Virginia Cooperative Extension
Virginia Tech • Virginia State University

EXPERT REVIEWED

CNRE-146P

Managing Human-Wildlife Interactions: Feral Swine (*Sus scrofa*)

Authored by Elizabeth Tsang, Former Undergraduate Student, Fish and Wildlife Conservation, Virginia Tech; and James A. Parkhurst, Associate Professor and Extension Specialist, Fish and Wildlife Conservation, Virginia Tech

Introduction

Today's farmyard hog, a domesticated version of the Eurasian wild boar (*Sus scrofa*), has a global distribution, thanks in part to the actions of early explorers who transported this hardy animal with them as a dependable food resource. When domesticated swine escape or are released purposefully, they become feral; over time, they reassume an outward appearance similar to that of their ancestors. Pure-stock Eurasian wild boars have also been brought to the U.S. for use in penned hunting facilities, and many escaped or were released and now have dispersed into the environment. Regardless of their origin, free-roaming swine in Virginia are considered a destructive, invasive species.

Feral swine cause significant economic damage (current national estimates exceed $1.5 billion per year) and physical damage to property, crops, and livestock; they are hosts and potential vectors in the spread of numerous diseases; and they prey on and compete directly with native species. Their method of foraging (i.e., rooting behavior) leads to trampling of vegetation, compaction of soils, and erosion and sedimentation in waterways.

As feral swine populations have grown and encroached on suburbanized areas, the incidence of vehicle-swine collisions and resulting personal injury and insurance costs has also increased. Given feral swine's rapidly growing geographic distribution and the severity of their devastating activities, the need for heightened awareness and greater understanding of the types of conflicts caused by feral swine is important. This publication provides an overview of these animals and steps that can be taken to manage negative interactions with them.

Biology and Behavior

Physical Characteristics

An adult female swine (sow) weighs between 110 and 200 pounds, whereas an adult male (boar) is typically heavier, weighing 130 to 250 pounds, though individuals weighing up to 300 pounds occasionally appear. The largest adult swine on record was a boar shot in North Carolina that weighed 880 pounds, but animals of this size are very rare. Adults can reach 5 feet in length and stand about 3 feet tall at the shoulder. The hair covering the body is typically coarse, dense, and silvery-black in color, but it can be any combination of black, brown, red/rust, or white (fig. 1). Young swine sometimes display a striped coloration that disappears as they age. Other distinctive characteristics of swine include an elongated snout, four-toed hooves (fig. 2), and continuously growing canine teeth, known as tusks, which can grow up to 5 inches long. Some physical features differ due to sex, age, or other factors. For example, boars often develop tough, cartilaginous "shields" on their shoulders, and their tusks are more robust than those of sows. Over time, feral swine typically appear more streamlined, have straighter tails, and exhibit softer bristles than domestic hogs.

Figure 1: General physical appearance and color variability among feral swine. These animals are displaying the typical rooting method of foraging. (Photo provided by the U.S. Department of Agriculture)

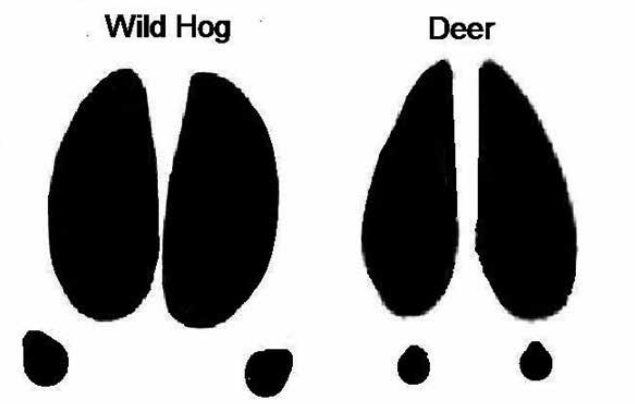

Figure 2: Typical footprint of a feral swine (left) compared to that of a white-tailed deer (Odocoileus virginianus) (right). (Diagram by Mississippi Wildlife, Fisheries, and Parks)

The wild hog track is rounder than the deer's, the toe is rounder, and the dewclaws are set wider apart. The deer track is narrower with a pointier toe and looks like an upside-down heart; the dewclaws are narrower and directly behind the hoof print.

History/Range

European explorers first brought domesticated swine to North America during the 1500s, primarily because these animals provided a reliable food source and could withstand the rigors of long oceanic voyages. Soon after their arrival at colonial settlements along the Gulf of Mexico, many hogs escaped captivity and became feral. Domestic swine first arrived in Virginia in the 1600s, primarily as the lower James River region was being colonized. Since the mid-1920s, a large and long-standing population of approximately 200 to 500 feral swine — remnants from prior subsistence farmsteads — was present in what now comprises parts of Back Bay National Wildlife Refuge and False Cape State Park, south of Virginia Beach.

According to the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), populations of feral swine exist in at least 35 states and three U.S. territories; this national population is estimated to exceed 6 million animals. In Virginia, at least 10 counties and/or cities were thought to be occupied by feral swine in 2021 (fig. 3).

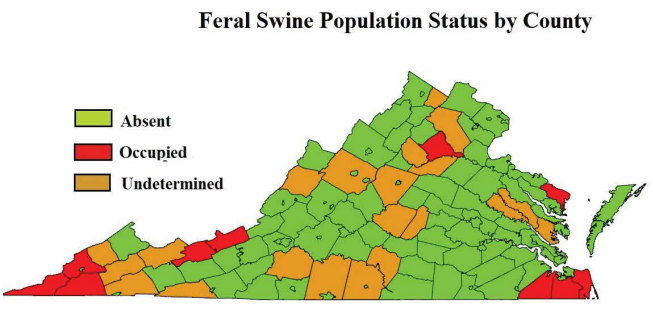

Figure 3: Distribution and status of feral swine populations in Virginia. (Figure from USDA-APHIS Wildlife Service, Virginia office)

Habitat

Feral swine can live in a wide variety of habitats, but they prefer locations near water sources that also offer good cover (e.g., dense brush). Moist bottomlands associated with a river or stream, a lake or pond, or wetlands that are thick with vegetation are ideal. However, their ability to survive in diverse habitats — such as the barrier island sand dunes and salt marshes in Eastern Virginia, the rolling hills and open meadows of Central Virginia, and the forests and mountains of the Appalachians — illustrates their adaptability. Several known centers of feral swine activity in Virginia exist near commercial agricultural operations and developed residential suburbs, demonstrating their ability to survive in highly modified environments as well.

Diet

Feral swine are opportunistic omnivores, which means they will eat just about any form of meat or plant-based food wherever and whenever available. Adults typically consume about 3% to 5% of their body weight each day, which, over the course of a year, adds up to about 1 ton of food per pig per year. Swine seek hard and soft mast (i.e., shelled nuts like acorns and soft, seasonal fruits of trees and shrubs) when available, but they also consume herbaceous vegetation, roots and tubers, and grains. They also consume carrion, invertebrates, amphibians, reptiles, eggs, birds, small mammals, or young livestock; in some cases, they even may cannibalize juvenile hogs. In suburban areas, feral swine have been known to use pet food left outdoors, compost (where accessible), and edible waste they can access by knocking over garbage containers left curbside. Large sections of agricultural fields and/or row crops can be devastated in as little as a single night of foraging activity by free-roaming swine (fig. 4).

Figure 4: Damage to field crop from feral swine. (Photo by USDA-APHIS)

Social Behavior

Feral swine congregate in family units known as "sounders," which typically include one or more sows and perhaps several generations of offspring. Sounders usually contain anywhere from two to 20 individuals, but they can have as many as 40 or more animals. Several boars may associate with a sounder from time to time, but they tend to roam more freely than sows with young. Weaned pigs will remain with the sow until the juveniles begin to mate or the sow produces a new litter. Although feral swine can be observed at any time of day, they often become nocturnal, especially when disturbed or harassed and during periods of high temperatures. Despite being fairly large animals with relatively short legs, they can reach speeds up to 30 mph over short distances. When threatened or cornered, swine often circle up with the adults facing outward and the young protected in the center of the circle. Feral swine do not maintain large home ranges, which average 0.5 to 3.0 square miles in size. The range size depends in part on the quality and abundance of food resources in the area. During periods of low food availability, swine can travel as many as 15 miles in search of food or water.

Reproduction, Mortality, and Disease

Juvenile swine can become sexually mature by 8 months of age. In Virginia, sows usually have two litters a year — one in late spring/early summer and another in late fall/early winter. Each litter will contain five to 12 piglets. Gestation lasts 112 to 114 days. As an indication of the reproductive potential of feral swine, a population composed of healthy adults located on good habitat with ample food resources is capable of doubling its size every six to seven months, though this has not yet been observed in Virginia, where predation on piglets is high.

The average life span of feral swine reported nationally is 10 years; the oldest hog on record was a 27-year-old animal. Mortality is highest among juveniles, especially during the first three months of life, and can reach as high as 50% within a litter. Adult swine typically have few predators; humans represent the primary mortality factor. Aside from humans, other known predators include coyotes, bobcats, bears, large raptors, and perhaps dogs, many of which focus on piglets.

Feral swine are susceptible to and carriers of up to 45 different parasites (both internal and external types) and diseases — including swine brucellosis, pseudorabies virus, leptospirosis, tuberculosis, swine fever, and foot and mouth disease — many of which are transmissible to humans, livestock, or domestic pets. Surveillance testing has confirmed the presence of eight different reportable diseases in swine captured in Virginia, including pseudorabies virus, swine brucellosis, influenza A, leptospirosis, porcine respiratory reproductive syndrome, toxoplasmosis, trichinosis, and porcine epidemic diarrhea virus. The greatest disease prevalence currently exists among swine in far Southwest Virginia.

Conflict Status and Implications

In Virginia, feral swine are defined as "any swine that are wild or for which no proof of ownership can be made" (Virginia Administrative Code 4VAC15-20-160). Feral swine also are classified as a "nuisance species" (Code of Virginia §29.1-100), a categorization that removes most forms of protection given to native wildlife. In the case of feral swine, there is no closed season on harvest, there is no daily or season limit on the number taken, and they can be hunted over bait. However, that does not mean that a person can automatically hunt and shoot any free-roaming swine, assuming it to be a nuisance animal. Determination of whether a free-roaming swine is owned can be difficult, especially for animals that are family pets (e.g., pot-bellied pigs), domestic swine that recently escaped from captivity, or domestic swine that are allowed to roam free due to the oddities of Virginia's fencing laws. In any case, the killing of a hog for which legal ownership eventually can be proven may result in a need to compensate the owner.

As noted above, Virginia's existing fencing laws can make resolution of feral swine conflicts difficult. Currently, counties must decide how responsibility for maintaining control of domestic livestock is delegated ("fence-in" versus "fence-out") (fig. 5). Under fence-in requirements, livestock owners must contain their

animals behind fencing or other suitable barriers on their own land. Owners can be held responsible for any damage their escaped or unfenced animals cause. In contrast, in fence-out counties, livestock owners are not required to contain their domestic stock with fencing; it is the responsibility of other landowners to fence unwanted animals off their property. If livestock damage property that is not fenced to keep animals out, the owner of the livestock is not at fault. As a result, in fence-out counties it can be difficult to differentiate between domestic free-ranging animals and actual feral swine.

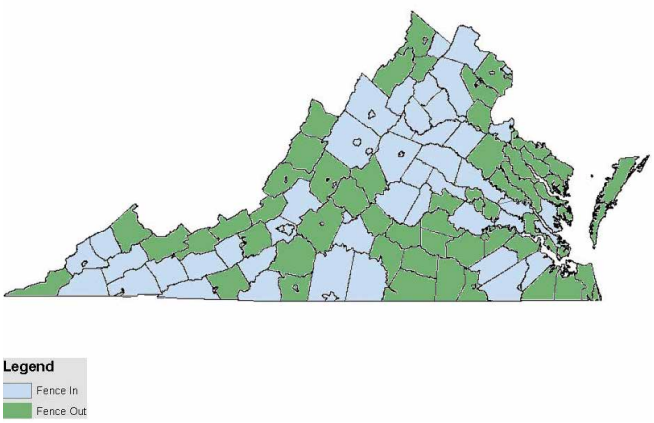

Figure 5: Current status of fencing requirements by county in Virginia. (Figure by USDA-APHIS Wildlife Services, Virginia office)

Because a portion of today's society enjoys hunting swine recreationally for the challenge presented and for food, participants are dedicated and passionate about maintaining the tradition and culture associated with hunting swine. Unfortunately, to bolster hunting opportunity, some participants have captured and then transported and released feral swine in places where swine had not existed previously. This activity is illegal (4VAC15-30-40-G) and contributes to spreading feral swine conflicts across the commonwealth. Although many participants believe that hunting helps keep feral populations under control, the reality is just the opposite: Swine that have been hunted become more skittish, are more likely to become nocturnal, and are much more difficult to locate and manage.

Extent and Severity of Damage

Feral swine create serious problems for farmers, gardeners, and livestock producers; estimates of agriculture-related losses attributed solely to feral swine have reached $1.5 billion annually in the U.S. Because swine forage by rooting (fig. 6), they destroy both the aboveground and belowground components of plants, which usually prevents the plants from resprouting or regenerating. This rooting also causes extensive damage to crops, hayfields, and pastures and often leads to erosion and a flow of sediments to adjacent waterways. Plants not eaten or uprooted are often destroyed by trampling.

Figure 6: Illustration of rooting damage caused by feral swine foraging in a suburban, residential neighborhood. (Photo is licensed under CC BY-NC-SA 2.0)

Swine also compete directly with livestock for food. In periods of reduced natural foods, they may attempt to defend and monopolize food put out for livestock. This can lead to aggressive encounters, sometimes resulting in injury. More importantly, these encounters increase the potential spread of disease. As noted earlier, swine are carriers of up to 45 types of diseases and parasites, many of which are transmissible to livestock. This increases the cost burden for producers in the form of greater testing, surveillance, and treatment. In cases of detected, reportable disease outbreak where quarantine or potential depopulation may be mandated, the financial impact on producers can be devastating.

The detrimental effects of feral swine are not restricted to rural areas. Feral swine are becoming more common in suburban communities, and they are not afraid to wander through private property and public spaces as they seek food. They can easily destroy expensive landscaping, lawns, and other grassy areas (e.g., recreational fields, parks, golf courses) from their rooting and trampling. As swine become comfortable settling into these suburban environments, there is an increased threat of disease transmission to pets and of aggressive encounters when swine attempt to acquire and defend food resources.

Aside from the negative effects inflicted on our communities and commodity production systems, feral swine also disrupt ecological systems and services. In addition to their destructive rooting behavior noted earlier, the thoroughness of their foraging can be so intense that the entire stockpile of acorns, other nuts, and fruits that falls to the ground — and on which many other native species depend — is depleted. This seed bank is also essential for successful forest regeneration. The disturbed forest soils left behind after rooting

provide a perfect seedbed for invasive plants to invade and assume dominance, leading to a less diverse forest. Additionally, swine will repeatedly rub against trees, ultimately wearing away the protective bark (known as "girdling") and killing the affected trees.

Management Options and Strategies

Given the severity and extent of damage caused and the potential threat of disease that this non-native species poses, the stated goal of natural resource management agencies in Virginia is to eradicate all feral swine from the environment. Although similar objectives have been accomplished in other states, success in achieving eradication in Virginia will take both time and the cooperation of all residents and surrounding states. In the interim, residents are encouraged to follow recommendations to reduce the growth and spread of swine populations and to avoid behaviors and/or activities that benefit swine populations.

First and foremost among these recommendations is the need to report any sightings of feral swine to the appropriate management authorities, such as the Virginia Department of Wildlife Resources or the Virginia office of the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services. Reports can be made anonymously through the Virginia Wildlife Conflict Helpline (toll-free: 855-571-9003).

Importance of Education

If the spread of swine is to be slowed, stopped, or even reversed, education is vital. People need to understand how, why, and where swine pose a threat and that this spread has increased primarily as a direct result of purposeful relocations and releases of swine by humans. Anyone who witnesses an illegal release or transport of feral swine should report that activity immediately. To report a suspected violation, call the Virginia Wildlife Crime Line at 800-237-5712 or email WildCrime@dgif.virginia.gov.

Management Techniques

As efforts to reduce and ultimately eradicate populations of feral swine are underway, simple husbandry and nonlethal options can help discourage feral swine. Reducing — and hopefully eliminating — access to pet foods left outdoors, discarded food wastes (e.g., compost), and unsecured garbage cans will discourage swine presence. On farms, adopting practices that prevent easy access to crops (e.g., fencing) or to livestock food dispensers make these areas less attractive to swine. Although fencing can be effective for protecting crops and livestock, it must be robust and well-constructed to withstand the force feral swine can exert; as such, fencing often is best suited for protecting small plots of land. Electrified fencing designs often perform better in excluding swine than non-electrified systems. Fencing that is effective against hogs can be expensive due to the higher quality material required and the level of maintenance needed to keep fencing functional.

Repellent strategies typically include three potential types: auditory (noise), visual (sight), and chemical deterrents. Auditory repellents involve loud noises such as threat alarms or predator calls, sirens, or concussive blasts (e.g., a propane cannon). Visual repellents involve use of bright or flashing lights or a physical device designed to scare away the offending animal by its resemblance to a potential predator. So far, no visual or auditory deterrents have proven successful in repelling swine over long periods of time. Chemical repellents operate by incorporating compounds that taste or smell bad or have an unpleasant texture when eaten. At the present time, there are no repellents registered by the Environmental Protection Agency for use on swine.

Vaccines are not available for many of the diseases harbored by feral swine. Nevertheless, pet owners and livestock producers should adopt the practice of keeping pets and livestock current on vaccinations and parasite treatments as a way to maintain their good health, especially in areas where swine are known to exist.

Lethal Options

Trapping with euthanasia is currently deemed the most effective and recommended population management approach, but additional methods are often necessary to handle especially hard-to-reach individuals. Based on reports of sightings and confirmation of swine presence from surveillance monitoring and on-site reconnaissance, heavily baited, large, corral-type enclosure traps are used to attract and capture feral swine (fig. 7). Because swine are notoriously cautious when anything new is introduced into their surroundings, baiting efforts often extend for several weeks before any capture is attempted. The objective of such a trapping effort is to capture an entire sounder at once and not allow any individuals to escape. Animals that escape learn from the experience and will be much more difficult to catch a second time, especially if a similar capture approach is used. "Judas hogs" (i.e.,

swine that have been caught, fitted with a radio tracking collar, and subsequently released) have proven useful in locating hard-to-find sounders. Although this technique is labor intensive and requires expensive radio-tracking equipment, it is an effective way to find small, hard-to-detect populations of feral swine because the Judas animal will often lead managers directly to the well-hidden sounder as it seeks to rejoin its kin.

Figure 7: Baiting a corral trap in preparation for capturing feral swine. (Photo by Jay Cumbee/U.S. Department of Agriculture)

In cases where only a single individual or just a few animals need to be captured, other trap designs may be better suited than a large corral design. Various box and/or cage traps are available, and each has unique advantages and disadvantages. Box traps tend to be bulkier and heavier, thereby making transport and setup more difficult, but they often prove more durable over time. They also tend to be more confining, which may make swine less likely to enter (fig. 8). Cage traps are less confining, lighter in weight, and easier to transport, but they can be more difficult to use (i.e., removing captured individuals or releasing nontarget species inadvertently captured) (fig. 9). Great variety also exists in the type of entryway closures used on these traps, which may include drop door panels, numerous versions of swinging or spring-tensioned gates, or having an entire suspended trap drop from above (e.g., BoarBuster™). Traps fitted with video cameras and remote-controlled closure-release technology have improved trapping success significantly and reduced nontarget captures. Managers can monitor the movements of swine in and around a trap site remotely via cell phone. If the manager sees that the entire sounder has entered the trap, the release to close the door on the trap can be triggered with a click of a link on the phone while being miles from the capture site.

Figure 8: A type of portable box trap suitable for capturing a single feral swine. (Photo is licensed under CC BY-NC-SA 2.0 Stuart Borrett)

Figure 9: A cage trap used to capture multiple feral swine at a time. Photo is licensed under CC BY-NC-SA 2.0 St. Vincent Volunteers)

Snares are sometimes employed to catch swine left behind after conducting a bait and trap program, usually when several members of the sounder avoided capture during the trapping effort. Snares can be problematic due to the potential risk of catching nontarget animals. Special precautions may be necessary to minimize this risk (e.g., use of wire locks to prevent the snare from closing all the way) and to ensure that snare deployment techniques (e.g., loop size and height aboveground) comply with applicable state regulations.

Shooting is often promoted as a cost-effective, easy, and selective method of population management. Despite these advantages, when used alone, shooting is not an effective long-term option for several reasons. Because shooting can eliminate only one animal per shot taken, it is impossible to remove an entire sounder before the remaining individuals scatter at the sound of the

first shot. Even with multiple shooters, eliminating the entire sounder rarely occurs. In addition, those that escape now become harder to kill once they associate shooters with guns as a threat. However, when used as a "mop-up" tool after conducting a trapping program, shooting may prove useful to remove a small number of wayward individuals from the original sounder. Aerial shooting has been used in some states to locate and remove especially difficult to find feral swine. The Code of Virginia prohibits aerial shooting, but a special waiver was recently granted for its use to assist in the eradication of a problematic population of feral swine when all other methods have failed. Where aerial shooting is to be used, helicopters are preferred because they fly slower and allow greater maneuverability than fixed-wing planes. Aerial shooting is expensive, and costs associated with this service can exceed $1,000 per hour of flight.

Currently, there are no registered toxicant products designated for use on feral swine in the United States. Kaput, a warfarin-based, anticoagulant toxicant temporarily received pesticide registration in 2017, and several states allowed its use on wild swine. However, following vocal opposition against its use from within the scientific community, states that previously had allowed its use subsequently retracted approval. Recently, researchers at the USDA have found that sodium nitrite may be effective as a toxicant; however, much work remains before this product would be registered for use on swine, especially in refining methods of product delivery and administration.

Conclusion

Feral swine represent a serious threat that needs immediate attention to slow and hopefully stop their expansion throughout Virginia. Given the mandate adopted by the state's natural resource management agencies, the presence of any sightings of suspected feral swine should be reported immediately to the Human Wildlife Conflict Helpline so that managers can begin to implement removal activities. In the interim, residents should refrain from actions that enhance or enable swine to prosper and should report suspected illegal transport and release of swine to the proper wildlife authorities. Due to uncertainties about ownership, individuals are encouraged not to attempt killing what might appear to be feral animals on their own, but instead to inform wildlife authorities and let them ascertain the true status of those animals.

Resources

Resources Used

Duncan, B., and D. Schwab. 1986. "Virginia's Bay of Pigs." *Virginia Wildlife* 47 (8): 16-21.

Forehand, C. Unpublished manuscript. *Annual Update on Feral Swine Management Activities in Virginia: July 1, 2018-June 30, 2019*. USDA-APHIS-WS Report.

Linzey, D. W. 1998. *The Mammals of Virginia*. Blacksburg, VA: McDonald and Woodward.

Proctor, A. 2012. "Feral Hogs: Trouble on the Horizon." *Virginia Wildlife* 73 (6): 20-21.

Whitaker, J. O., Jr., and W. J. Hamilton Jr. 1998. *Mammals of the Eastern United States*. Ithica, NY: Comstock.

Additional Resources Available to Readers

For those interested in learning more about feral swine and the issues associated with them, the following links provide access to a series of USDA publications that discuss the issues highlighted in this publication in more detail.

Feral Swine: An Overview of the Problem – www.aphis.usda.gov/publications/wildlife_damage/bro-feral-swine-overview.pdf.

Feral Swine: Damages, Disease Threats, and Other Risks – www.aphis.usda.gov/publications/wildlife_damage/fsc-feral-swine-risks.pdf.

Feral Swine: Disease Risks to Livestock – www.aphis.usda.gov/publications/wildlife_damage/fs-disease-risk-livestock.pdf.

Feral Swine: Impacts on Game Species – www.aphis.usda.gov/publications/wildlife_damage/fsc-feral-swine-impacts-game-species.pdf.

Feral Swine: Impacts to Native Wildlife – aphis.usda.gov/publications/wildlife_damage/bro-feral-swine-impacts.pdf.

Feral Swine: Impacts on Threatened and Endangered Species – aphis.usda.gov/publications/wildlife_damage/fsc-feral-swine-impacts-tes.pdf.

Identifying and Reporting Feral Swine – www.aphis.usda.gov/publications/wildlife_damage/fsc-feral-swine-id.pdf.

Landowners who seek additional information about feral swine also may want to examine the following.

A Landowner's Guide for Wild Pig Management: Practical Methods for Wild Pig Control – researchgate.net/publication/235985106_A_Landowner%27s_Guide_for_Wild_Pig_Management_Practical_Methods_for_Wild_Pig_Control.

Managing Wild Pigs: A Technical Guide – www.aphis.usda.gov/wildlife_damage/feral_swine/pdfs/managing-feral-pigs.pdf.

.

Visit our website: www.ext.vt.edu
Produced by Virginia Cooperative Extension, Virginia Tech, 2022

VT/0322/CNRE-146P