Arkansas Post National Memorial Gillett, Arkansas National Park Service U.S. Department of the Interior



Feral Hog Management Plan Arkansas Post National Memorial











## FERAL HOG MANAGEMENT PLAN

## FOR

## ARKANSAS POST NATIONAL MEMORIAL

June 2012

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## **Review Record**

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Comment [EEW1]: Suggest changing the header to a single line: Feral Hog Plan\_\_\_\_\_Arkansas Post National Memorial

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#### **Purpose and Need**

This plan has been developed to guide in the creation of strategies and tactics to manage feral hogs on Arkansas Post. This plan is intended to be a living plan with review and revision every two years from the date of approval. Each revision will be accompanied by a description of changes. These descriptions of changes will be placed in Appendix X. Revision dates will be designated by the date of signature on the Review Record at the front of the plan.

#### **History**

Feral hogs (*Sus scrofa*) include pure Eurasian wild boar, domestic hogs, and mixtures of bloodlines that fall in between the two extremes. Feral hogs were first introduced into America by Spanish explorers in the late 1400's (Salway, 2009). During the late 1800's and early 1900's Eurasian wild boar and feral pigs were commonly released in New Hampshire, the Carolinas, Tennessee, and as far west as California (Salway, 2009). Feral hogs are now reported in 38 states (Fogarty, 2007). The highest concentration is in the southeastern Gulf Coast Region and California (Southeastern Cooperative Wildlife Disease Study, 2007). Biologists have estimated the population of feral hogs in the United States to be roughly 4 million and rapidly increasing (Salway, 2009).

#### **Identification**

The collared peccary (*Tayassu tajacu*), also known as javelin (HAV a lee nah), is the only pig native to North America and is restricted to desert and thorn-scrub habitats of New Mexico, Arizona, and sections of Texas. Formerly it ranged as far north as the Red River on the Texas and Oklahoma state borders, and as far east as the Brazos River. Domestic hogs and wild boars both belong to the genus *Sus* (Masterson, 2007). Some authors reserve *Sus scrofa* for the wild boar and call the domestic hog *Sus domesticus*, while other authors call the domestic hog *Sus scrofa domesticus*. Since the domestic hogs and wild boars interbreed freely, and the absolute genetic identity is irrelevant for management purposes, in this plan both wild boar and domestic hogs will be called *Sus scrofa*.

Feral hogs are covered in coarse, bristle-like hair that can range from dark grey to brown (Barrett et al., 2005). Adults range from 29.4 kg to 113.4 kg (65 lbs to 250 lbs), but can be in excess of 181.4 kg (400 lbs) in some cases. Their size and conformation depend on the breed, degree of hybridization with wild boar, and level of nutrition during their growing period (Barrett et al., 2005). Compared to the feral hogs, wild boars have longer legs and larger heads with longer snouts. Young boars generally have a reddish-brown color with longitudinal black stripes. As the young mature, the animals lose their stripes and the red hair changes to brown and eventually black (Barrett et al., 2005). Both the male feral hog and the wild boar have four continuously growing tusks, one in each quadrant of the jaw, throughout their life. Hybridization among wild boar and feral hogs has resulted in a very diverse mix of the species (Barrett et al., 2005).

Feral hog tracks could prove difficult to identify because of their similarity to some of the native animals (See Figure 1 below). They can be easily mistaken for white-tailed deer or, in the southwest and Texas, for the javelina.



Figure 1. Courtesy of the Texas Parks and Wildlife Department

### **Communication and Perception**

Smell is the most developed of any of the feral hog's senses. The snout has extra flexibility due to a large, round disk of cartilage that is attached to its muscle (Nowak, 1991). Feral hogs also have a heightened sense of taste. They can readily identify unknown objects through these enhanced senses. It is widely believed that their eyesight is poor. Their eyes are positioned to the side of the head, thus limiting their forward viewing (Nowak, 1991). These animals are also known to be highly intelligent (Nowak, 1991). Feral hogs also vocalize with grunts and squeals but the extent of their communication abilities has not been studied extensively.

### <u>Habitat</u>

Feral hogs can thrive in a wide variety of habitats from tidal marshes to mountain ranges. They prefer dense brush or marsh vegetation for cover purposes. They are typically restricted to areas that remain above freezing temperatures and below the snowline during the winter (Whitaker, 1988). Mast-producing hardwood forests are optimal areas but they will inhabit conifer forests as well. Feral hogs will also frequent livestock-producing areas. They will use open range and pastures, typically at night, but normally only if the human activities are minimal. In the warm summer months, hogs will spend a great deal of time wallowing in ponds, creeks, or streams, usually under cover of foliage (Whitaker, 1988). Here at Arkansas Post the bottomland hardwood forests, former agricultural fields in secondary stages of ecological succession, and riparian areas near streams and bayous are favorite cover of feral hogs within the park (personal observations of Sarah Allely and David Evans).

#### Food

Feral hogs are omnivores being that their generalist diet ranges from grains to mammals. They feed on roots, tubers and other buried vegetation during wet periods or when near underground streams and rivers. Acorns and other mast make up the greatest portion of their diet when available (Peine et al., 1990). Feral hogs will gather in oak forests when acorns fall and their movement will considerably decline during this time of food abundance (Singer et al., 1984). During poor mast years, feral hogs increase their range and increase the amount of buried vegetation and invertebrates consumed. It is during these times that they are more likely to turn to predation and kill vertebrates for food (Peine et al., 1990). Small goats, calves, lamb, and deer have been found in the opened stomachs of captured feral hogs (Singer et al., 1984).

#### **Reproduction**

Feral hogs are the most prolific large mammal in North America (see Figures 2, 3 and 4). Given adequate nutrition, a feral hog population can double in as little as four months (Mapston, 2004). In Arkansas's temperate climate the reproductive activity of feral hogs is limited to spring. In tropical climates, the species can reproduce year-round. The peak breeding period always coincides with the rainy season, regardless of location (Nowak, 1991). During the first year of life, both sexes reach sexual maturity- between 8 to 12 months for males and 5 to 8 months for females. Despite the early maturation of females, they typically do not breed until 18 months of age. Male breeding success comes much later at full maturity, which comes typically around age five (Johnson et al., 1982). Males remain solitary except during the breeding season while the females and young tend to remain in groups called "sounders." Females will leave the sounder to nest and give birth. A litter can produce between 3 and 12 young and the females produce 1 to 2 litters each season throughout their lives. Gestation can vary between 100 and 140 days (Whitaker, 1988). Young are weaned in 3 to 4 months and they usually leave their mother before the next litter if multiple litters occur that season (Nowak, 1991).



Figure 2. Courtesy of the Southeastern Cooperative Wildlife Disease Study www.feralswinemap.org







Arkansas Post National Memorial Feral Hog Management Plan

### **Legal Definitions**

The Arkansas Code Annotated has numerous references to feral hogs. Because these can change from legislative session to legislative session, they have been placed in Appendix A which will be updated every two years as the plan is reviewed

### **Disease and Transmission**

Feral swine are susceptible to, and can be carriers of a wide range of infectious diseases that are detrimental to wildlife populations, livestock and humans (Choquenot et al. 1996). Table 1 shows an overview of the most common diseases found in feral hogs in the United States.

**Table 1**. This is a partial list of viral and bacterial diseases associated with feral swine(Compiled by Witmer et al. (2003) from Williams and Barker (2001) and Hutton et al.(2006) in Rouhe and Sytsma (2007)).

Viral Diseases	Bacterial Diseases
Bovine Herpes virus	Anthrax
Classic Swine Fever	Brucellosis
Corona viral infections	Erysipelothrix infections
Encephalomyocarditis	Helicobacter
Foot-and-mouth disease	Letpospirosis
Influenza A	Bovine tuberculosis
Louping-ill virus	Pasteurellosis
Malignant Catarrhal fever	Plague
Menangle virus	Salmonellosis
Papillomavirus infections	Yersiniosis
Parainfluenza virus	
Pestvirus infections	
Pseudorabies	
Rabbit hemmorrhagic disease	
Rinderpest	
San Miguel sea lion virus	
Swinepox	
Swine vesicular disease	
Vesicular swine virus	
Vesicular stomatitus	

The most important diseases these animals carry are more fully discussed in Appendix B.

### **Impact on Flora and Fauna**

Feral hogs can negatively impact the ecosystems they inhabit. Wallowing and rooting can destroy herbaceous undergrowth, ruin crops and native vegetation, and can affect quality of

nearby sources of water (Wolf et al., 2003, Whittaker, 1988, Kaller et al., 2007). Rooting by pigs disturbs the seed bank, alters the soil by increasing soil temperature, and reduces surface vegetation. This in turn can also increase or decrease the nitrogen content of soils, increase oxidation, and increase the leaching of calcium, phosphorous, zinc, copper and magnesium (Wolf et al. 2003, Kaller et al., 2007). Rooting can also create large unattractive open spaces, reduce perennial cover and increase the growth of non-native, invasive annual and perennial plants (Wolf et al., 2003). When vegetation and undergrowth is removed from large portions of a watershed, it increases the runoff into adjoining bodies of water. The lack of vegetation and increased runoff causes increased turbidity and decreased water quality. Feral hogs lack sweat glands and will, therefore, stay closer to bodies of water during the summer to help maintain their internal temperature. Rooting in streams, rivers, and ponds is also very common among feral hogs. They have been known to decimate populations of freshwater mussels in other areas of the country (Kaller et al., 2007). Rooting in ponds and ephemeral ponds such as road ruts can upset the reproductive cycle of several species of amphibian as they rely on these fish-free habitats to ensure adequate recruitment. These omnivores will also prey on other aquatic plant and animal life, thus, disrupting the local food web. However, this makes up only 5% of their total diet on average (Wood, 1997). Feral hogs also prev on other types of local wildlife found in and around the Arkansas Post, including snails, salamanders, and turtle eggs. The Great Smoky Mountains National Park suffered a dramatic decrease in diversity among snails and salamanders due to feral hog predation. Most notably, an estimated 80% loss of red-cheeked salamanders (Plethodon jordani) and Jones middle-toothed snails (Mesodon jonesianus) has occurred. While feral hogs could not be proven to be the sole cause of these losses, the evidence is stacked greatly against them (Peine et al., 1990).

This is an excerpt from a research paper written by Michael D. Kaller and his colleagues at Louisiana State University regarding water quality and feral hogs:

"Hunter harvester data suggests that feral hogs (Sus scrofa) of western Louisiana are increasing, and population control in this region is complicated by the mixing of feral and domestic free-range hogs. Aggressive management may be warranted as feral and domestic hogs appear to be having unexpected effects on their ecosystem. We present the results of 3 recent investigations of genetic source-tracking to link waterborne bacteria with bacteria from feral hogs. We integrate our most recent findings with data regarding: (1) water shed quality in a watershed without hog management and (2) aquatic biota of the same watershed. Hog activity substantially increased waterborne bacteria, which often exceeded state and federal surface water guidelines. Aquatic biota, specifically freshwater mussels and aquatic insects of the collector and scraper feeding guilds, declined in stream reaches with hog activity. Finally, PCR (polymerase chain reaction)-based DNA source-tracking revealed a >95% similarity between coliform bacteria isolated from water and bacteria isolated from the feral hog and water were compared with 900 other bacteria samples from a variety of domestic animals and wildlife, the bacteria isolated from the feral hog and water differed from the 900 other samples. These data suggest that the increasingly abundant hogs of western Louisiana are not only causing detriment to terrestrial flora and fauna, but are negatively impacting

native freshwater mussels (*Bivalvia unionacea*) and insects as indicated by genetic source-tracking methods." (Kaller et al., 2007)

Hard mast is the production of hard-shelled seeds that accumulate on the forest floor. Mast is an essential food source for many native species, including white-tailed deer and turkey, and the presence of feral hogs threatens this resource (Mapston, 2004). Seriously reducing the amount of hard mast available to other local wildlife will threaten their survival during the winter months (Singer et al., 1984).

Local land owners around the park can also suffer damage to fences, irrigation, gardens, and agriculture from feral hogs. One study that covered 40 counties in California calculated a loss of \$1,730,000 in crops due to feral hog damage (Frederick, 1998). Cooperation with local land owners will be essential in dealing with the problem at Arkansas Post due to the extent of adjoining properties. This cooperation can manifest itself in several ways. Park neighbors can contact the Visitor Center when they see feral hogs, or suspect they are being transported in and dumped. Park neighbors can also fence their property in such a way as to impede the movement of feral hogs across the landscape. Park neighbors can also establish their own eradication problem program on their property, depleting the population much faster than if the park acts alone.

### **Impact to Visitors**

The mission of Arkansas Post National Memorial is to commemorate human settlement near the confluence of the Arkansas and Mississippi Rivers and the events associated with the first European settlement in the Lower Mississippi River Valley by interpreting and fostering an appreciation of the interaction of the cultural groups, their histories, and their significance to the region; preserving the cultural and natural resources; and promoting resource stewardship through education.

The cultural and natural resources located within the Osotouy unit of the park are being threatened and damaged by feral hogs and the possibility for infestation at the Memorial Unit exists. It is required by law that National Park Service employees protect and preserve these resources for future generations. <u>The</u> Osotouy is a unit of the park is located in Arkansas County near Nady, Arkansas. Osotouy is the name of a former Quapaw village and is believed to be the location of the first post established by Henry de Tonti in 1686. Situated within this unit of the park is a cluster of Native American burial and ceremonial mounds known as the Menard Mounds. Several artifacts have been recovered from the excavation of this site. The mounds remain partially intact today, but are currently grown up with trees and dense vegetation. During the 1940's and 1950's the site was excavated by archeologists and many artifacts such as pottery, glass beads, and tools were recovered. Over 20 burials were found during the excavation, but some had been robbed of the artifacts. Over the years vandalism and looting have occurred within this unit damaging historical and cultural artifacts.

Many efforts have been exhausted to maintain and preserve the condition of these mounds. Today, the biggest threat to the condition of the mounds is feral hogs. Feral hogs are rooting, trampling, wallowing, and rubbing all around the mounds. No evidence has suggested that the hogs have rooted on the mounds, but there are hog signs all over the area. <u>This r</u>Rooting, wallowing, and trampling disturb and compact the soil, which in turn disturbs cultural artifacts buried in the ground. In order to protect these resources it is crucial that some form of feral hog management be implemented.

Arkansas Post is known for its spectacular scenery, varied canoeing opportunities, extensive hiking and horseback trails, fishing, wildlife viewing, and historical sites. All of these features and values are affected by the presence of feral hogs. Feral hogs are drawn to the river during the warm months to help regulate their internal temperature, which increases the probability of rooting along the river banks and threatens the aquatic life they prey upon. This damage to the river banks can be ecologically disastrous, and reduces the aesthetics of the river itself. The hogs have already begun damaging hiking and horseback trails. They have not yet attacked a visitor, but the potential for such an encounter is present. There is a documented case of a deer hunter in Cherokee County, Texas, who died from a feral hog attack (Burns, 1998). This was an isolated incident, but with hogs can become dangerous when they <u>feelfeel</u> they or their offspring are being threatened. Feral hogs can weigh over 250 pounds, have long tusks, and run up to 30 mph for short stretches. (Salway, 2009). Feral hogs have been observed to be the most territorial during the winter months. The scarcity of food causes male hogs to aggressively defend areas that are rich in acorns or other typically sought after food (Wood, 1977).

### Management

The most effective management strategies incorporate a combination of tactics to combat feral hog populations. These tactics includes shooting, live trapping, hunting with dogs, fencing, and public awareness efforts. In the state of Texas, federal and state agencies incorporate aerial shooting in their arsenal when dealing with feral mammals (Mapston, 2004).

#### <u>Shooting</u>

Hunting is less effective when there is an abundance of food resources for feral hogs, lessening their need to take risks and scavenge in open areas. Feral hogs quickly become aware of hunting pressure and avoid certain locations or feed only at night (Kammermeyer et al. 2006). Trying to be random and avoid repeatedly hunting in the same area or at the same times in a general area is beneficial to avoid habituation of the hogs. Utilizing a variety of stand hunting, stalk hunting, changing hours, and locations (Kammermeyer et al. 2006) will make this method of control more effective. AGFC regulations must be followed unless hunting is done by qualified staff working under the direction of this plan.

**Comment [STA2]:** Not sure if we need to keep this sentence since we will only be using qualified staff.

#### **Trapping**

Trapping success is going to be correlated with food availability. For this reason fall, winter, and early spring are generally the best time to trap feral hogs. These are the periods of high competition for food resources. Pre-baiting the trap site is very important to ensure successful trapping. Pre-baiting allows the feral hogs to grow accustomed to feeding at a specific location. Baiting at a location for several days prior to constructing a trap is suggested. If possible, the trap should be built in phases over a period of weeks, allowing the hogs to become accustomed to the sights of the trap and the smells of humans. Bait should be distributed a good distance away from the trap location leading back to the entrance. Hogs will cut across the bait trail and follow it to the feast at the trap location.

#### Hunting with Dogs

Well trained tracking and catch dogs can be invaluable in hunting operations. They can either wind or cut the trail of a hog or band of hogs. Once on the trail, the tracking dogs can quickly find the hogs at which time catch dogs can be used to restrain the lead hogs. The Ozark National Forest has been using hunters with dogs under a very limited program with reasonable success. There are a few potential negatives to hunting with dogs. First is to ensure the dog will track and chase hogs, not other wildlife such as deer and elk. Second, dogs often get injured by the hogs. Third, the hunters have to be absolutely dedicated to reducing the feral hog population. Some hunters use their catch dogs to live capture hogs for sale or transport to new areas, establishing new populations, or enhancing existing populations in the process.

#### **Fencing**

Fencing with hog wire has proven an effective method to localize hog movements in specific areas, and to keep hogs out of critical habitat. Fencing with hog wire impacts other species by limiting their free movement in or out of the park. For this reason, this plan only recommends fencing for limited areas to prevent hog predation and impacts on specific critical resources or habitat. Electric Fencing....

#### Public Awareness and Education

It is imperative to interpret the real and potential negative impacts feral hog populations have on park and neighboring lands. Swine farms are not common in the area, though a few do exist. Cattle farming remain an economic driver in the local economy. Cattle farmers are at risk from pseudorabies infections, pasture damage, and fence damage caused by free roaming bands of feral hogs. Row cropping is prevalent in the area and feral hogs can have devastating economic impacts on crops and household gardens. A small herd of hogs can destroy a garden in a matter of hours. Feral hogs also dig extensively in hay meadows and pastures, especially when rooting out the rhizomes of Johnsongrass (*Sorghum halepense*) one of their favored food sources and a primary warm season forage grass in much of the area. Feral hogs also destroy the ground nesting bird nests. These include such iconic species as whippoorwill, wild turkey, and bobwhite quail. Feral hogs impact springs, streams, and riparian areas, fouling the water with mud and feces. This is a problem for some of the more rural areas where surface streams and springs are still used as domestic water sources.

#### Research

**Comment [STA3]:** I would leave this in just to keep it on the table if we decide to try this method in the future.

**Comment [STA4]:** We need to discuss how we are going to address this.

Research to further our understanding of hog behavior and impacts to the ecosystems found in Arkansas Post is very important. Baseline data will be collected on the wild hog herd:

- Each captured or killed hog will be documented with a variety of characteristics including: sex, weight, sexual maturity, tusk length, and height.
- Blood samples will be taken when possible to further document diseases and blood-borne pathogens.
- The feral hog damage database will be updated and maintained routinely.
- Innovative ideas should be considered to help further knowledge of feral hog movement and range. For example, the "Judas pig" technique is one method to consider.

#### **Recommendations**

#### Field Surveys

Field surveys of hog damage will be conducted by staff from all of the field going divisions. The surveys can be done on a simple form. This form and the survey will be explained each year at employee orientation, or division meetings as appropriate. The completed forms will be sent to the Resource Management Division for entry into the database which is linked to the Geographic Information System. Pictures by the reporting party will be encouraged. These pictures will be hyperlinked to the database.

Non-routine surveys may also be required to get an understanding of the extent and location of a band of feral hogs for control operations. These non-routine surveys may be done with the assistance of all park divisions.

#### Trapping

Trapping will be utilized and is generally most effective during the fall and winter when there is a significant decrease in availability in food resources within the park. The following website: <u>http://www.agfc.com/species/Documents/hog\_trap\_flier\_web.pdf</u> gives pertinent information regarding how to build corral traps.

### **Hunting**

Hunting should be engaged in throughout the year, but especially during the fall and winter seasons. Switching up locations and times of hunting would be beneficial to limit any patterns that can be detected by the feral hogs. Hunting can be done in concert with baiting. AGFC regulations must be followed unless hunting is done by qualified staff working under the direction of this plan.

### Hunting with Dogs

Hunting with dogs under contract may be allowed on a case-by-case basis in certain areas. The contract language and scope of work should require the posting of a bond by the contractor to protect the government from rogue hunters and ensure all hogs taken are killed.

### **Baiting**

**Comment [STA5]:** We had discussed not using hunting as a control method, but may want to leave it in here as an option in the future.

Baiting is an essential component in attempting to identify areas with feral hog activity. A variety of bait combinations have been employed. Currently the following list of bait mixtures have worked:

- Dry corn mixed with strawberry jello powder.
- Dry corn, apples and strawberry jello powder mixed in a container and set for a few days.
- Expired beer mixed with dry corn and set for two days, followed by the addition of strawberry jello powder and apples.
- Dry corn and snow cone syrup (strawberry, cherry, etc.) mixed together.
- Dry corn and vanilla extract mixture mixed together.

With all of the bait mixtures, it is recommended to use catfish cheese to ward off deer and smaller mammals from eating the bait. The cheese will help by releasing a strong scent that feral hogs will find difficult to resist. Place some cheese against the bark of trees around the bait site and make a trail leading back to the bait site and/or trap. Employing the same method with the bait mixture is also a recommendation. The bait pile in the trap should be far from the door, near the trigger.

### Carcass Removal

Once a hog has been successfully captured and/or killed, carcass disposal will become a priority. Depending on the location of the carcass, and the number of carcasses, they may be either left to decompose, or be dragged off to an out of sight, or away from water site. Because hogs are omnivores, they will scavenge kill sites, possibly resulting in greater catch/kill success. Generally, butchering of the hogs by park staff is not recommended as the risk of contracting disease is too great. If the carcass is moved, the use of personal protective equipment (PPE) is mandatory.

#### Blood Sampling

When a feral hog is captured/killed, blood samples will be taken when feasible. Supplies for blood collection can be procured from USDA Animal and Plant Inspection Service (APHIS)

Clint Turnage with USDA-APHIS suggests collecting blood samples from under the right foreleg in an attempt to puncture the heart. If that does not work, going through the rib cage or breastbone area should guarantee access to the heart for collection. There are three other locations on a hog that can produce an access point for blood collection: the ears, neck area and the tail. The ear can become an ideal spot because there are at least three prominent veins located there (Framstad et al., 2000). The external jugular vein in the neck region and the tail vein are both good areas to get sufficient samples (Framstad et al., 2000). To get an idea of the proper place to insert the needle if deciding to go for the jugular vein please view the photo:



**Comment [STA6]:** We do not have the necessary equipment to do this as written here (centrifuge and storage facility). I suggest we change this section to cover having Clint Turnage/APHIS assist us in hog removal and that they will do sampling as a part of their work.

Concerning the tail vein, the best course of action to ensure a successful collection is to hold the tail up and to try and stick the needle at a 45° angle (Framstad et al., 2000). The caudal vein runs right under the tail in a groove next to the artery so this is also a simple access point and the placement of the needle is shown on the following photo:



Fill two vials, label them, and photograph of the pig the sample was taken from. Use a biohazard container to discard needles and place gloves and used syringes in biohazard and sharps containers respectively. Record the data on the blood sample datasheets provided. Data that must be entered onto the data sheets includes date, vial number(s), description of the hog, sex, age, and collector. Samples must be centrifuged for ten to fifteen minutes. The sample tubes are then wrapped with paper towels, and place in plastic bags. The bag(s) and datasheet(s) are placed in shipping envelopes and sent to APHIS. Copies of the datasheets will be used to enter data into the feral hog database. Speed is a very important aspect for successful blood samples collection. Hog blood coagulates very quickly, within several minutes. *Environmental Requirements* 

Appendix I contains the environmental documentation required for this plan

### ACKNOWLEDGEMENTS

This plan would not be possible without the dedicated effort of Patrick A. Jarrett and Katherine Hernandez, both Student Conservation Association interns, who dedicated a summer working on the feral hog problem, researching, trapping, and developing a draft plan.

Comment [EEW7]: Are these folks from BUFF? Comment [EEW8]:

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## Arkansas Post National Memorial Feral Hog Management Plan Appendix A Arkansas Code Annotated References to Feral Hogs

### 2-38-501 Definition

- (1) "Feral hog" means any hog of the species Sus scrofa, including a Russian or European wild boar, that is roaming freely upon public land or private land:
  - (A) That is not enclosed with a fence sufficient under § 2-39-101 et seq.; and
  - (B) Without the landowner's permission;
- (2) (A) "Feral hog" does not include a stray domestic hog that has escaped from domestic confinement for less than five (5) calendar days.

(B) If the owner of the stray domestic hog provides notice of the escape to all adjacent landowners within five (5) calendar days of the escape, the stray domestic hog is not considered a "feral hog" for an additional ten (10) calendar days following the initial five-day period; and

(3) A "feral hog" is deemed to be domestic livestock.

#### 2-38-502. Hunting.

Notwithstanding any provision of this chapter, any person may take and kill a feral hog except that:

(1) A feral hog taken on public property during any established hunting season must be taken with a weapon and method allowed for that hunting season;

(2) A feral hog may be taken on any land where the hunter has legal access unless prohibited by the landowner; and

(3) No person whose hunting license is revoked may take or kill a feral hog during the period of the revocation.

### 2-38-503. Animal health requirements.

A feral hog shall be subject to animal health requirements established by the Arkansas Livestock and Poultry Commission.

### 2-38-504. Releasing hogs into the wild.

(a) Unless the landowner has consented, any person who knowingly releases any hog to live in a wild or feral state upon public land or private land is in violation of this section.

## Arkansas Post National Memorial Feral Hog Management Plan Appendix A Arkansas Code Annotated References to Feral Hogs

(b) Any person who violates this section shall be guilty of a violation and upon conviction shall be subject to a fine not to exceed five hundred dollars (\$500).

### 2-39-110. Liability for injuring animals.

If any person damaged for the want of a sufficient fence shall hurt, wound, lame, or kill, or cause the same thing to be done by shooting, hunting with a dog, or otherwise, any animal mentioned in this chapter, with the exception of a feral hog, the person shall be liable to the owner of the animal for double damages, with costs.

#### Pseudorabies

From Wikipedia, the free encyclopedia

Pseudorabies			
Virus classification			
Group:	Group I ( <u>dsDNA</u> )		
Family:	<u>Herpesviridae</u>		
Genus:	<u>Varicellovirus</u>		
Species:	<b>Pseudorabies virus</b> (Suid herpesvirus 1 (SHV-1))		

**Pseudorabies** is a <u>viral</u> disease in <u>swine</u> that is <u>endemic</u> in most parts of the world. It is caused by *porcine herpesvirus 1*, which is also called pseudorabies virus (PRV) or suid herpesvirus-1 (SHV-1) and is also known as **Aujeszky's disease**, and in cattle as **mad itch**. PRV is considered to be the most economically important viral disease of swine in areas where <u>hog cholera</u> has been eradicated.<sup>[11]</sup> Other domestic and wild <u>mammals</u>, such as <u>cattle</u>, <u>sheep</u>, <u>goats</u>, <u>cats</u>, <u>dogs</u>, and <u>raccoons</u>, are also susceptible. The disease is usually fatal in these hosts.<sup>[2]</sup> Research on PRV in pigs has pioneered animal disease control with genetically modified vaccines. PRV is now extensively studied as a model for basic processes during lytic herpesvirus infection, and for unravelling molecular mechanisms of herpesvirus neurotropism.<sup>[3][4]</sup> Although the word "pseudorabies" means "false rabies," or "rabies-like," it is a misnomer.

Pseudorabies is related to the herpes virus, not the rabies virus.

### History

The earliest reports of a disease suspected to be pseudorabies were in 1813 in the <u>United States</u>. These reports described a condition in cattle characterized by severe itching and called *mad itch*. In 1902 a <u>Hungarian veterinarian</u>, <u>Aladár Aujeszky</u>, isolated PRV from a dog, ox, and cat and showed that it caused the same the disease in swine and <u>rabbits</u>. The name *pseudorabies* came from the symptoms similar to rabies that it caused in rabbits.<sup>[5]</sup>

### **Disease overview**

The virus is shed in the saliva and nasal secretions of infected swine and is spread through oral or nasal contact. <u>Aerosolization</u> of the virus and transmission by <u>fomites</u> also may occur. The virus may potentially survive for seven hours in humid air and spread up to two kilometers. Furthermore, it may survive on well water for up to seven hours, in green grass, soil, and feces for up to two days, in contaminated feed for up to three days, and in straw bedding for up to four days.<sup>161</sup>

Diagnosis is made through an <u>ELISA</u> test. Vaccines are available for swine (<u>ATCvet</u> codes: <u>QI09AA01</u> inactivated, <u>QI09AD01</u> live, plus various combinations).<sup>[7]</sup> There are eradication programs in the United States and the United Kingdom. In 2004 the commercial swine population of the United States was declared free of pseudorabies, but the disease remained in feral pig populations.<sup>[8]</sup>



Wild pigs tested seropositive for pseudorabies in the United States in the olive shaded states

### **Symptoms**

Swine are usually asymptomatic, but PRV can cause abortion, high mortality in piglets, and coughing, sneezing, fever, constipation, depression, seizures, <u>ataxia</u>, circling, and excess salivation in piglets and mature pigs. Mortality in piglets less than one month of age is close to 100 percent, but it is less than 10 percent in pigs between one and six months of age. Pregnant swine can reabsorb their litters; deliver mummified, stillborn, or weakened piglets.<sup>[9]</sup> In cattle, symptoms include intense itching followed by neurological signs and death. In dogs, symptoms include intense itching, jaw and <u>pharyngeal</u> paralysis, howling, and death. In cats, the disease is so rapidly fatal that there are usually no symptoms.<sup>[11]</sup> Any infected secondary host generally only lives two to three days.<sup>[6]</sup>

### Species

Populations of <u>wild boar</u>, or feral hogs (*Sus scrofa*), in the U.S. commonly contract and spread the virus throughout their range. Mortality is highest in young piglets. Pregnant sows often abort when infected. Otherwise healthy male adults (boars) are typically latent carriers, that is, they harbor and transmit the virus without displaying symptoms or suffering disability.<sup>[10]</sup> Swine (both domestic and feral) are usual reservoirs for this virus, though it does affect other species, often with high mortality. Pseudorabies has been reported in other mammals, including brown bears, and <u>black bears</u>, <u>Florida panther</u>, <u>raccoons</u>, <u>coyotes</u>, and whitetail deer. In most cases, contact with pigs or pig products was either known or suspected. Outbreaks in farm fur species in Europe (<u>mink</u> and <u>foxes</u>) have been associated with feeding infected pig products. Many other species can be experimentally infected. Humans are not potential hosts.<sup>[11]</sup>

### Transmission

Pseudorabies is highly contagious. In most cases, this disease is transmitted through nose to nose contact. Nose to nose contact is the most common type of transmission because Pseudorabies is mostly present in nasal and oral areas. This disease can wipe out entire herds.

### Prevention

Pseudorabies vaccines are not available in the United States. To prevent this disease from occurring, basic farm biosecurity procedures are recommended.

### **Applications in Neuroscience**

PRV is a powerful tool used in neurobiology that can be employed to analyze neural circuits in the <u>central nervous system</u> (CNS). The Bartha strain of PRV is an attenuated form developed in 1961, and is employed as a retrograde <u>transneuronal tracer</u>.<sup>[12]</sup> PRV-Bartha is transported to a neuronal cell body via its axon where it is replicated and dispersed throughout the cytoplasm and the dendritic tree. PRV-Bartha is able to cross synaptic gaps into the axons of *only* synaptically connected neurons, thereby propagating the virus in the retrograde fashion. Using temporal studies and/or genetically engineered strains of PRV-Bartha, second, third, and higher order neurons may be identified in the <u>neural network</u> of interest.

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#### **Classical swine fever**

From Wikipedia, the free encyclopedia

Classical swine fever			
Virus classification			
Group:	Group IV ( <u>(+)ssRNA</u> )		
Family:	<u>Flaviviridae</u>		
Genus:	<u>Pestivirus</u>		
Species:	Classical swine fever virus		

Not to be confused with *swine influenza* (swine flu).

**Classical swine fever (CSF)** or **hog cholera** (also sometimes called **pig plague** based on the German word *Schweinepest*) is a highly contagious disease of <u>pigs</u> and <u>wild boar</u>.

#### **Clinical Signs**

Swine fever causes <u>fever</u>, <u>skin lesions</u>, <u>convulsions</u> and usually (particularly in young animals) <u>death</u> within 15 days.

The signs are indistinguishable from those of African swine fever.



5

Pinpoint hemorrhages on the kidneys are characteristic of classical swine fever The infectious agent responsible is a <u>virus</u> CSFV (previously called hog cholera virus) of the genus <u>*Pestivirus*</u> in the family <u>*Flaviviridae*</u>.<sup>[11]</sup> CSFV is closely related to the ruminant pestiviruses which cause Bovine Viral Diarrhea (BVDV) and Border Disease (BDV).<sup>[2]</sup>

The effect of different CSFV strains varies widely, leading to a wide range of clinical signs. Highly virulent strains correlate with acute, obvious disease and high mortality, including neurological signs and hemorrhages within the skin.

Less virulent strains can give rise to sub acute or chronic infections that may escape detection, while still causing abortions and stillbirths. In these cases herds in high risk areas are usually serologically tested on a thorough statistical basis.

Infected piglets born to infected but subclinical sows help maintain the disease within a population. Other signs can include lethargy, fever, immuno-suppression, chronic diarrhea and secondary respiratory infections. The incubation period of CSF ranges from 2 to 14 days, but clinical signs may not be apparent until after 2 to 3 weeks. Preventive State Regulations usually assume 21 days as the outside limit of the incubation period. Animals with an acute infection can survive 2 to 3 months before their eventual death.

Eradicating CSF is problematic. Current programs revolve around rapid detection, diagnosis and slaughter. This may possibly be followed by emergency vaccination (<u>ATCvet</u> codes: <u>QI09AA06</u> for the inactivated viral vaccine, <u>QI09AD04</u> for the live vaccine). Vaccination is only used where the virus is widespread in the domestic pig population and/or in wild or feral pigs. In the latter case a slaughter policy alone is usually impracticable. Possible sources for maintaining and introducing infection include the wide transport of pigs and pork products, as well as endemic CSF within wild boar and feral pig populations.

#### Diagnosis

Epidemiology + symptoms + pathology + laboratory examination

- Direct immunofluorescence detection of virus in histological edges
- Indirect immunofluorescence detection of specific antibodies from sera
- <u>ELISA</u>
- Histology of the brain shows vasculo-endothelial proliferation and peri-vascular cuffing (cuffing is highly suggestive when accompanied by other signs but is not pathonomonic for the disease).

#### See also

- <u>2007 Central Luzon hog cholera outbreak</u>
- <u>Animal viruses</u>

#### References

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Retrieved from "<u>http://en.wikipedia.org/wiki/Classical\_swine\_fever</u> This page was last modified on 3 April 2011 at 17:34.

#### **Swine Brucellosis**

Swine brucellosis is caused by bacteria very similar to the organism that causes brucellosis in cattle, and both diseases are a public health concern. Swine brucellosis causes abortions in sows and infertility in boars. Although this disease does not kill pigs outright, it causes losses in reproduction that decrease profits for swine producers.

The swine brucellosis organism is transmitted in reproductive discharges, particularly the afterbirth, from infected sows or in semen from infected boars. Infected swine are disease carriers for life, and there is no effective treatment. Detecting infected swine through blood tests and culling these animals is the only way to remove the disease from the herd.

Swine brucellosis has been reported in wild pig populations in at least 10 States based primarily on serological prevalence. The disease can be spread to domestic swine if wild pigs are introduced into local herds. Introduction could be intentional, or wild pigs could break into pastures or pens to breed with domestic sows.



Pigs infected with swine brucellosis can serve as a source of infection to domestic animals. Cattle can also become infected if they come in close contact with infected wild pigs.

Humans can get swine brucellosis through handling infected tissues of wild pigs. Hunters are at risk when they field-dress and butcher wild pigs and should take the following precautions:

1. Always wear disposable plastic or rubber gloves when field-dressing, cleaning, and butchering a wild pig carcass. Avoid direct contact with blood and reproductive organs.

2. As soon as possible, wash hands with soap and hot water after dressing wild pigs.

3. Burn or bury gloves and remains from butchered wild pigs.

4. Cook wild pig meat thoroughly.

The symptoms of swine brucellosis in humans are not distinctive enough for a clear-cut diagnosis. Most people report recurring fever, chills, sweating, weakness, headaches, pains in muscles or joints, loss of appetite, and weight loss. People with these symptoms who have been exposed to wild pigs should consult their doctor about swine brucellosis.

Source: http://www.dnr.state.oh.us/Default.aspx?tabid=19574\_04/19/2011

# Buffalo National River Feral Hog Management Plan Appendix C Feral Hog Field Survey Datasheet

Observer Name(s):	Date:	Date:			
Time:: (24 hour)					
UTM Coordinates (NAD 83, Zone 15N)	mE; m	N			
Damage Noted:					
Type: Rooting $\Box$	Tracks  Tree Rubs				
Size: (Square Feet):					
Aspect (check all that apply): N $\Box$		$N \square$			
Location: Forest D Botto Stream or River Bed	om □ Field □ Trail □ l □				
Number of Hogs:					
Size: Piglet (<15 lbs.)					
Juvenile (15-60 lbs.)					
Adult (>60 lbs.)					
Weight: Actual D Estim	nated				
Sex: Female: Male	:				
Natural Markings:					
Black $\Box$ White Face $\Box$ Stripe	ed   Other				
Disposition of Hog(s):					
Damage Only (Hog not seen):	□				
Sighted Only:	□				
Trapped:	□				
Shot:	□				
Were any of the hogs pregnant or lactating	?				
Photos (provide image file names):					
Additional Information:					

# Arkansas Post National Memorial Feral Hog Management Plan Appendix D Tissue Sample Collection Datasheet and Instructions

Collector(s):			_ D	ate:	
Sample 1: Code BNR	(BNR-YY	YYY-####)			
Type: Blood/Serum □ Tissu	e 🗆 🛛 Head	1 □ Othe	er 🗆		
Photos of hog (filenames and path):					
Location hog taken UTM (Z15N N.	AD83)		mE;	r	nN
Sex of hog: Male $\Box$ Fema	le 🗆				
Sample 2: Code BNR	(BNR-YY	YYY-####)			
Type: Blood/Serum  Tissu	e 🗆 Head	1 □ Othe	er 🗆		
Photos of hog (filenames and path):					
Location hog taken UTM (Z15N N.	AD83)		mE;	r	nN
Sex of hog: Male $\Box$ Fema	le 🗆				
Sample 3: Code BNR	(BNR-Y	YYY-####)			
Type: Blood/Serum  Tissu	e 🗆 Head	i □ Othe	er 🗆		
Photos of hog (filenames and path):					
Location hog taken UTM (Z15N N	AD83)		mE;	r	nN
Sex of hog: Male □ Fema	le 🗆				
Chain of Custody:					
1. Sample(s) relinquished to:					
Affiliation:	Print Name		Si D	gnature ate:	
2. Sample(s) relinquished to:					
Affiliation:	Print Name		Si D	gnature ate:	

## Arkansas Post National Memorial Feral Hog Management Plan Appendix D Tissue Sample Collection Datasheet and Instructions

#### Disclaimer

These guidelines are subject to change. Before collecting tissue samples, ask the program contact if biological collections are necessary. If so, he will have specific protocols that may differ from those above.

#### **Collection Objectives**

- 1. Collect blood samples of feral pigs for disease testing
- 2. Collect feral pig head for pseudo-rabies testing
- 3. Collect samples for genetic testing
- 4. Limit the spread of feral pig-borne disease

#### **Safety Information**

Body substance isolation procedures should be followed – wear exam gloves when processing the head or taking samples, consider eye protection.

### **Collection Procedures**

#### Heads

- 1. Photograph hog with a digital camera.
- 2. Heads shall be severed in such a way as to include the skull and a large portion of the neck to preserve the lymph nodes. Bullet damage will not hamper testing.
- 3. Document location pig was taken with GPS.
- 4. Bag the head in plastic and label with date, location taken, and the sex of the hog. Heads should be maintained in a refrigerated or cooled environment.
- 5. The program contact person will give the sample an individual code name.
- 6. Contact person will get the samples in to the USDA.

#### Blood

- 1. Photograph hog with a digital camera
- 2. Use supplied syringes and blood vials.
- 3. Any blood sample is acceptable, but it is preferable if the blood is drawn from the heart, a vein, or an artery.
- 4. After a sample is drawn, insert the needle into the vial and empty the syringe into the vial. Secure the needle cover back on the needle, and tape it in place.
- 5. Document location pig was taken with map and GPS.
- 6. Label sample with date, location taken, and sex of the hog. Tape the sample and syringe together.
- 7. Refrigerate the blood sample, and syringe pending delivery to the contact person.

## Arkansas Post National Memorial Feral Hog Management Plan Appendix D Tissue Sample Collection Datasheet and Instructions

- 8. The program contact person will give the sample an individual code name.
- 9. Contact person will get the samples in to the USDA.

#### Tissue

- 1. Photograph hog with a digital camera.
- 2. Document location pig was taken with GPS.
- 3. Bag the tissue in doubled zip lock bags and label with date, location taken, and the sex of the hog. Tissue should be maintained in a refrigerated or cooled environment.
- 4. The program contact person will give the sample an individual code name.
- 5. Contact person will get the samples in to the USDA.

### **Program Contact:**

Ray Benjamin Park Ranger 402 N. Walnut, Suite 136 Harrison, AR 72601 870-365-2770 (Office) 870-577-0935 (Cell) raymond\_benjamin@nps.gov

### **USDA Contact:**

Clint Turnage Wildlife Disease Biologist USDA Animal and Plant Health Inspection Service Little Rock, AR 501-835-2318 Clint.T.Turnage@aphis.usda.gov

## Arkansas Post National Memorial Feral Hog Management Plan Appendix E Park Staff Participation Guidelines

Previous management actions have consisted of monitoring damage and encouraging neighbors to dispatch them on their properties during hunting seasons. These efforts have been random at best. A variety of feral swine eradication methods will be applied where appropriate by park staff. Facilities Management and Resource Management personnel will be the primary divisions involved in these efforts. Park personnel outside these divisions may be utilized, with supervisor's approval, at the discretion of the Superintendent. Volunteer staff may also be drawn upon but explicit roles and duties need to be included on the volunteer agreement. Resource Management Division maintains an inventory of the firearms for use in eradications which may be checked out to hunters by terrestrial habitat staff in the Resource Management office at park headquarters. Staff involved in eradication using these firearms must be certified by attending an annual firearms proficiency and safety course conducted by one of the parks firearms instructors. Course of fire is included in this appendix. Once certified, these personnel are authorized to eradicate or remove feral hogs within the boundaries of Arkansas Post, during daylight hours, in or out of current AGFC hunting seasons, without a current AGFC hunting license. Nighttime operations will be authorized on a case-by-case basis.

Guidelines for reduction by firearms include:

- following all safety procedures when using firearms to shoot hogs;
- annual firearms training and qualification;
- staff involved in reduction activities will be required to carry a park radio and check in/out with Park Headquarters with all pertinent information regarding the activity;
- remove feral hog carcasses in accordance with procedures established within this plan.

## Arkansas Post National Memorial Feral Hog Management Plan Appendix E Park Staff Participation Guidelines

### **Firearms Proficiency Course of Fire for Feral Hog Eradication Participants**

### **Distance: 25 Yards**

### Standing: No gun/arm rest.

On command, shooter takes weapon off safety, fires 2 rounds. Places weapon safety on, unloads and makes weapon safe. Time limit=15 seconds.

### **Kneeling:**

On command, shooter takes weapon off safety, fires 2 rounds. Places weapon safety on, unloads and makes weapon safe. Time limit=15 seconds.

### Sitting:

On command, shooter takes weapon safety off, fires 2 rounds. Places weapon safety on, unloads and makes weapon safe. Time limit=15 seconds.

### **Prone:**

On command, shooter takes weapon safety off, fires 2 rounds. Places weapon safety on, unloads and makes weapon safe. Time limit=15 seconds.

### Minimum of 6 rounds within the time limit in the simulated vital organ area of target.

# Arkansas Post National Memorial Feral Hog Management Plan Appendix F Hog Trap Inspection and Forms

Inspector(s):	Date:				
UTM Coordinates (NAD 83, Zone 15N) mE;	mN				
Trap Type: Corral D Enclosed/Box D Other D					
Trap Condition:         Good □       Needs Minor Repair □         Needs Minor Repair □	Destroyed				
Trap Baited (circle one)? Yes No					
Type of Bait:					
Hogs in trap? Yes No How Many?					
Problems:					

# Arkansas Post National Memorial Feral Hog Management Plan Appendix G Feral Hog Removal Record

Date	Time	Sex	Size	Method	Color	Location	Exterminator
mm/dd/vvvv	24 hour	Male	Piglet	Trap	Pattern	e.g.	Name
	2111001	Female	Iuvenile	Hunt	Black	Sanders	i vuille
		<u>r</u> emaie	<u>A</u> dult	<u></u> unt	White Face	field	
			<u>11</u> uun		<u>Striped</u>	neid	
					<u>Othor</u>		
					<u>O</u> ulei		

Arkansas Post National Memorial Feral Hog Management Plan Appendix H Plan Revision History Details