ENVIRONMENTAL ASSESSMENT

FERAL SWINE DAMAGE MANAGEMENT BY THE KANSAS WILDLIFE SERVICES PROGRAM

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March 2016

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1.1 INTRODUCTION

While wildlife is a valuable natural resource, some species of wildlife cause conflicts with human interests. Feral swine (*Sus scrofa*) in Kansas can come into conflict with human interests at one time or another, and need to be managed to control their damage. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program has personnel with expertise to respond to damage caused by wildlife, including feral swine.

USDA-APHIS-WS is authorized by Congress to manage a program to reduce human/wildlife conflicts. WS' mission, developed through a strategic planning process (APHIS 2014), is to *"...provide Federal leadership in managing problems caused by wildlife. WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can damage agricultural and industrial resources, pose risks to human health and safety, and affect other natural resources. The WS program carries out the Federal responsibility for helping to solve problems that occur when human activity and wildlife are in conflict with one another. The WS program strives to develop and use wildlife damage management strategies that are biologically sound, environmentally safe, and socially acceptable. WS also strives to reduce damage caused by wildlife to the lowest possible levels while at the same time reducing wildlife mortality. This approach represents the future towards which WS is moving. In charting this course, WS must continuously improve and modify wildlife damage management strategies*." This is accomplished through:

- Training of wildlife damage management (WDM) professionals;
- Development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
- The collection, evaluation, and dissemination of management information;
- Cooperative WDM programs;
- Informing and educating the public on how to reduce wildlife damage; and
- Providing technical advice and a source for limited use of management materials and equipment such as cage traps.

This Environmental Assessment (EA) evaluates ways that this responsibility could be carried out to resolve conflicts with feral swine in Kansas. Feral swine damage management (FSDM) is an important function of the Kansas WS Program (KWSP).

KWSP is a cooperatively funded and service oriented program. Before WS conducts direct control activities involving take of feral swine on private lands, municipal, county or other government lands, a signed *Work Initiation Document for Wildlife Damage Management* (WS Form 12A) is obtained. WS conducts direct control activities on federal government lands only if *Work Plans* are in place covering the actions. These documents and work plans list the intended target animals and the methods to be used. KWSP cooperates with private property owners and managers and with appropriate land and wildlife management agencies, as requested, with the goal of effectively and efficiently resolving wildlife damage problems in compliance with all applicable federal, state, and local laws.

USDA-APHIS-WS has the Federal statutory authority under the Animal Damage Control Act of March 2, 1931, as amended, and the Act of December 22, 1987, *to cooperate with other Federal agencies and programs, States, local jurisdictions, individuals, public and private agencies, organizations, and institutions while conducting a program of wildlife services involving animal species that are injurious or a nuisance to, among other things, agriculture, horticulture, forestry, animal husbandry, natural resources such as wildlife, and human health and safety as well as conducting a program of wildlife services involving mammalian and avian (bird) species that are reservoirs for zoonotic diseases*.

Individual actions on the types of sites encompassed by this analysis are normally categorically excluded under the APHIS Implementing Regulations for compliance with the National Environmental Policy Act (NEPA) as described in the Code of Federal Regulations (CFR) 7, 372.5(c). APHIS Implementing Regulations also provide that all technical assistance furnished by WS is categorically excluded (7 CFR 372.5(c) and 60 Federal Register 6,000, 6,003). KWSP has prepared this EA to assist in planning FSDM activities and to clearly communicate with the public the analysis of cumulative impacts for a number of issues of concern in relation to alternative means of meeting needs for such management in the State. This analysis covers KWSP's plans for current and future FSDM actions wherever they may occur in Kansas.

1.2 PURPOSE

The purpose of this EA is to analyze the effects of KWSP activities in Kansas to manage damage caused by feral swine. The feral swine population has increased in Kansas which has increased the need for KWSP assistance to cooperating entities experiencing swine damage problems or damage threatened by them. Feral swine cause considerable damage to agricultural crops, pastures, stored feed, and other resources. Swine directly compete with many native wildlife species and decrease habitat quality. In some cases they may predate livestock and wildlife or infect them with diseases such as swine brucellosis, pseudorabies, and leptospirosis. Swine may pose a threat to human health and safety from disease, direct contact, or vehicular accidents. These damages, mostly to private landowners in Kansas, drive the need for action.

1.2.1 Summary of Proposed Action

The proposed action is to continue the current portion of the KWSP program that responds to requests for FSDM, and in response to the increasing population and distribution of feral swine in Kansas, prepare for increased conflicts with them. To meet these goals, KWSP has the objective of responding to all requests for assistance with, at a minimum, technical assistance or self-help advice, or, where appropriate and cooperative or congressional funding is available, direct control assistance in which professional KWSP personnel conduct FSDM. An Integrated Wildlife Damage Management (IWDM) approach would be implemented which allows the use of all legal techniques and methods, used singly or in combination, to meet each requestor's need for resolving conflicts with feral swine. Agricultural producers and others requesting assistance will be provided with information regarding the use of effective nonlethal and lethal techniques, as appropriate. Lethal methods used by KWSP would include shooting, aerial shooting, trapping, snaring, sodium nitrite if it becomes registered for use in Kansas, or euthanasia following live capture in corral traps, drop nets, and other live capture devices. Nonlethal methods used by KWSP may include propane exploders, fencing, other barriers, and deterrents. In many situations, the implementation of nonlethal methods such as fencing would be the responsibility of the requestor to implement. FSDM by KWSP would be allowed in the State, when requested, on private or public lands where a need has been documented, upon completion of a *Work Initiation Document* or *Work Plan*. All management actions would comply with appropriate federal, state, and local laws.

1.3 NEED FOR ACTION

The need for action to manage damage associated with feral swine in Kansas arises from requests for assistance[1] received by WS to reduce and prevent damage associated with feral swine which is explained in great detail in USDA (2015). Feral swine, also known as "*wild pigs*", "*wild boars*", and "*feral hogs*", are medium-size hoofed mammals similar to domestic swine. They usually have coarser and denser coats than their domestic counterparts and exhibit modified canine teeth called "*tusks*" that are normally 3 to 5

[1]WS would only conduct feral swine damage management after receiving a request for assistance. Before initiating FSDM, the appropriate Memorandums of Understanding would be in place and a *Work Initiation Document* or *Work Plan* would be signed between WS and the cooperating entity which would list all the methods the property owner or manager would allow to be used on property they own or manage.

inches long with lengths to 9 inches. These tusks curl out and up along the sides of the mouth. Lower canines are also prominent but smaller. Young feral swine may have pale longitudinal stripes on the body until they are about six weeks of age. Adults of the species average 3 feet in height and 4.5 feet to 6 feet long. Males may attain a weight of 150 to 450 pounds while females may weigh 75 to 350 pounds.

Feral swine breed throughout the year with the peak season normally in the fall. Litter sizes typically range from one to 12 piglets (Mayer and Brisbin 2009). Feral swine are one of the most prolific wild mammals in North America and given adequate nutrition, a feral swine population can reportedly double in just four months (Barrett and Birmingham 1994). Feral swine may begin to breed as young as four months of age and sows can produce two litters per year (Mayer and Brisbin 2009). Feral swine are found in a variety of habitats throughout much of the United States with highest densities occurring in southern states. Populations are usually clustered around areas with ample food and water supplies. Evidence of the presence of feral swine may be rooted-up earth, tree rubs at ground level to 3 feet high, with clinging hair or mud, and muddy wallows.

Swine are not native to North America (Mayer and Brisbin 1991). Domesticated swine were likely first introduced to North America by European explorers that used swine as a food source. Until the early 1900s, fencing in (closed-range) livestock was not a common practice and domesticated swine were often allowed to range freely. With domestic swine roaming freely, many swine became feral. Until the 1930s, all feral swine originated from domesticated stock; however, starting in the 1930s, "*Russian wild boars,*" one of several subspecies, or appropriately the Eurasian wild boar native to Europe and Asia, were imported into areas of the United States for sport hunting. As wild boars escaped, crossbreeding occurred with the already present "*feral domestic swine*." Although morphologically distinct as a result of domestication over thousands of years (e.g., larger haunches on domestic swine), both the domestic swine and the Eurasian wild boar are recognized as the species *Sus scrofa*. When free roaming in North America, domestic swine, wild boars, and their hybrids are included in the term feral swine.

The alleviation of damage or other problems caused by or related to the behavior of wildlife including feral swine is termed wildlife damage management and is recognized as an integral component of wildlife management (The Wildlife Society 1990). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated and the need for damage management is derived from the specific threats to resources. Feral swine have no intent to do harm. They utilize habitats (*e.g.*, reproduce, travel, forage) where they can find a niche. If their activities result in lost economic value of resources or threaten human safety, people characterize this as damage. When damage exceeds or threatens to exceed an economic threshold or pose a threat to human safety, people seek assistance with resolving damage or reducing threats to human safety. The threshold triggering a request for assistance is often unique to the individual person requesting assistance and can be based on many factors (*e.g.*, economic, social, aesthetics). Therefore, how damage is defined is often unique to the individual person and damage occurring to one individual may not be considered damage by another individual. However, the use of the term "*damage*" is consistently used to describe situations where the individual person has determined the losses associated with wildlife is actual damage requiring assistance (*i.e*., has reached an individual threshold). The term "*damage*" is most often defined as economic losses to resources or threats to human safety; however, "*damage*" could also be defined as a loss in the aesthetic value of property and other situations where the behavior of wildlife is no longer tolerable to an individual person.

Damage caused by feral swine occurs primarily from the consumption of resources and the destruction of habitat or property from their rooting and wallowing behavior. Feral swine can also pose threats to human safety and property from being struck by airplanes and other vehicles. Estimates placed the agricultural and environmental damage caused by feral swine in the United States at $800 million per year (Pimentel et al. 2005), but this was increased to $1.5 billion per year (Pimentel 2007). More specific information regarding feral swine damage to agricultural resources, natural resources, property, and threats to human safety are discussed in the following subsections of the EA.

The need for action is based on the continuous damage caused by feral swine in Kansas. Their population has increased considerably in the last two decades and KWSP has continued to receive a number of calls annually regarding FSDM similar to other states (Timmons et al. 2012). From FY12 (Fiscal Year 2012 = October 1, 2011 to September 30, 2012) to FY14, damage work tasks from the WS Management Information System (MIS[2]) associated with feral swine damage annually averaged 1,091 work tasks for damage at a value of about $375,000 (Table 1). The value of damage was not often verified, but was recorded when the information was available.

Table 1. The number of work tasks and value of damage to agricultural and natural resources, property, and human health and safety caused by feral swine in Kansas as reported to or verified by WS personnel from FY12 to FY14. The damage reported in this table is only a fraction of the actual damage caused by feral swine in Kansas.

Category	Resource	FY12		FY13		FY14		Average	
		WTs	$ Value $	WTs	$ Value $	WTs	$ Value $	WTs	$ Value $
Human Health and Safety		4	$0	17	$0	6	$0	9	$0
Subtotal		**4**	**$0**	**17**	**$0**	**6**	**$0**	**9**	**$0**
Agriculture	Pasture/Range	336	$74,510	299	$500,567	228	$58,280	288	$211,119
	Grain/Sod/Hay/Crops	78	$19,000	177	$64,600	333	74,748	196	$52,783
	Livestock/Feed	78	$0	57	$0	77	$0	71	$0
Subtotal		**492**	**$93,510**	**533**	**$565,167**	**638**	**$133,028**	**554**	**$263,902**
Property	Turf/General	556	$89,500	331	$85,550	200	$650	362	$58,567
	Dikes/Dams	-	-	13	$5,000	98	$15,000	37	$6,667
Subtotal		**556**	**$89,500**	**344**	**$90,550**	**298**	**$15,650**	**399**	**$65,233**
Nat. Res.	Wetland/Recr. Area	-	-	12	$20,000	94	$123,497	35	$47,832
	Wildlife	-	-	37	$0	35	$0	24	$0
Subtotal		**-**	**-**	**49**	**$20,000**	**129**	**$123,497**	**59**	**$47,832**
TOTAL		**1,052**	**$183,010**	**943**	**$675,717**	**1,071**	**$272,175**	**1,022**	**$376,967**

WTs – Work Tasks

1.3.1 Need for FSDM to Protect Agricultural Resources

Agricultural damage and threats caused by feral swine can occur to rangeland, pasture, crops, livestock, livestock health and feed, and other agricultural resources (Beach 1993, Seward et al. 2004, West et al. 2009, Hamrick et al. 2011). Damage occurs from direct consumption of agricultural resources and from trampling, rooting, or wallowing, common activities of feral swine. Additionally, livestock and feed is vulnerable to their depredations and become a possible source for disease transmission. From FY12 to FY14, KWSP Specialists annually completed an annual average of 554 work tasks to protect crops, rangeland, pasture, hayfields, sod farms, and livestock and their feed (Table 1). The average annual value of the damage caused mostly prior to any WS action was $265,000. The value of damage accounts for only those incidents where KWSP assistance was requested and a damage estimate was given. This does not represent all damage that occurs in Kansas.

Rooting is a common activity of feral swine during their search for food where they overturn sod and soil in the search for food (West et al. 2009, Stevens 2010, Hamrick et al. 2011). Feral swine also wallow in water and mud to regulate body temperature and to ward off skin parasites. The feral hog's rooting and wallowing activities damage crops, pastures, hay meadows, and sod farms, and spoil watering holes used

[2] MIS - Computer-based Management Information System used for tracking KWSP WDM activities. Throughout the text, data for a year (i.e. FY12) will be given and is from the MIS. MIS reports will not be referenced in the text or Literature Cited Section because MIS reports are not kept on file. A database is kept that allows queries to be made to retrieve the information needed.

by livestock. In addition to damage to pasture and seed crops, soil upheaval can lead to soil loss through leaching and erosion. Feral swine activity in the vicinity of stock watering facilities can lead to degradation of the area and tainting of the water. Wallowing activities in stock ponds can result in severely muddied water, algal blooms, oxygen depletion, bank erosion, soured water and reduction in fish viability (Beach 1993). Feral hogs also cause damage to field crops. Damages to crops result both from feeding and feeding related activities (i.e., trampling and rooting) with a large percentage of losses as a result of the latter (Beach 1993). In Kansas, damages to several field crops have been documented including damage to corn, wheat, soybeans, alfalfa, milo, and sorghum (Table 1).

Livestock, another important agricultural resource in Kansas, can also be impacted by feral swine. Of greatest concern is disease transmission to swine production facilities such as swine brucellosis and pseudorabies. Feral swine are potential reservoirs for several other diseases and parasites that threaten livestock. A study (Corn et al. 1986) conducted in Texas found that feral swine do represent a reservoir of diseases. Swine harvested in this study tested positive for pseudorabies, brucellosis, and leptospirosis. Other diseases carried by feral swine include hog cholera, tuberculosis, and anthrax (Beach 1993, West et al. 2009, Stevens 2010, Hamrick et al. 2011). A study in Oklahoma (Saliki et al. 1998) found samples also positive for antibodies against porcine parvovirus, swine influenza, and porcine reproductive and respiratory syndrome virus (PRRS). PRRS is a highly infectious virus, requiring only a few viral particles to initiate infection (USDA 2009). The total cost of productivity losses due to PRRS in the domestic swine herd in the United States was estimated at $664 million annually during 2011 and represented an increase from the $560 million annual cost estimated in 2005 (Holtkamp et al. 2013). Pseudorabies is a viral disease associated with an extremely contagious herpes virus that can have negative effects on reproduction in domestic swine. An economic analysis estimated that the annual cost of pseudorabies to pork producers in the United States at more than $30 million annually in lost production as well as testing and vaccination costs (USDA 2008). Brucellosis is a bacterial disease that can also have negative impacts on reproduction of swine.

Cholera, trichinosis, and African swine fever are additional diseases that can be transmitted between livestock and feral swine. Disease transmission is likely to occur where domestic livestock and feral swine have a common interface, such as at water sources and livestock feeding areas. Although several diseases carried by swine are also transmissible to other livestock, the primary concern is the potential transmission of diseases from feral swine to domestic swine. Many of the diseases associated with feral swine also negatively affect the health and marketability of domestic swine that can lead to economic losses to the livestock producer. Additionally, feral swine can transport the vector of a disease, such as ticks which can further the spread of pathogens (Timmons et al. 2012, Sanders, et al. 2013). A disease outbreak not only has negative economic implications to the individual livestock producer but an outbreak also could cause economic losses that can negatively affect the statewide swine industry.

The United States is one of the world's largest producers of pork and is the second largest exporter of pork. Pork production in the United States accounts for about 10% of the total world supply. The retail value of pork sold to consumers exceeds $30 billion annually. In addition, the pork industry supports more than 600,000 jobs (USDA 2008). Kansas's inventory of all domestic swine in March 2014 was estimated at 1,670,000 (Kansas Agricultural Statistics Service (KASS) 2015). Although the source of livestock disease outbreaks can be difficult to identify, a risk of transmission and the spreading of diseases to domestic swine and other livestock exists wherever feral swine and domestic livestock interact (Witmer et al. 2003). In addition to large-scale commercial operations, small-scale "*backyard*" swine operations where domestic swine could interact with feral swine are also at risk (Saliki et al. 1998). Therefore, the potential exists for severe economic losses to occur because of the transmission of infectious diseases between feral and domestic swine. Although the size of the Kansas feral swine population is unknown, possibilities of contacts between feral and domestic swine exist. With Kansas' large number of domestic swine, the potential exists for significant economic losses as a result of a two-way transmission of infectious diseases between feral and domestic swine. An outbreak of PRRS in a northern Oklahoma domestic swine operation resulted in losses associated with high rates of illness and high mortality in both adult swine and neonates, of nearly 15,000 pigs and financial losses in excess of a half million dollars (M. Marlow, Wildlife Biologist, WS, pers. comm. 2014).

Feral swine are also efficient predators. Calves, kids, lambs, and poultry have been known to become prey of feral swine (West et al. 2009, Stevens 2010). The young are generally most vulnerable, but adult animals that are weakened or injured are also preyed upon. Feral swine have been reported to kill considerable numbers of domestic livestock, especially young animals, in some areas (Barrett and Birmingham 1994). There has only been one case of feral swine predation reported and verified by KWSP. That occurred in FY07 in Bourbon County and resulted in a loss of a cow and calf. Since feral swine so thoroughly consume young prey, it is often hard to find evidence that birthing and subsequent predation occurred. If a landowner is not alert to the possibility of feral swine predation, it is easily overlooked. Frequently, even when predation is considered, feral swine often escape suspicion because people generally underestimate their capabilities as a predator (Beach 1993).

In many parts of Kansas, ranchers rely on riparian habitat to provide shade and watering areas for their livestock. Riparian habitat can be destroyed by the rooting and wallowing behavior exhibited by feral swine. This is particularly true when drought conditions concentrate large numbers of feral swine into limited riparian areas (Beach 1993).

1.3.2 Need for FSDM to Protect Natural Resources

Feral swine predate and compete with native wildlife, and severely damage a variety of habitats. Competition with and predation of native wildlife is a concern often reported to KWSP Specialists assisting landowners and managers with wildlife conflicts. KWSP conducted an annual average of 59 work tasks from FY12 to FY14 for the protection of natural resources where damages averaged almost $50,000 (Table 1).

Feral swine are omnivorous and feed on a wide variety of items, many of which are staples for native fauna. Damage in areas supporting feral swine populations can sometimes be a serious natural resource management concern for land managers. Substantial damage has occurred to natural resources, including destruction of fragile plant communities, killing, and destruction of tree seedlings, and erosion of soils (Barrett and Birmingham 1994, West et al. 2009, Hamrick et al. 2011). Food sources for feral swine includes acorns, hickory nuts, pecans, beech nuts, and a wide variety of vegetation including roots, tubers, grasses, fruit, and berries, but feral swine also eat crayfish, frogs, snakes, salamanders, mice, eggs and young of ground nesting birds, young rabbits, and any other easy prey or carrion encountered (Ditchkoff and Mayer 2009). Feral swine have been known to kill and eat white-tailed deer (*Odocoileus virginianus*) fawns (Hellgren 1993, National Audubon Society 2000, Ditchkoff and Mayer 2009). A study conducted in northern Texas found that feral swine consumed 23.5% and 11.5 % of simulated Northern Bobwhite (*Colinus virginianus*) nests in each of the study areas. Researchers concluded feral swine nest predation could be a contributing factor in Northern Bobwhite population declines (Timmons et al. 2011).

Feral swine can cause damage to natural flora and fauna on private lands along with designated natural areas, such as parks and wildlife management areas in Kansas. Those sites suffer erosion and local loss of critical ground plants and roots as well as destruction of seedlings because of their feeding and other activity (Barrett and Birmingham 1994). Many experts in the fields of botany and herpetology have observed notable declines in some rare species of plants, reptiles, amphibians, and soil invertebrates in areas inhabited by feral swine (Singer et al. 1982). Many state and federal natural resource managers are now in the process of controlling swine numbers because of their known impact to endangered plants and animals (Thompson 1977). Feral swine can disturb large areas of vegetation and soils through rooting, and feral swine inhabiting coastal, upland, and wetland ecosystems can uproot, damage, and feed on rare native species of plants and animals (Means 1999). Feral swine can disrupt natural vegetative communities, eliminate rare plants and animals, alter species composition within a forest including both canopy and low growing species (Lipscomb 1989, Frost 1993), increase water turbidity in streams and wetlands (reducing water quality and impacting native fishes), damage wetlands and small creeks where they can impact sensitive fish and mollusks (Campbell and Long 2009), and increase soil erosion and alter nutrient cycling (Singer et al. 1982).

An important seasonal food resources used by feral swine is wild fruit and nut crops, especially oak (*Quercus* spp.) mast (Wood and Roark 1980). Each adult feral swine can consume up to 1,300 pounds of mast per year (Knee 2011). Oak mast is an important food source for deer (*Odocoileus spp*.) and Wild Turkeys (*Meleagris gallopavo*) in Kansas. In 1998, researchers removed 68 swine during the first year of a study and estimated the turkey nesting success rate was 0% in the study area (Timmons et al. 2011). The following year, researchers removed 313 feral swine from the study area and the turkey nesting success rate increased to 25%. Timmons et al. (2011) concluded that feral swine were a contributing factor to turkey nest depredation in the wildlife management area. Feral swine have also been documented preying on turkey poults (Wood and Lynn 1977). When feral swine actively compete for mast, resident deer and Wild Turkey may enter the winter with inadequate fat reserves, thus threatening the viability of these native wildlife species (Beach 1993). In years of poor mast production, feral swine were found to have negative effects on white-tailed deer populations due to competition for acorns (Wood and Roark 1980, Campbell and Long 2009). Due to their acute sense of smell, feral swine more rapidly and efficiently consume fallen mast crop (Beach 1993). Feral swine also have the ability to change to other food sources when acorns were depleted, which deer are often unable to do (Beach 1993). Consumption of hard mast by feral swine in forests also reduces the potential for forest regeneration, further affecting the food chain necessary to maintain species diversity and stable populations (Campbell and Long 2009).

Finally, feral swine can be very damaging to different habitats, especially wetlands. Plant forage makes up approximately 88% of a feral swine's dietary composition and is consumed year-round (Mayer and Brisbin 2009). This high dependence on vegetation may be why feral swine can cause the greatest damage to environmentally sensitive areas (Campbell and Long 2009). Feral swine can reduce recruitment of saplings, increase the spread of invasive plants, prevent forest regeneration, reduce seedlings and seedling survival, and eliminate understory (Campbell and Long 2009). Rooting behavior by feral swine in beech forest understory was found to be so severe that recovery was unlikely to occur (Bratton 1975, 1977). Where feral swine reduced herbaceous and belowground vegetation, recovery time was expected to take more than three years (Howe et al. 1981). Feral swine reduce the amount of vegetative ground cover and leaf litter, reducing the critical microclimatic conditions necessary for seedling establishment and growth in forests (Chavarria et al. 2007). With less stable soil conditions and understory, trees are more susceptible to toppling during wind and ice storms.

1.3.3 Need for FSDM to Protect Property

Feral swine in Kansas were responsible for an annual average of 399 work tasks to protect property with an annual average of $65,000 in damage from FY12 to FY14 prior to implementing FSDM (Table 1). Feral swine can damage landscaping, golf courses, roads, drainage ditches and cause erosion by feeding in these areas. Feral swine dig or root in the ground with their nose in search of desired roots, grubs, earthworms, and other food sources. This activity turns sod and grass over, which often leaves the area bare of vegetation and susceptible to erosion. Golf course managers frequently complain of feral swine damaging fairways and greens in other states with higher feral swine populations. Suburban communities, where feral swine sometimes exist, often have landscaping completely destroyed by feral swine foraging, costing thousands of dollars to repair.

Feral swine also pose a threat to property from being struck by motor vehicles (Miller 1993, Mayer and Johns 2007) and aircraft. Mayer and Johns (2007) collected data on 179 feral swine-vehicle collisions involving 212 feral swine which suggested that vehicular accidents with feral swine are costly due to their mass. Potentially, the total annual cost of feral swine-vehicle collisions in the United States might be as high as $36 million or roughly $1,173 per vehicle (Mayer and Johns 2007). Data obtained through the

Kansas Department of Transportation (KDOT 2014) shows that deer were involved in an annual average of 10,220 vehicular crashes annually with 5 fatalities and 564 injuries from 2002 to 2012, resulting in hundreds of thousands of dollars in vehicle and personal damage. Damage is typically greatest in areas where populations are dense. This suggests that if the feral swine population increases, vehicular accidents will increase as well. Swine could also be struck by aircraft at air facilities in the State and cause considerable damage. However, from FY99 to FY14, only two feral swine were struck on runways in United States (FL, TX) with one responsible for $40,000 damage to the aircraft and the other not estimated, but it struck a wing propeller, nose gear, and cowling (FAA 2016).

1.3.4 Need for FSDM to Protect Human Health and Safety

Feral swine can pose a threat to human safety from disease transmission, aggressive behavior, and being struck by vehicles and aircraft. In many circumstances, assistance with a wildlife conflict is requested because of a perceived risk to human health or safety associated with wild animals living near people or acting abnormally in human-inhabited areas. Under the proposed action, WS could assist in resolving those types of problems. In the majority of cases in which human health concerns were a major reason for requesting assistance with feral swine damage, there may have been no actual cases of transmission of disease to people to prompt the request, but the potential for disease transmission is the primary reason people request assistance from the WS program. Kansas WS conducted an annual average of 9 work tasks related to human health and safety from FY12 to FY14. This will increase, if their population increases.

Feral swine are potential reservoirs for approximately 30 viral and bacterial diseases (Davidson and Nettles 1997, Samuel et al. 2001, Williams and Barker 2001) and 37 parasites (Forrester 1991) that are transmissible to people. Brucellosis, salmonellosis, toxoplasmosis, trichinosis, tuberculosis, and tularemia are some of the "*zoonotic diseases*" (*i.e.*, diseases that could be transmitted to people from animals) that can be carried by feral swine (Hubalek et al. 2002, Seward et al. 2004, Stevens 2010), but actual transmission of diseases to people is thought to be rare (Amass 1998). However, over 200 people in the United States became ill with three deaths were reported after people ate spinach leaves that were contaminated with *E. coli* that was identified as originating from feral swine feces deposited in California spinach fields (U.S. Food and Drug Administration 2007, Rouhe and Sytsma 2007).

Swine can serve as major reservoirs of H1N1 and H3N2 influenza viruses, which are endemic in swine populations worldwide and are responsible for one of the most prevalent respiratory diseases in swine (Brown 2004). The maintenance of these viruses in swine and the frequent exchange of viruses between swine and other species are facilitated directly by swine husbandry practices. Following interspecies transmission to swine, some influenza viruses may be extremely unstable genetically, giving rise to many virus variants (Brown 2004). It is a concern of public health officials that swine will be the organism in which a re-assortment of the H5N1 virus changes into one that is easily transmitted between people (Hutton et al. 2006).

Situations where the threat of disease associated with feral swine populations might occur include, but are not limited to:

- Exposure to the threat of leptospirosis, anthrax, dermatophilosis, rabies, or Lyme disease due to high populations of feral swine in urban and suburban areas or from companion animals coming in contact with infected swine or other wild, feral, or domestic animals contracting the virus (*e.g.,* pets, farm animals, feral cats, skunks, fox). Some diseases such as the West Nile virus may be transmitted by biting flies or mosquitoes and are typically more of a threat during the time of year that these insects are more prevalent. It should be noted that West Nile virus antibodies have been found in feral swine but it is not known if the virus can be transmitted from feral swine blood.

- Exposure to the bacterium *Brucella suis* causes swine brucellosis. Swine are considered the natural host for *B. suis* and can be harbored without signs of illness. People may contract the disease by handling or eating undercooked meat. In Louisiana, there have been 23 reported cases of brucellosis in people since 1987. However, the cause of infection for twenty of those cases was classified as "*undetermined*" because a general diagnosis was made based on a serological diagnosis. The three remaining cases were confirmed human infections of *B. suis* occurring in Sabine, St. Landry, and Rapides Parishes in 2009 (T. Conger, USDA-Veterinary Services pers. comm. 2009).

- Exposure to the parasite *Trichenella spiralis*, which can cause trichinosis in humans. Due to the life cycle of this parasite, most carnivores or omnivores are potential hosts for *T. spiralis*. People generally contract the disease by eating meat that is not thoroughly cooked.

In addition to threats from disease transmission, feral swine pose a threat to people from aggressive behavior or being a passenger in a motor vehicles and aircraft that strikes a swine. Feral swine can be very aggressive toward people, especially when threatened. A man in New Orleans was gored by a feral swine while hunting, causing severe injuries to his legs (Masson 2014). Vehicle collisions, including aircraft, are also a human health and safety concern due to the potential for injury or death when striking feral swine, which can weigh up to 400 pounds or more (Mayer and Johns 2007). With an increase in their population, vehicular incidences could increase dramatically, similar to deer-vehicle collisions in Kansas. The deer population in Kansas has increased dramatically over the last 40 years. Automobile collisions with deer annually averaged 5 deaths and 564 injuries to people from 2002 to 2012 (KDOT 2014). As feral swine populations continue to increase in numbers and geographical distribution, more incidents of vehicular encounters can be expected. Feral swine at airports could cause a catastrophic incident involving the death of the crew and passengers, but this has not occurred at Kansas airports.

1.4 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

APHIS has prepared a programmatic feral swine environmental impact statement (EIS) to evaluate alternatives for a nationally coordinated feral swine damage management program in the U.S., American Samoa, Guam and the Commonwealth of the Northern Mariana Islands, U.S. Virgin Islands, and Puerto Rico (*hereinafter* USDA 2015). The Record of Decision (ROD), issued July 2015, selected a nationally coordinated, integrated FSDM program. The selected alternative in the ROD incorporated all legally available FSDM methods and retained the flexibility to continue to work with local stakeholders under state or local level NEPA decisions, with local stakeholders to manage feral swine damage according to local feral swine management goals. This EA is consistent with the applicable findings, policies, and operational procedures evaluated in the Final EIS.

1.5 DECISIONS TO BE MADE

Based on the scope of this EA, the decisions to be made are:

- Should KWSP continue FSDM as currently implemented in Kansas?

- If not, how should KWSP fulfill its legislative responsibilities for managing feral swine damage in the State?

- What standard operating procedures (SOPs) should be implemented to minimize identified risks?

- Might continuing KWSP's current FSDM program have significant impacts requiring preparation of a statewide EIS?

1.6 SCOPE OF THIS EA ANALYSIS

1.6.1 Actions Analyzed

This EA evaluates the effects of KWSP FSDM activities on the human environment. FSDM is conducted to protect agricultural and natural resources, property, and human health and safety. FSDM activities will likely expand with the potentially increasing population of feral swine in Kansas.

1.6.2 Native American Lands and Tribes

KWSP has not received requests from any Native American Tribes in Kansas to provide assistance with FSDM for the protection of resources on tribal lands. If a tribe contacted KWSP for assistance, the methods employed and potential impacts would be the same as for any private land upon which KWSP could provide service.

1.6.3 Federal Lands

KWSP provides FSDM on federal lands in Kansas including the Army Corps of Engineers, U.S. Forest Service, Department of Defense, and others. If KWSP were requested to conduct FSDM on federal lands for the protection of private resources, this EA would cover the actions implemented. However, if the request is to protect federal resources, the requesting federal agencies would be responsible for NEPA documentation. This EA would cover such actions, though, if the requesting federal agency determined that this EA had an adequate analysis to cover the actions to be implemented and they adopted it in their own Decision Record. Actions taken on federal lands are included in the analysis in this EA.

1.6.4 Time Period This EA Will Be Valid

This EA will remain valid until KWSP determines that new needs for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document will be reviewed and revised as necessary. This EA will be reviewed annually to ensure that FSDM activities are still within the scope of analyses in this EA.

1.6.5 Site Specificity

This EA analyzes potential impacts of FSDM on the human environment as required by NEPA and addresses KWSP FSDM activities on all lands with *Work Initiation Document* signed by WS and the cooperating entity, or as otherwise covered by *WS Work Plans* on federal public lands within Kansas. It also addresses the impacts of FSDM on areas where additional agreements with KWSP may be written in the reasonably foreseeable future in Kansas. Because the proposed action is to continue the current program under this one EA, and because the current program's goal and responsibility is to provide FSDM when requested within the constraints of available funding and manpower, it is conceivable that additional FSDM efforts could occur. Thus, this EA anticipates potential expansion and analyzes the impacts of such expanded efforts as part of the current program. In fact, expansion of the program is expected because the feral swine population has been expanding and increasing.

Planning for the management of feral swine damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, insurance companies, and other emergency response agencies. Although some of the sites where feral swine damage is likely to occur and lead to requests to KWSP for assistance can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible; however, many issues apply wherever feral swine damage and resulting management occurs, and are treated as such. Feral swine populations can develop about anywhere in Kansas.

The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 is the site-specific routine thought process for determining methods and strategies to use or recommend for individual actions conducted by KWSP in Kansas. The Decision Model is not intended to require documentation or a written record each time it is used, and it necessarily oversimplifies complex thought processes. Decisions made using the model would be in accordance with SOPs described herein and adopted or established as part of the Decision.

The analysis in this EA considers impacts on target and nontarget wildlife species, people, pets, and the environment. Wildlife populations, with the exception of threatened and endangered (T&E) species, are typically monitored over large geographic areas (*e.g.*, the West, the State) and smaller geographic areas by the state wildlife agency (*e.g.*, game management units). WS monitors target and nontarget take for Kansas, and, depending on the species, at a more local level such as county or property. The game management units and counties do not correspond to each other in Kansas, thus, analysis of wildlife population impacts is better analyzed at the statewide level. Additionally, because feral swine are nonindigenous to Kansas and often viewed as an ecological pest, their removal would benefit the human environment.

1.6.6 Interdisciplinary Development of the EA

Comments were solicited from the Kansas Department of Wildlife, Parks , and Tourism (KDWPT), Kansas Department of Agriculture (KDA), the Kansas Animal Health Division (KDA-AHD), Kansas State University Cooperative Extension Service (KSU-CES), the United States Fish and Wildlife Service (USFWS), and Fort Riley Military Installation. The EA and comments will be maintained in an administrative file located at the KWSP State Office, 4070 Fort Riley Blvd., Manhattan, KS 66502.

1.7 AUTHORITY AND COMPLIANCE

1.7.1 Authority of Federal and State Agencies for FSDM in Kansas

1.7.1.1 KWSP Legislative Authority. The primary statutory authority for the WS Program is the Act of March 2, 1931 (46 Stat. 1468; 7 USC 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c). The WS program is the lead federal authority in managing damage to agricultural resources, natural resources, property, and threats to human safety associated with animals. WS' directives define program objectives and guide WS' activities when managing damage.

KWSP conducts FSDM in cooperation with and under the authorities of KDA-AHD. FSDM is also conducted in cooperation with USFWS, KDWPT, KDA, and KSU-CES. FSDM assistance is provided statewide. KWSP works cooperatively with several entities such as local livestock associations and county governments to provide FSDM assistance for its constituents. FSDM activities occur on both private and public lands. FSDM methods that can be used in Kansas are discussed in Section 3.3.1.3. Each feral swine damage situation may require the use of one or more of these methods.

1.7.1.2 Kansas Department of Wildlife, Parks and Tourism. KDWPT is responsible for managing wildlife species. However, feral swine are considered non-wildlife and, therefore, not regulated or managed by KDWPT. KDWPT states in their hunting regulations that feral hogs threaten agricultural crops and native wildlife in several Kansas counties. The state's goal is to eradicate or reduce feral swine to the lowest possible level. KDWPT conducts work under the authority of the Kansas Wildlife and Parks Commission (KSA (Kansas Statutes Annotated) 32-701-1127). Wildlife species under KDWPT authorities include game, nongame, and T&E species. Many of the species that KDWPT manages would benefit from FSDM and KWSP could conduct FSDM for the protection of other wildlife at the direction of KDWPT.

1.7.1.3 Kansas Department of Agriculture. KDA has regulatory authority for the safe and proper use of pesticides in WDM (KSA 2-2453 and 2-2454), certification of applicators (KSA 2-2441a and 2-2445a), and product label registration (KSA 2-2201). Any use of pesticide products (repellents and toxicants (no toxicants are currently registered for use, but research is being conducted on the compound sodium nitrite)) in FSDM by KWSP would be subject to KDA regulatory requirements. KDA also has an interest in seeing feral swine eradicated from the State because of the damage they inflict on agriculture.

KDA-AHD works with livestock throughout Kansas to monitor their health and disease outbreaks. Since feral swine are vectors of a number of diseases that have the potential to impact domestic livestock, KDA-AHD has an inherent interest in FSDM. Also, feral swine in Kansas are considered feral livestock and, therefore, authority over them rests with the State Livestock Commissioner at KDA-AHD.

1.7.1.4 Kansas State University Cooperative Extension Service. KSU-CES is directed to develop a statewide program for control of damage caused by wildlife (KSA 76-459-464). KSU-CES instructs farmers and ranchers on effective damage management methods to more effectively protect their crops, poultry, and livestock from wildlife damage. KSU-CES also conducts studies on WDM methods, especially focusing on nonlethal control methods, to prevent agricultural losses caused by wildlife and to supply individuals, at cost, with materials not readily available from local commercial sources for use in damage control work.

1.7.1.5 U.S. Fish and Wildlife Service. USFWS has statutory authority to manage federally listed T&E species through the Endangered Species Act (ESA) and migratory birds under the Migratory Bird Treaty Act. KWSP, under Section 7 of ESA, must consult with USFWS to ensure that federal activities do not impact T&E species or their designated critical habitat. Part 7(a) (1) requires federal agencies to use their authorities in furtherance of the ESA.

1.7.2 Compliance with Federal Laws

Several federal laws regulate or, otherwise, affect KWSP FSDM activities. KWSP complies with these laws, and consults and cooperates with other agencies as appropriate.

1.7.2.1 National Environmental Policy Act (NEPA). NEPA was enacted to insure that environmental impacts are considered in a planning process. Most federal actions are subject to NEPA (Public Law 91-190, 42 USC 4321 et seq.) and its implementing regulations established by the Council on Environmental Quality (CEQ) (40 CFR 1500-1508). In addition, WS follows USDA (7 CFR 1b) and APHIS (7 CFR 372) NEPA implementing regulations as a part of the decision-making process. KWSP prepares analyses of the environmental impacts of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in Kansas. When KWSP operational assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency.

1.7.2.2 Endangered Species Act (ESA). It is federal policy, under the ESA, that all federal agencies shall seek to conserve T&E species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with USFWS to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available*" (Sec.7(a)(2)). KWSP (2015) consulted with USFWS under Section 7 of the ESA in Kansas concerning potential impacts of WDM methods on T&E species and completed a Biological Assessment (KWSP 2015). KWSP abides by all the established standard operating procedures (SOPs) identified in KWSP (2015) to minimize or nullify any potential impact. USFWS (2015) concurred with the SOPs. The Section 7 consultation ensures that potential impacts to T&E species will be avoided or minimized.

1.7.2.3 National Historic Preservation Act (NHPA) of 1966, as Amended. NHPA, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that can result in changes in the character or use of historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources, and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings. KWSP actions on Tribal lands are only conducted at the Tribe's request and under signed agreement; thus, the Tribes have control over any potential conflict with cultural resources on its properties. KWSP activities as described under the proposed action do not cause ground disturbances nor do they otherwise have the potential to significantly affect visual, audible, or atmospheric elements of historic properties and are, thus, not undertakings as defined by the NHPA. FSDM could benefit historic properties if such properties were being damaged by feral swine. In those cases, the officials responsible for management of such properties would make the request and would have decision-making authority over the methods to be used. Harassment techniques that involve noise-making could conceivably disturb users of historic properties if they were used at or in close proximity to such properties; however, it would be an exceedingly rare event for noise-producing devices to be used in close proximity to such a property unless the resource being protected from feral swine damage was the property itself, in which case the primary effect would be beneficial. Also, the use of such devices is generally short term and could be discontinued if any conflicts with historic properties arose. KWSP has determined FSDM actions are not undertakings as defined by the NHPA because such actions do not have the potential to result in changes in the character or use of historic properties.

1.7.2.4 Executive Order 13112 of February 3, 1999, Invasive Species. Nonnative plants and animals that inadvertently find their way to the United States are of increasing concern as they threaten our natural resources. One study estimated that the total costs of invasive species in the United States amounted to more than $138 billion each year (Pimentel et. al. 1999). Invasive species impact nearly half of the currently listed T&E species under ESA. On February 3, 1999, Executive Order 13112 was signed establishing the National Invasive Species Council (Council). The Council is an inter-Departmental body that helps coordinate cost-effective federal activities regarding invasive species and ensure that activities are complementary. Council members include the Departments of the Interior, Agriculture, Commerce, State, Treasury, Transportation, Defense, and Health and Human Services, and the U.S. Environmental Protection Agency (EPA), and the U.S. Agency for International Development. Together with the Invasive Species Advisory Committee, stakeholders, concerned members of the public, and member departments, the Council formulated an action plan for the nation. The Council issued the National Invasive Species Management Plan early in 2001 to provide an overall blueprint for Federal action. The Plan recommends specific action items to improve coordination, prevention, control and management of invasive species by the federal agency members of the Council. Feral swine are considered an invasive species in the United States because they are not part of the native fauna of wildlife.

1.7.2.5 Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Executive Order 12898 promotes the fair treatment of people of all races, income levels, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies, and activities on minority and low-income persons or populations. This EA will evaluate activities addressed in the alternatives for their potential impacts on the human environment and compliance with Executive Order 12898.

WS would use only legal, effective, and environmentally safe damage management methods, tools, and approaches. The EPA through FIFRA, KDA, the United States Department of Justice, Drug Enforcement Administration (DEA), MOUs with land managing agencies, and WS' Directives would regulate chemical methods that could be available for use by WS pursuant to the alternatives. WS would properly dispose of any excess solid or hazardous waste. WS does not anticipate the alternatives would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations. In contrast, the alternatives may benefit minority or low-income populations by reducing threats to public health and safety and property damage.

KWSP personnel use WDM methods as selectively and environmentally conscientious as possible. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

1.7.2.6 Executive Order 13045 - Protection of Children from Environmental Health and Safety Risks. Children may suffer disproportionately from environmental health and safety risks for many reasons, including their development, and physical and mental status. Because KWSP makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, WS has considered the impacts that this proposal might have on children. The proposed action would occur by using only legally available and approved methods where it is highly unlikely that children would be adversely affected. For these reasons, KWSP concludes that it would not create an environmental health or safety risk to children from implementing this proposed action.

1.7.2.7 The Native American Graves Protection and Repatriation Act of 1990. This Act (Public Law 101-106, 25 USC 3001) requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal agencies are to discontinue work until the agency has made a reasonable effort to protect the items and notify the proper authority.

1.7.2.8 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA and its implementing regulations (Public Law 110-426, 7 USC 136 et. seq.) require the registration, classification, and regulation of all pesticides used in the United States. The EPA is responsible for implementing and enforcing FIFRA. EPA and KDA regulate chemical methods that could be available to manage damage associated with feral swine in the State.

1.7.2.9 Federal Food, Drug, and Cosmetic Act (21 USC 360). This law places administration of pharmaceutical drugs, including those used in wildlife capture and handling, under the United States Food and Drug Administration.

1.7.2.10 Controlled Substances Act of 1970 (21 USC 821 et seq.). This law requires an individual or agency to have a special registration number from DEA to possess controlled substances including some chemical methods used for wildlife capture and handling.

1.7.2.11 Animal Medicinal Drug Use Clarification Act of 1994. This Act and its implementing regulations (21 CFR 530) establish several requirements for the use of animal drugs including animal drugs used to capture and handle wildlife in damage management programs. Those requirements are: (1) a valid "veterinarian-client-patient" relationship, (2) well defined record keeping, (3) a withdrawal period for animals that have been administered drugs, and (4) identification of animals. A veterinarian, either on staff or on an advisory basis, would be involved in the oversight of the use of animal capture and handling drugs under any alternative where WS could use those immobilizing and euthanasia drugs. Veterinary authorities in each state have the discretion under this law to establish withdrawal times (i.e., a period after a drug is administered that must lapse before an animal may be used for food) for specific drugs. Animals that people might consume within the withdrawal period must be identifiable (e.g., use of ear tags) and labeled with appropriate warnings.

1.7.2.12 Airborne Hunting Act of 1971. This Act (Public Law 92-159), and amended in 1972 (Public Law 92-502) added to the Fish and Wildlife Act of 1956 as a new section (16 USC 742j-l) that prohibits shooting, or attempting to shoot, harassing, capturing or killing any bird, fish, or other animal from aircraft except for certain specified reasons. Under exception [16 USC 742j-l, (b)(1)], state and federal agencies are allowed to protect or aid in the protection of land, water, wildlife, livestock, domesticated animals, human life, or crops using aircraft.

1.7.3 State and Local Laws

Feral swine are regulated by state and local laws because they are resident animals. Current Kansas law regards feral swine as feral livestock and, therefore, regulatory authority lies with the State Livestock commissioner at KDAH. Current legislation on feral swine can be found in House Bill 2899 passed February 20, 2006 prohibits the advertising and selling of feral swine hunts and prohibits the hunting of feral swine in Kansas except for pest control. This legislation allows landowners to protect their property and conduct feral swine control, but it removes the incentive of hunting which may provoke illegal releases of feral swine in some areas of the state for hunting opportunities.

1.8 A PREVIEW OF THE REMAINING CHAPTERS IN THIS EA

This EA is composed of 5 chapters. Chapter 2 discusses and analyzes the issues and affected environment. Chapter 3 contains a description of each alternative, alternatives not considered in detail, and SOPs to minimize or avoid environmental impacts. Chapter 4 analyzes the environmental impacts associated with each alternative considered in detail for each of the issues. Chapter 5 contains the list of preparers of this EA, persons consulted, and literature cited.

2.0 CHAPTER 2: DISCUSSION OF ISSUES

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues that have driven the development of SOPs, and issues that will not be considered in detail, with rationale. The affected environment for each issue will be incorporated into the discussion of the environmental impacts in Chapter 4.

2.1 ISSUES

The following issues have been identified as areas of concern requiring consideration in this EA. These will be analyzed in detail in Chapter 4:

- Effects of FSDM on Feral Swine Populations
- Effects of FSDM on Nontarget Species Populations, including T&E Species
- Effects of FSDM on Public and Pet Safety and the Environment
- Humaneness of FSDM Methods Used in FSDM

2.2 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

2.2.1 Effects on Feral Swine Populations

A common concern of the public is whether WDM actions are effective at controlling target species populations. The effect of damage management actions on feral swine populations will be analyzed in this EA. However, it must be noted that feral swine are considered an invasive species in Kansas, and as such, eradication is the desired goal for their population. Extirpation is usually not feasible in many other states. However, we believe it is possible in certain areas of Kansas. Other areas, where extirpation may not be possible, the goal will be to manage the population at its lowest possible level.

An example of the feasibility of extirpation points to the Fort Riley population in northeast Kansas. Feral swine where discovered on the 100,000 acre Army installation in 1993. KWSP was asked to cooperate and develop a control program in 1995. KWSP removed 385 feral swine from 1995-2000 via aerial shooting, cage traps, snares and shooting. There has not been a feral swine killed or reported since 2000. After thirteen years, KWSP believes that the extirpation of that population was successful. Other populations in Kansas are of similar size and reside in similar habitat as Fort Riley. To date, KSWSP has extirpated 10 other feral swine populations. Feral swine will more than likely always have a presence in Kansas but KWSP believes that with adequate funding and personnel, other populations in the state can be extirpated and populations, especially along the southern and eastern border, can be controlled quickly and adequately. Eradication has been conducted in other areas, but included fencing to keep swine from reinvading areas (McCann and Garcelon 2008)

2.2.2 Effects on Nontarget Species Populations, Including T&E Species

A common concern among members of the public and wildlife professionals, including KWSP personnel, is the potential impacts of damage control methods and activities on nontarget species, particularly T&E species. KWSP's SOPs include measures intended to avoid or reduce the effects of FSDM methods on nontarget species populations and are presented in Chapter 3.

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects of FSDM and the establishment of SOPs including special restrictions or mitigation measures. KWSP (2015) consulted with USFWS under Section 7 of the ESA in Kansas concerning potential impacts of WDM methods on T&E species and completed a Biological Assessment (2015). KWSP abides by all the established standard operating procedures (SOPs) identified in KWSP (2015) to minimize or nullify any potential impact. USFWS (2015) concurred with the SOPs. The Section 7 consultation ensures that potential impacts to T&E species will be avoided or minimized.

KWSP has reviewed the current list of T&E species in Kansas (Table 2), both federal and state listed, and FSDM implemented by KWSP will have no adverse effect on any of the species listed. KWSP reviewed this list of 55, excluding those no longer found in the state, which included 4 mammals, 7 birds, 2 reptiles, 8 amphibians, 16 fish, 16 invertebrates, and 2 plants for potential impacts from FSDM and the potential for a beneficial effect if feral swine are removed (Table 2). Of the species and subspecies listed, KWSP did not include species that have been extirpated from the state. In Kansas, several species listed under provisions of the federal and state laws pertaining to the protection of threatened and endangered species such as ESA, some are no longer found in Kansas including the gray wolf (*Canis lupus*), wild and not reintroduced populations of the black-footed ferret, Indiana bat (*Myotis sodalist*), Eskimo Curlew[3] (*Numenius borealis*), Black-capped Vireo (*Vireo atricapilla*), spectaclecase mussel (*Cumberlandia monodonata*), and running buffalo clover (*Trifolium stoloniferum*). Additionally, no recent collections/sightings have been recorded for the New Mexico threadsnake (*Rena dissecta*), longnose snake (*Rhinocheilus lecontei*), checkered gartersnake (*Thamnophis marcianus*), and many-ribbed salamander (*Eurycea multiplicata*), so these species may be extirpated; even if these species were present, FSDM would not have an adverse effect on them, but swine removal could potentially benefit the reptiles and amphibians.

WS has determined that all FSDM methods used would have no adverse effect on any of the current listed species with the exception of the Lesser Prairie-Chicken. The only activity that has the potential to affect the prairie-chicken would be aerial shooting when they are on leks from March to May, with females attending leks after early May probably renesting after a nest failure (Hagen and Giesen 2005). However, KWSP has not conducted aerial shooting in the range of feral swine and does not anticipate such at this time. WS would reconsult if feral swine invade western Kansas in the range of the Lesser Prairie-Chicken.

In contrast to adverse impacts on nontarget animals from direct take of feral swine through FSDM methods, some nontarget species may actually benefit from FSDM. Feral swine could be responsible for destroying their habitat or direct predation/depredation of the T&E species or its nestlings/eggs. Prime examples are the benefit to ground nesting bird species such as the Lesser Prairie-Chicken that results from any reduction in nest destruction or predation from feral swine activity, or the reduction of impacts to wetlands from feral swine wallowing where T&E species of fish, invertebrates, and plants are present. However, even though these species could benefit, they would likely only truly benefit from FSDM directed to protect them where feral swine were considered a direct threat to them. KWSP is currently not conducting any such activities, but if USFWS or KDPW, or land management agency, contacted KWSP and requested feral swine to be removed for the protection of a species, KWSP would consult with USFWS or KWDP prior to taking any such actions. KWSP has identified 11 federally listed species and an additional 27 state listed species that could benefit from the removal of feral swine if they were found in the listed species' habitat.

[3] Believed extinct

Table 2. Kansas Federally and State listed T&E species.

Species	Scientific Name	Status	Locale in Kansas	Habitat	FSDM	FS Rem.
MAMMALS						
Black-footed Ferret	*Mustela nigripes*	FE SE	Logan	G	0	0
Gray Myotis	*Myotis grisescens*	FE SE	Cherokee/Crawford Co.	CF	0	0
Northern Long eared Bat	*Myotis septentrionalis*	FT	Mainly Central	CF	0	0
Eastern Spotted Skunk	*Spilogale putorius*	ST	Statewide	FG	0	0
BIRDS						
Piping Plover	*Charadrius melodus*	FT ST	Mainly East	LW	0	+
Snowy Plover	*Charadrius alexandrinus*	ST	Scattered	W	0	+
Lesser Prairie-Chicken	*Tympanuchus pallidicinctus*	FT	Southwest	G	-	+
Least Tern	*Sterna antillarum*	FE SE	Statewide	LW	0	+
Whooping Crane	*Grus americana*	FE SE	Mainly Central	GW	0	0
Rufa Red Knot	*Calidris canutus rufa*	FT	Mainly Central	W	0	0
Sprague's Pipit	*Anthus spragueii*	FC	Central	G	0	0
REPTILES						
Common Map Turtle	*Graptemys geographica*	ST	East	Lm	0	+
Broadhead Skink	*Eumeces laticeps*	ST	Far East	F	0	+
AMPHIBIANS						
Eastern Newt	*Notophthalmus viridescens*	ST	Cherokee/Linn Co.	FW	0	+
Longtail Salamander	*Eurycea longicauda*	ST	Cherokee Co.	CW	0	0
Cave Salamander	*Eurycea lucifuga*	SE	Cherokee Co.	CW	0	0
Grotto Salamander	*Typhlotriton spelaeus*	SE	Cherokee Co.	CW	0	0
Green Toad	*Bufo debilis*	ST	Logan/Morton/Wallace	GP	0	0
Strecker's Chorus Frog	*Pseudacris streckeri*	ST	Barber/Harper Co.	FW	0	+
Green Frog	*Rana clamitans melanota*	ST	Cherokee Co.	FW	0	+
Eastern Narrowmouth Toad	*Gastrophryne carolinensis*	ST	Cherokee Co.	GW	0	+
FISH						
Pallid Sturgeon	*Scaphirhynhus albus*	FE SE	Far Northeast	Lgm	0	0
Arkansas Darter	*Etheostoma cragini*	FC ST	South	LWg	0	+
Western Silvery Minnow	*Hybognathus argyritis*	ST	Far Northeast	LWg	0	+
Plains Minnow	*Hybognathus placitus*	ST	Statewide	LWg	0	+
Sturgeon Chub	*Macrhybopsis gelida*	ST	Northeast	LWg	0	+
Shoal Chub	*Macrhybopsis hyostoma*	ST	Northeast	Lg	0	0
Sicklefin Chub	*Macrhybopsis meeki*	SE	Far Northeast	Lgm	0	0
Silver Chub	*Macrhybopsis storeriana*	SE	East	Lg	0	0
Peppered Chub	*Macrhybopsis tetranema*	SE	South-Central	Lg	0	0
Redspot Chub	*Nocomis asper*	ST	Cherokee Co.	LWg	0	+
Hornyhead Chub	*Nocomis biguttatus*	ST	East-Central	Wg	0	+
Arkansas River Shiner	*Notropis girardi*	FT SE	Southwest/S-central	LWg	0	+
Topeka Shiner	*Notropis topeka*	FE ST	Scattered mainly E	Wg	0	+
Blackside Darter	*Percina maculata*	ST	Wabaunsee Co.	Wg	0	+
Flathead Chub	*Platygobio gracilis*	ST	Far West/Northeast	LWg	0	+
Neosho Madtom	*Noturus placidus*	FT ST	Southeast	Lg	0	+
INVERTEBRATES						
Scott Optioservus Riffle Beetle	*Optioservus phaeus*	SE	Scott County	W	0	+
American Burying Beetle	*Nicrophorus americanus*	FE SE	Southeast	FG	0	+
Delta Hydrobe Snail	*Probythinella emarginata*	ST	Chase County	Wg	0	+
Slender Walker Snail	*Pomatiopsis lapidaria*	SE	Atchison County	Wm	0	+
Sharp Hornsnail	*Pleurocera acuta*	ST	Franklin County	Wgm	0	+
Mucket Mussel	*Actinonaias ligamentina*	SE	Franklin/Linn/Miami Co.	Lg	0	+
Elktoe Mussel	*Alasmidonta marginata*	SE	Cherokee County	Lg	0	+
Flat Floater Mussel	*Anodonta suborbiculata*	SE	Allen/Linn/Neosho Co.	LWm	0	+
Rock Pocketbook Mussel	*Arcidens confragosus*	ST	Franklin/Miami Co.	Lm	0	+
Western Fanshell Mussel	*Cyprogenia aberti*	SE	Southeast	Lg	0	+
Butterfly Mussel	*Ellipsaria lineolata*	ST	Southeast	Lg	0	+
Neosho Mucket Mussel	*Lampsilis rafinesqueana*	FE SE	Southeast	Lg	0	+
Flutedshell Mussel	*Lasmigona costata*	ST	Southeast	Lg	0	+
Ouchita Kidneyshell Mussel	*Ptychobranchus occidentalis*	ST	Southeast	LWg	0	+
Rabbitsfoot Mussel	*Quadrula cylindrica*	FT SE	Southeast	Lg	0	+
Ellipse Mussel	*Venustaconcha ellipsiformis*	SE	Cherokee County	Wg	0	+
PLANTS						
Mead's Milkweed	*Asclepias meadii*	T	Mainly East	G	0	0
W. Prairie Fringed Orchid	*Platanthera praeclara*	T	Northeast	G	0	+

STATUS: C – Candidate**; E –** Endangered; **F** – Federally listed; **S** – State listed; **T** – Threatened
HABITAT: C – Caves; **F** - Forests/riparian borders; **G** - Grass/pasture/meadow; **L** – Lakes/rivers; **W** - Wetland/marsh/creek; **g** – gravel/sandy substrate; **m** – muddy substrate
FSDM/FS Removal Impacts: (-) – Minimal Negative; **0** – none; **(+)** – Potential Positive

Another peripheral factor pertinent to assessing the risk of adverse effects to nontarget species, as well as public and pet health and safety, of KWSP FSDM activities is the potential for adverse effects from not having professional assistance from programs like KWSP available to private entities and the State that express needs for such services. KWSP operates to assist individuals with damage from feral swine where a need exists. In the absence of a program, or where restrictions prohibit the delivery of an effective program, it is most likely that FSDM would be conducted by the State and other entities such as private individuals. Private FSDM activities are more likely to have higher risks to nontarget species because private activities may include the unwise or illegal use of FSDM methods. For example, in 2004 several dogs were poisoned in Wyoming and Idaho where baits laced with Temik®, a carbamate insecticide with the active ingredient aldicarb, instead of the wolves they were believed to be targeting (Stahl 2004). A wolf in northwest Colorado was believed to be killed with the poison compound 1080, sodium fluoroacetate (Denver Post 2011). In Idaho, dogs were poisoned with meat laced with the artificial sweetener xylitol, toxic to canids but not humans, meant for coyotes (*Canis latrans*) (Smith 2012). A wolf in northwest Colorado was believed to be killed with the poison compound 1080, sodium fluoroacetate (Denver Post 2011). Examples are replete in the news with many different types of wildlife being killed to protect resources where people losing resources to wildlife take matters into their own hands. The Texas Department of Agriculture (2015b) has a website and brochure devoted solely to preventing pesticide misuse in controlling agricultural pests. Therefore, WS believes that it is in the best interest of the public, pets, and the environment that a professional FSDM program be available because private resource owners could elect to conduct their own control rather than use government services and simply out of frustration resort to inadvisable techniques (Treves and Naughton–Treves 2005).

2.2.3 Effects of FSDM on Public and Pet Safety and the Environment

Some FSDM methods could pose a threat or cause injuries to people and pets. WS uses firearms sometimes with night-vision equipment, lead in bullets/shotgun shells, aircraft, cage traps including corral traps with sight-activated and one way doors, and neck snares. WS personnel could also use fencing, frightening devices such as pyrotechnics (pyrotechnic use by the user is included with firearms below), propane cannons, and lights, chemical repellents, tracking dogs, immobilization/euthanasia drugs, and GonaCon™ (contraceptive vaccine). Of these, the use of firearms and lead associated with their use, aircraft, and snares have the potential to have an effect on public and pet safety. The other methods would have, at most, a negligible impact on people or pets such as noise when frightening devices are used. Drugs used in FSDM would not have an effect on people or pets since they are target specific and animals killed would be disposed according to WS Policy and U.S. Food and Drug Administration (FDA) guidelines.

Another peripheral factor pertinent to assessing the risk of adverse effects of KWSP FSDM activities is the potential for adverse effects to people and pets from not having professional assistance from programs like KWSP available to private entities and the State that express needs for such services as discussed in Section 2.2.2. In the absence of a program, or where restrictions prohibit the delivery of an effective program, it is most likely that FSDM would be conducted by the State and other entities such as private individuals. Private FSDM activities are more likely to have higher risks to the public and pets because private activities may include the unwise or illegal use of FSDM methods (Treves and Naughton–Treves 2005).

2.2.3.1 Firearms. WS personnel routinely use firearms to remove feral swine in damage situations. Two issues arise with firearms and these are the risk associate with firearm use and the risk of lead exposure (lead risks are discussed in Section 2.2.3.2). WS is not involved in sport hunting or law enforcement activities, and is unique as firearms or firearm-like devices are used on a frequent basis, often daily, in rural and urban settings (National Security Academy 2008). Sometimes, the actions may be high profile and require extra safety precautions and high competency. As a result of this, and the fact that WS personnel use firearms more frequently than many other people with duties that include the use of firearms, WS personnel receive firearms training, often similar to that received by law enforcement agencies.

WS personnel who use firearms are subject to new applicant drug testing, random drug testing, reasonable suspicion testing, and post-accident testing. As a condition of employment, WS employees who carry and use firearms are subject to the Lautenberg Domestic Confiscation Law, which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence (18 USC § 922(g)(9)). WS minimizes risks to human health and safety by implementing extensive training and safety practices highlighted in WS Directive 2.615. WS policy has requirements for training, safe use, storage and transportation of firearms as prescribed by the WS Firearms Safety Training Manual (WS Directive 2.615, 05/03/02). The required firearms training is conducted biennially by certified instructors. Hands-on firearms proficiency is evaluated in the field and candidates must pass a written exam. Therefore, firearms are handled in a safe manner with consideration given to the proper firearm to be utilized for the given target density, backstop, and unique field conditions.

Table 3. The annual average number of accidents and incidents with firearms and firearm-like devices used by APHIS-WS in WDM from FY08 thru FY12.

AVERAGE ANNUAL ACCIDENTS AND INCIDENTS WITH FIREARMS FROM FY08 TO FY12 BY WS IN WDM							
Method	**Injury**	**Pers. Error**	**Mechanical**	**Ammunition**	**Mishaps**	**Unknown**	**Theft**
Shotgun (ground)	0.2*	0.4	0.6	0.4	0	0.6	
Shotgun (aerial)[1]	0	0.4	0	0	0.2	0	
Rifle	0.4*#	0.2	0.8	1.0	0.2	0.2	
Rifle with Suppressor	0	0	0.2	0	0	1.8	
Pistol	0.2^	0.4	0	0	0	0	
Pneumatics (air rifles)	0	0	0	0	0.2	0	
Pyrotechnic (pistol launcher)[2]	0.2*	0.2	0.2	0.6	0	0	
Pyrotechnic (12 ga. cracker shell)[2]	0	0	0	0.2	0	0	
Paint Balls, Rubber Bullets, Dart & Net Guns	0	0	0	0	0	0	
Thefts[3]	N/A						1.0
TOTAL BY CATEGORY	**1.0**	**1.6**	**1.8**	**2.2**	**0.6**	**2.6**	**1.0**
TOTAL OF ACCIDENTS/INCIDENTS	**1.0**	**8.8**					**1.0**

1=In Aerial Operations Risk Assessment 2= In Pyrotechnics Risk Assessment 3 – Thefts often involved a variety of firearms (including one that stole an entire safety box that was bolted to vehicle while employee was in immediate area responding to a damage request).
*=Injury associated with a mechanical failure #=Injury associated with an ammunition failure ^=Injury resulting from personal error

Nationwide, with about a million shots fired annually from all firearm types, WS has a minimal number of accidents/incidents (about 9/year – Table 3) with much less risk of injury (1/year – Table 3). Nine personnel were injured from FY04 to FY13 (10 years). Three injuries were to the leg (one a pellet from an air rifle, one from a .22 caliber pistol, and one from a high-powered rifle) and five injuries were to hands, face, and eardrums from rounds going off in the barrel. One accident involving a pyrotechnic launcher resulted in injuries to the hand and the loss of the pinky finger and part of the ring finger of a WS' employee. This is a minimal number of injuries and none involved the public. Thus, the risk of firearm usage to the public is minimal. In addition, no domestic pets were taken from FY08 to FY12.

2.2.3.2 Effects from the Use of Lead in Ammunition. KWSP uses nontoxic shot (*e.g.,* steel and bismuth) and lead shot, lead bullets, and non-lead pellets for ground-based shooting. WS uses nontoxic shot for all migratory birds shot under the authority of a permit issued by USFWS and in areas where there is a potential risk to T&E or sensitive species such as Bald Eagles. In general, sport hunting using rifles or shotguns, which would be similar in nature to shooting by WS with regard to dispersal of lead shot, tends to spread lead over wide areas and at low concentrations (Craig et al. 1999). The primary concerns raised thus far about sport hunting and lead shot contamination have been focused on aquatic areas where waterfowl hunting occurs, and the feeding habits of many species of waterfowl that result in them picking up and ingesting shot from the bottoms of ponds, lakes, and marshes. Shooting of lead shot in dry land upland areas has not raised similar levels of concern except where such activities are more intensively concentrated such as those which can occur with dove hunting at harvested crop fields and with game bird hunting at "shooting preserves" (Kendall et al. 1996). In an ecological risk assessment of lead shot exposure in non-waterfowl bird species, ingestion of lead shot was identified as the exposure mode of concern rather than just contact with lead shot or lead leaching from lead shot distributed in the environment (Kendall et al. 1996). Shots fired during WDM activities in Kansas are scattered in distribution over relatively wide areas in mostly uninhabited locations where contact with humans or ingestion by birds picking up grit to aid in digestion of food are highly unlikely.

The amount of lead deposited on the landscape from the firing of shotguns and rifles during WDM is very small since the amount of land area involved is huge. WS conducted WDM on an annual average of 562,000 acres from FY08 to FY12[4] (total acres worked from FY08 to FY12 = 844,000 acres) which includes all wildlife. WS uses firearms for many WDM activities in Kansas including ground-based, aerial, and harassment shooting, and shooting to euthanize animals caught in traps. WS uses steel shot or pellets to take birds listed on a migratory bird permit from USFWS, but the MIS does not track the type of shot or bullets used, lead or not lead. For the sake of analysis, it was conservatively determined that KWSP used 1,267 pounds of lead per year from FY08 to FY12 or 23.1 oz./square mile (1.0 g/acre) where KWSP conducted WDM. This figure was determined with several conservative assumptions that had to be used since the MIS does not track the number of shots that were fired. For the sake of analysis, Kansas was estimated to use 100% lead for aerial shooting (shotgun), 10% lead for shooting birds (shotgun), 70% lead for shooting mammals (shotgun), 90% lead for rifles, and no lead pellets for air rifles. The amount of lead used was also calculated by assuming that 3 shotgun shells (1.2 oz. lead each) were used to take each mammal during aerial shooting, 2 shotgun shells (1.2 oz. lead each) or 2 rifle bullets (0.25 oz. lead each) were used to take each animal with shooting on the ground, and 1 rifle bullet for large mammals or 1 .22 bullet (0.1 oz. lead each) for small animals euthanized in a foothold, snare, or cage trap). Additionally, it was assumed that 1 shot was taken for every 10 mammals or 100 birds that were hazed (primarily at airports in Kansas). These are considered conservative because KWSP personnel do not likely shoot as many times as suggested, the bullets used are likely smaller number of grains, nontoxic shot is used for most all bird work (nontoxic shot is used for birds taken under a USFWS permit), and most carcasses shot are retrieved and disposed of according to WS Policy in areas where they are not available for avian scavengers, the species of most concern with lead use.

The estimated lead use by WS, 23.1 ounces of lead over one square mile (1.0 g/acre), is considered very minimal. WS shooting for all wildlife species taken or hazed (harassment shooting) in WDM occurs on small proportion of the land area in Kansas. The annual average (FY10-FY14) area worked by WS was about 1.1% of the land area of Kansas. The land area of exposure to shots fired is still relatively large in relation to the amount of shot distributed. Even though this is a small amount, to address even the most extremely unrealistic concerns raised regarding this issue, we have looked at the following detailed scientific facts and data related to any potential exposure of lead resulting from the lead shot used by WS in all WDM activities. It should be noted that hunting is not allowed on much of lands under agreement where WS conducts WDM (*e.g.,* airports and feedlots), thus cumulative impacts on these lands would not include upland game hunting (nontoxic shot is required for waterfowl hunting).

The hazard standard set by EPA for lead concentrations in residential soils is 400 ppm (1 part per million is equivalent to 1 mg/kg or 0.0064 oz./lb.) in children's play areas, and 1,200 ppm on average for the rest of a residential yard[5]. We are unaware of any established standards for lead contamination of soil in remote rural areas of the kind where WS conducts much of its WDM activities in Kansas, but it is reasonable to assume the guideline for residential areas would be more stringent than any such standard that might ever be established for rural areas. Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil is generally retained within the top 20 cm (about 8 inches). A representative average weight of soil is in the range of 110 lbs. (49.9 kg) per cubic foot (Environmental Working Group 2001). The number of cubic feet of soil in the top 8 inches of soil in one acre is about 29,000. Therefore, a reasonable estimate of the total weight of the top layer of soil per acre where spent lead shot should remain would be 3.2 million lbs. (110 x 29,000) or 1.5 million kg. If considered over the amount of land area involved in WDM in the State during a typical year, the amount of lead distributed from WS WDM activities would constitute an

[4] Lead usage for Kansas has been analyzed for FY08 to FY12 in a Draft Risk Assessment and this information will be used. No significant changes have occurred since FY12 to increase the use of lead. As proven "green" ammunition becomes available, KWSP is incorporating its use in WDM programs.

[5] The EPA soil-lead hazard is bare soil on residential real property or on the property of a child occupied facility that contains total lead equal to or exceeding 400 parts per million (mg/g) in a play area or average of 1,200 parts per million of bare soil in the rest of the yard based on soil samples (40 CFR 745.65(c)).

average of about 0.0007 mg/kg of soil. This is a small fraction, about 580,000 times less than the concentration in the EPA hazard standards for children play area soils shown above. Soil uncontaminated by human activities generally contains lead levels up to about 50 ppm (or 50 mg/kg) (Agency for Toxic Substances and Disease Registry 2007) or 72,000 times more than KWSP contributes. Thus, KWSP adds minimal amounts of lead to the soil in Kansas and would take hundreds of thousand years to accumulate enough to meet the level for children's playgrounds.

A remaining question is whether lead shot deposited in remote areas by WS might lead to contamination of water, either ground water or surface water via runoff that occurs during or following rainfall or melting snow cover. Stansley et al. (1992) found that lead did not appear to "transport" readily in surface water when soils are neutral or slightly alkaline in pH (i.e., not acidic), but that it will transport more readily under slightly acidic conditions. In their study, they looked at lead levels in water that was subjected directly to high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Although they detected elevated lead levels in water in a stream and a marsh that were in the shot "fall zones," they did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot where it was believed the lead contamination was due to water runoff from the parking lot, and not from the shooting range areas. Their study indicated that even when lead shot is highly accumulated in areas with permanent water bodies present, the lead does not necessarily cause elevated lead contamination of water further downstream. They also reported that muscle samples from two species of fish collected in the water bodies with high lead shot accumulations had lead levels that were well below the accepted threshold standard of safety for human consumption (Stansley et al. 1992). Craig et al. (1999) reported that lead levels in water draining away from a shooting range with high accumulations of lead bullets in the soil of the impact areas were far below the EPA's "action level" (i.e., requiring action to treat the water to remove lead) of 15 ppb ("parts per billion"). They reported that the dissolution (i.e., capability of dissolving in water) of lead declines when lead oxides form on the surface areas of the spent bullets and fragments in the impact areas. This means "transport" of lead from bullets or shot distributed across the landscape is reduced once the bullets and shot from these crusty lead oxide deposits on their surfaces, which serves to naturally further reduce the potential for ground or surface water contamination. These studies suggest that, given the very low and highly scattered shot concentrations that occur from WS's WDM shooting activities, as well as most other forms of dry land small game hunting in general, lead contamination of water from such sources would be minimal to nonexistent. Based on the above analysis, we conclude that the amount of lead deposited by WS WDM operations is far below any level that would pose any risk to public health or of significant contamination of water supplies.

In a review of lead toxicity threats to the California Condor (*Gymnogyps californianus*), a species not found in Kansas, but highly susceptible to lead poisoning, the Center for Biological Diversity et al. (2004) concluded that lead deposits in soils, including those caused by target shooting by the military at shooting ranges on military reservations used by condors, did not pose significant threats to the condor. The concern was that lead might bio-accumulate in herbivores that fed on plants that might uptake the lead from the soil where the target ranges were located. However, Center for Biological Diversity et al. (2004) reported blood samples from condors that foraged at the military reservation where the target shooting occurred did not show elevated lead levels, and, in fact showed lower lead levels than samples from condors using other areas. Because lead deposited by WS's WDM activities is widely scattered in comparison to military shooting ranges, it is clear that, despite valid concerns about other sources of lead toxicity in the environment, lead deposited onto the landscape by WS should not cause any significant impacts on wildlife, nor should it contribute in any significant way to cumulative impacts from other sources of lead shot deposited by sport hunting. However, there appears to be a growing body of evidence that lead bullets and shot remaining in carcasses of animals that are shot but not removed from the landscape can pose lead toxicity problems for scavenging California Condors (Center for Biological Diversity et al. 2004). These concerns have also arisen regarding lead poisoning from Bald Eagles scavenging predators that have been shot. The WS Program has tried various nontoxic (non-lead) shot loads to reduce the concern of lead poisoning, and continues to move in this direction as new nontoxic ammunition is developed that is effective for WDM. However, some evidence has shown that the threat of lead toxicity to eagles is not as severe as previously thought. Hayes (1993) reviewed literature and analyzed the hazard of lead shot to raptors, in particular eagles from aerial shooting by WS. Key findings of that review were:

- Eagles are known to scavenge on bird and mammal carcasses, particularly when other food sources are scarce or when food demands are increased.

- In studies that documented lead shot consumption by eagles (i.e., based on examining the contents of regurgitated pellets), the shot was associated with waterfowl, upland game bird, or rabbit remains, and was smaller than BB or #4 buckshot used in aerial shooting. Lead levels have been detected in eagle blood samples, but the source of the exposure was unknown. Lead residues have been documented in jackrabbits, voles (*Microtus sp.*), and ground squirrels which can explain how eagles could ingest lead from sources other than lead shot. In one study (Pattee et al. 1981), four of five captive Bald Eagles force fed uncoated lead shot died and the fifth went blind. Frenzel and Anthony (1989) suggested, however, that eagles usually reduce the amount of time that lead shot stays in their digestive systems by casting most of the shot along with other indigestible material. It appears that healthy eagles usually regurgitate lead shot in pellet castings which reduces the potential for lead to be absorbed into the blood stream (Pattee et al. 1981; Frenzel and Anthony 1989).

- WS personnel examined nine coyotes (*Canis latrans*) shot with copper plated BB shot to determine the numbers of shot retained by the carcasses. A total of 59 BBs was recovered, averaging 6.5 pellets per coyote. Of the 59 recovered pellets, 84% was amassed just under the surface of the hide opposite the side of the coyote that the shot entered, many exhibited minute cracks of the copper plating, and two shot pellets were split. The fired shot was weighed, compared with unfired shot, and found to have retained 96% of its original weight. Eagles generally peel back the hide from carcasses to consume muscle tissue. Because most shot retained by coyotes tends to end up just under the hide, it would most likely be discarded with the hide. Any shot consumed would most likely still have the nontoxic copper plating largely intact, reducing the exposure of the lead to the digestive system. These factors combined with the usual behavior of regurgitation of ingested lead shot indicate a low potential for toxic absorption of lead from feeding on coyotes killed by aerial shooting.

The above analysis indicates adverse effects on eagles from scavenging on animals killed in WDM are unlikely. Bald Eagle populations appear to be increasing in North America from Breeding Bird Survey (BBS) data surveywide which includes the 48 contiguous states and the southern portions of Canada and Alaska. Golden Eagle populations appear to be somewhat stable, but show nonsignificant trends in the BBS (BBS trend estimates for raptors are not as reliable because of small sample sizes). BBS data survey-wide indicate an increasing trend in breeding populations of Golden Eagles (nonsignificant) and Bald Eagles (significant, $P<0.05$) in North America from 1966-2013 (Sauer et al. 2014). However, researchers have suggested that the population of Golden Eagles may be declining in the West (Kochert et al. 2002, Good et al. 2007). Good et al. (2007) estimated the population of Golden Eagles in 4 Bird Conservation Regions from aerial transects at 27,000 and hope to continue the surveys to determine the trend in the population (preliminary estimates suggest a decline). Thus, Bald Eagle populations do not appear to be adversely affected by lead toxicity problems. Some portion of the Golden Eagle population dies from lead poisoning which is believed to occur from eating hunter shot carcasses which were not retrieved. However, one study found that found that eagles were exposed to lead in the environment from unknown sources over extended periods of time (Kochert et al. 2002). To minimize exposure from WDM activities, WS retrieves shot carcasses where practical and disposes of them in areas where eagles and other scavengers such as hawks are not able to scavenge on them. In addition, WS uses nontoxic shot where eagles have been documented recently. In addition, no evidence has been brought forth to indicate that any animals killed during WDM by WS have resulted in any indirect lead poisoning of scavenging eagles or other animals.

2.2.3.3 Aircraft Usage. The use of aircraft by KWSP under the proposed alternatives includes the use of helicopters or single engine fixed-wing aircraft for the purposes of aerial survey, capture, or aerial shooting. Pilots and gunners are given extensive training at the WS National Aviation Training Center in Utah and are certified. The pilots and gunners are given frequent training thereafter. Accident rates have been analyzed and found to be similar to general aviation, but decreased since the Aviation Training Center became operational (Table 3). Aerial shooting is used by KWSP in Kansas since 1998. KWSP has not had any aerial accidents involving crash or injury.

Table 3. WS and contract pilots hours flown including aerial shooting and other activities, accidents, and general aviation (GAV) hours and accidents (NTSB 2013) for 1996-2012[6]. The accident rates are standardized for 100,000 hours of flying.

	Aerial Shooting Hours						Other WS Hours			
Year	**WS Hours Flown**	**WS Accidents**		**CP Hours Flown**	**CP Accidents**		**Mostly Aerial Drop, Training, Surveying**		**GAV Hours (NTSB 2013)**	**GAV Accidents**
		FW	**RW**		**FW**	**RW**	**Hrs Flown**	**FW/RW**		
1996	14,999	1P	0	1,282	1P	0	17	0	24,881,000	1,908
1997	18,953	0	0	921	0	1U	8,105	0	25,591,000	1,840
1998	15,910	1P	0	1,182	0	2M 1P	6,433	0	25,518,000	1,902
1999	16,072	0	0	884	1P	0	9,095	0	29,246,000	1,905
2000	12,334	1P	0	1,221	1U	1M	2,035	0	27,838,000	1,837
2001	12,856	0	0	1,596	0	1P	2,277	0	25,431,000	1,727
2002	12,609	1P	0	3,173	0	0	505	0	25,545,000	1,716
2003	12,471	1P	1M	2,936	1P	0	1,057	0	25,998,000	1,741
2004	9,609	2P	0	7,536	0	0	0	0	24,888,000	1,619
2005	10,219	0	0	7,108	0	0	29	0	23,168,000	1,671
2006	10,226	1P	0	7,384	0	0	135	0	23,963,000	1,523
2007	9,709	1P1U	0	6,268	0	0	1,451	0	23,819,000	1,654
2008	10,048	0	0	6,739	0	0	1,363	0	22,805,000	1,569
2009	10,094	0	0	6,018	0	0	1,075	0	20,862,000	1,480
2010	9,832	0	0	5,073	0	0	758	0	21,688,000	1,440
2011	9,906	1U	0	3,943	0	0	1,080	0	21,488,000	1,470
2012	11,021	0	0	3,652	0	0	1,052	0	21,697,000	1,471
Total 96-12	**206,868**	**11**	**1**	**66,916**	**4**	**6**	**36,467**	**0**	**414,426,000**	**28,473**
Accident Rate	WS Hours	5.80 per 100,000		CP Hours	14.94 per 100,000		**All WS Hours**		GAV Accident Rate	6.87 per 100,000
	All WS/CP Aerial Shooting = 8.04 per 100,000						7.09 per 100,000			
Total 03-12	**103,135**	**7**	**1**	**56,657**	**1**	**0**	**8,000**	**0**	**230,376,000**	**15,638**
Accident Rate	WS Hours	7.76 per 100,000		CP Hours	1.77 per 100,000		**All WS Hours**		GAV Accident Rate	6.79 per 100,000
	All WS/CP Aerial Shooting = 5.63 per 100,000						5.36 per 100,000			
Total 08-12	**50,901**	**1**	**0**	**25,425**	**0**	**0**	**5,328**	**0**	**108,540,000**	**7,430**
Accident Rate	WS Hours	1.96 per 100,000		CP Hours	0 per 100,000		**All WS Hours**		GAV Accident Rate	6.85 per 100,000
	All WS/CP Aerial Shooting = 1.31 per 100,000						1.22 per 100,000			

FW = Fixed-wing RW = Rotary-wing CP = Contract Pilots GAV = General Aviation
P = Pilot Error M = Mechanical Problem U = Unknown Cause

Several concerns arose in the late 1990s and the 2000s from people that thought that the aircraft that are used by APHIS-WS aerial operations could unintentionally cause wildlife to disperse from aircraft overflights; among these were that birds may abandon nests and wild horses (*Equus ferus caballus*) would stampede causing undue stress and mares to abort fetuses. Additionally it was thought that catastrophic ground fires or pollution from oil or petroleum spills could occur.

Aircraft Overflights. A potential source of an effect on wildlife is from low-level flights associated with aerial shooting disturbing wildlife, including threatened and endangered (T&E) species. A number of studies have looked at the response of various wildlife species to aircraft overflights. The National Park Service (1995) reviewed studies on the effects of aircraft overflights on wildlife. The report revealed that a number of studies documented responses by certain wildlife species suggesting adverse impacts could occur. Few, if any studies, have proven that aircraft overflights cause significant long-term adverse impacts on wildlife populations, although the report stated it is possible to draw the conclusion that impacts to populations are occurring. It appears that some species will frequently or, at least

[6] Data in this table is by calendar year to match GAV data (NTSB 2013).

occasionally, show adverse responses to even minor overflight occurrences. In general, it appears that the more serious potential impacts occur when overflights are frequent such as hourly and over long periods of time which represents "chronic exposure." Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. WS aerial WDM operations occur in relatively remote rangeland areas where tree cover is at most scattered to allow for visibility of target animals from the air. In addition, WS spends relatively little time over any one area.

Several examples of wildlife species that have been studied with regard to low-level flights are available in the literature. Low-level overflights of 2-3 minutes in duration by a fixed-wing airplane and a helicopter produced no "drastic" disturbance of tree-nesting colonial waterbirds, and, in 90% of the observations, the individual birds either showed no reaction or merely looked up (Kushlan 1979). Conomy et al. (1998) quantified behavioral responses of wintering American black ducks (*Anas rubripes*), American wigeon (*Anas americana*), gadwall (*Anas strepera*), and American green-winged teal (*Anas crecca carolinensis*) exposed to low-level flying military aircraft in North Carolina and found that only a small percentage (2%) of the birds reacted to the disturbance. They concluded that such disturbance was not adversely affecting the time-activity budgets of these species. Mexican spotted owls (*Strix occidentalis lucida*) (Delaney et al. 1999) did not flush when chain saws and helicopters were greater than 110 yards away; owls flushed to these disturbances at closer distances and were more prone to flush from chain saws. Owls returned to their predisturbance behavior 10-15 minutes following the event and researchers observed no differences in nest or nestling success (Delaney et al. 1999). Delaney et al. (1999) found that chain saws at similar distances were more disturbing to the owls than aircraft overflights. Similarly, the USFS (2002) found that Mexican spotted owls showed only minor behavioral changes to F-16 fly-bys during training runs, but less behavioral changes than to natural and other man-made occurrences. Andersen et al. (1989) conducted low-level helicopter overflights directly at 35 red-tailed hawk (*Buteo jamaicensis*) nests and concluded their observations supported the hypothesis that red-tailed hawks habituate to low-level flights during the nesting period; results showed similar nesting success between hawks subjected to such overflights and those that were not. White and Thurow (1985) did not evaluate the effects of aircraft overflights, but found that ferruginous hawks (*Buteo regalis*) are sensitive to certain types of ground-based human disturbance to the point that reproductive success may be adversely affected. However, military jets that flew low over the study area during training exercises did not appear to bother the hawks, and nor did the hawks get alarmed when the researchers flew within 100 feet in a small fixed-wing aircraft (White and Thurow 1985). White and Sherrod (1973) suggested that disturbance of raptors by aerial surveys with helicopters may be less than that caused by approaching nests on foot. Ellis (1981) reported that five species of hawks, two falcons (*Falco* spp.), and golden eagles (*Aquila chrysaetos*) were "incredibly tolerant" of overflights by military fighter jets, and observed that, although birds frequently exhibited alarm, negative responses were brief and the overflights never limited productivity. Grubb et al. (2010) evaluated golden eagle response to civilian and military (Apache AH-64) helicopter flights in northern Utah. Study results indicated that golden eagles were not adversely affected when exposed to flights ranging from 100 to 800 meters along, towards and from behind occupied cliff nests. Eagle courtship, nesting and fledging were not adversely affected, indicating that no special management restrictions were required in the study location.

Krausman et al. (1986) reported that only 3 of 70 observed responses of mule deer to small fixed-wing aircraft overflights at 150 to 500 feet above ground resulted in the deer changing habitats. They believed that the deer may have been accustomed to overflights because the study area was near an interstate highway that was frequently followed by aircraft. VerCauteren and Hygnstrom (2002) noted that when studying the efficacy of hunting to manage deer populations, that when deer were flown over during their censuses, they typically just stood up from their beds, but did not flush. In addition, WS aerial operations personnel frequently observe deer and antelope standing apparently undisturbed beneath or just off to one side of aircraft. Krausman and Hervert (1983) reported that, in 32 observations of the response of bighorn sheep (*Ovis canadensis*) to low-level flights by small fixed-wing aircraft, 60% resulted in no disturbance, 21% in "slight" disturbance, and 19% in "great" disturbance. Another study (Krausman et al. 1998) found that 14% of bighorn sheep had elevated heart rates that lasted up to 2 minutes after an F-16 flew over at an elevation of 400 feet, but it did alter the behavior of penned bighorns. Weisenberger et al. (1996) found that desert bighorn sheep (*O. c. nelsoni*) and mule deer had elevated heart rates for 1 to 3 minutes and became alert for up to 6 minutes following exposure to jet aircraft. Fancy (1982) reported that only 2 of 59 bison groups showed any visible reaction to small fixed-wing aircraft flying at 200-500 feet above ground. These studies indicate that ungulates are relatively tolerant of aircraft overflights, even those that involve noise at high decibels.

WS has actively used fixed- and rotary-wing aircraft for aerial WDM activities in areas inhabited by wildlife for years. The fixed-wing aircraft used by WS are relatively quiet whereas the helicopter is somewhat noisier. WS conducts aerial WDM activities on areas only under agreement and concentrates efforts during certain times of the year to specific areas such as lambing grounds. WS (2005, 2006, and 2011) looked at the issue of aerial shooting overflights on wildlife and found that WS had annually flown less than 20 min/mi^2 on properties under agreement; basically WS flies very little over any one property under agreement in any given year. As a result, no known problems to date have occurred with WS aircraft overflights on wildlife nor are they anticipated in the future. WS avoids other wildlife when seen and not the target of an operation such as white-tailed deer and grouse leks. Based on the above information and analysis, it is reasonable to conclude that WS aerial low-level flights should not cause any adverse impacts to nontarget species, including those that are listed as T&E.

Fires and Spills. Information was obtained from Mr. Norm Wiemeyer, Chief, NTSB Denver Field Office (pers. comm. 2000), the agency responsible for investigating aviation accidents, on the potential for fires and fuel spills in 2000 due to concerns from environmental organizations. Mr. Wiemeyer stated that he had no recollection of any major fires caused by any government aircraft; he had been in that position since 1987. Mr. Jacob Wimmer has been the WS National Aviation Safety Manager and Inspector in Charge since November 2005. Mr. Wimmer has investigated all accidents and incidents since that date and has a good working knowledge of accidents and incidents from 2000, since Mr. Wiemeyer's statement. Mr. Wimmer was able to confirm that WS aircraft have caused no major fires as a result of their operations. The only fire that was a result of WS aerial operations was at a Utah accident site in June 2007. The airplane crashed, ignited a post-crash fire, but fire spread no further than the impact debris field and extinguished itself. The period of greatest fire danger typically occurs during the hotter summer months, but WS ordinarily conducts fewer aerial shooting operations during these months because ground cover and other conditions are not conducive for finding target animals. Since APHIS-WS aircraft have not caused any major ground or forest fires for many years in hundreds of thousands of hours flying, it is reasonable to assume that the risk of this occurring is minimal.

Petroleum Products Contamination. WS aircraft have caused no contamination due to leakage or spillage of petroleum products. There have been no reported fuel spills as a result of aircraft refueling operations either at fixed base operations or in field operations. No fuel or oil spillage has resulted through accident or incident and in all cases fuel tanks, fuel lines, oil tanks and oil lines have remained intact with the exception of the accident in Utah in 2007. The only rupture or leakage was a result of the accident named in the Fires and Spills section, but it was consumed by the subsequent fire before any seepage could occur.

Mr. Wiemeyer of NTSB stated that aviation fuel is extremely volatile and will evaporate within a few hours or less to the point that even its odor cannot be detected. Jet A fuel does not pose a large environmental problem if spilled, even at the maximum amounts that could be used by WS. It is a straight chained hydrocarbon with little benzene present and microbes would quickly break-down any spill residue through aerobic action (J. Kuhn, Montana Department of Environmental Quality, pers. comm., 2001). The quantities used by WS aircraft are relatively small (52 gallon maximum in a fixed-wing aircraft and 91 gallon maximum in the helicopters used by WS), and during much of each flight the amount of fuel on board would be considerably less than these maximum amounts. In some cases, not all of the fuel would be spilled. Thus, there should be little environmental hazard from unignited fuel spills.

WS believes the low probability of a crash and subsequent spill, and one record of a minor fuel spill occurring from its aircraft fleet, poses negligible risk to the environment.

For privately owned aircraft, the aircraft owner or his/her insurance company is responsible for clean-up of spilled oils and other fluids, but only if required by the owner or manager of the property on which the accident occurred. In the case of Bureau of Land Management (BLM), USFS, and National Park Service lands, the land managing agency generally requires soil to be decontaminated or removed and properly disposed of. With the size aircraft used by WS, the quantities of oil capable of being spilled in any accident are small (i.e., 6-8 quarts maximum for reciprocating (piston) engines and 3-5 quarts for turbine engines) with minimal chance of causing environmental damage. Aircraft used by WS are single engine models, so the greatest amount of oil that could be spilled in one accident would be about 8 quarts. Due to the low quantities of oil on any given WS aircraft, the low probability of a crash, and subsequent spill, the risk to the environment is negligible.

Petroleum products degrade through volatilization and bacterial action, particularly when exposed to oxygen (EPA 2000). Thus, small quantity oil spills on surface soils can be expected to biodegrade readily. Even in subsurface contamination situations involving underground storage facilities, which would generally be expected to involve larger quantities than would ever be involved in a small aircraft accident, EPA guidelines provide for *natural attenuation* or volatilization and biodegradation to mitigate environmental hazards (EPA 2000). Thus, even where oil spills in small aircraft accidents are not cleaned up, the oil would not be expected to persist in the environment and would occur in such small quantities that the risk to drinking water and aquatic ecosystems is negligible.

2.2.3.4 Snare and Cable Restraint Usage. Snares are used frequently to capture feral swine. Snares pose no to negligible theoretical risk to the public. However, larger pets, primarily free-roaming dogs, can be captured in these devices. Snares are used in areas where Specialists believe that a pet will not be travelling. Properties where snares are employed are posted to the potential dangers and it is expected that landowners/managers will alert guests to their use. Thus, most risks are negated.

Snares and cable restraints can be used in aquatic and terrestrial habitats to capture animals for translocation or lethal removal. Use-pattern data indicates snares and cable restraints could be used throughout the year by WS. Snares and cable restraints are normally placed in travel ways, and capture is around the neck, body, or leg. WS' personnel generally place snares in restricted travel ways where the target animal is forced to travel over or through the device. Most neck or body snares used in terrestrial habitat are placed in or under fences where evidence indicates that the target animal is entering the area where damage is occurring. Neck snares used in aquatic habitat are usually placed in shallow water at water entrance trails or exit trails, lodge entrances, or territorial marking sites used by target animals. Placement of snares is dependent upon the habits of the respective target species and habitat conditions. Placement location is selected to minimize exposure to and capture of nontarget animals. Dependent upon snare type and circumstances, use may occur in rural or urban areas and on privately or publicly owned properties.

Most snares are passive capture methods that are only activated by an animal moving through the snare causing the loop to close. However, some snaring systems use power-activation to increase the speed of loop closure or to propel the loop of the snare onto the body of an animal. Most power-activated snares use a spring to close the loop of the snare quickly. When setting a power-activated snare, a spring is generally compressed and held compressed by a trigger or pan. Power-activated snares often rely on a trigger to activate, which often requires an animal to step on a pan (*i.e.*, foot-depressed trigger) or for the target animal to pull the trigger with their mouth or foot. When an animal trips the trigger or steps on the pan, the compressed spring releases pulling the cable loop closed quickly. Similar to passively activated snares, power activated snares may be used as either lethal or live-capture devices. One commonly used power activated snare is the foot snare. Like other snares, the foot snare consists of a flexible loop made from cable, which would be placed on the ground along active trails or near bait sites and covered with dirt or snow. The foot snare can be set as a spring-powered non-lethal device, activated when an animal places its foot on the trigger or pan. Several styles of foot snares are available.

The Association of Fish and Wildlife Agencies (AFWA), along with federal and private partners working cooperatively, embarked on a goal to develop voluntary Best Management Practices (BMP) for trapping and snaring furbearers in the United States (Batcheller et al. 2000). The stated purpose and intent of AFWA in developing the BMPs was to: "Scientifically evaluate traps and trapping systems used for capturing furbearers in the United States." AFWA determined the best methods by species[7], but was primarily targeting harvest by private fur trappers and not take in wildlife damage management activities. Evaluations of trap performance were based on animal welfare, efficiency, capture rate, selectivity, practicality, safety, mechanical function, cost, quality, durability, weight, and maintenance requirements (Fall 2002). Results of their research (AFWA 2013) were provided to state and federal wildlife agencies as well as trappers and the public in the form of a general overview on BMPs for traps and trapping and specifically the most efficient and humane methods for trapping 23 furbearer species in the United States. The goals were to promote regulated trapping as a modern wildlife management tool, identify practical traps and trapping techniques while continuing to improve efficiency, selectivity, and the welfare of trapped animals through research, to provide specifications for traps that meet BMP criteria for individual species in various regions of the United States, to provide wildlife management professionals with information to evaluate trapping systems in the United States; and to instill public confidence in and maintain public support for wildlife management and trapping through distribution of science-based information. AFWA (2013) focused on private trappers and realized that trapping to control depredations was different. However, WS has adopted these standards as possible for trapping and snaring in the United States and conducts research on different trapping systems.

WS Policy (WS Directive 2.450, 03/10/2004) states that the use of the BMP trapping guidelines developed and promulgated by AFWA for private fur harvest and other trapping activities are valuable and would be followed as practical. WS utilizes the BMP guidelines as the basis for policy formulation, but recognizes that some devices used in wildlife damage management are not commercially available and that not all devices recommended in the BMP guidelines for general public use meet the more stringent performance requirements, particularly for efficiency and durability, for use in federal wildlife management activities.

2.2.4 Humaneness and Animal Welfare Concerns of Methods Used by KWSP

The issue of humaneness, as it relates to the killing or capturing of wildlife is an important but complex concept. Kellert and Berry (1980) in a survey of American attitudes toward animals stated that 58% of their respondents, *". . . care more about the suffering of individual animals . . . than they do about species population levels."* Schmidt (1989) indicated that vertebrate pest control for societal benefits could be compatible with animal welfare concerns, if *". . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process."*. Suffering has been described as a *". . . highly unpleasant emotional response usually associated with pain and distress*." However, suffering *". . . can occur without pain . . . ,*" and *". . . pain can occur without suffering . . ."* (American Veterinary Medical Association (AVMA) 1987, 2001, 2007). Because suffering carries with it the implication of a time frame, a case could be made for *". . . little or no suffering where death comes immediately . . ."* (California Department of Fish and Game 2004), as in the case of shooting or drug-induced euthanasia.

Defining pain as a component of humaneness may be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and the causes that elicit pain responses in humans would *". . . probably because for pain in other animals..."* (AVMA 1987). However, pain experienced by individual animals probably ranges from none to considerable

[7] Furbearers with AFWA (2013) trapping BMPs include 221 species. Each has its own documents for the target species and can be found at AFWA (2013). Feral swine were not included.

(California Department of Fish and Game 2004). WS acknowledges that some damage management methods, such as foot-hold traps and cable restraints, may cause varying degrees of pain in different animal species for varying lengths of time. However, at what point pain diminishes or stops under these types of restraint has not been measured by the scientific community. Wildlife managers and the public would both be better served to recognize the complexity of defining suffering, since *" . . . neither medical nor veterinary curricula explicitly address suffering or its relief"* (California Department of Fish and Game 1991, 2004).

Pain and suffering as it relates to tools used to capture animals, is often interpreted differently by professional wildlife biologists and lay people, and people that receive feral swine damage or threats of damage may perceive humaneness differently, particularly if they have resources being damaged such as pets or livestock being injured or killed and they contemplate the humaneness of having their pets or livestock killed by feral swine. The issue of humaneness has at least two aspects in relation to the proposed action.

- Animal welfare organizations are concerned that some methods used to manage wildlife damage expose animals to unnecessary pain and suffering. Research suggests that some methods, such as restraint in foothold traps or changes in the blood chemistry of trapped animals, indicate "*stress*" (Kreeger et al. 1988). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness (Bateson 1991, Sharp and Saunders 2008, Sharp and Saunders 2011).

- Humaneness, as perceived by the livestock industry and pet owners, requires that domestic animals be protected from predators because humans have bred much of the natural defense capabilities out of domestic animals. It has been argued that man has a moral obligation to protect these animals from predators. Predators, such as feral swine, frequently do not kill larger prey animals quickly, and will often begin feeding on them while they are alive and still conscious (Wade and Bowns 1982).

Therefore, humaneness, in part, appears to be a person's perception of pain or suffering inflicted on an animal, which, in turn, is governed by the person's past experiences. Different people may perceive the humaneness of an action in different ways. The challenge in coping with this issue remains how to achieve the least amount of suffering within the constraints imposed by current technology, funding, workforce, and social concerns. The decision-making process involves tradeoffs between the aforementioned aspects of pain from damage management activities and the needs of humans to reduce wildlife damage. An objective analysis of this issue must consider not only the welfare of wild animals but also the welfare of humans and prey animals if damage and losses are not stopped.

KWSP personnel are trained professionals who strive to use the most humane methods available to them, recognizing the constraints of current technology, workforce, funding and social concerns. In determining the damage management strategy, preference would be given to practical and effective nonlethal methods (WS Directive 2.101). However, nonlethal methods may not always be applied as a first response to each damage problem. The most appropriate response could be a combination of nonlethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy.

WS has improved the selectivity and humaneness of many management devices through research and is striving to bring new, more humane tools and methods into use. WS, through the combined efforts of the WS state programs and the USDA, APHIS, WS, National Wildlife Research Center (NWRC), has been involved in the testing and development of a number of nonlethal WDM techniques including, pyrotechnics, livestock guarding animals, remote activated guard devices, and light-siren devices. NWRC has conducted research on tranquilizer devices to reduce stress and injuries to animals captured in traps. However, improved WDM methods are still needed. Until new methods and tools are developed, a certain amount of animal suffering could occur (*e.g.,* when nonlethal damage management methods are not practical, available, or effective). Whenever possible and practical, WS employs euthanasia methods recommended by the AVMA (2007) and professional wildlife damage managers (Julien et al. 2010), even though the AVMA euthanasia methods were developed principally for companion animals and slaughter of food animals, and not for free-ranging wildlife.

WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some FSDM methods are used in situations where nonlethal damage management methods are not practical or effective. KWSP personnel are experienced, trained and professional in their use of management methods, in order to be as humane as possible under the constraints of current technology, workforce and funding.

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.3.1 Appropriateness of Preparing an EA and not an EIS for Such a Large Area

Some individuals might question whether preparing an EA for an area as large as Kansas would meet the NEPA requirements for site specificity. Comparatively, FSDM is currently a minor component of KWSP activities, though, it may expand greatly should funding become available because the problem has increased exponentially in the last decade.

KWSP's mission is to manage damage caused by wildlife, not overall wildlife populations. As an agency that exists to manage specific types of damage, KWSP can predict the types of locations or situations where damage is likely to occur. However, due to any number of variable circumstances, KWSP has no absolute control over when a request for FSDM assistance will be received nor can KWSP predict specific, individual times and locations of most feral swine damage situations. Therefore, KWSP must be ready and able to provide assistance on short notice anywhere in the State. The missions of other federal and state wildlife management agencies generally concentrate on management for wildlife abundance and are not equipped or prepared to prevent feral swine damage problems without resorting to extreme and extensive population management strategies that, in most cases, would neither be prudent nor affordable. Given the feral swine population, the increase in requests for assistance, and program activity monitoring, KWSP believes this EA addresses most potential needs at any given location.

If a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire State provides a better analysis than multiple EA's covering smaller zones.

2.3.2 KWSP's Impact on Biodiversity

KWSP does not attempt to eradicate any native wildlife species in Kansas. KWSP operates in accordance with international, federal and state laws, and regulations enacted to ensure species viability. Impacts on target and nontarget species populations because of KWSP's lethal FSDM activities are minor as will be shown in section 4.1. The impacts of WS on biodiversity are not significant nationwide or statewide. In the case of local feral swine populations, the goal may be to eliminate a local population but because feral swine are not part of the mix of native wildlife species, they are not an essential component of the native biodiversity. A reduction in feral swine populations could reduce competition with or predation of native species and destruction damage to habitats, thereby increasing or restoring biodiversity.

2.3.3 Wildlife Damage is a Cost of Doing Business -- a "Threshold of Loss" Should be Established Before Allowing any Lethal FSDM

KWSP is aware that some people feel federal WDM should not be allowed until economic losses reach some arbitrary pre-determined threshold level. Although some damage can be tolerated by most resource owners, KWSP has the legal direction to respond to requests for WDM, and it is program policy to aid each requester with the goal of minimizing losses. KWSP uses the WS Decision Model (Slate et al. 1992) thought process discussed in Chapter 3 to determine appropriate strategies. In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie NF, et al., the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part the court found that a forest supervisor need only show that damage from wildlife is threatened, to establish a need for WDM (Civil No. 92-C-0052A January 20, 1993). Thus, there is judicial precedence indicating that it is not necessary to establish a criterion such as percentage of loss of a herd to justify the need for WDM actions.

2.3.4 American Indian and Cultural Resource Concerns

The National Historic Preservation Act (NHPA) of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that can result in changes in the character or use of historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources, and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings. KWSP actions on Tribal lands would only be conducted at the Tribe's request and under signed agreement; thus, the Tribes have control over any potential conflict with cultural resources on Tribal properties. As was discussed in Section 1.7.2.4, KWSP FSDM actions are not undertakings as defined by the NHPA.

2.3.5 Cost-effectiveness of FSDM

"Does the value of damage avoided equal or exceed the cost of providing FSDM?" The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.23) does not require a formal, monetized cost-benefit analysis to comply with NEPA. Consideration of this issue is not essential to making a reasoned choice among the alternatives being considered. Cost effectiveness is not, nor should it be, the primary goal of the WS Program. Additional constraints, such as environmental protection and land management goals, are considered whenever a request for assistance is received and the WS Decision Model is used to determine an appropriate course of action (Slate et al. 1992). These constraints may be integral parts of an FSDM project which could increase the cost, but not necessarily increase the effectiveness.

3.0 CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 ALTERNATIVES ANALYZED IN DETAIL

Four alternatives will be analyzed in detail in this EA:

- **Alternative 1 - Continue the Current KWSP FSDM Program (*the Proposed Action/No Action Alternative*).** This is the Proposed Action as described in Chapter 1 and the "No Action" alternative as defined by CEQ for analysis of ongoing programs or activities.

- **Alternative 2 - Nonlethal FSDM Methods Used by KWSP.** Under this alternative, KWSP would use only nonlethal methods to reduce damage by feral swine.

- **Alternative 3 - Technical Assistance Only.** Under this alternative, KWSP would not conduct any direct operational FSDM activities in Kansas. If requested, affected resource owners would be provided with technical assistance information only.

- **Alternative 4 - No Federal KWSP FSDM.** This alternative consists of no Federal FSDM program by KWSP.

3.2 DESCRIPTION OF THE ALTERNATIVES

3.2.1 Alternative 1 - Continue the Current Federal FSDM Program (*No Action/Proposed Action*)

The No Action alternative is a procedural NEPA requirement (40 CFR 1502), is a viable and reasonable alternative that could be selected, and serves as a baseline for comparison with the other alternatives. The No Action alternative is the continuation of an ongoing program and, as defined here, is consistent with the CEQ's definition (CEQ 1981).
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The proposed action is to continue the current portion of KWSP that responds to requests for FSDM, and in response to increasing distribution of feral swine throughout Kansas, prepare for increased conflicts with agricultural and natural resources, property, and threats to human health and safety in Kansas. To meet these goals KWSP would have the objective of responding to all requests for assistance with, at a minimum, technical assistance or self-help advice, or, where appropriate and when cooperative or congressional funding is available, direct damage management assistance in which professional KWSP personnel conduct FSDM. An IWDM approach would be implemented which would allow the use of all available legal techniques, used singly or in combination, to meet the need of each requestor for resolving conflicts with feral swine. Agricultural producers and others requesting assistance would be provided with information regarding the use of effective nonlethal and lethal techniques. Lethal methods used by KWSP would include shooting, aerial shooting, snaring, or euthanasia following live capture by trapping. Nonlethal methods used by KWSP may include drop nets, cage traps, fencing barriers, and deterrents. In many situations, the implementation of nonlethal methods such as fencing would be the responsibility of the requestor to implement. FSDM by KWSP would be allowed in the State, when requested, on private or public property where a need has been documented with the completion of a *Work Initiation Document* or *Work Plan*. All management actions would comply with appropriate federal, state, and local laws.

3.2.2 Alternative 2 - Nonlethal FSDM Methods Used by KWSP

This alternative would require KWSP to use nonlethal methods only to resolve feral swine damage problems including exclusion techniques, harassment, and resource management. Wildlife management techniques could not be used such as cage traps and drop nets because feral swine would have to be relocated and this would be contrary to state law. Persons receiving technical assistance could still resort to nonlethal and lethal wildlife management methods that were available to them. Aerial shooting to control feral swine is currently restricted to KWSP personnel. Therefore, the use of this method by private individuals would not be allowed. Shooting, snares, drop nets, and cage traps would likely be implemented by private individuals and the State as allowed by state law.

3.2.3 Alternative 3 - Technical Assistance Only

This alternative would not allow KWSP to conduct operational FSDM in Kansas. KWSP would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, or others could conduct FSDM using traps, shooting, or any lethal or nonlethal method that is legal. Aerial shooting to control feral swine is currently restricted to KWSP personnel, and, therefore, could not be used.

3.2.4 Alternative 4 - No Federal KWSP FSDM

This alternative would eliminate federal involvement in FSDM in Kansas. KWSP would not provide direct operational or technical assistance and requesters of KWSP services would have to conduct their own FSDM without KWSP input. There would be no federal oversight, so persons with limited abilities and training could implement FSDM.

3.3 FSDM STRATEGIES AVAILABLE TO KWSP IN KANSAS

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2 and 3 described above. Alternative 4 would terminate both KWSP technical assistance and operational FSDM by KWSP.

3.3.1 Alternative 1 - Continue the KWSP FSDM Program

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially to achieve a cumulative effect. The philosophy behind IWDM is to implement the best combination of effective management methods in a cost-effective manner while minimizing the potentially harmful effects on humans, target and nontarget species, and the environment. IWDM may incorporate cultural practices (i.e., animal husbandry), habitat modification (i.e., exclusion), animal behavior modification (i.e., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

3.3.1.1 The FSDM Strategies That KWSP Employs.

Technical Assistance Recommendations. "Technical assistance," as used herein, consists of information, demonstrations, and advice on available and appropriate FSDM methods. The implementation of damage management actions is the responsibility of the requester. In some cases, KWSP provides supplies or materials that are of limited availability for non-KWSP entities to use. Technical assistance may be provided following a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, the requester's abilities, and the practicality of their application.

Under APHIS NEPA Implementing regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving wildlife damage problems.

Direct Damage Management Assistance. This is the implementation or supervision of damage management activities by KWSP personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone, and when *Work Initiation Documents* or other comparable instruments provide for KWSP direct damage management. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of KWSP personnel are often required to effectively resolve complex wildlife damage problems.

3.3.1.2 WS Decision Making. KWSP personnel are frequently contacted after requesters have tried or considered both nonlethal and lethal methods and found them to be ineffective for any number of reasons. Misapplied or inappropriate methods are often impractical, too costly, time consuming or inadequate for reducing damage to an acceptable level. KWSP personnel assess the problem and evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are developed into a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. This conscious thought process for evaluating and responding to damage complaints is the WS Decision Model (Slate et al. 1992). In the model, most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a documented process, but a mental problem-solving process common to most if not all professions.

3.3.1.3 FSDM Methods Available for Use. The most effective approach to resolving wildlife damage problems would be to integrate the use of several methods, either simultaneously or sequentially, known as IWDM. An IWDM or adaptive plan would integrate and apply practical methods of prevention and reduce damage by feral swine while minimizing effects of damage reduction measures on humans, other species, and the environment. An adaptive plan may incorporate resource management, physical exclusion, deterrents, and localized removal of target species, or any combination of these, depending on the characteristics of specific damage problems.

In selecting damage management techniques for specific damage situations, consideration would be given to the magnitude, geographic extent, duration and frequency, and likelihood of feral swine damage. Consideration would also be given to the status of feral swine, local environmental conditions and impacts, social and legal aspects, and relative costs of damage reduction options. The cost of damage reduction may sometimes be a secondary concern because of the overriding environmental, legal, and animal welfare considerations. Those factors would be evaluated in formulating FSDM strategies that incorporate the application of one or more techniques.

A variety of methods would potentially be available to WS relative to the management or reduction of damage from feral swine. Various federal, state, and local statutes and regulations and WS directives would govern use of damage management methods. The WS would develop and recommend or implement strategies based on resource management, physical exclusion, and wildlife management approaches. Within each approach there may be available a number of specific methods or techniques. The following methods could be recommended or used by WS. Many of the methods described below would also be available to other entities in the absence of any involvement by the WS program.

3.3.1.3a Resource Management

Resource management includes a variety of practices that may be used by agriculture producers and other resource owners to reduce their exposure to potential wildlife depredation losses. Implementation of these practices is appropriate when the potential for depredation can be reduced without significantly increasing the cost of production or diminishing the resource owner’s ability to achieve land management and production goals. Changes in resource management are usually not conducted operationally by WS, but WS could assist producers in implementing changes to reduce problems.

Animal Husbandry. This general category includes modifications in the level of care and attention given to livestock, shifts in the timing of breeding and births, selection of less vulnerable livestock species to be produced, and the introduction of human custodians or guarding animals to protect livestock. The level of care or attention given to livestock may range from daily to seasonal. Generally, as the frequency and intensity of livestock handling increases so does the degree of protection. In operations where livestock are left unattended for extended periods, the risk of depredation is greatest. The risk of depredation can be reduced when operations permit nightly gathering so livestock are unavailable during the hours when feral swine are most active. Additionally, the risk of depredation is usually greatest with immature livestock. This risk diminishes as age and size increase and can be minimized by holding expectant females in pens or sheds to protect births and by holding newborn livestock in pens for the first 2 weeks. Shifts in breeding schedules can also reduce the risk of depredation by altering the timing of births to coincide with the greatest availability of natural prey to predators or to avoid seasonal concentrations of migrating predators such as golden eagles.

The use of human custodians and guarding animals can also provide significant protection in some instances. The presence of herders to accompany bands of sheep on open range may help ward off feral swine. Guard animals have also proven successful in many sheep and goat operations.

Altering animal husbandry to reduce wildlife damage has many limitations. Nightly gathering may not be possible where livestock are in many fenced pastures and where grazing conditions require livestock to scatter. Hiring extra herders, building secure holding pens, and adjusting the timing of births is usually expensive. The timing of births may be related to weather or seasonal marketing of young livestock. The expense associated with a change in husbandry practice may exceed the savings.

The supply of proven guarding dogs is generally quite limited, requiring that most people purchase and rear a pup. Therefore, there is usually a 4 to 8 month period of time necessary to raise a guarding dog before it becomes an effective deterrent to predators. Since 25 to 30 percent of dogs are not successful, there is a reasonable chance that the first dog raised as a protector will not be useful. The effectiveness of guarding dogs may not be sufficient in areas where there is a high density of predators, where livestock widely scatter in order to forage, or where dog to livestock ratios are less than recommended. Guarding dogs may harass and kill nontarget wildlife.

Modification of Human Behavior. KWSP may recommend alteration of human behavior to resolve potential conflicts between humans and wildlife. For example, KWSP may recommend the elimination of feeding of wildlife that occurs in parks and forests near suburban areas or golf courses. This includes inadvertent feeding allowed by improper disposal of garbage. Feral swine adapt well to living near human settlements, but their proximity to humans may result in damage to property. Additionally, it can be difficult to consistently enforce no-feeding regulations and to effectively educate all people concerning the potential liabilities of feeding wildlife.

3.3.1.3b Physical Exclusion

Physical exclusion methods restrict the access of feral swine to resources. These methods provide a means of appropriate and effective prevention of wildlife damage in many situations. The primary exclusion method for feral swine is fencing.

Fencing. Fences, electric or not, are widely used to prevent damage. Feral swine exclusion fences constructed of woven wire or multiple strands of electrified wire are also effective in some areas for feral swine, but fencing does have limitations. Even an electrified fence may not be swine-proof and the expense exceeds the benefit in most cases. If large areas are fenced, the feral swine have to be removed from the enclosed area to make it useful. Some fences inadvertently trap, catch or affect the movement of nontarget wildlife. Lastly, fencing is not practical or legal in some areas (e.g., restricting access to public land).

3.3.1.3c Wildlife Management

Reducing wildlife damage through wildlife management is achieved through the use of a myriad of techniques. The objective of this approach is to alter the behavior of or repel the target species, remove specific individuals from the population, reduce local population densities, or suppress/extirpate exotic species populations to eliminate or reduce the potential for loss or damage to property and natural resources.

Frightening Devices. Frightening devices are used to repel feral swine from an area where they are a damage risk (i.e., airport, crops). The success of frightening methods depends on the swine's fear of, and subsequent aversion to, offensive stimuli. A persistent effort is usually required to effectively apply frightening techniques and the techniques must be sufficiently varied to prolong their effectiveness. Over time, animals often habituate to commonly used scare tactics and ignore them. In addition, in many cases animals frightened from one location, but a problem at another. Scaring devices, for the most part, are directed at specific target species by KWSP Specialists working in the field. However, several of these devices, such as scarecrows and propane exploders can be automated.

Harassment and other scaring devices and techniques to frighten animals are probably the oldest methods of combating wildlife damage. These devices may be either auditory or visual and generally only provide short-term relief from damage. A number of sophisticated techniques have been developed to scare or harass wildlife from an area. The use of noise-making devices is the most popular and commonly used. Other methods include harassment with visual stimuli (e.g., scarecrows, human effigies, balloons, wind socks), vehicles, people, or dogs. These are used to frighten swine from the immediate vicinity of the damage prone area. As with other WDM efforts, these techniques tend to be more effective when used collectively in a varied regime rather than individually. However, the continued success of these methods frequently requires reinforcement by limited shooting (see Shooting).

Propane Exploders operate on propane gas and are designed to produce loud explosions at controllable intervals. They are strategically located (i.e., elevated above the vegetation) in areas of high feral swine use to frighten them from the problem site. Because animals are known to habituate to sounds, exploders must be moved frequently and used in conjunction with other scare devices. Exploders can be left in an area after dispersal is complete to discourage animals from returning.

Pyrotechnics, also known as shell-crackers and scare cartridges, are commonly used to repel wildlife. Shell-crackers are 12 gauge shotgun shells containing firecrackers that are projected up to 75 yards in the air before exploding. They can be used to frighten feral swine and are most often used for scaring them to prevent crop depredations. The purpose is to produce an explosion between feral swine and their objective, the crop. Scare cartridges, noise bombs, whistle bombs, racket bombs, and rocket bombs, are fired from 15 millimeter flare pistols. They are used similarly to shell-crackers but are projected for shorter distances. Noise bombs are firecrackers that travel about 75 feet before exploding. Whistle bombs are similar to noise bombs, but whistle in flight but do not explode. They produce a noticeable response because of the trail of smoke and fire, as well as the whistling sound. Racket bombs make a screaming noise in flight and do not explode. Rocket bombs are similar to noise bombs but may travel up to 150 yards before exploding.

Lights, such as strobe, barricade, and revolving units, are used with mixed results to frighten predators. Brilliant lights, similar to those used on aircraft, are most effective in frightening night feeding mammals. These extremely bright-flashing lights have a blinding effect, causing confusion that reduces the animal's ability to locate it food or roosting spot. However, feral swine rapidly become accustomed to such lights and their long-term effectiveness is questionable. In general, the type of light, the number of units, and their location are determined by the size of the area to be protected and by the power source available.

Other Scaring Devices are available to scare wildlife. The Electronic Guard (siren strobe-light device), a battery-powered, portable unit that houses a strobe light and siren has been developed by NWRC. The device activates automatically at nightfall and is programmed to discharge periodically throughout the night. Efficacy of strobe-sirens is highly variable, but in certain situations, this device has been used successfully to reduce coyote and black bear (*Ursus americanus*) depredation on sheep. The technique has proven most successful when used at "bedding grounds" where sheep gather to sleep for the night. The device, however, is a short-term tool used to deter predation until livestock can be moved to another pasture, brought to market, or other predator damage management methods are implemented.

Chemical Repellents. Chemical repellents are nonlethal chemical formulations used to discourage or disrupt particular behaviors of wildlife. Chemical repellents are categorized by their delivery mechanism: olfactory, taste, and tactile. Olfactory repellents must be aerosolized substances that are inhaled to be effective. These are normally gases, or volatile liquids and granules, and require application to areas or surfaces that need protecting. Taste repellents are compounds (i.e., liquids, dusts, granules) that are normally applied to trees, shrubs, and other materials that are likely to be eaten or gnawed by the target species. Tactile repellents are normally thick, liquid-based substances that cause some type of irritation to wildlife extremities such as feet when applied to areas or surfaces where the wildlife travel to discourage further use of the area.

Repellents are often ineffective or are short-lived in reducing or eliminating damage caused by wildlife and, therefore, are not frequently used by KWSP. Chemical repellents available commercially for mammals contain a variety of active ingredients such as powdered or putrescent egg concentrate (i.e., Deer Away®), bone tar oil (i.e., Magic Circle Deer Repellent®), denatonium saccharide (i.e., Ro-Pel®), capsaicin from hot pepper (i.e., Hot Sauce®, Miller®), ammonium soaps (i.e., Hinder®) and sodium salts of higher fatty acids (i.e., Bye Deer®), naphthalene (Chaperone Squirrel and Bat Repellent®), tobacco dust (i.e., F&B Rabbit and Dog Chaser®), tetramethylthiuram disulfide (i.e., Gustafson Thiram-42®), anthraquinone, (i.e., Flight Control®) and zinc dimethyldithiocarbamate (i.e., Earl May Ziram). These compounds are relatively nontoxic to the environment with the amount of active ingredient used in the different formulations following label instructions. Many of the active ingredients in repellents are listed on the EPA's 25b exempt list which reduces registration requirements because of their relatively low risk to the environment. Most of the above repellents have labels with, at most, a "Caution" statement and can be purchased by the general public and most can be used for feral swine to protect landscaping, gardens, and crops in small areas.

Capture or Take Methods. Several methods are available to capture or take offending animals. The appropriateness and efficacy of any technique depends on a variety of factors. From FY10 to FY14, KWSP used cage and corral traps (50.7% of 286 annual average number of swine taken), aircraft (34.5%), shooting (13.0%), and snares (1.8%).

Cage and Corral Traps are usually circular, made from steel posts and heavy gauge wire mesh. These traps are used to capture animals alive and can often be used where many lethal or more dangerous tools would be too hazardous. These either have one-way or sight-activated doors to capture swine. Cage and corral traps are well suited for use in most areas. They usually work best when baited with foods attractive to feral swine. Most cage traps and all corral traps are advantageous in that they often do not have tops which allow nontarget animals to fly out, or jump or climb over the side (birds and deer, raccoons (*Procyon lotor*), and other mammals), but with sides high enough to keep feral swine entrapped. Large cage and corral traps are a very effective tool for capturing feral swine.

Drop Nets are nets that are hung up over an attractant such as corn. Feral swine are prebaited to the area and allowed to get accustomed to the net. Similar to corral traps, the net can be activated, "dropped," while swine are feeding on the bait. Depending on the number taken, size of mesh, and process time, drop nets can sometimes injure the animals captured, those animals struggling to get out.

Snares made of wire or cables are among the oldest existing WDM tools. They can be used effectively to catch most species including feral swine. They are generally not affected by inclement weather. Snares may be employed as either lethal or live-capture devices depending on how or where they are set. Snares set to capture feral swine by the neck are usually lethal but stops can be attached to the cable to make the snare a live capture device. Snares positioned to capture the animal around the body can be a useful live-capture device, but they are more often used as lethal control techniques. Snares can be effectively used wherever a target animal moves through a restricted lane of travel (e.g., trails through vegetation). When a feral swine moves forward into the loop formed by the cable, the noose tightens and it is held.

The catch-pole snare is used to capture or safely handle problem animals. This device consists of a hollow pipe with an internal cable or rope that forms an adjustable noose at one end. The free end of the cable or rope extends through a locking mechanism on the end opposite of the noose. By pulling on the free end of the cable or rope, the size of the noose is reduced sufficiently to hold an animal. Catch poles are used primarily to remove live animals from traps without danger to or from the captured animal.

Shooting is conducted for feral swine with rifles and shotguns and is very selective for the target species. Shooting is sometimes used as the primary FSDM method in many feral swine control operations. Often, though, shooting is only used opportunistically where a KWSP Specialist sees the target swine in the damage area at random. Shooting is limited to locations where it is legal and safe to discharge firearms. Safety precautions for firearm usage were discussed in Section 2.2.3.1.

Shooting can also be used with spotlighting or specialized equipment such as night-vision (starlight scopes, infrared, or thermal imaging scopes). This type of shooting is generally conducted when other forms of control like trapping are unsuccessful due to trap shy animals or lack of bait acceptance particularly during the summer months. It is conducted in areas where it is safe to discharge firearms and can be very effective at removing select animals.

Aerial Shooting (shooting from an aircraft) is a commonly used FSDM method. Aerial shooting is species specific and can be used for immediate control to reduce livestock and natural resource losses if weather, terrain, and cover conditions are favorable. Fixed-wing aircraft are most frequently used in flat and gently rolling terrain whereas helicopters, with better maneuverability, have greater utility and are safer over rugged terrain and timbered areas. In broken timber or deciduous cover, aerial shooting is more effective in winter when snow cover improves visibility and leaves have fallen. The WS program aircraft-use policy helps ensure that aerial shooting is conducted in a safe and environmentally sound manner, in accordance with Federal and State laws and were discussed in Section 2.2.3.3. Pilots and aircraft must be certified under established WS program procedures and only properly trained WS employees are approved as gunners. Section 2.2.3.3 discussed the safety of aircraft usage to WS personnel, people, pets, nontarget species, and the environment.

Tracking Dogs or trailing dogs are commonly used to track and "bay" target feral swine. Dogs commonly used are different breeds of hounds such as blue tick, red-bone, and Walker. They become familiar with the scent of the animal they are to track and follow, and will strike (howl) when they smell them. Tracking dogs are trained not to follow the scent of nontarget species. KWSP Specialists find the track of the target species and put their dogs on it. Typically, if the track is not too old, the dogs can follow the trail and bay the animal. When the dogs bay the animal, it usually seeks refuge in a thicket on the ground at bay. The dogs stay with the animal until the KWSP Specialists arrives and dispatches it. A possibility exists that dogs will switch to a fresher trail of a nontarget species while pursuing the target species. This usually occurs with dogs that are trained to follow other animals as well. However, this is a non-desirable trait for tracking dogs and dog handlers watch for and provide training to prevent this behavior.

Chemical Immobilizing and Euthanizing Drugs are important tools for managing wildlife. Under certain circumstances, KWSP personnel are involved in the capture of animals where the safety of the animal, personnel, or the public are compromised and chemical immobilization provides a good solution to reduce these risks. KWSP employees that use immobilizing drugs are certified for their use and follow the guidelines established in the WS Field Operational Manual for the Use of Immobilization and Euthanasia Drugs. Telazol® (tiletamine), and Ketamine/Xylazine are immobilizing agents used by WS to capture and remove wild animals. These are typically used in urban, recreational, and residential areas where the safe removal of a problem animal is most easily accomplished with a drug delivery system (e.g., darts from rifle, pistol, or blow guns, syringe pole, or hand-fed baits). Immobilization is usually followed by euthanasia. Euthanasia is usually performed with drugs such as Beuthanasia-D® or Fatal-Plus® which contain forms of sodium phenobarbital. Euthanized animals are disposed of by incineration or deep burial to avoid secondary hazards. Drugs are monitored closely and stored in locked boxes or cabinets according to WS policies, and DEA or FDA guidelines. Most drugs fall under restricted-use categories and must be used under the appropriate license from DEA which KWSP does hold. Due to restrictions on use, KWSP expects to have no impacts to people or pets with the use of these drugs.

Reproductive Inhibitors cause loss of fecundity in wildlife. Contraceptive measures for wildlife can be grouped into four categories: surgical sterilization, oral contraception, hormone implantation, and immunocontraception (i.e., the use of contraceptive vaccines). These techniques would require that each individual animal receive either single, multiple, or possibly daily treatment to successfully prevent conception. The use of oral contraception, hormone implantation, or immunocontraception would be subject to approval by Federal and State regulatory agencies.

Reproductive inhibitors are currently under investigation as a potential nonlethal option to help reduce feral swine populations and associated damage. However, at this time, no methods are currently approved by EPA or FDA for feral swine control. Registration of a contraceptive will require extensive laboratory and field testing. These methods are included in this EA to the extent that information is available to facilitate NEPA review and possible incorporation into future program activities in the event that the methods are registered for this application.

APHIS-WS NWRC has been instrumental in the development of a contraceptive agent called GonaCon™ registered for use in female white-tailed deer, and free-ranging horses and donkeys (*Equus africanus asinus*) that also is effective in feral swine (Killian et al. 2006, Campbell et al. 2010). GonaCon™ is a gonadotropin-releasing hormone (GnRH) immunocontraceptive vaccine which is delivered as a single shot. The vaccine stimulates the production of antibodies that bind to GnRH (a hormone in an animal's body that signals the production of sex hormones). By binding to GnRH, the antibodies reduce the release of sex hormones, causing reduced breeding activity. Research is needed to support a potential registration for use in feral swine, and NWRC is working on the development of an oral delivery vaccine. Since GonaCon is a vaccine, it will have no impact on public or pets if they eat a swine treated with such.

Current methods of sterilization are generally not practical for KWSP operational FSDM activities because: (1) surgical sterilization would require that each animal be captured and sterilization conducted by licensed veterinarians which would be extremely labor intensive and expensive; and (2) population modeling indicates that reproductive control is more efficient than lethal control only for some rodent and small bird species with high reproductive rates and low survival rates (Dolbeer 1988).

As alternative methods of delivering sterilants are developed, sterilization may prove to be a more practical tool in some circumstances. Reduction of local populations could conceivably be achieved through natural mortality combined with reduced fecundity. In essence, no animals would be killed directly with this sterilization, but their potential for reproduction would be eliminated. A disadvantage to contraception is that the animals would continue to cause damage, especially for invasive wildlife populations such as feral swine where eradication would be preferred unless it was combined with another technique to reduce the population in the damage area. Populations of animals that commonly disperse and have that opportunity would not be as affected by contraception techniques.

3.3.1.4 Nonlethal Methods Used By KWSP. Agricultural producers and others requesting assistance are provided with information regarding the use of nonlethal techniques. These are techniques that consist primarily of nonlethal preventive methods such as cultural methods and habitat modification that could be implemented by an agricultural producer or property owner. Of the above, resource management and physical exclusion techniques could be used. Of the wildlife management techniques, frightening devices, repellents, and cage traps and chemical immobilizing drugs without euthanasia or relocation (not allowed by State law) could be used for feral swine as nonlethal methods.

3.3.1.5 Lethal Methods Used By KWSP. Several wildlife management methods are or can be used lethally. Firearms, both rifles and shotguns, can be used to selectively remove feral swine by shooting. This involves actively managing feral swine from the ground, sometimes with the aid of dogs, night-vision equipment, scopes, and other ancillary devices or from the air which involves the use of rotary or fixed wing aircraft. Additional methods that could be used lethally include drop nets, corral traps, cage traps, and snares followed by euthanasia and these are often used to take feral swine and reduce conflicts.

3.3.2 Alternative 2 - Nonlethal FSDM Methods Used by KWSP

This alternative would require KWSP to use nonlethal methods only to resolve feral swine damage problems. KWSP would be limited to resource management and physical exclusion techniques described above and, of the wildlife management techniques, frightening devices, repellents, drop nets, cage traps, and snares (neck snares would have to use stops not to kill the swine), corral traps and chemical immobilizing drugs. However, the wildlife techniques would have to be used nonlethally, but animals could not be relocated to other areas of Kansas per state law, so most of these methods would not likely be used. Persons receiving technical assistance or direct control assistance from KWSP including the general public and state agency personnel that were unsatisfied with KWSP's results could resort to the use of lethal FSDM methods described in Section 3.3.1.3. The basis of method selection by private individuals may not be biologically sound or prudent. Aerial shooting to control feral swine is currently restricted to KWSP personnel, and, therefore, this method would not be used.

3.3.3 Alternative 3 - Technical Assistance Only

This alternative would not allow for KWSP operational FSDM in Kansas. KWSP would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, or others could conduct FSDM using all available legal FSDM methods such as traps, shooting, and exclusion (see Section 3.3.1.3 for a detailed list of FSDM methods). Aerial shooting to control feral swine is restricted to KWSP personnel, and therefore, would not be available to private individuals.

3.3.4 Alternative 4 - No Federal KWSP FSDM

This alternative would eliminate federal involvement in FSDM in Kansas. KWSP as well as any other federal agency would not provide direct operational or technical assistance. Requesters that would not be able to get KWSP services and would have to conduct their own FSDM without KWSP input. Information on future developments in nonlethal and lethal management techniques that culminate from research efforts by APHIS-WS NWRC would not be as accessible to affected resource owners or managers. Producers, state agency personnel, or others would be left with the option to conduct FSDM activities including all the methods described in Section 3.3.1.3.

3.4 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Several alternatives were considered but not analyzed in detail. The rationale for not considering these in detail is given.

3.4.1 Compensation for Feral Swine Damage Losses

A Compensation Alternative would establish a system to reimburse persons with feral swine damage. This alternative was eliminated from further analysis because no federal or state laws currently exist to authorize such action. Under such an alternative, KWSP would not provide any direct control or technical assistance. Aside from lack of legal authority, a compensation program tends to have many drawbacks:

- It requires a great deal of labor to investigate and validate damage claims and to determine and administer appropriate compensation for such claims. This results in large expenditures of money which would likely cost several times as much as the current program.

- Compensation is often unfair to producers because payments would most likely be below full market value and funds for such programs are often less than needed.

- It is difficult to make timely responses to all requests to assess and confirm damage, and certain types of damage may not be conclusively verified. For example, it would be impossible to prove conclusively in individual situations that feral swine were responsible for disease outbreaks even though they may actually have been responsible. Thus, a compensation program that requires verification would not meet its objective for mitigating such losses.

- Compensation would give little incentive to resource owners to limit damage through improved cultural FSDM methods and husbandry, or other practices and management strategies.

- Not all resource owners would rely on a compensation program and lethal control would likely continue as permitted by state law.

- Compensation would not be practical for reducing threats to human health and safety.

3.4.2 Develop a Statewide Bounty Program for Feral Swine

Bounties have been used in many states for over 150 years for a variety of animals, and in particular, coyotes. Among coyote bounty case histories, no documented evidence exist that bounty programs have temporarily or permanently reduced coyote numbers or abundance in any state (Bartel and Brunson 2003). Kansas enacted a $2 bounty on coyotes in 1877 and it remained in place until 1970. This bounty cost the state approximately $100,000 per year. After 93 years and approximately 9.3 million dollars in bounty payments, the results were overwhelmingly conclusive that the bounty system did not control coyotes and it did not control damage to poultry or livestock (Henderson 1987). Although feral swine are very different then coyotes, biologists believe them to be equally or even more difficult to control than coyotes and unaffected by a bounty program.

Although nearly every state in the country has abandoned the idea of a bounty for predator control, Utah recently re-enacted a bounty on coyotes. Bartel and Brunson (2003) conducted a survey of the Utah bounty participants to determine the effectiveness of the program and to determine what motivated the bounty participants. The study determined that the bounty program did not produce the desired results in terms of increasing hunter participation or reducing the coyote population. They found little evidence that new hunters or trappers were recruited by the bounty program and the survey showed that the income from the bounty was the least important reason for participating. Enjoying the outdoors was the number one reason they participated. This implies that the people who participate in a bounty program are the ones that are likely to participate in hunting and trapping regardless of a bounty. Therefore the bounty was not enough of an incentive to recruit new hunters and it was not enough of an incentive for current hunters to increase their efforts significantly.

Texas has the highest population of feral swine in the country. Feral swine numbers in Texas are estimated at 2.6 million animals (Texas Department of Agriculture 2015a). Research yielded only one case in Texas where a bounty was attempted for feral swine. Van Zandt County attempted a bounty on feral swine in 2003-2004. They paid $7 for each set of matched ears that came into the County Extension Office. According to the County Extension Specialist (B. Cummins, Tex. Coop. Ext., pers. comm. 2008) that administered the program, the program was a failure. The County paid out over $16,000 in bounties in 18 months with no apparent decrease in feral swine numbers or damage. The bounty program was discontinued.

A bounty on feral hogs would likely cause some severe conflicts with the current strategy to control and eradicate feral swine in Kansas. First, by giving a value to feral swine in Kansas it could provide an incentive to merely maintain current populations and could easily encourage more illegal releases of feral swine. Secondly, a bounty would make obtaining permission from landowners much more difficult to conduct FSDM because a landowner might see feral swine as having value and deny access to their property. Public hunting is not an effective means of control and due to the nature of feral swine (scatter under extreme hunting pressure), a bounty would likely achieve little control while scattering feral swine to new areas. A bounty would also likely increase the problem of trespassing which appears to already be a serious problem in every area that feral swine occur in Kansas. Additionally, a bounty program would likely result in fewer quality disease samples from harvested animals which would decrease overall disease surveillance.

3.5 WS SOPs INCORPORATED INTO FSDM TECHNIQUES

An SOP is any aspect of an action that serves to prevent, reduce, or compensate for negative impacts that otherwise might result from that action. The current program, nationwide and in Kansas, uses many such SOPs. The key SOPs are incorporated into all alternatives as applicable, except the No Federal Program Alternative (Alternative 4). Most SOPs are instituted to abate specific issues while some are more general and relate to the overall program. SOPs include those recommended or required by regulatory agencies such as EPA and these are listed where appropriate. Additionally, specific measures to protect resources such as T&E species that are managed by WS's cooperating agencies (USFWS and KDWPT) are included in the lists below.

3.5.1 General SOPs Used by WS in FSDM

- KWSP complies with all applicable laws and regulations that pertain to conducting FSDM on private and public lands.

- KWSP coordinates with government agency officials for work on public lands to identify and resolve any issues of concern with FSDM.

- The use of FSDM methods such as traps, shooting, and aerial shooting conform to applicable rules and regulations administered by the State.

- The WS Decision Model (Slate et al. 1992) thought process, as discussed in Section 1.6.4 which is designed to identify effective WDM and their impacts, is consistently used.

3.5.2 WS SOPs Specific to the Issues

The following is a summary of the SOPs used by WS that are specific to the issues listed in Chapter 2 of this document.

3.5.2.1 Effects on Target Feral Swine.

- KWSP Specialists use specific trap types, lures, and placements that are most conducive for capturing feral swine.

- KWSP monitors the total number of target animals taken and provides data to other agencies (i.e., KDA-AHD, KDWPT) as appropriate.

- Before operational FSDM is conducted, a *Work Initiation Document for Wildlife Damage Management* or *Work Plan* must be signed by KWSP and the land owner or administrator.

3.5.2.2 Effects on Nontarget Species Populations, Including T&E Species.

- KWSP personnel are highly experienced and trained to select the most appropriate FSDM method(s) for taking feral swine with little or no impact to nontarget species.

- Pan-tension devices will be used on foothold traps and foot snare triggers to reduce the capture of nontarget wildlife including T&E species that weigh less than the target species.

- WS will not use foothold traps or snares in areas where Whooping Cranes have been seen such as agricultural fields, open grassy areas, and wetlands while they migrate through the State.

- Neck snares will be equipped with stops (crimped rings to prevent snare cable from closing) that would allow a T&E species escape where the target animal is larger.

- Cage traps will be placed in areas where animals will not be exposed to extreme environmental conditions and checked frequently enough to release nontarget animals, including T&E species, alive.

- If WS personnel install fencing exclude feral swine from areas, it will be monitored periodically to ensure that it is not trapping or ensnaring wildlife, especially T&E species.

- WS will avoid the use of frightening devices where a T&E species that could be affected has been seen. WS may request an emergency Section 10 permit from USFWS to haze these species from a resource being protected such as an airfield where feral swine are being hazed.

- In areas with a T&E species smaller than the target animal, snare stops will be used or snare placement will be such (*i.e.*, big loop size or at a height that is unlikely to capture a smaller species) to preclude the capture of the T&E species. For example, it is very unlikely to capture a with a ferret or prairie-chicken with a snare set for coyotes because of the height that they are set and the loop size used to capture a coyote; ferrets or prairie-chickens could possibly be taken with smaller snares (highly unlikely) targeting smaller animals with a smaller diameter snare wire placed much closer to the ground, but these have rarely ever been used in Kansas and not in areas inhabited by T&E species that could possibly be taken, even to capture them.

- Where WS personnel use shooting from ground or air in WDM, WS personnel will be able to identify target animals and similar T&E species where both could potentially be present (e.g., coyotes *vs.* wolves).

- KWSP personnel work with research programs such as NWRC to continually improve and refine the selectivity of management devices, thereby reducing nontarget take.

- Nontarget animals captured in traps or with any other FSDM method are released at the capture site unless it is determined by KWSP Specialists that the animal is not capable of self-maintenance.

- SOPs, and reasonable and prudent alternatives and measures are established through consultation with USFWS and implemented to avoid adverse impacts to T&E species.

- WS will not aerial hunt areas in Kansas within 3 miles of occupied Lesser Prairie-Chicken habitat from March 1 to July 15 without further consultation with USFWS. This does not include vehicle use on normally travelled roads that are adjacent to a lek.

- WS personnel using 4-wheel ATVs will use roads and existing trails as much as possible to conduct field work.

- WS personnel will not collect plants while afield.

- WS personnel will wash vehicles regularly to ensure WS does not spread invasive plant seeds.

- WS will notify USFWS if a black-footed ferret or its sign is found outside Logan County.

3.5.2.3 Effects of FSDM on Public and Pet Safety and the Environment.

- All chemical pesticides or repellents will be registered for use with EPA and KDA. KWSP employees will be trained and certified by program personnel or other experts in the safe and effective use of these materials under EPA and KDA approved programs and will comply with each pesticide's directions and labeling in addition to EPA and KDA rules and regulations.

- KWSP Specialists who use firearms and pyrotechnics are trained and certified by experts in the safe and effective use of these materials.

- Conspicuous bilingual warning signs alerting people to the presence of snares or other FSDM methods with a potential risk to people and their pets when they are set in the field are placed at major access points.

- Cage traps, snares, and other traps are set and inspected according to WS policy.

- Training and certification is required of crewmembers for aerial shooting projects. This training includes training in the use of personal protective equipment, emergency procedures in the event of an aerial accident, target identification and additional firearms training specific to aircraft. Commercial rated pilots must pass a Class II physical exam as defined by the Federal Aviation Administration (FAA) and are subjected to recurrent WS safety training for low-level aircraft. Aircraft are inspected to meet or exceed Part 135 FAA aircraft standards.

- Carcass disposal, as possible, is conducted according to WS Policy to minimize risks of lead poisoning and other potential maladies.

3.5.2.4 Humaneness of Methods Used by WS.

- Chemical immobilization and euthanasia procedures that do not cause pain or undue stress are used by certified KWSP personnel when practical and where safe.

- KWSP personnel attempt to kill captured target animals that are slated for lethal removal as quickly and humanely as possible. In most field situations, a shot to the brain is performed to euthanize a trapped animal which is in concert with the AVMA's (1987, 2001, 2007) definition of euthanasia. In some situations, accepted chemical immobilization and euthanasia methods may be used.

- Research continues with the goal of improving the humaneness of FSDM devices.

4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative from Chapter 3 in relation to the issues identified for detailed analysis in Chapter 2. This section analyzes the environmental consequences of each alternative in comparison with the proposed action to determine if the real or potential impacts would be greater, lesser, or the same. Therefore, the proposed action or current program alternative serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. Therefore, the background and baseline information presented in the analysis of the current program alternative also applies to the analysis of each of the other alternatives.

The following resource values within Kansas are not expected to be negatively impacted by any of the alternatives analyzed: soils, geology, minerals, floodplains, wetlands, visual resources, air quality, aquatic resources and range. These resources will not be analyzed further. Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources. Additionally, greenhouse gas emissions from all APHIS offices and vehicles would not meet the CEQ standard of significance (USDA 2015).

The proposed project will not cause major ground disturbance, will not cause any physical destruction or damage to property, does not cause any alterations of property, wildlife habitat, or landscapes, and does not involve the sale, lease, or transfer of ownership of any property. The proposed methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. (see Section 1.7.2.3).

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

NEPA requires federal agencies to determine whether their actions have a "*significant impact on the quality of the human environment*." The environmental consequences of the 4 alternatives are discussed below with emphasis on the issues presented in Chapter 2. The comparison of alternatives will be used to make a selection of the most appropriate alternative for KWSP FSDM activities. The alternatives selected for detailed assessment provide the best range of alternatives that could potentially meet the purpose and the need of FSDM in Kansas as identified in Chapter 1.

4.1.1 Effects on Feral Swine Populations

The authority for management of feral swine in Kansas is KDA-AHD. KDA-AHD and other State agencies such as KDWPT would prefer that feral swine be eradicated from the State because it is an invasive species and causes considerable damage.

An aspect, perhaps overriding, that is germane to the determination of "significance" under NEPA is the effect of a federal action on the *status quo* for the environment. States have the authority to manage populations of wildlife species as they see fit, except for migratory and T&E species. However, management direction for a given species can vary among states, and state management actions are not subject to NEPA compliance. Therefore, the *status quo* for the environment with respect to state-managed wildlife species is the management direction established by the States. Federal actions that are in accordance with state management have no effect on the *status quo*.

4.1.1.1 Alternative 1 - Continue the Current Federal FSDM Program. Many states with well-established feral swine populations have reasonable goals to manage feral swine populations and the damage associated with feral swine. In most cases, states would desire eradication due to the nature of the animal and the problems feral swine present. Eradication, however, is not always feasible. Kansas is unique in that the current population is still relatively small and, thus, its goals will be different than those of a neighboring state such as Oklahoma or Missouri with much higher populations. Most of Kansas's feral swine population consists of isolated populations that are not widespread. KWSP has proven in the past that extirpation of isolated populations in the State can be done (e.g., Fort Riley as described in Section 2.2.1). The current proposed action is to continue the goal of extirpating isolated populations and continue control and long term suppression of larger populations in the state.

Prior to 1994, only rumored reports of feral swine existed in Kansas. In 1994, the Fort Riley Military Installation discovered a population of feral swine on its property in northeast Kansas. This was the first documented population in Kansas. Fort Riley asked KWSP in FY95 for assistance in the eradication of this population, or at least control to a manageable population size. From FY95 to FY00, KWSP removed 385 feral swine using an integrated approach of aerial shooting, cage traps, snares and shooting and appeared to have eradicated the population. KWSP has continued to monitor the area for swine or their sign, but has found none and has no verified reports since FY00. Thus, the population is believed to have been extirpated.

After FY00, KWSP was not involved in any feral swine control until FY04. In FY04, KWSP responded to a disease threat from a domestic swine operation. A farm located less than one mile across the Kansas border in Oklahoma experienced an outbreak of PRRS. It was believed that feral swine in Kansas may have contacted the domestic swine. KWSP used aerial shooting and removed 14 feral swine near the domestic operation.

In FY05, KWSP conducted a feral swine survey in Kansas and discovered populations in 10 counties. In FY06, KWSP, in cooperation with USDA-APHIS-Veterinary Services and KDA-AHD, conducted disease surveillance, removing 108 feral swine from 4 counties. In FY07, KDA-AHD funded increased levels of FSDM and disease monitoring which resulted in the removal of 263 feral swine from 8 counties. Since the FSDM's program inception, KWSP has removed over 4,000 feral swine from the state and has extirpated 10 populations. KWSP has also worked with state, federal and local authorities in its neighboring states (CO, NE, MO, and OK) on feral swine populations located near the state line. Kansas currently has feral swine populations in 5 counties mostly occurring along the southern and eastern border where KWSP anticipates it will conduct FSDM. Additionally, KWSP will conduct FSDM elsewhere in the state for any populations that may arise or may be illegally released.

Other counties in Kansas have reported the presence of feral swine and KWSP investigates these as they are received. Currently KWSP is conducting control on all known feral swine populations in Kansas to some degree. Under the proposed action, FSDM will be continued with the objective of eradication or, at least, population suppression where populations become well-established in Kansas, but this is dependent on available funding.

4.1.1.2 Alternative 2 - Nonlethal FSDM Methods Used by KWSP. Under this alternative, KWSP would not kill any feral swine because lethal methods would not be used. Nonlethal activities conducted by KWSP might intensify, but most likely would result in similar levels of nonlethal FSDM activities as conducted under Alternative 1 because feral swine eradication and suppression are the objectives of KDA-AHD and other State agencies rather than just damage reduction. It is likely that State agencies and private individuals and entities would see KWSP as ineffective in achieving population objectives. Thus, these agencies and private individuals would likely increase lethal efforts to reduce feral swine. Depending on the level of effort, the lethal take of feral swine would likely be less than that under the proposed action. KWSP could offer advice on lethal FSDM methods that could be used. The primary difference in the level of take would be that aerial shooting would not be used and, thus, the efficiency of feral swine removal would be reduced. More effort by non-federal entities with lethal FSDM methods would likely be needed to take the same number of feral swine since aerial shooting could not be used. As a result, the State's objective of eliminating feral swine in Kansas may not be achieved.

4.1.1.3 Alternative 3 -Technical Assistance Only. Under this alternative, KWSP would have little impact on feral swine populations in Kansas because KWSP would be limited to providing advice without providing direct operational FSDM activities. All efforts to reduce feral swine damage would be conducted by the State and private entities and individuals to reduce or prevent feral swine damage. KWSP could offer advice on the FSDM methods available and their proper use. Lethal control by these entities would likely increase similar to that under Alternative 2. In fact, it is likely the impact to the feral swine population would be similar to Alternative 2. As a result, and similar to Alternative 2, the State's objective of eliminating feral swine in Kansas may not be achieved.

4.1.1.4 Alternative 4 - No Federal KWSP FSDM. Under this alternative, KWSP would have no impact on feral swine populations in the State. Without a federal KWSP program, State and private efforts would likely increase in an attempt to alleviate feral swine damage. This would result in similar levels of feral swine being lethally taken as under Alternatives 2 and 3, but possibly slightly less because technical advice and demonstrations would not be readily available. Since KWSP could not offer any advice on FSDM methods, FSDM could be conducted with little or no technical help and be conducted in an ineffective manner. Thus, efforts to meet the objectives of eradication or suppression of swine populations in Kansas would be reduced somewhat more than under Alternatives 2 and 3.

4.1.2 Effects on Nontarget Species Populations, Including T&E Species

Nontarget species can be impacted by FSDM whether implemented by KWSP, other agencies, or the public. Impacts can range from direct take while implementing FSDM methods (e.g., deer caught in cage traps for feral swine) to indirect impacts resulting from implementing FSDM methods (e.g., deer unintentionally entangled in fences meant only to keep feral swine out of an area) and not implementing FSDM (reduction of a ground-nesting bird species in a given area where feral swine have not been controlled as discussed in Section 1.3.2). Measures are often incorporated into FSDM to reduce impacts to nontarget species. Various factors may, at times, preclude use of certain methods, so it is important to maintain the widest possible selection of FSDM tools for resolving feral swine damage problems. However, the FSDM methods used to resolve damage must be legal and biologically sound. Often, but not always, impacts to nontarget species can be minimized. Where impacts occur, they are mostly of low magnitude in terms of nontarget species populations. Following is a discussion of the various impacts to nontarget species under the four alternatives.

4.1.2.1 Alternative 1 - Continue the Current Federal FSDM Program. While every precaution is taken to safeguard against taking nontarget species, at times changes in behavioral patterns and other unanticipated events can result in the incidental take of unintended species. These occurrences happen, but should not affect the overall populations of any species under the current program. Most methods utilized for FSDM are highly selective, but traps and snares have the potential for taking nontargets. . From FY10 to FY14, KWSP had minimal nontarget take including a coyote killed in a neck and 3 white-tailed deer and two cows released from cage traps. From FY05 to FY09, KWSP killed 3 coyotes in neck snares, a white tailed deer in a neck snare and 2 in cage traps (broke necks trying to get out of trap), and freed 5 from cage traps. The only other species was an eastern cottontail (*Sylvilagus floridanus*) in a neck snare (small swine are sometimes targeted in an effort to completely eradicate them from an area). From FY95 to FY04, the only other nontarget species taken during FSDM was a raccoon. Intuitively, this is a minimal take of nontargets and would not impact any of these species populations, especially when comparing to sports harvest. Considering that 2,901 feral swine were removed from FY05 to FY14, averaging 290 per year, and KWSP lethally took 4 coyotes, 3 white-tailed deer, and one cottontail (<1 nontarget/year), KWSP has had minimal impact on nontarget species populations.

FSDM as proposed under this alternative could also reduce predation and competition between native wildlife species and feral swine. As discussed in section 2.2.2, some nontarget species may actually benefit from FSDM. For example, ground nesting bird species would benefit from any reduction in feral swine because nest destruction and predation would be reduced. Other native species such as white-tailed deer would benefit because more browse would be available.

KWSP FSDM methods will have no adverse effect on any of the federally listed T&E, and candidate species other than aerial shooting in the area of lesser prairie-chicken lek (Table 2). On the other hand, since feral swine are omnivorous and environmentally destructive, a positive effect could occur on these species following FSDM in areas where feral swine may disturb or actually feed upon them. Feral swine removal could have the potential to benefit 11 federally listed species and an additional 23 state listed species (Table 2), if feral swine were found in the habitat of these species.

Finally, a fully Integrated FSDM program implemented by KWSP would likely reduce the unwise or illegal use of methods to reduce feral swine damage, as discussed in Section 2.2.2. These activities could result in negative, but unknown, impacts on nontarget wildlife. Treves and Naughton-Treves (2005) and AFWA (2004) discuss the need for WDM and that an accountable government agency is best suited to take the lead in such activities because it increases the tolerance for wildlife by those being impacted by their damage and has the least impacts on wildlife overall.

4.1.2.2 Alternative 2 - Nonlethal FSDM Methods Used by KWSP. Under this alternative, KWSP take of nontarget animals would probably be less than that of the proposed action because no lethal FSDM would be conducted by KWSP. However, nontarget take would not differ substantially from the current program because the current program takes very few nontarget animals (ave. 0.8 lethally and 1.0 nonlethally taken per year from FY05 to FY14 and 0.2 lethally and 1.0 nonlethally from FY10 to FY14). The State and private entities would likely increase FSDM activities which would result in the take of nontarget animals. It is expected that nontarget take would actually increase under this alternative because aerial shooting, one of the most selective and efficient methods for feral swine removal, would not be used. On the other hand, if feral swine were not removed from areas, impacts to native wildlife including T&E species would be expected to increase dependent on the level of FSDM implemented by the State. Finally, if feral swine damage problems were not effectively resolved by nonlethal control methods, private entities would likely resort to implementing lethal FSDM such as use of shooting. This could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than the proposed action. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to the unwise or illegal use of chemical toxicants and other methods which could lead to unknown impacts on local nontarget species populations, including T&E species, as discussed in Section 2.2.2. It is anticipated that this alternative would likely have higher overall impacts on nontarget species than Alternative 1.

4.1.2.3 Alternative 3 -Technical Assistance Only. Alternative 3 would not allow any KWSP direct operational FSDM in the area. There would be no impact on nontarget or T&E species by KWSP activities from this alternative. Technical assistance or self-help information would be provided at the request of producers and others. Although technical support might lead to the more selective use of FSDM methods by private parties than that which might occur under Alternative 4, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods leading to greater take of nontarget wildlife than under the proposed action. It is hypothetically possible that, similar to Alternative 2, frustration caused by the inability to reduce losses could lead to the unwise or illegal use of chemical toxicants and other methods which could lead to unknown impacts on local nontarget species populations, including some T&E species. A reduction in the number of feral swine taken could also lead to higher rates of predation and competition with native wildlife species which could impact their populations. It is anticipated that under this alternative, nontarget wildlife would be impacted to a much greater degree than under Alternatives 1, and slightly more than Alternative 2.

4.1.2.4 Alternative 4 - No Federal KWSP FSDM. Alternative 4 would not allow KWSP or any other federal agency to conduct FSDM in Kansas or provide advice on the correct use of FSDM methods.

Thus, KWSP would have no impact on nontarget or T&E species under this alternative. However, nontarget take should not differ substantially from the current program because the current program takes very few nontarget animals. However, parties with feral swine damage problems would likely resort to whatever means of control they had available to them. It is expected that nontarget take would be highest under this alternative because many methods could be used ineffectively without instruction on their proper use. Private efforts to reduce or prevent depredations would likely result in less experienced persons implementing control methods which could lead to greater take of nontarget wildlife than under the proposed action. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to the unwise or illegal use of chemical toxicants and other methods which could impact local nontarget species populations, including some T&E species. Finally, feral swine would be least likely to be controlled efficiently under this alternative and, thus, their impacts would be greatest under this alternative. It is anticipated that impacts to nontarget wildlife including T&E species would be highest under this alternative.

4.1.3 Effects of FSDM on Public and Pet Safety and the Environment

The public, pets, and the environment could potentially be impacted by FSDM whether implemented by KWSP, other agencies, or the public. Impacts can range from direct injury while implementing FSDM methods to indirect impacts resulting from implementing FSDM methods (e.g., impacts to water quality from illegal chemical use by frustrated landowners). Measures are often incorporated into FSDM to minimize or nullify risks to the public, pets, and the environment. Various factors may, at times, preclude use of certain methods, so it is important to maintain the widest possible selection of FSDM tools for resolving feral swine damage problems. However, the FSDM methods used to resolve feral swine damage must be legal and biologically sound. Following is a discussion of the various impacts under the Alternatives.

4.1.3.1 Alternative 1 - Continue the Current Federal FSDM Program. FSDM methods that might raise safety concerns include the use of firearms and lead, aircraft, snares, pyrotechnics for hazing, cage traps, chemical repellents, drugs, and reproductive inhibitors. WS poses minimal threat to people, pets and the environment with these FSDM methods such as shooting, hazing with pyrotechnics, trapping, and use of chemicals. All firearm and pyrotechnic safety precautions are followed by WS when conducting FSDM and KWSP complies with all applicable laws and regulations governing the lawful use of firearms. Shooting with shotguns or rifles is used to reduce feral swine damage when lethal methods are determined to be appropriate. Shooting is selective for target species. Firearms are only used by KWSP personnel who are experienced in handling and using them. Firearm use is very sensitive and a public concern because firearms can be misused. The safety of firearms to people, pets, and nontarget species was discussed in Section 2.2.3.1. To ensure safe use and awareness, KWSP employees who use firearms to conduct official duties "will be provided safety and handling training as prescribed in the WS Firearms Safety Manual and continuing education training on firearms safety and handling will be taken biennially by all employees who use firearms." (WS Directive 2.615). KWSP also follows safety precautions and WS Policies when using pyrotechnics and accidents were discussed in Section 2.2.3.1 as they are considered firearms. The potential for lead exposure from ammunition fired from firearms was discussed in Section 2.2.3.2 and found to have minimal potential to have an effect on people, pets, or the environment. KWSP uses aircraft in FSDM, but this was found to have minimal potential to have an effect on people, pets, and the environment as discussed in Section 2.2.3.3. KWSP uses snares and cable restraints. These are strategically placed to minimize exposure to the public and pets. Nontarget take with these was minimal as discussed in Section 2.2.3.4 which would include pets. KWSP also has used cage traps and could use other methods such as chemical repellents, drugs for immobilization, euthanasia, and inhibiting reproduction, but these are anticipated to have no or little potential to people, pets, nontarget species, and the environment. The use of FSDM chemicals and drugs undergo rigorous testing and research to prove safety, effectiveness, and low public and environmental risks before they are registered by EPA or FDA. Any operational use of chemical repellents and tranquilizer drugs would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations and FDA rules which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are built-in mitigation measures that would assure that use of registered chemical products would avoid significant adverse effects on human health. Appropriate signs are posted on all properties where traps, snares, and other devices are set to alert the public of their presence. WS has had no accidents involving the use of firearms, pyrotechnics, aircraft, cage traps, or snares in which a member of the public or a pet was harmed. Therefore, no significant impact on human safety from the use of non-chemical BDM methods by KWSP is expected.

KWSP personnel that may use chemical drugs for immobilization and euthanasia are certified through WS to use them. KWSP personnel abide by WS policies and SOPs, and federal and state laws and regulations when using FSDM methods that have potential risks. The same would apply to immunocontraceptives should they become registered for use in Kansas. KWSP did not use any chemicals in FSDM from FY06 to FY13, and therefore, would not have any incidents involving the public or pets. Even so, if KWSP uses these, it is anticipated that KWSP would not have an effect on people, pets, or the environment from their use.

Thus, WS poses minimal risks to public and pet health and safety when implementing FSDM. In fact, KWSP is more likely to reduce public and pet safety hazards. This alternative would reduce threats to public and pet health and safety and the environment by removing feral swine from sites where they pose a potential hazard, such as to aircraft from being struck or to people from aggressive behavior, or have the potential of transmitting a disease.

4.1.3.2 Alternative 2 - Nonlethal FSDM Methods Used by KWSP. Alternative 2 would not allow for KWSP to use any lethal methods. KWSP would only implement nonlethal methods such as harassment with shooting firearms and pyrotechnics, live traps, repellents, tranquilizing drugs, and reproductive inhibitors. As discussed under Alternative 1, use of these FSDM devices is not anticipated to have more than minimal risks to the public, pets, and the environment. The public is often especially concerned with the use of firearms and chemicals. Under this alternative, risks to human safety from KWSP's use of firearms on the ground or from aircraft would be minimal since it would only be used to haze feral swine from areas. KWSP anticipates that the use of methods involving chemical repellents and drugs would increase under this alternative. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or FDA. Any operational use of chemical repellents and tranquilizer drugs would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations and FDA rules which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are built-in mitigation measures that would assure that use of registered chemical products would avoid significant adverse effects on human health. These methods as well as the other nonlethal chemicals that could be used by KWSP in FSDM were discussed above and not expected to impact the public, pets, or the environment.

However, increased use of firearms and other methods by less experienced and trained private individuals would probably occur without KWSP assistance under this alternative. People that see KWSP as ineffective implementing nonlethal FSDM methods may resort to conducting FSDM themselves with little or no information or training on the use of the methods. Therefore, risks to human and pet health and safety would probably increase under this alternative because people that had received assistance from KWSP in the past may resort to the use of the methods that pose a risk to the public and pets with no oversight or training programs. Additionally, as discussed in Section 2.2.2, the illegal or unwise use of toxicants and other methods could lead to hazards to people, pets, and the environment. Therefore, it is believed that risks associated with FSDM methods would likely increase under this alternative.

Human and pet health and safety risks associated with feral swine would likely increase under this alternative since it is anticipated that fewer feral swine would be removed depending on the level of effort expended by State agencies and the public on reducing feral swine populations. Disease (Hutton et al.

2006) and other risks that could impact people and pets would likely be higher or about the same. However, it is believed that risks to disease, and potentially incidents of human or pet exposure to aggressive swine or vehicular accidents would likely increase under this alternative, especially since aerial shooting would not be used, an effective method to reduce large numbers of swine.

4.1.3.3 Alternative 3 -Technical Assistance Only. Under this alternative which would be very similar to Alternative 2, risks to human and pet health and safety and the environment from KWSP using firearms, aircraft, snares, and cage traps would not occur, and be the methods used that could be slightly less depending on the level of effort expended by the state and private individuals on FSDM. Increased use of firearms by less experienced and trained private individuals would probably occur without KWSP direct operational assistance which would likely increase human safety risks, similar to Alternative 2. Also, as under Alternative 2, people frustrated from a lack of an organized control effort could resort to the unwise or illegal use of methods that could have an effect on human safety, pets, and the environment. Similar to Alternative 2, risks to people and pets associated with feral swine such as from disease would likely increase, but would be dependent on the level of effort expended by the State agencies and the public. Thus, it is likely that this alternative would have similar risks as Alternative 2.

4.1.3.4 Alternative 4 - No Federal KWSP FSDM. Under this alternative, risks to human safety from KWSP would be completely nullified, thus it would be less than the current program alternative. However, KWSP's current FSDM program has an excellent safety record in which no accidents involving the use of FSDM methods has occurred which resulted in a member of the public or a pet being harmed. The elimination of a federal program under this alternative would increase use of firearms and other FSDM methods by less experienced and trained private individuals, which would likely increase human safety risks. Without proper training and instruction on the use of FSDM methods, it is likely that some methods would be used improperly, and, therefore, result in higher risks to the public, pets, and the environment, even higher than under Alternatives 2 and 3. Additionally, the unwise or illegal use of methods such as illegal toxicants would be highest under this alternative and could impact human and pet safety, and the environment. Finally, this alternative would likely result in the lowest number of feral swine taken. Fewer feral swine taken could increase risks to people and pets from disease and other conflicts. Overall, this alternative would have the highest risks for the public, pets, and the environment.

4.1.4 Humaneness and Animal Welfare Concerns of Methods Used by KWSP

4.1.4.1 Alternative 1 - Continue the Current Federal FSDM Program. Under this alternative, methods viewed by some persons as inhumane would be employed such as cage traps and snares. Despite WS Policies and SOPs designed to maximize humaneness as described in section 2.2.4, the perceived stress and trauma associated with being held in snares or other devices until the KWSP biologist or specialist arrives at the site to dispatch the animal, or, as in the case of an unharmed nontarget, to release it, is unacceptable to some persons. KWSP personnel are experienced, trained and professional in their use of management methods, in order to be as humane as possible under the constraints of current technology, workforce and funding.

4.1.4.2 Alternative 2 - Nonlethal FSDM Methods Used by KWSP. The amount of suffering by target and nontarget wildlife under this alternative caused by KWSP would be less than under the proposed action since lethal control activity by KWSP would not be allowed, but some nonlethal methods such as cage traps could still be used. However, use of firearms, traps, and snares by state and private individuals would probably increase if damage was not satisfactorily reduced by KWSP. This could result in less experienced persons implementing use of traps and snares without modifications which are used to exclude smaller nontarget animals. Increased take and suffering of nontarget wildlife could result. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to the unwise or illegal use of chemical toxicants and other methods which could lead to animal suffering. Thus, it is anticipated that as much or more animal suffering would occur under this alternative as under Alternative 1.

4.1.4.3 Alternative 3 -Technical Assistance Only. Under this alternative, methods viewed by some persons as inhumane would not be employed by KWSP, but would likely be employed by the state or private individuals. Use of firearms, traps and snares by private individuals would probably increase. This could result in less experienced persons implementing use of cage traps and snares without modifications which are used to exclude smaller nontarget animals. Greater take and suffering of nontarget wildlife could result. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to unwise or illegal use of chemical toxicants and other methods which might result in increased animal suffering. Thus KWSP believes that the same or more animal suffering would occur under this alternative than under Alternative 1, but similar to Alternative 2.

4.1.4.4 Alternative 4 - No Federal KWSP FSDM. Alternative 4 would not allow any KWSP FSDM in the State. Impacts regarding the issue of humaneness under this alternative would likely be similar to those under Alternative 3. Under this alternative, methods viewed by some persons as inhumane would not be employed by KWSP, but would likely be employed by state and private individuals. Use of traps and shooting by private individuals would probably increase, and proportionately without instruction or training. This could result in even more less experienced persons implementing use of firearms, traps and snares without modifications which are used to exclude smaller nontarget animals than under Alternatives 2 or 3. Greater take and suffering of nontarget wildlife could result. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to the unwise or illegal use of chemical toxicants and other methods which might result in increased animal suffering. KWSP believes that this alternative would result in the highest suffering by target and nontarget wildlife, more than Alternatives 1, 2, and 3.

4.2 SUMMARY AND CONCLUSION

Impacts associated with activities under consideration here are not expected to be "significant." Based on experience, impacts of the FSDM methods and strategies considered in this document are very limited in nature. The addition of those impacts to others associated with past, present, and reasonably foreseeable future actions, will not result in cumulatively significant environmental impacts. Monitoring the impacts of the program on the populations of both target and nontarget species will continue. All feral swine control activities that may take place will comply with relevant laws, regulations, policies, orders, and procedures, including the NEPA, the Endangered Species Act, and FIFRA. A summary of the overall effects of the FSDM alternatives relative to the issues is given in Table 3. The current program alternative provides the lowest overall negative environmental consequences combined with the highest positive effects.

Table 3. A summary of the environmental consequences of each program alternative relative to each issue.

ISSUE		**ALTERNATIVE 1**		**ALTERNATIVE 2**		**ALTERNATIVE 3**		**ALTERNATIVE 4**	
Impact by:		KWSP	Public	KWSP	Public	KWSP	Public	KWSP	Public
Target Spp.		++	+	+	+	+	+	0	+
Nontarget Spp.	**Adverse**	0	0	0	-	0	-	0	-
	Beneficial	+	0	0	0	0	0	0	0
Risks to People, Pets, & Environment	**Adverse**	0	-	0	--	0	--	0	--
	Beneficial	++	0	+	0	+	0	0	0
Humaneness		-	-	0	--	0	--	0	--

"0" = None or Minimal; “-“ = Slight Negative; "+" = Slight Positive; -- High Negative;++ High Positive

5.0 CHAPTER 5: LIST OF PREPARERS AND PERSONS CONSULTED

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5.3 LITERATURE CITED

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