79	3.06	13.9	25.3	20.3	21.5	19.0
Put up fences	49	4.06	2.0	8.2	22.4	16.3	51.0
Harass feral hogs (e.g., noise/lights)	53	3.96	7.5	7.5	20.8	9.4	54.7
Use repellents (e.g., scents, pepper spray)	42	4.38	0.0	0.0	26.2	9.5	64.3
Use legal toxicants (e.g., warfarin, sodium nitrite, etc.)	42	3.86	4.8	4.8	38.1	4.8	47.6
Officially lease to someone else to hunt for recreation and enjoyment	59	3.46	8.5	13.6	32.2	15.3	30.5

Survey responses were 1 = strongly agree, 2 = somewhat agree, 3 = neither agree nor disagree, 4 = somewhat disagree, and 5 = strongly disagree.

n = number of landowners who have used the control measure.

DISCUSSION

The results of this study indicated that most private forest landowners across the WGR were familiar with feral hogs, which differed from the familiarity levels reported by Adams and others (2005), where less than half of the respondents reported being knowledgeable about hog biology and its environmental impacts. A possible explanation is that private forest landowners' knowledge of feral hogs has increased with their physical encounters with hogs and better access to hog information through educational and outreach activities in the past 2 decades.

Our study found that across the WGR, forest landowners have overall negative perceptions of feral hogs, consistent with earlier studies (e.g., Adams and others 2005, Caplenor and others 2017, Harper 2014). Specifically, private forest landowners surveyed in this study agreed that feral hogs are a nuisance and threat and should be eliminated, which is in line with the findings from Adams and others (2005), Mengak (2012), and Caplenor and others (2017), who all reported that landowners have negative perceptions on feral hogs and agreed on controlling them.

Additionally, this study revealed the similarities among private forest landowner supportiveness of various feral hog control measures in three different States. For example, the majority of forest landowners in this region strongly support the option of "Capture and kill" and "Targeted sharpshooting on the ground over bait sites" as well as the education and incentive-based statements of "Educate people on how to prevent damage" and "Provide technical assistance for landowners/farmers to control feral hogs." This is comparable to Tennessee landowners in Watkins and others (2019), who reported that most respondents also supported capture and kill, targeted sharpshooting, education, and providing technical assistance. These similar attitudes towards management options can help justify large-scale management plans for feral hogs at the State and Federal levels, and can better guide management protocols to be cost-effective, accessible, and supported by stakeholders.

This study highlights the greatest- and least-utilized methods of feral hog control by WGR forest landowners. The most commonly used control measures were trapping hogs and shooting hogs—which were also reported to be the most effective methods of reducing feral hogs. This aligned with Mayer and others (2009) and Mapston (2007), who reported that shooting was commonly used specifically in regions that had smaller feral hog populations. However, this did not follow the findings of more recent literature that focuses on the efficacy of these control methods. While Mayer (2014) reported that hunting (shooting) only removed about 23 percent of the feral hog population annually, efficacy can vary. As an example, in Texas, aerial shooting is most effective in areas with little tree canopy and few human structures. Bodenchuk (2014) showed that aerial shooting is the lowest cost per animal removed for the Wildlife Services program in Texas.

Ground shooting can be effective when single or small groups can be dispatched but it is not effective for larger groups—sounders—where the survivors learn to avoid humans and become difficult to locate. Campbell and others (2010) reported that flying helicopters low to the ground and shooting a sounder did not disperse other pigs from their established home ranges. Shooting can be opportunistic whenever seen on the property, or more methodical, such as hunting with hog dogs or shooting with thermal scopes at known feral hog feeding sites at night.

Shooting tends to be less efficient than trapping because only a few individuals are removed. When trapping, box traps that catch individuals have proven less effective than a whole-sounder approach to reducing feral hogs and their damages. Trapping protocols or best practices are necessary, as feral hogs can develop trap shyness and learn to avoid traps and people (Massei and others 2011, West and others 2009), making them difficult to find and recapture or shoot.

Harassing feral hogs and putting up fences were the least utilized and the least effective methods at controlling feral hog numbers. Several factors

can drive the efficacy and utilization rates of feral hog traps, from trap design to location, or even bait choice. Trap design can be a potential factor, as traps with smaller gates are less expensive but also less effective than larger/wider gates (Higginbotham 2014). Furthermore, animal-activated gates cannot be selected for target species, but human-activated gates have high initial costs that make them impractical to landowners (Ditchkoff and Bodenchuk 2020). What forest landowners perceive to be effective at reducing feral hog presence may also depend on individual management goals; if a landowner wants feral hogs removed from their land entirely, they may find fences to be ineffective compared to the landowner that seeks crop protection from feral hog foraging.

CONCLUSIONS

This study investigated private forest landowners' perspectives of and experiences with feral hogs across three States in the WGR. Private forest landowners in the WGR are familiar with feral hogs and have overwhelmingly negative attitudes toward feral hogs, which suggested that private forest landowners realized the damages related to feral hogs to forest land and improving the current silvicultural practices might be needed in the future to avoid feral hog damage. Various methods have been implemented by landowners to control feral hogs, but only certain ones were considered to be most effective—specifically trapping and shooting. In addition, private forest landowners most strongly support lethal control measures for managing feral hogs and strongly support receiving education and technical assistance on managing feral hogs. This result indicated that private forest landowners will be interested in the effective practices and management options for controlling feral hogs in this region, which could be a future silvicultural research topic. For example, Fern and others (2020) found that changing tree species or providing logging slash piles as alternative foraging choices outside the tree planting area might be helpful to avoid feral hog damage. However, the practice of debris scattering following a clearcut can help feral hogs discover the seedlings, thus an alternative practice might be needed to protect the seedlings.

LITERATURE CITED

- Adams, C.E.; Higginbotham, B.J.; Rollins, D. [and others]. 2005. Regional perspectives and opportunities for feral hog management in Texas. *Wildlife Society Bulletin*. 33: 1312–1320. [https://doi.org/10.2193/0091-7648\(2005\)33\[1312:RPAOFF\]2.0.CO;2](https://doi.org/10.2193/0091-7648(2005)33[1312:RPAOFF]2.0.CO;2).
- Barrios-Garcia, M.N.; Ballari, S.A. 2012. Impact of wild boar (*Sus scrofa*) in its introduced and native range: a review. *Biological Invasions*. 14: 2283–2300. <https://doi.org/10.1007/s10530-012-0229-6>.
- Bodenchuk, M.J. 2014. Method-specific costs of feral swine removal in a large metapopulation: the Texas experience. In: Timm, R.M.; O'Brien, J.M., eds. *Proceedings of the 26th vertebrate pest conference*. Davis, CA: University of California: 269–271. <https://doi.org/10.5070/V426110394>.
- Campbell, T.A.; Long, D.B.; Leland, B.R. 2010. Feral swine behavior relative to aerial gunning in southern Texas. *Journal of Wildlife Management*. 74: 337–341. <https://doi.org/10.2193/2009-131>.
- Caplenor, C.A.; Poudyal, N.C.; Muller, L.I.; Yoest, C. 2017. Assessing landowners' attitudes toward wild hogs and support for control options. *Journal of Environment Management*. 201: 45–51. <https://doi.org/10.1016/j.jenvman.2017.06.022>.
- Centner, T.J.; Shuman, R.M. 2015. Governmental provisions to manage and eradicate feral swine in areas of the United States. *Ambio*. 44: 121–130. <https://doi.org/10.1007/s13280-014-0532-9>.
- Conover, M.R.; Vail, R.M. 2007. In the news. *Human-Wildlife Conflicts*. 1: 2–3. <https://doi.org/10.26077/bhzzf-4j22>.
- Dillman, D.A. 2000. *Mail and internet surveys: the tailored design method*. 2nd ed. New York, NY: John Wiley & Sons. 464 p.
- Ditchkoff, S.S.; Bodenchuk, M.J. 2020. Management of wild pigs. In: VerCauteren, K.C.; Beasley, J.C.; Ditchkoff, S.S. [and others], eds. *Invasive wild pigs in North America: Ecology, impacts, and management*. Boca Raton, FL: CRC Press: 102–110.
- Elston, J.J.; Hewitt, D.G. 2010. Intake of mast by wildlife in Texas and the potential for competition with wild boars. *Southwestern Naturalist*. 55: 57–66. <https://doi.org/10.1894/TAL-03.1>.
- Fern, M.P.; Armstrong, J.B.; Barlow, R.J.; Kush, J.S. 2020. Ecological factors influencing wild pig damage to planted pine and hardwood seedlings. *Human-Wildlife Interactions*. 14(2): 228–238. <https://doi.org/10.26077/e63f-b82a>.
- Harper, E.E.; Miller, C.A.; Stephenson, A.L. [and others]. 2014. Landowner attitudes and perceived risks toward wild pigs on private lands in Illinois. *INHS Technical Report 2014 (16)*. Human Dimensions Research Program Report HR-14-05. Champaign, IL: Illinois Natural History Survey. 40 p. <https://www.ideals.illinois.edu/items/55892>.
- Higginbotham, B. 2014. The art and (some) science of trapping wild pigs: from traps to gates to triggers and more! In: Timm, R.M.; O'Brien, J.M., eds. *Proceedings of the 26th vertebrate pest conference*. Davis, CA: University of California: 258–268. <https://doi.org/10.5070/V426110558>.
- Loggins, R.E.; Wilcox, J.T.; van Vuren, D.H.; Sweitzer, R.A. 2002. Seasonal diets of wild pigs in oak woodlands of the central coast region of California. *California Fish and Game*. 88: 28–34.
- Mapston, M.E. 2007. Feral hogs in Texas. B-6149. College Station, TX: Texas A&M AgriLife Extension Service. 26 p. <https://hdl.handle.net/1969.1/87218>.
- Massei, G.; Roy, S.; Bunting, R. 2011. Too many hogs? A review of methods to mitigate impact by wild boar and feral hogs. *Human-Wildlife Interactions*. 5: 77–79. <https://doi.org/10.26077/aeda-p853>.

- Mayer, J.J. 2009. Overview of wild pig damage. In: Mayer, J.J.; Brisbin, I.L., Jr., eds. Wild pigs: biology, damage, control techniques and management. SRNL-RP-2009-00869. Aiken, SC: U.S. Department of Energy, Savannah River National Laboratory: 221–246. <https://doi.org/10.2172/975099>.
- Mayer, J.J. 2014. Estimation of the number of wild pigs found in the United States. SRNL-STI-2014-00292. Aiken, SC: U.S. Department of Energy, Savannah River National Laboratory. 8 p. <https://sti.srs.gov/fulltext/SRNL-STI-2014-00292.pdf>.
- Mayer, J.J.; Brisbin, I.L., Jr. 2009. Wild pigs: biology, damage, control techniques and management. SRNL-RP-2009-00869. Aiken, SC: U.S. Department of Energy, Savannah River National Laboratory. 400 p. <https://doi.org/10.2172/975099>.
- Mayer, J.J.; Nelson, E.A.; Wike, L.D. 2000. Selective depredation of planted hardwood seedlings by wild pigs in a wetland restoration area. *Ecological Engineering*. 15: S79–S85. [https://doi.org/10.1016/S0925-8574\(99\)00074-9](https://doi.org/10.1016/S0925-8574(99)00074-9).
- Mengak, M.T. 2012. 2012 Georgia wild pig survey. Final report. Athens, GA: Warnell School of Forestry and Natural Resources, University of Georgia. 41 p. <https://hdl.handle.net/10724/31083>.
- Mississippi State University. 2013. Wild pig info. Mississippi State, MS: Mississippi State University Extension. <https://www.wildpiginfo.msstate.edu/index.php>. [Date accessed: August 27, 2015].
- Tanger, S.M.; Guidry, K.M.; Nui, H. 2015. Monetary estimates of feral hog damage to agricultural producers in Louisiana. *Journal of the NACAA*. 8(2): 8 p. <https://www.nacaa.com/journal/c24d174c-19d3-478f-ac32-9d1b869d75c7>.
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service [USDA APHIS]. 2020. Feral swine-managing an invasive species. www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/operational-activities/feral-swine. [Date accessed: August 20, 2019].
- Watkins, C.; Caplenor, C.A.; Poudyal, N.C. [and others]. 2019. Comparing landowner support for wild hog management options in Tennessee. *Journal of Environment Management*. 232: 722–728. <https://doi.org/10.1016/j.jenvman.2018.11.075>.
- West, B.C.; Cooper, A.L.; Armstrong, J.B. 2009. Managing wild pigs: a technical guide. Human-Wildlife Interactions Monographs 1. Starkville, MS: Berryman Institute. 55 p. <https://doi.org/10.26079/600a-ed8d>.