WILD PIGS

Integrated Pest Management for Home Gardeners and Landscape Professionals

Wild pigs are not native to North America and were first introduced in California in 1769 by the Spanish missionaries at Mission San Juan Bautista. The missionaries released domestic pigs near the missions in order to take advantage of the rich natural forage resources available. Released domestic pigs that were not harvested or recaptured became feral. Feral is a term that refers to an animal or group of animals that was once domesticated but has since lost its domestic nature and become wild. In the 1920's, Russian wild boars were introduced in Monterey County for sport hunting. Russian wild boar and domestic swine belong to the same species, *Sus scrofa*, (Figure 1) and are able to interbreed without restriction. Wild pigs in California today are descendants of both the released domestic pigs and the Russian wild boar.

Wild pigs are susceptible to at least 30 transmittable livestock diseases and are hosts to over 35 types of parasites. Of the 30 diseases that wild pigs carry, 20 can be transferred to humans. Wild pigs are known to cause extensive damage to crops and rangelands. Additionally, they are known carriers of five major waterborne pathogens that can contaminate drinking water: *Escherichia coli* (*E. coli*), *Campylobacter*, *Salmonella*, *Cryptosporidium*, and *Giardia*.

IDENTIFICATION

Since wild pigs in California today are descendants of both domestic swine and the Russian wild boar, their appearance can vary based on their heritage. Table 1 summarizes some of the physical differences that may be observed between wild pigs and domestic pigs.

LIFE CYCLE, BIOLOGY, AND BEHAVIOR

Wild pigs usually live to be 4 to 8 years old, with high mortality rates among the young and the very old. Full-grown males are usually 200 pounds at adult weight, while full-grown females weigh slightly less and average about 175 pounds. While they can grow larger than this, it is not considered common; and it would most likely occur under artificial supplementation of feed. Once juveniles reach 10 to 15 pounds, predation risk is minimal. Females are sexually mature and can be reproductive at 6 to 9 months of age, although most females are over a year before they have their first litter. Females can have up to 2 litters per year, and litter size can vary from as little as 3 to as many as 18 per litter, with an average litter size of 5 or 6. The size of the litter and the success rate of the young depend on available resources. In areas where food resources and cover are plentiful, litter sizes will be larger and a larger number of pigs will survive. When food resources are scarcer, litter sizes will be smaller; and there will be increased competition between the young for resources. Competition among littermates can be strong, leaving weaker pigs more susceptible

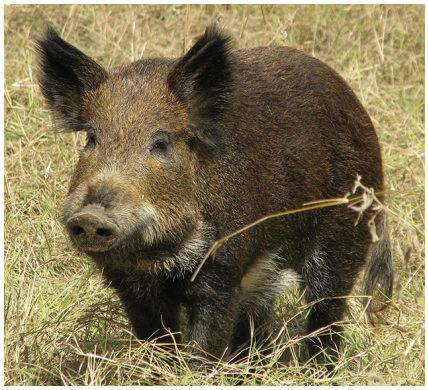

Figure 1. Wild pig, *Sus scrofa*.

Table 1: Physical Characteristics of Wild and Domestic Pigs.

Physical Characteristic	Wild Pigs	Domestic Pigs
Hair	Amply covered with coarse, long hair	Sparse, short hair
Ears	Relatively small and erect	Relatively large and floppy
Tail	Straight, covered in hair	Curly, little hair present
Body	Razor-backed, shoulders higher and wider than hindquarters	Wide body, flat back
Tusks	Long and sharp	Relatively short
Head	Longer snout with flat profile	Shorter snout, concave profile
Color	Mostly black, some pied or russet	Usually white, sometimes russet or pink
Young	Dark with horizontal stripes	Same uniform color as parents

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to disease and predation. Up to 48% of pigs may die within the first year of life.

Wild pigs are very smart and able to adapt and respond to an array of environmental conditions in order to sustain their population. Their fecundity and litter success rates are highly correlated with precipitation amounts. Like many other species during dry years, wild pigs have smaller litters with lower survival rates. During dry years, wild pigs also expand their home range in search of food and water. During years with above average precipitation, wild pigs have larger litters with higher survival rates among the young.

Known for their voracious appetite, wild pigs have a wide and varied diet made up of plant and animal matter. Wild pigs frequently scavenge and will prey upon reptiles, amphibians, and small mammals. Such feeding is indiscriminate; wild pigs will kill and eat whatever is most available or easiest to catch. Wild pigs will even prey upon lambs, full grown sheep, kids (baby goats), and calves. Wild pigs root through the soil to find roots, bulbs, and grubs, and show a strong preference for hard mast crops (e.g., acorns). The monogastric (one stomach) digestive system of the pig is similar to humans; pigs will digest food in as little as 4 to 6 hours. A full grown wild pig will consume about 3% of its body weight per day. However, they are capable of consuming considerably more in a short period of time. For example, one study reported 49 spade foot toads (*Scaphiopus holbrooki*) in the stomach of a harvested wild pig. Another wild pig stomach contained seven voles, two pocket gophers, one woodrat, and three mice. The rapid rate of digestion in the pig indicates that the harvested pigs had consumed the contents of their stomach in the last 4 to 6 hours and also demonstrates the substantial amount one pig is able to consume when binge feeding.

Wild pigs live in matrilineal groups called sounders that are led by a dominant female. While males are nomadic and are known to move about within their home range, females tend to stay in their familial groups with 80% of females remaining with the sounder in which they were reared. Although wild pigs are considered habitat generalists, a few common themes are often observed. Wild pigs like to rest and nest in areas with low growing dense vegetation. Like most other vertebrates, wild pigs need water. Additionally, since wild pigs do not have sweat glands, in hot weather they wallow in seeps and springs to cool themselves. Wild pigs show a dietary preference for a number of plants that grow in riparian areas, so their home range will be dictated by not only the availability of water resources but also proximity to riparian ecosystems, especially in the summer or during dry periods.

IMPACT

Wild pigs impact ecosystems through their rooting, wallowing, foraging, and hunting, with a conservative annual estimate of $1.5 billion in economic damage nationally to agriculture and the environment. They are highly competitive for food resources and have been known to drive cattle away from supplement. Deer are also known to vacate an area, such as a water source, upon the arrival of wild pigs.

Their rooting behavior overturns and tills the soil, uprooting plants, exposing bare soil, and creating opportunities for weeds to invade (Figures 2 and 3). They disturb native and naturalized vegetation and reduce available forage for livestock and other wildlife. Their wallowing disturbs springs and seeps, and they are known to cause damage to stock water troughs by rooting around their bases and undermining the troughs (Figure 4). Their rooting and wallowing behavior also disturbs riparian areas and reduces habitat suitability for native and endangered wildlife species. In urban areas, the rooting behavior of wild pigs can cause extensive damage to lawns and gardens.

The foraging behavior and dietary preferences of wild pigs makes them highly competitive with other wildlife species. Many native wildlife species (e.g., black bear (*Ursus americanus*) and mule deer (*Odocoileus hemionus*)) are highly dependent on hard mast crops, which are known to be a favorite of wild pigs. In years where hard mast crops are small, wild pigs may invade and rob the underground caches of small mammal species. Wild pigs have been implicated in the reduced regeneration of oak trees in California due to their

Figure 2. Wild pig rooting in an almond orchard. The drip irrigation system was most likely damaged as a result of this wallow.

Figure 3. A man sits in a deep hole created by wild pig rooting. Extensive rooting can lead to erosion, loss of forage, and invasion by weedy species.

Figure 4. Wild pigs drinking and swimming in a cattle water trough. The pigs can damage water control valves causing a waste of water resources and may spread disease by contaminating the water supply for livestock and other wildlife species. Direct interaction of wild pigs and livestock can also result in disease transmittance.

rooting behavior and their affinity for acorns. However, it has been proposed that wild pigs may instead facilitate oak regeneration because they do not generally consume all available acorns and may actually "plant" some through their rooting behavior; but there is no scientific evidence to support this theory. In fact, one study found that high density populations of wild pigs led to lower acorn survival.

Wild pigs can be a major nuisance for farmers and ranchers, as they will invade farm fields and eat crops, disturb plantings by rooting through the soil, defecate in fields leaving behind fecal coliforms that may be infectious to humans, and pose a serious risk to human and livestock health by serving as vectors for numerous diseases and parasites. In California, damage from wild pigs can be quite high. One study noted a 6 – 10% loss in revenue in various agricultural commodities when wild pigs are present, while a study in Texas estimated $57 million worth of damage caused by wild pigs to crops annually.

Wild pigs carry five major waterborne pathogens that can be infectious to humans. These five pathogens are: *E.coli*, *Campylobacter*, *Salmonella*, *Cryptosporidium*, and *Giardia*. For example, after the *E. coli* outbreak in spinach from California fields in 2006, *E. coli* was isolated from both cattle and wild pigs. Although the exact source could not be verified, wild pigs were considered the prime suspect. In another study in Texas, six of seven wild pigs tested positive for *E. coli*. Additionally, wild pigs increase turbidity in water sources by stirring up sediment. Turbidity, or the relative cloudiness of water, is a critical factor affecting the survival of waterborne pathogens. As turbidity increases, the survival rate of waterborne pathogens, including *E. coli*, also increases. Further, high levels of turbidity can protect waterborne pathogens during the chemical disinfection process used in water treatment facilities.

Wild pigs pose a significant potential disease threat to humans, domestic livestock, and native wildlife and are hosts to at least 37 parasites that can affect multiple species. Wild pigs can carry potentially devastating diseases to domestic livestock and wildlife including pseudorabies, foot and mouth disease, swine brucellosis, bovine tuberculosis, and classical swine fever. Given the diverse hazards posed by wild pigs, combined with the extreme negative economic impact they often impose, an effective management program is warranted.

LEGAL STATUS

Wild pigs are classified as a game animal by the California Department of Fish and Wildlife, and a license and tag is required to hunt them. If wild pigs are causing damage to property, depredation permits are available for removing nuisance individuals. Unmarked, free-roaming domestic pigs are legally equivalent to wild pigs.

MANAGEMENT

Wild pigs can be managed through small-scale exclusion, trapping, and/or shooting. While recreational hunting is often a preferred method, it is not effective at controlling wild pig population growth. Trapping, however, is highly effective at controlling and reducing wild pig population growth. All methods of control are only effective long-term if adjacent property owners work together cooperatively to reduce population size; otherwise, even the most efficient wild pig removal programs will suffer from frequent reinvasion from neighboring pig populations.

Exclusion

Excluding wild pigs using fencing is an effective option, although it can be expensive. However, if implemented on a small scale, it can be practical. Wild pigs are strong enough to upturn many types of fences and simply go under them by utilizing their natural rooting instinct. If wild pigs are excluded using a fence, it should be monitored closely to watch for signs that the perimeter has been breached. For more information on how to properly construct wild pig exclusionary fences, see the References section.

Trapping

Trapping is a common and effective method of removing wild pigs. There are two types of traps that are most commonly used with wild pigs, box traps and corral traps. Box traps are usually relatively small, about 4′ x 4′ x 8′, and constructed using heavy duty welded framing as well as wire paneling. A door system with a trip wire is used to allow entry but prevent escape from the trap. Some box traps are equipped with what is known as a rooting door, which allows multiple pigs to enter by utilizing their natural rooting tendencies but prevents escape.

Corral traps are generally larger than box traps and designed to capture larger numbers of wild pigs (Figure 5). Corral traps are either round or square, although round traps are recommended over square traps because pigs tend to pile up in the corners of square traps and will climb on top of each other to escape the trap. If a square corral trap is used, it is recommended that the corners be adequately covered to prevent pigs from climbing out. The two basic door types used in corral traps are the same as those used in box traps. Either a drop gate, triggered by a trip wire, is used or a rooting door on springs is used. In the case of the drop gate, the trip wire is generally attached to something of interest to the pigs at the furthest end of the trap from the door. This allows more than one pig to enter in search of food before the trip wire is triggered and the door drops closed. Corral traps are preferred by many because entire sounders can be

Figure 5. Wild pigs in a corral trap.

captured at once, which helps prevent trap education of other wild pigs.

Traps are baited with a number of food substances intended to draw wild pigs in as they search for food (Figure 6). Recommendations include corn, barley, oats, carrion, fruit, and fermented corn or soybeans, although any food that the wild pigs are currently feeding on is a good option. Trapping is considered more of an art than a science, and it may take some time to determine which bait works best. Some have developed mechanical feeding devices, like a 55-gallon drum with small holes that lets bait out. This allows wild pigs to access the bait but prevents smaller, non-target species from consuming bait. Pre-baiting traps can significantly improve the success rate of a trapping program. It is important to ensure a steady bait supply, check traps daily, and check traps from a distance. If trapped pigs are approached, they may become agitated and attempt to escape the trap. Wild pigs are large, strong animals; and traps must be constructed using materials that can withstand the force of agitated individuals. For more information on trapping and how to build and bait traps, see the References section.

OTHER CONTROL METHODS

Shooting is a popular method of controlling wild pig populations; however, recreational hunting alone is not an effective control method. Pressure from hunting will drive wild pigs to move away from where they are hunted or, at a minimum, will restrict their movements. The California Department of Fish and Wildlife maintains a "Guide to Hunting Wild Pigs in California" on their website. It is legal to use dogs when hunting wild pigs under some circumstances. However, it has been found that using dogs is most effective for locating individuals or smaller groups of wild pigs. In some cases, a female pig is trapped, spayed, fitted with a radio collar, and then released. Since female pigs live in groups, the spayed female pig will lead wildlife managers to local pig populations, which can assist population control efforts.

Figure 6. An example of a bait station inside a corral trap.

Chemical Control

There are no toxicants currently registered for use on wild pigs in the United States and there are no known effective repellents. Further, there are no oral contraceptives approved for use with wild pigs.

Eradication

Any eradication efforts should be approached with careful planning and forethought. Eradication efforts are expensive and time consuming; however, they can be successful by implementing multiple control methods. There are two examples of wild pig eradication documented in California. One example comes from Santa Cruz Island where wild pigs were eradicated in 2007 at a total cost of about $5 million. Eradication took about 26 months and 5,036 wild pigs were shot on the 62,000 acre island. Wild pigs were also eradicated from Pinnacles National Monument (now Pinnacles National Park) at a total cost of over $600,000 dollars for 200 wild pigs. This number does not include the approximate $2 million that was spent to install an exclusionary fence to prevent wild pigs from recolonizing the monument. The cost of maintaining the fence is over $50,000 annually.

Obviously, eradicating or even lowering a wild pig population to an acceptable level is quite expensive, difficult to achieve, and difficult to maintain. It should be noted that assistance in wild pig removal can often be obtained from USDA/APHIS/Wildlife Services and some County Agricultural Commissioner's offices. Contact your local County Agricultural Commissioner's office for more details.

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