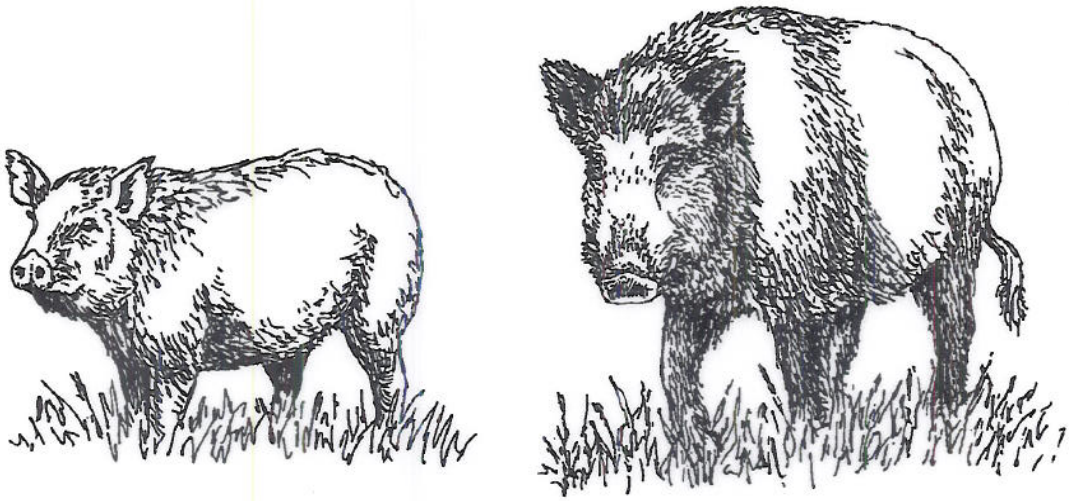
ENVIRONMENTAL ASSESSMENT,
FINDING OF NO SIGNIFICANT IMPACT,
AND DECISION

for

FERAL SWINE DAMAGE MANAGEMENT IN KANSAS



Prepared By:

United States Department of Agriculture
Animal and Plant Health Inspection Service
Kansas Wildlife Services Program

February 2009

Finding of No Significant Impact
and
Decision
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Feral Swine Damage Management
in Kansas

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program responds to a variety of requests for assistance from individuals, organizations, and agencies experiencing damage caused by wildlife in Kansas. WS activities are conducted in cooperation with other federal, state, and local agencies, as well as private organizations and individuals. Ordinarily, according to APHIS procedures implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions may be categorically excluded (7 CFR 372.5(c), 60 Fed. Reg. 6000-6003, 1995). However, WS prepared an environmental assessment (EA) to comply with APHIS NEPA implementing regulations and interagency agreements, to facilitate planning, interagency coordination, streamline program management, and to involve the public. The EA, released by WS in December 2008, documented the need for feral swine (*Sus scrofa*) damage management (FSDM) in Kansas and assessed potential impacts of various alternatives in relation to issues analyzed for responding to feral swine damage problems.

WS's proposed action was to allow the use of all FSDM methods on any lands authorized in the State for the protection of agriculture, property, natural resources, and public safety. WS, under contract, assists landowners and organizations with responding to complaints from feral swine. WS also assists public entities and Tribes with FSDM when requested. WS cooperates closely with the Kansas Animal Health Department (KAHD), Kansas Department of Agriculture, Kansas Department of Wildlife and Parks, and U.S. Fish and Wildlife Service (USFWS). In Kansas, feral swine are not protected.

A major overarching factor in determining how to analyze potential environmental impacts of WS's involvement in FSDM is that such management can be conducted by state and local government, or private entities with or without assistance from WS and these groups are not necessarily subject to compliance with NEPA. In fact, WS conducts much of its FSDM as an agent of requesting cooperators that could conduct FSDM themselves. This means that the Federal WS program has limited ability to affect the environmental outcome of FSDM in Kansas, except that WS implemented FSDM was determined to have lower risks to nontarget species and the public than some alternatives discussed at depth in the EA. Therefore, WS has limited ability to affect the environmental *status quo*. Despite this limitation of federal decision-making in this situation, this EA process is valuable for informing the public and decision-makers of the substantive environmental issues and alternatives of FSDM for resource protection.

Public Involvement

Draft EAs were sent to KAHD, the Kansas Departments of Agriculture and Wildlife and Parks, Kansas State University Cooperative Extension Service, USFWS, and Fort Riley Military Installation, agencies with professional expertise covering different aspects of the EA for their review and comments. The comments that were received from these agencies were incorporated into the EA.

Following interagency review of the draft EA, an EA was prepared and released to the public for a 32 day comment period. The resulting EA or a "Notice of Availability" letter was sent directly to 32 interested public and private organizations and individuals. In addition, a Notice of Availability of the EA was published in the *Topeka Capitol Star* (Fed. Reg. 72:13237-13238, March 21, 2007) for 3

consecutive days, December 31- January 2, 2009 . The EA was also made available for public review on the WS National website at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml and at the WS State Office, 4070 Fort Riley Blvd., Manhattan, KS 66502, or from requests received by personal contact, mail, or e-mail. However, the public did not request additional EAs as a result of the "Notice of Availability." The deadline for comments was January 31, 2009.

Public Comments

Following the 32-day public review and comment period, WS did not receive any comment letters on the FSDM EA.

Major Issues

Cooperating agencies and the public, from previous EAs, helped identify a variety of issues deemed relevant to the scope of this EA. These issues were consolidated into the following 4 primary issues that were considered in detail in the predecisional EA:

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

Affected Environment

The proposed action is to continue conducting FSDM where feral swine are causing damage to agriculture, property, natural resources or public health and safety to private, public, and Tribal properties in Kansas. FSDM will only be conducted where the appropriate Agreement for Control or Work Plan is in place allowing FSDM methods to be used and at the request of private landowners, KAHD, Kansas Department of Agriculture, Kansas Department of Wildlife and Parks, USFWS, Tribe, or other Federal Agencies that manage land. The current program's goal and responsibility is to provide service when requested within the constraints of available funding and manpower.

Alternatives Analyzed in Detail

Four potential alternatives were developed to address the issues identified above. Two additional alternatives were considered, but not analyzed in detail. A detailed discussion of the anticipated effects of the alternatives on the objectives and issues is described in Chapter 4 of the EA. The following summary provides a brief description of each alternative and its anticipated impacts.

Alternative 1. Continue the Current Federal FSDM Program (No Action/Proposed Action). The "No Action" Alternative is a procedural NEPA requirement (40 CFR 1502.14(d)), and is a viable and reasonable alternative that could be selected. Consideration of the No Action Alternative is required under 40 CFR 1502.14(d), and provides a baseline or the environmental *status quo* for comparing the potential effects with the other alternatives. In this EA, the No Action Alternative is consistent with CEQ's definition.

In the case of the FSDM EA for Kansas, the No Action Alternative was the equivalent of the Proposed Action Alternative and the Current Program. Alternative 1 was determined to benefit individual resource owners/managers, while resulting in only low levels of impact to target and nontarget wildlife populations including T&E species, very low risks to or conflicts with the public, and minimal potential to negatively impact ecosystems. Current lethal methods available for use are selective for target species and appear to present a balanced approach to the issue of humaneness when all facets of the issue are considered. WS responds to requests for FSDM to protect human health and safety, agricultural crops and resources, property, natural resources, T&E species, and forestry in Kansas. To meet the goal, WS has the objective of responding to all requests from individual and corporate landowners, other public agencies and Tribes for assistance with, at a minimum, technical assistance or self-help advice, or, where appropriate and where cooperative or congressional funding is available, direct damage management assistance with professional WS Specialists conducting damage management actions. An Integrated Wildlife Damage Management approach would be implemented which allows the use of any legal technique or method, used singly or in combination, to meet the needs of requestors 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. In many situations, the implementation of nonlethal methods such as exclusion-type barriers would be the responsibility of the requestor to implement which means that, in those situations, WS's only function would be to implement methods difficult for the requestor to implement, if determined to be necessary. FSDM implemented by WS would be allowed in the State, when requested, on private property sites, public facilities or other locations where a need has been documented, upon completion of an *Agreement for Control.* All management actions would comply with appropriate and applicable Federal, state, and local laws.

Alternative 2. Nonlethal FSDM Only By WS. Under this alternative, WS would use only nonlethal methods to reduce damage by feral swine. Private landowners and state agencies would still have the option of implementing their own lethal control measures. Risks to or conflicts with target species would be about the same as Alternative 1. Risks to the public, and nontarget and T&E species, on the whole, including private efforts at FSDM, would probably be greater than Alternative 1, but slightly less than or about the same as Alternative 3 or 4 because WS would provide some assistance. Program effectiveness would probably be lower than Alternative 1. Personnel experienced in FSDM often already know when and where practical nonlethal control techniques would work. Therefore, this alternative could result in the use of methods that are known to be ineffective in particular situations. Selectivity of FSDM methods under this alternative would likely be less than Alternative 1 if reduced effectiveness leads to greater FSDM efforts by less experienced and proficient private individuals, but greater than Alternatives 2 and 3. The hypothetical use of illegal methods could occur as under Alternative 4, but be similar or slightly higher than under Alternative 1

Alternative 3. Technical Assistance Only. Under this alternative, WS would not provide any direct control assistance to persons experiencing feral swine damage problems, but would instead provide advice, recommendations, and limited technical supplies and equipment. Lethal FSDM would likely be conducted by persons with little or no experience and training, and with little oversight or supervision. Risks to or conflicts with the public, wetlands, nontarget, and T&E species would probably be more than Alternative 1, but slightly less than or about the same as Alternative 2. The effectiveness of WS and selectivity of FSDM methods would probably be lower than Alternative 1. Finally as discussed above, frustrated resource owners that have endured recurring losses may resort to the use of illegal or inappropriate techniques that could result in unknown consequences.

Alternative 4. No Federal WS FSDM. This alternative would consist of no federal involvement in FSDM in Kansas. Neither direct operational FSDM nor technical assistance on FSDM techniques would be available from WS. The majority of the federal FSDM assistance would be borne by KAHD

or other State agency. Private individuals could increase their efforts if KAHD were unable to respond adequately which means more FSDM would be conducted by persons with less experience and training, and with little oversight or supervision. Risks to the public, nontarget and T&E species, and wetlands would probably be greater than under Alternative 1, and effectiveness and selectivity would probably be lower. In addition, frustrated resource owners that have endured recurring losses may resort to the use of illegal or inappropriate techniques that could result in unknown consequences, and would likely be highest under this alternative.

Alternatives considered but not analyzed in detail were:

1. Compensation for Feral Swine Damage Losses
2. Develop a Statewide Bounty Program for Feral Swine

Finding of No Significant Impact

The analysis in the EA indicated that there will not be a significant impact, individually or cumulatively, on the quality of the human environment as a result of implementing the Proposed Action. I agree with this conclusion and therefore find that an Environmental Impact Statement need not be prepared. This determination is based on the following factors:

1. FSDM, as conducted by WS in Kansas, is not regional or national in scope. It is a statewide program and the scope was discussed in the EA. Under the proposed Action, WS would continue to assist individuals and entities with feral swine damage as necessary. Even if WS were not involved, under state law most FSDM would be conducted by private individuals or entities, or state and local government that are not subject to compliance with NEPA.

2. The proposed action would pose minimal risk to public health and safety. No injuries to any member of the public are known to have resulted from WS FSDM activities. In addition, a risk assessment has analyzed the use of FSDM methods by WS (USDA 1997) and these were found to pose only minimal risks to the public, pets, and nontarget wildlife species. This issue was addressed in the EA and the Proposed Action was found to have the least impacts.

3. There are no unique characteristics such as park lands, prime farm lands, wetlands, wild and scenic areas, or ecologically critical areas that would be significantly affected except positively.

4. The effects on the quality of the human environment are not highly controversial. Although there is some opposition to feral swine control, this action is not highly controversial in terms of size, nature, or effect.

5. Based on the analysis documented in the EA, the effects of the proposed FSDM program on the human environment would not be significant. The effects of the activities under the Proposed Action are not highly uncertain and do not involve unique or unknown risks. If WS were unable to respond adequately under the other Alternatives, a potential exists that could involve unique and unknown risks by non-professionals implementing FSDM and frustrated property owners that have been ineffective with FSDM methods resorting to the illegal use of chemicals.

6. The proposed action would not establish a precedent for any future action with significant effects. All issues under the proposed action were discussed thoroughly, and these would not add cumulatively to any known future actions that would result in significant effects.

7. No significant cumulative effects on the quality of the human environment were identified through the EA.

8. The proposed FSDM activities would not affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places, nor would they likely cause any loss or destruction of significant scientific, cultural, or historical resources. If anything, the Proposed Action would have beneficial effects on these resources.

9. An evaluation of the proposed action and its effects on T&E species determined that no significant adverse effects would occur to such species. This is supported by the 1992 Biological Opinion (USDA 1997) and a review of the currently listed species in Kansas in the EA.

10. The proposed action would be in compliance with all Federal, State, and local laws imposed for the protection of the environment. The proposed activity does not violate the Endangered Species Act or any other law. As allowed by State law, FSDM could be conducted by private individuals or entities, or state and local agencies that are not subject to compliance with NEPA if WS were not involved.

11. There were no irreversible or irretrievable resource commitments identified in this EA, except for a minor consumption of fossil fuels for routine operations.

Decision

I have carefully reviewed the EA and the input resulting from the public involvement process. I believe the issues and objectives identified in the EA would be best addressed through implementation of Alternative 1 (the Proposed or No Action Alternative to continue the current program). Alternative 1 is therefore selected because (1) it offers the greatest chance at maximizing effectiveness and benefits to affected resource owners and managers within current program funding constraints; (2) it will maximize selectivity of methods available; (3) it offers a balanced approach to the issue of humaneness when all facets of the issue are considered; (4) it will continue to minimize risk to or conflicts with the public; and (5) it will minimize risks to nontarget and T&E species. WS in Kansas will continue to use an IWDM approach in compliance with all the applicable mitigation measures listed in Chapter 3 of the EA.

For additional information regarding this decision, please contact Thomas Halstead, State Director, USDA- APHIS-WS, 4070 Fort Riley Blvd., Manhattan, KS 66502 – (785) 537-6855

Jeffrey Green, PhD, Regional Director
APHIS-WS Western Region

2/6/09
Date

Literature Cited

U.S. Department of Agriculture (USDA). 1997. Animal Damage Control Program Final Environmental Impact Statement. (*Revision*) USDA-APHIS-WS, Operational Support Staff, 6505 Belcrest Rd., Room 820 Federal Bldg, Hyattsville, MD 20782. 314 pp + App.

ENVIRONMENTAL ASSESSMENT

FERAL SWINE DAMAGE MANAGEMENT BY THE KANSAS WILDLIFE SERVICES PROGRAM

Prepared By:

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES

In Cooperation With:

KANSAS ANIMAL HEALTH DEPARTMENT

December 2008

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1.0 CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

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 sometime 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 2007), 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."* 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 operational FSDM is conducted, *Agreements for Control* or *KWSP Work Plans* must be signed by KWSP and the land owner or administrator. 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 might be requested within 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 significantly in Kansas and expanded since the 1990s, increasing the need for KWSP assistance to individuals experiencing swine damage problems or damage is threatened by feral swine populations in the vicinity of their property. Feral swine cause considerable damage to agricultural crops, pastures, stored feed, and other resources. Swine directly compete with many valuable native wildlife species and decrease habitat quality. In some cases they may predate directly on livestock and wildlife species, or can pass diseases to them, especially considering that they are vectors of swine brucellosis, pseudorabies, leptospirosis, and other diseases. Swine may pose a threat to human health and safety from disease, and automobile and aircraft 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 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 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 would be provided with information regarding the use of effective nonlethal and lethal techniques. Lethal methods used by KWSP would include shooting, aerial hunting, trapping, snaring, or euthanasia following live capture in cage traps. 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 an Agreement for Control. All management actions would comply with appropriate federal, state, and local laws.

1.3 NEED FOR ACTION

The need for action is based on the escalating damage caused by feral swine in Kansas. Their population has increased considerably in the last two decades, and KWSP has continued to receive increased numbers of calls annually regarding FSDM. From FY06 (Fiscal Year 2006 = October 1, 2005 to September 30, 2006) to FY08, damage work tasks and requests associated with feral swine damage increased from 37 to 849 per year (Table 1) indicating the increased problems with feral swine (KS MIS[1]). The value of damage was not often verified, but was recorded when the information was available. This actually decreased, but reflects the lack of qualified damage estimates.

[1] MIS - Computer-based Management Information System used for tracking KWSP WDM activities. Throughout the text, data for a year (i.e. FY06) will be given and is from the MIS. MIS reports will not be referenced in the text or Literature Cited

Table 1. The number of requests for assistance 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 FY06 to FY08. The damage reported in this table is only a fraction of the actual damage caused by feral swine in Kansas.

Category	Resource	FY06		FY07		FY08		Average	
		Req.	$ Value $	Req.	$ Value $	Req.	$ Value $	Req.	$ Value/Yr
Human Health and Safety		-	-	2	$0	16	$0	6	$0
Subtotal		0	$0	2	$0	16	$0	6	$0
Agriculture	Livestock/Feed	26	$0	15	$1,500	13	$100	18	$533
	Pasture/Hay/Range	8	$1,000	19	$0	224	$3,400	84	$1,467
	Grain/Sod/Crops	1	$10,000	49	$5,800	79	$0	43	$5,267
Subtotal		35	$11,000	83	$7,300	316	$3,500	145	$7,067
Property	Turf/General	2	$500	87	$0	514	$0	201	$167
Subtotal		2	$500	87	$0	514	$0	201	$167
Nat. Res.	Wetland/Recr. Area	-	-	-	-	3	$0	1	$0
Subtotal		0	$0	0	$0	3	$0	1	$0
TOTAL		37	$11,500	172	$7,300	849	$3,500	352	$7,234

Req. = Requests for assistance

1.3.1 Need for FSDM to Protect Agricultural Resources

Feral swine are responsible for large scale destruction of crops, hay meadows, and pasture primarily by feeding, rooting, and wallowing. Additionally, livestock and feed is vulnerable to their depredations and potential for disease transmission. From FY06 to FY08, KWSP Specialists annually completed work tasks for an average of 145 requests for assistance to protect crops, rangeland, pasture, hayfields, sod farms, livestock, and livestock feed that had already incurred about $7,000 in damages (Table 1). 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 and is done year-round in search of food (Stevens 1996). The feral hog's rooting and wallowing activities damage crops, pastures, hay meadows, and sod farms, and spoil watering holes used 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). A large percentage of losses are in addition to that loss resulting from the resource being eaten (Beach 1993). In Kansas, damages to several field crops have been documented including damage to corn, wheat, soybeans, alfalfa, milo, and sorghum.

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, bubonic plague, and anthrax (Beach 1993). 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 (Henry 2003). Kansas's inventory of all domestic swine in June 2008 was estimated at 1,830,000 (Kansas

Section because MIS reports are not kept on file. A database is kept that allows queries to be made to retrieve the information needed.

Agricultural Statistics Service 2008). Although the size of the Kansas feral swine population is unknown, possibilities of contacts between feral and domestic swine exist. In addition to large-scale commercial operations, Kansas has a large number of small-scale "backyard" swine operations that could potentially come in contact with feral swine (Saliki et al. 1998). 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. A recent 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, Disease Biologist, Oklahoma WS, pers. comm. 2008).

Feral swine are also efficient predators. Calves, kids, lambs, and poultry have been known to become prey of feral swine (Stevens 1996). The young are generally most vulnerable, but adult animals that are weakened or injured are also preyed upon. 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 valued at $1500. 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 easy to overlook this as a cause for low production. 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. Feral swine are omnivorous and feed on a wide variety of items, many of which are staples for native fauna. One of the more important seasonal food resources used by feral swine is wild fruit and nut crops, especially oak mast (Wood and Roark 1980). Oak mast is also an important food source for deer (*Odocoileus spp.*) and Wild Turkey (*Meleagris gallopavo*). 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). Feral swine also predate native wildlife, especially young and injured wildlife, and ground nesting birds, their nestlings and eggs (Beach 1993). Finally, feral swine can be very damaging to different habitats, especially wetlands. Their rooting and foraging can completely destroy the understory in forests and make trees less stable during windstorms. Their wallowing and foraging can significantly damage wetlands, which may be important for threatened and endangered (T&E), and sensitive species such as fish. KWSP received an average of 1 request annually from FY06 to FY08 for the protection of natural resources.

1.3.3 Need for FSDM to Protect Property

Feral swine damage a variety of property. Lawns, landscaping, and gardens can literally be destroyed by a herd of feral swine, causing thousands of dollars in damage. 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. Another problem is the potential for larger swine to cause collisions with vehicles and aircraft. Like deer and other large game species which cross

highways, feral swine are struck by vehicles, often causing damage to automobiles and possibly injuring their passengers (Miller 1993). Data obtained through the Kansas Department of Transportation (2008) shows that deer were involved in an average of over 9,500 vehicular crashes annually with 2 fatalities and 27 injuries from 1997 to 2007, resulting in tens of thousands of dollars in vehicle damage. Damage is typically greatest in areas where populations are dense. Finally, where feral swine have access to runways, they can cause considerable damage to aircraft. Deer cause the greatest amount of damage to the aviation industry nationwide and this damage amounts to hundreds of millions of dollars annually (Cleary et al. 2005). Feral swine are larger and could cause considerably more damage. Feral swine in Kansas were responsible for an average of 201 requests for assistance to protect property that had an average of $167 damage from FY06 to FY08 prior to implementing FSDM (Table 1).

1.3.4 Need for FSDM to Protect Human Health and Safety

Feral swine can be a threat to human health and safety from disease and in vehicle accidents. Feral swine are potential reservoirs for at least 30 viral and bacterial diseases (Davidson and Nettles 1997, Samuel et al. 2001, Williams and Barker 2001) and 37 parasites (Forrester 1991) that threaten people. Diseases such as brucellosis, salmonellosis, toxoplasmosis, trichinosis (Seward et al. 2004), tuberculosis, and tularemia (Stevens 1996, Hubalek 2002) are among those that they can carry and transmit to humans. Amass (1998) reported that human infection with swine diseases are rare based on the lack of reported human cases. While these diseases are rare, they can be fatal to those that contract them. Additionally, many of the diseases would not be reported because they may go untreated, misdiagnosed, or unreported. Most of these diseases can be transmitted to livestock and were discussed above.

Another potential problem with feral swine is vehicular accidents. With an increase in their population, these could increase dramatically, similar to deer-vehicle collisions in Kansas. These accidents could result in the injury or death of persons involved in the accidents. Automobile collisions with deer in 2005 resulted in 2 deaths and 328 injuries to people (KDOT 2006). 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. Feral swine were responsible for an average of 6 requests for assistance involving the protection of human health and safety from FY06 to FY08 (Table 1).

1.4 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

WS issued a Final Environmental Impact Statement on the national WS program, hereinafter referred to as USDA (1997). This EA is tiered to USDA (1997) and pertinent information from that document has been incorporated by reference into this EA.

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 an 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 exponentially 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 under *Cooperative Agreement* or *Agreements for Control*, or as otherwise covered by *WS Work Plans* (e.g., 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.

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 (*see USDA 1997, Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application*). 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 T&E species, are typically monitored over large geographic areas (i.e., the West, the State) and smaller geographic areas by the State Wildlife agency (i.e., KDW P game management units). WS monitors target and nontarget take for Kansas and by county. 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 Departments of Wildlife and Parks (KDWP), Kansas Department of Agriculture (KDA), the Kansas Animal Health Department (KAHD), 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 authorities for the APHIS-WS program are the Act of March 2, 1931 (46 Stat. 1468; 7 United States Code (USC) 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c). The Act of March 2, 1931, as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, provides that:

> *"The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001."*

The Act of December 22, 1987 provides in part:

> *"That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with States, local jurisdictions,*

individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammals and birds species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."

KWSP conducts FSDM in cooperation with and under the authorities of KAHD. FSDM is also conducted in cooperation with USFWS, KDWP, 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 and Parks. KDWP is responsible for managing wildlife species. However, feral swine are considered non-wildlife and, therefore, not regulated or managed by KDWP. KDWP would prefer to see feral swine eradicated from the State as they potentially could cause problems for native wildlife species (John Silovsky, KDWP, pers. comm. 2008). KDWP conducts work under the authority of the Kansas Wildlife and Parks Commission (KSA (Kansas Statutes Annotated) 32-701-1127). Wildlife species under KDWP authorities include game, nongame, and T&E species. Many of the species that KDWP manages would benefit from FSDM and KWSP could conduct FSDM for the protection of other wildlife at the direction of KDWP.

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)) 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.

1.7.1.4 Kansas Animal Health Department. KAHD 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, KAHD 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 KAHD.

1.7.1.5 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.

1.7.1.6 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.

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 (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)). WS obtained a Biological Opinion (BO) from USFWS in 1992 describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F). WS has at the programmatic level initiated a new consultation with USFWS to reevaluate the 1992 BO and to fully evaluate potential effects on T&E species listed or proposed for listing since the 1992 USFWS BO. KWSP will abide by that BO when it is completed. In the meantime, KWSP has considered all species that have been listed in Kansas after the 1992 BO and will have no effect on them from FSDM.

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 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. Environmental justice is a movement promoting 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, also known as environmental equity, has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental justice is a priority within APHIS and WS. 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. APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA. All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to insure environmental justice. 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.

1.7.3 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 hunting, cage traps, snares and shooting. There has not been a feral swine killed or reported since 2000. After eight 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. KWSP believes that with adequate funding and personnel, other populations in the state can be extirpated.

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. WS has programmatically consulted with the USFWS under Section 7 of the ESA concerning potential impacts of WDM methods on T&E species and has obtained a Biological Opinion (USDA 1997, Appendix F). KWSP abides by all the "*Reasonable and Prudent Alternatives and Methods and Terms*

and Conditions" established by USFWS in the 1992 Biological Opinion for those T&E species found in Kansas and the FSDM methods that may affect them. The USFWS guidelines ensure 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) and FSDM implemented by KWSP will have no effect on any of the species not covered in the Biological Opinion.

Table 2. Kansas Federally listed T&E species.

SPECIES	SCIENTIFIC NAME	Status	Locale in Kansas	Habitat	FSDM Method	FS Removal
MAMMALS						
Bat, gray	*Myotis grisescens*	E	Extreme SE	CF	0	0
Bat, Indiana*	*Myotis sodalis*	E	East	CF	0	0
BIRDS						
Crane, Whooping	*Grus americana*	E	Mainly Central	GW	0	0
Curlew, Eskimo*	*Numenius borealis*	E	Scattered	GW	0	0
Plover, Piping	*Charadrius melodus*	T	Mainly East	LW	0	+
Prairie-Chicken, Lesser	*Tympanuchus pallidicinctus*	C	Southwest	G	0	+
Tern, Interior Least	*Sterna antillarum*	E	Statewide	LW	0	+
Vireo, Black-capped*	*Vireo atricapillus*	E	South-central	FG	0	+
FISH						
Darter, Arkansas	*Etheostoma cragini*	C	South	LW	0	+
Madtom, Neosho	*Noturus placidus*	T	Southeast	W	0	+
Shiner, Arkansas River	*Notropis girardi*	T	South	LW	0	+
Shiner, Topeka	*Notropis topeka*	E	Scattered mainly E	W	0	+
Sturgeon, pallid	*Scaphirhynchus albus*	E	Northeast	L	0	0
INVERTEBRATES						
Spectaclecase*	*Cumberlandia monodonta*	C	East	L	0	0
Mucket, Neosho	*Lampsilis rafinesqueana*	C	Southeast	LW	0	+
Beetle, American burying	*Nicrophorus americanus*	E	Southeast	FG	0	+
PLANTS						
Milkweed, Mead's	*Asclepias meadii*	T	East	G	0	+
Orchid, Western prairie fringed	*Platanthera praeclara*	T	East	W	0	+
Clover, running buffalo*	*Trifolium stoloniferum*	E	Miami County	FG	0	+

Historic records only

STATUS
C *- Candidate*
E *– Endangered*
T *– Threatened*

HABITAT
C *- Caves*
F *- Forests/riparian borders*
G *- Grassland/range/meadows*
L *- Lakes, Rivers*
W *- Wetland/marsh/creek*

FSDM/FS Removal Impacts
(-) *- Negative*
0 *- none*
(+) *– Positive*

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. 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.

Another peripheral factor pertinent to assessing the risk of adverse effects to nontarget species 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, Great-tailed Grackles were illegally poisoned in Texas with dicrotophos (Mitchell et al. 1984) and a corporation in Kentucky was fined for illegally using

carbofuran to destroy unwanted predators including raptors at a private hunting club (Porter 2004). Similarly, on a Georgia quail plantation, predatory birds were being killed by eggs that had been injected with carbofuran (the Federal Wildlife Officer 2000); in Oklahoma, Federal agents charged 31 individuals with illegally trapping and killing hawks and owls to protect fighting chickens (USFWS 2003). All of these examples represent ill-advised or illegal uses of methods to protect resources that could have impacted nontarget species. The Texas Department of Agriculture (2008) has a website and brochure devoted solely to preventing pesticide misuse in controlling agricultural pests. Similarly, the Department for Environment, Food and Rural Affairs (2004) in Britain has a "Campaign against Illegally Poisoning of Animals." Therefore, KWSP 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, and in particular the use of firearms and aerial hunting by KWSP personnel, could pose a threat or cause injuries to people and pets. WS personnel routinely use firearms and aircraft to remove feral swine in damage situations. 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. The use of aircraft by KWSP, which under the alternatives proposed, include the use of helicopter or single engine fixed-wing aircraft for the purposes of aerial survey, capture, or aerial hunting. 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. Aerial hunting has been utilized to some degree in Kansas since 1998. KWSP has not had any aerial accidents involving crash or injury.

Due to concerns about aerial hunting and its potential impacts to the environment, the following information was obtained from Mr. Norm Wiemeyer, Chief, Denver Field Office of the National Transportation Safety Board (NTSB, the agency that investigates aviation accidents) regarding potential aviation-related environmental concerns:

> **Major Ground or Forest Fires:** Mr. Wiemeyer stated he had no recollection of any major fires caused by government aircraft since he has been in his position beginning in 1987. In addition, there are no reports of fires caused by WS aircraft in Idaho or any other state. The period of greatest fire danger typically occurs during the summer months, but WS ordinarily conducts few aerial hunting operations during the summer months.
>
> **Fuel Spills and Environmental Hazard from Aviation Accidents:** The 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 (N. Wiemeyer, NTSB, to G. Littauer pers. comm. 2000). Jet A fuel also does not pose a large environmental problem if spilled. This is because a straight chained hydrocarbon with little benzene present and microbes would quickly break-down any spill by aerobic action. The quantities potentially involved in aircraft used by WS are relatively small (52 gallon maximum in a fixed-wing aircraft and 91 gallon maximum in the helicopters used by WS) and less than many vehicles traveling state highways. In addition, 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.

Oil and Other Fluid Spills: For privately-owned aircraft, the aircraft owner or his/her insurance company is responsible for cleanup of spilled oils and other fluids if required by the owner or manager of the property on which the accident occurred. In the case of BLM, Forest Service and National Park Service lands, the land managing agency generally requires soil to be decontaminated or removed and properly disposed. With the size of aircraft used by WS, the quantities of oil (6-8 quarts maximum for reciprocating engines) capable of being spilled in any accident are small and insignificant with respect to the potential for environmental damage. Aircraft used by WS are single engine models, so the greatest potential amount of oil that could be spilled in one accident would be about 8 quarts.

Petroleum products biodegrade 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 in some situations to mitigate environmental hazards (EPA 2000). Thus, even where oil spills in small aircraft accidents are not cleaned up, the oil does not persist in the environment or persists in such small quantities that there is no problem. Also, WS' accidents generally would occur in remote areas away from human habitation and drinking water supplies. Thus, the risk to drinking water appears to be exceedingly low or nonexistent.

Based on a thorough Risk Assessment, APHIS concluded that, the use of aerial hunting is selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997).

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).

2.2.4 Humaneness and Animal Welfare Concerns of Methods Used by KWSP

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management 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 is 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 1987). 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 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would " . . . *probably be causes for pain in other animals . . .* " (American Veterinary Medical Association 1987). However, pain

experienced by individual animals probably ranges from little or no pain to significant pain (California Department of Fish and Game 1991).

Pain and suffering, as it relates to WS damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public would 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).

Therefore, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The challenge in coping with this issue is how to achieve the least amount of animal suffering within the constraints imposed by current technology and funding.

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.

WS 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 (USDA 1997). 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 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. USDA (1997) stated that:

> *"Cost effectiveness is not, nor should it be, the primary goal of the APHIS-WS program. Additional constraints, such as environmental protection, land management goals, and others, are considered whenever a request for assistance is received. These constraints increase the cost of the program while not necessarily increasing its effectiveness, yet they are a vital part of the APHIS-WS program."*

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:

1) **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 is the "No Action" alternative as defined by CEQ for analysis of ongoing programs or activities.

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

3) **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.

4) **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).

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 hunting, trapping, snaring, or euthanasia following live capture by trapping. Nonlethal methods used by KWSP may include 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 an Agreement for Control 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. Additionally, cage traps could be used, but feral swine would have to be relocated. Persons receiving technical assistance could still resort to lethal methods that were available to them. Aerial hunting 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, and cage traps would likely be implemented by private individuals.

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 hunting 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 IWDM Strategies That KWSP Employs.

Technical Assistance Recommendations. "Technical assistance" as used herein is 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 Agreements for Control 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 conscience 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.

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. Also, guarding dogs often harass and kill non-target 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. However, it is difficult to consistently enforce no-feeding regulations and to effectively educate all people concerning the potential liabilities of feeding wildlife.

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 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 non-target wildlife. Lastly, fencing is not practical or legal in some areas (e.g., restricting access to public land).

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 become 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, 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 (*Canis latrans*) 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 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 which are applied to areas or surfaces to discourage travel of wildlife by causing irritation such as to the feet. Most repellents are ineffective or are short-lived in reducing or eliminating damage caused by wildlife, therefore, are not used very often 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, especially following label instructions. Many of the active ingredients in repellents are listed on the EPA's 25b exempt list, and have reduced 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 mostly 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 will depend on a variety of factors.

Cage Traps come in a variety of styles for WDM to target different species. The most commonly known cage traps used in the current program are box traps. Box traps are usually rectangular, made from steel 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. Box traps are well suited for use in residential areas. Cage traps usually work best when baited with foods attractive to the target animal. They are used to capture animals ranging in size from mice to deer, but are usually impractical in capturing most large animals. However, large cage traps do work well for capturing feral swine, provided the traps can be transported by vehicle to the damage sites.

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.

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 or aerial hunting (shooting from an aircraft) is a commonly used FSDM method. Aerial hunting 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 hunting is more effective in winter when snow cover improves visibility and leaves have fallen. The WS program aircraft-use policy helps ensure that aerial hunting is conducted in a safe and environmentally sound manner, in accordance with Federal and State laws. Pilots and aircraft must be certified under established WS program procedures and only properly trained WS employees are approved as gunners.

Aircraft Overflights have created concerns of disturbing wildlife. A number of studies have looked at responses of various wildlife species to aircraft overflights. The National Park Service reviewed studies on the effects of aircraft overflights on wildlife. The report revealed that a number of studies have documented responses by certain wildlife species that suggest adverse impacts could occur. Few, if any studies, have proven that aircraft overflights cause significant 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 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 hunting operations occur in relatively remote areas with little time spent over any one area.

WS has actively used fixed-wing aircraft and helicopters for aerial hunting 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 cooperator agreement. WS Predator EAs from other states where aerial hunting is used frequently have looked at the issue of aerial hunting overflights on wildlife and have found that WS has annually flown less than 10 min./mi.^{2} on properties under agreement. Thus, wildlife would be disturbed minimally and chronic exposure situations would not

occur. As a result, no known problems to date have occurred with WS aerial hunting overflights on wildlife nor are they anticipated in the future.

Hunting Dogs are frequently used in WDM to locate or pursue feral swine. WS uses trailing or tracking dogs, and trap-line companion dogs. Training and maintaining suitable dogs requires considerable skill, effort, and expense. There must be sufficient WDM needs for dogs to make the effort of training worthwhile.

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 hunting 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 Department of Justice, Drug Enforcement Administration or Food and Drug Administration (FDA) guidelines. Most drugs fall under restricted-use categories and must be used under the appropriate license from the U.S. Department of Justice, Drug Enforcement Administration which KWSP does hold.

Chemosterilants and Contraception 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.

These methods 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 and would therefore be extremely labor intensive and expensive; (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); and (3) there are currently not any Federally or State approved chemosterilants available for operational use in feral swine damage management.

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, just their potential for reproducing would be eliminated. A disadvantage to contraception is that the animals would continue to cause damage, especially for overabundant wildlife populations 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.

The two most promising drugs for immunocontraception of large mammals are GonaCon™ Immunocontraceptive Vaccine and Porcine Zona Pellucida. However, the goal for feral swine in Kansas is eradication, so these drugs, even if registered, would be of limited use and more suited for overabundant native species such as white-tailed deer (*Odocoileus virginianus*).

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 with relocation could be used for feral swine.

Lethal Methods Used By KWSP

Shooting is the practice of selectively removing feral swine by shooting with a shotgun, or rifle. This involves actively hunting the feral swine from the ground, sometimes with the aid of dogs, or may involve hunting from rotary or fixed wing aircraft. Cage traps and snares followed by euthanasia are often utilized in reducing feral swine 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. The nonlethal methods that KWSP would be limited to resource management and physical exclusion techniques described above and, of the wildlife management techniques, frightening devices, repellents, and cage traps and chemical immobilizing drugs with relocation. Persons receiving technical assistance or direct control assistance from KWSP and were unsatisfied with KWSP's results, as well as state agency personnel, or others, 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 hunting 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 hunting 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 or any other federal agency would not provide direct operational or technical assistance and requesters of KWSP services 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 WS's National Wildlife Research Center 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 those methods described in Section 3.3.1.3 including trapping, shooting, and exclusion, but would not include aerial shooting.

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 require the establishment of 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, analysis of this alternative in the FEIS indicated that the concept has many drawbacks (USDA 1997):

- It would require a great deal of labor to investigate and validate all damage claims and to determine and administer appropriate compensation for such claims. This would result 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.

- It is difficult to make timely responses to all requests to assess and confirm damage, and certain types of damage could 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 1.5 million animals. 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. We contacted the extension office in that county to discuss the success of the program. 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 and the County is now seeking state funding to develop a control program with WS.

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. Many WS SOPs are discussed in depth in USDA (1997, Chapt. 5). 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 KDWP) are included in the lists below.

Some key mitigating measures pertinent to the proposed action and alternatives that are incorporated into WS SOPs include the following.

3.5.1 General SOPs Used by WS in FSDM

- KWSP FSDM activities in Kansas are consistent with USDA (1997) SOPs.
- KWSP complies with all applicable laws and regulations that pertain to conducting FSDM on private and public lands.
- KWSP coordinates with 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 hunting 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., KAHD, KDWP) as appropriate.
- Before operational FSDM is conducted, *Agreements for Control* or *KWSP Work Plans* 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 on nontarget species.
- 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.
- Reasonable and prudent alternatives and measures are established through consultation with USFWS and implemented to avoid adverse impacts to T&E species.

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

- A formal risk assessment (USDA 1997, Appendix P and Q) concluded that hazards to the public from FSDM devices and activities are low.

- 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 traps or other FSDM methods with a potential risk to people and their pets are placed at major access points when they are set in the field.

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

- Training and certification is required of crewmembers for aerial hunting 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.

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 trapped animals which is in concert with the American Veterinary Medical Association's (1987) definition of euthanasia (Beaver et al. 2001). 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.

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 KAHD. KAHD and other State agencies such as KDWP 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 feasible in most cases. Kansas is unique in that the current population is still relatively small and, thus, its goals will be different

then 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 for assistance in control and or eradication of that population in FY95. From FY95 to FY00, KWSP removed 385 feral swine using an integrated approach of aerial hunting, cage traps, snares and shooting. KWSP has continued to monitor the area for signs of any existing animals but there has been no sign or verified reports since FY00 and that population is believed to be 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 hunting 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 KAHD, conducted disease surveillance, removing 108 feral swine from 4 counties. In FY07, KAHD funded increased levels of FSDM and disease monitoring which resulted in the removal of 263 feral swine from 8 counties. In FY08, funding for FSDM and disease surveillance increased slightly which resulted in the removal of 614 feral swine from 10 counties. It is likely that take will continue to increase as the feral swine population spreads. However, if KWSP can eliminate feral swine from areas, it is expected that take will decrease.

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, dependant 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 KAHD 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 hunting would not be used and, thus, the efficiency of feral swine removal would be reduced. As a result, more effort by non-federal entities with lethal FSDM methods would likely be needed to take the same number of feral swine. 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. Thus, the impact to the feral swine population would be about the same as Alternative 2, and not likely to achieve the states objective of elimination feral swine in Kansas.

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 in Kansas, State and private efforts would likely increase as an attempt to alleviate damage caused by feral swine. This would result in similar levels of feral swine being lethally taken as under Alternatives 2 and 3. However, KWSP would not offer any advice on FSDM methods and, therefore, FSDM could be conducted with little or no technical help. Thus, efforts to meet the objectives of eradication or suppression would be reduced 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 entangled in fences meant only to keep feral swine out of an area and not an intended use of the method) 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 bird 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 under the 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 FY06 to FY08, KWSP lethally took 3 white-tailed deer, 3 coyotes, and 1 cottontail (*Sylvilagus spp.*) as nontargets and 5 deer that were released. Methods such as traps designed for feral swine often allow non-targets to be released unharmed. From FY95 to FY05, the only other nontarget species taken during FSDM were raccoons (*Procyon lotor*). 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 985 feral swine were removed from FY06 to FY08, less than 1% of the lethal take was nontarget species, which is a minimal impact to nontarget species.

KWSP FSDM methods will have no effect on any of the federally listed T&E, and candidate species (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 13 listed species (Table 2), if feral swine were found in the habitat of these species.

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.

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 the International Association of Fish and Wildlife Agencies (2004) discuss the need for wildlife damage management 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. 2.3 per year). 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 hunting, 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 dependant 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 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, but probably less than under Alternative 2, frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants 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 illegal use of chemical toxicants 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, aerial hunting, snares, pyrotechnics for hazing, cage traps, and chemical repellents, drugs, and reproductive inhibitors. WS poses minimal threat to people, pets and the environment with FSDM methods such as shooting, hazing with pyrotechnics, trapping, and use of chemicals (USDA 1997-Appendix P&Q). 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. 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 Specialists, who use firearms as a condition of employment, are required to certify that they meet the criteria as stated in the Lautenberg Amendment. KWSP also follows safety precautions and WS Policies when using pyrotechnics. KWSP uses cage traps and snares. These are strategically placed to minimize exposure to the public and pets. Appropriate signs are posted on all properties where these traps are set to alert the public of their presence. WS has had no accidents involving the use of firearms, pyrotechnics, cage traps, or snares in which a member of the public or a pet was harmed. A formal risk assessment of WS' operational management methods found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no significant impact on human safety from WS' use of non-chemical BDM methods 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. USDA (1997) conducted a risk assessment on WS's use of FSDM methods and concluded that they had minimal hazards to the public, pets, and the environment. Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target

individuals or populations, and such use has negligible impacts on the environment (USDA 1997). KWSP did not use any chemicals in FSDM from FY06 to FY08, and therefore, would not have any incidents involving the public or pets.

Thus, WS poses minimal risks to public and pet health and safety when implementing FSDM. In fact, KWSP can reduce public 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 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 any lethal methods use by KWSP. 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 chemicals. The nonlethal chemicals that could be used by KWSP in FSDM were discussed above and not expected to impact the public, pets, or the environment. 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.

Under this alternative, risks to human safety from KWSP's use of firearms on the ground or from aircraft would be minimal. However, increased use of firearms and other methods by less experienced and trained private individuals would probably occur without KWSP assistance with the use of these methods. 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 safety would probably increase under this alternative because people that had received assistance from KWSP in the past may resort to the unwise or illegal use of methods. Additionally, as discussed in Section 2.2.2, the illegal use of toxicants could lead to hazards to people, pets, and the environment.

On the other hand, human and pet health and safety risks associated with feral swine would likely increase under this alternative. Disease (Hutton et al. 2006) and other risks that could impact people and pets could be higher or about the same depending on the level of effort expended by State agencies and the public on reducing feral swine populations. Therefore, it is believed that risks associated with FSDM methods would likely increase under this alternative.

4.1.3.3 Alternative 3 -Technical Assistance Only. Under this alternative, risks to human and pet health and safety and the environment from KWSP using firearms or aircraft would not occur. 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 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's use of firearms or aircraft would be 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 these methods have occurred that have resulted in a member of the public being harmed. The elimination a federal program would increase use of firearms and other FSDM methods by less experienced and trained private individuals under this alternative, which would likely increase human safety risks. Without proper training and instruction on the use of these methods, it is likely that some would be used improperly, and, therefore, have higher risks for the public, pets, and the environment, even higher than under Alternatives 2 and 3. Additionally, the 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. 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 traps and shooting by 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 illegal use of chemical toxicants 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 private individuals. Use of traps and shooting by private individuals would probably increase. This could result in less experienced persons implementing use of 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 illegal use of chemical toxicants which might result in increased animal suffering. Thus KWSP believes that the same or more animal suffering would occur under this alternative as under Alternative 1.

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 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 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 illegal use of chemical toxicants 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

The environmental effects of implementing FSDM correspond with those raised and discussed in detail in Chapter 4 of USDA (1997). 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, as described in USDA (1997), 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 Endangered Species Act, Migratory Bird Treaty 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	0	0	0	0	0	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	-	0	-
	Beneficial	+	0	+	0	+	0	0	0
Humaneness		-	0	0	-	0	-	0	-

"0" = None or Minimal; "-" = Negative; "+" = Positive

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