ENVIRONMENTAL ASSESSMENT
(FINAL)

REDUCING COYOTE DAMAGE TO LIVESTOCK AND OTHER RESOURCES IN LOUISIANA

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

March 2016

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ACRONYMS

AMDUCA	Animal Medicinal Drug Use Clarification Act
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FLIR	Forward Looking Infrared
FR	Federal Register
FY	Fiscal Year
IV	Intravenous
IC	Intracardiac
LDWF	Louisiana Department of Wildlife and Fisheries
MOU	Memorandum of Understanding
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWRC	National Wildlife Research Center
PL	Public Law
RS	Revised Statute
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Services
WS	Wildlife Service

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 PURPOSE

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS)[1] program in Louisiana continues to receive requests for assistance to reduce threats to human safety and to resolve or prevent damage occurring to agricultural resources, natural resources, and property associated with coyotes (*Canis latrans*). Individual damage management projects conducted by the WS program could be categorically excluded from further analysis under the National Environmental Policy Act (NEPA), in accordance with APHIS implementing regulations for the NEPA (7 CFR 372.5(c), 60 FR 6000-6003).

The purpose of this Environmental Assessment (EA) is to evaluate cumulatively the individual projects that WS could conduct to manage damage and threats to agricultural resources, property, natural resources, and threats to people caused by coyotes. This EA will assist in determining if the proposed cumulative management of coyote damage could have a significant impact on the environment based on previous activities conducted by WS and based on the anticipation of conducting additional efforts to manage damage caused by coyotes. Because the goal of WS would be to conduct a coordinated program to alleviate coyote damage in accordance with plans, goals, and objectives developed to reduce damage, and because the program's goals and directives[2] would be to provide assistance when requested, within the constraints of available funding and workforce, it is conceivable that additional damage management efforts could occur. Thus, this EA anticipates those additional efforts and the analyses would apply to actions that may occur in any locale and at any time within Louisiana as part of a coordinated program. This EA analyzes the potential effects of coyote damage management when requested, as coordinated between WS and the Louisiana Department of Wildlife and Fisheries (LDWF).

WS is preparing this EA to: 1) facilitate planning, 2) promote interagency coordination, 3) streamline program management, 4) clearly communicate to the public the analysis of individual and cumulative impacts of proposed activities, and 5) evaluate and determine if there would be any potentially significant or cumulative effects from the alternative approaches developed to meet the need for action. The analyses contained in this EA are based on information derived from WS' Management Information System, published documents (see Appendix A), interagency consultations, and public involvement.

This EA evaluates the need for action to manage damage associated with coyotes in the State, the potential issues associated with managing damage, and the environmental consequences of conducting different alternatives to meet the need for action while addressing the identified issues. WS initially developed the issues and alternatives associated with managing damage caused by coyotes in consultation with the LDWF. The LDWF has regulatory authority to manage populations of coyotes in the State. To assist with identifying additional issues and alternatives to managing damage associated with coyotes in Louisiana, WS will make this EA available to the public for review and comment prior to the issuance of a Decision[3].

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[1]The WS program is authorized to protect agriculture and other resources from damage caused by wildlife through the Act of March 2, 1931 (46 Stat. 1468; 7 USC 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c).

[2]At the time of preparation, WS' Directives occurred at the following web address: http://www.aphis.usda.gov/wildlife_damage/ws_directives.shtml.

[3]After the development of the EA by WS and after public involvement with identifying new issues and alternatives, WS will issue a Decision. Based on the analyses in the EA after public involvement, WS will make a decision to publish a Notice of Intent to prepare an Environmental Impact Statement or WS will issue a Finding of No Significant Impact notice to the public in accordance to the NEPA and the Council of Environmental Quality regulations.

WS previously developed an EA that addressed WS' activities to manage damage associated with coyotes in the State. The previous EA identified the issues associated with managing damage associated with coyotes and analyzed alternative approaches to meet the specific need identified in the EA while addressing the identified issues. Since this EA will re-evaluate those activities conducted under the previous EA to address new information, the analyses and the outcome of the Decision issued based on the analyses in this EA will supersede the previous EA that addressed the need to manage coyote damage.

1.2 NEED FOR ACTION

Some species of wildlife, including coyotes, have adapted to and have thrived in human altered habitats. Those species, in particular, are often responsible for the majority of conflicts between people and wildlife. Those conflicts often lead people to request assistance with reducing damage to resources and to reduce threats to human safety.

Wildlife can have either positive or negative values depending on the perspectives and circumstances of individual people. In general, people regard wildlife as providing economic, recreational, and aesthetic benefits. Knowing that wildlife exists in the natural environment provides a positive benefit to some people. However, activities associated with wildlife may result in economic losses to agricultural resources, natural resources, property, and threaten human safety. Therefore, an awareness of the varying perspectives and values are required to balance the needs of people and the needs of wildlife. When addressing damage or threats of damage caused by wildlife, wildlife damage management professionals must consider not only the needs of those people directly affected by wildlife damage but a range of environmental, sociocultural, and economic considerations as well.

Resolving wildlife damage problems requires consideration of both sociological and biological carrying capacities. The wildlife acceptance capacity, or sociological carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations. Biological carrying capacity is the land or habitat's ability to support healthy populations of wildlife without degradation to the species' health or their environment during an extended period of time (Decker and Purdy 1988). Those phenomena are especially important because they define the sensitivity of a person or community to a wildlife species. For any given damage situation, there are varying thresholds of tolerance exhibited by those people directly and indirectly affected by the species and any associated damage. This damage threshold determines the wildlife acceptance capacity. While the biological carrying capacity of the habitat may support higher populations of wildlife, in many cases the wildlife acceptance capacity is lower. Once the wildlife acceptance capacity is met or exceeded, people begin to implement population or damage management to alleviate damage or address threats to human health and safety.

Wildlife damage management is the alleviation of damage or other problems caused by or related to the behavior of wildlife and can be an integral component of wildlife management (Berryman 1991, The Wildlife Society 2015). The threat of damage or loss of resources is often sufficient for people to initiate individual actions and the need for damage management can occur from specific threats to resources. Those animals have no intent to do harm. They utilize habitats (*e.g.*, feed, shelter) where they can find a niche. If their activities result in lost economic value of resources or threaten human safety, people often characterize this as damage. When damage exceeds or threatens to exceed an economic threshold and/or pose a threat to human safety, people often seek assistance with resolving damage or reducing threats to human safety. The threshold triggering a request for assistance is often unique to the individual person requesting assistance and many factors can influence when people request assistance (*e.g.*, economic, social, aesthetics). Therefore, what constitutes damage is often unique to the individual person. What one individual person considers damage, another person may not consider as damage. However, the use of the term "*damage*" is consistently used to describe situations where the individual person has

determined the losses associated with wildlife is actual damage requiring assistance (*i.e.*, has reached an individual threshold). Many people define the term "*damage*" as economic losses to resources or threats to human safety; however, "*damage*" could also occur from a loss in the aesthetic value of property and other situations where the behavior of wildlife was no longer tolerable to an individual person.

At about the same time that the red wolf (*Canis rufus*) was extirpated from Louisiana, coyotes began to expand their range into the State (Paradiso and Nowak 1972, Riley and McBride 1972, Lowery 1974). Lowery (1974) reported coyotes first appeared in Louisiana sometime after 1942, and the first coyote was captured in Vernon Parish in 1949 (Goertz et al. 1975). Habitat changes are likely the biggest influence on the coyote's eastward range extension.

Linscombe et al. (1983) conducted surveys in Louisiana from 1978 through 1982 to determine relative abundance indices for several furbearer species, including coyotes. Linscombe et al. (1983) suggested that coyotes were spreading across the State from the northwest to the southeast and that the coyote population was increasing rapidly throughout the State. Today, coyotes occur in all Louisiana parishes and have a high relative abundance in most parishes (Lowery 1974, Hall 1979, Linscombe et al. 1983).

The need for action to manage damage and threats associated with coyotes in Louisiana arises from requests for assistance[4] received by WS. Coyotes can cause damage to or pose threats to a variety of resources. WS receives requests to reduce or prevent damage from occurring to four major categories: agricultural resources, natural resources, property, and threats to human safety.

WS has provided technical assistance to those persons requesting assistance with resolving damage or the threat of damage. Technical assistance provides information and recommendations on activities to alleviate coyote damage that the requester could conduct without WS' direct involvement in managing or preventing the damage. This EA discusses technical assistance activities further in Chapter 3. WS has conducted 452 technical assistance projects in Louisiana that addressed damage and threats associated with coyotes from federal fiscal year (FY) 2010 through FY 2015[5] involving 961 participants. Technical assistance projects conducted by WS do not include direct operational assistance projects conducted by WS where an entity requested WS' assistance through the direct application of methods.

As shown in Table 1.1, WS' personnel have responded to 446 incidents involving coyotes in the State from FY 2010 through FY 2015 to date and recorded $116,635 in losses to resource associated with coyotes. From FY 2010 through FY 2015 to date, the WS program has recorded 124 incidents involving cattle and calves with $78,379 in losses occurring from coyotes. In addition, there were 123 incidents involving coyotes and domestic pets from FY 2010 through FY 2015 to date, resulting in $14,805 in damages. There were also incidents involving sheep, lambs, horses, domestic fowl, and goats from FY 2010 through FY 2015 to date. Coyotes were associated with $4,044 in damage to sheep and lambs, $15,500 in damages to horses, $1,507 in damages to domestic fowl, and $2,400 in damages to goats. WS also recorded 116 incidences involving threats to human safety associated with coyotes from FY 2010 through FY 2015 to date. Table 1.1 only reflects coyote damage associated with requests for assistance received by WS and is not representative of all damage that occurs in the State during a given year. Therefore, the need for action is associated with people seeking WS' assistance to alleviate or prevent economic losses caused by coyotes and resolving the threats that coyotes can pose to human safety.

[4]WS would only conduct damage management activities after receiving a request for assistance. Before initiating damage management activities, WS and the cooperating entity would sign a Memorandum of Understanding, work initiation document, or other comparable document that would list all the methods the property owner or manager would allow WS to use on property they owned and/or managed.

[5]Information for FY 2015 is preliminary and subject to change

Table 1.1 – Reported number of coyote incidents and monetary losses to resources in the State, FY 2010 - FY 2015

	Year													
	2010		2011		2012		2013		2014		2015†		TOTALS	
Resource	#	$	#	$	#	$	#	$	#	$	#	$	#	$
Cattle/Calves	16	$20,000	27	$13,400	23	$3,171	22	$13,007	23	$14,137	13	$14,664	**124**	**$78,379**
Sheep/Lambs	2	$990	9	$1,000	8	$650	3	-	5	$590	3	$814	**30**	**$4,044**
Horses	3	-	2	$500	3	$15,000	1	-	2	-	5	-	**16**	**$15,500**
Domestic Fowl[1]	4	$125	8	$145	5	$252	1	-	5	$650	9	$335	**32**	**$1,507**
Domestic Pets	35	$2,670	29	$3,075	21	$1,600	19	$810	10	$3,850	9	$2,800	**123**	**$14,805**
Goats	-	-	3	$600	2	$1,800	-	-	-	-	1	-	**6**	**$2,400**
Human Safety[2]	40	-	31	-	17	-	14	-	12	-	2	-	**116**	**-**

†Data for FY 2015 is preliminary; therefore, the data is subject to change

[1]Domestic fowl includes ducks, turkeys, geese, chickens, and guinea fowl

[2]WS' personnel only documented the number of incidents

The following subsections of the EA provide specific information regarding coyote damage to those main categories.

Need for Coyote Damage Management to Alleviate Damage to Agricultural Resources

Most requests for assistance associated with coyotes that WS receives involve damage to agriculture resources, primarily predation on livestock. Coyotes can be responsible for the depredation of a wide variety of livestock, including cattle, sheep, goats, swine, exotic pen-raised game, other hoofed-stock, and poultry. Depredation is the killing, injury, or harassment of livestock, which can result in the monetary loss to the owner. Cattle and calves are vulnerable to predation, especially during the calving season. Sheep, goats, and poultry are highly susceptible to predation throughout the year (Henne 1975, Nass 1977, Tigner and Larson 1977, Nass 1980, O'Gara et al. 1983). Livestock losses can cause economic hardships to their owners, and without effective damage management to reduce predation risks, those economic hardships can escalate (Nass 1977, Howard and Shaw 1978, Nass 1980, Howard and Booth 1981, O'Gara et al. 1983).

In January of 2013, the National Agricultural Statistics Service (NASS) estimated the livestock inventory in Louisiana to be 780,000 cattle, 24,400 goats, and 7,000 swine (NASS 2014). People in Louisiana also raise poultry, sheep, horses, and other livestock (NASS 2014). In 2007, the total estimated market value of livestock and poultry products sold in the State exceeded $1 billion (NASS 2014).

In 2010, the NASS (2011) reported cattle and calf losses from animal predation totaled 219,900 head in the United States according to livestock producers. Animal predation represented 5.5% of the total cattle and calf losses reported by livestock producers in 2010 totaling $98.5 million in economic losses. Agricultural producers identified coyotes as the primary predator of livestock with 53.1% of cattle and calf losses attributed to coyotes. Producers spent nearly $188.5 million dollars on non-lethal methods to reduce cattle and calf losses from predation by animals in 2010 (NASS 2011). The primary non-lethal method employed by livestock producers was the use of guard animals with a reported 36.9% of producers that use at least one non-lethal methods using guard animals. Producers also reported using exclusion fencing, frequent checking, and culling as additional employed methods for reducing predation (NASS 2011).

Hall (1979) reported the results of an intensive food habit study of coyotes in Louisiana and found that cattle/calf remains represented the seventh most widely occurring food item in coyote stomachs. Michaelson and Goertz (1977) found the remains of cattle and calves in 13% of the coyote stomachs

analyzed for a food habit study of coyotes in northwest Louisiana. In Louisiana, the NASS (2011) reported that animal predators killed 1,800 cattle and 4,600 calves during 2010. During 2010, animal predators caused an estimated $3 million in economic losses to cattle and calves in Louisiana (NASS 2011). Coyotes were attributed to 68.8% of the cattle losses and 81.7% of the calves lost in Louisiana during 2010 (NASS 2011), which compares to coyotes being attributed to no cattle lost and 64.9% of the calves lost in 2005 (NASS 2006). Cattle producers in Louisiana reported using a number of non-lethal methods to reduce losses due to predators. The use of exclusion fencing was reported as being employed by 38.5% of cattle producers in Louisiana that used at least one non-lethal method along with 31.0% reporting the use of guard animals in 2010 (NASS 2011). In addition, 7.9% of cattle producers that used at least one non-lethal method reported herding as a non-lethal method to prevent predation in Louisiana during 2010 and 2.0% reported using frightening tactics (NASS 2011).

Coyotes accounted for 93% of all lambs and ewes killed by predators on nine sheep bands in shed lambing operations in southern Idaho and coyotes did not feed upon 25% of those lambs and ewes killed (Nass 1977). Coyotes were the predominant predator on sheep during a study in New Mexico and no signs of feeding occurred on more than 43% of the lambs killed by coyotes (DeLorenzo and Howard 1977). Coyotes were also the primary predator on sheep throughout a Wyoming study and essentially the only predator during the winter (Tigner and Larson 1977). Connolly (1992) determined that WS receives reports of or confirms only a fraction of the total predation attributable to coyotes.

In 1994, sheep producers in Louisiana reported losing 225 sheep and 700 lambs to predators (NASS 1995). Predation by coyotes accounted for 175, or 78% of sheep, and 700 or 100% of the lambs killed by predators. Sheep and lamb losses from predators in 1994 were valued at $27,300 and $19,125, respectively (NASS 1995). In 2004, sheep producers reported that coyotes killed 135,600 sheep in the United States with the value of those sheep killed estimated at $10.7 million (NASS 2005). Of all the sheep killed by predators in United States during 2004, coyotes accounted for 60.5% of the sheep losses reported by livestock producers (NASS 2005). Sheep and lambs remain vulnerable to predation throughout the year, particularly from coyotes and dogs (Henne 1975, Nass 1977, Tigner and Larson 1977, Nass 1980, O'Gara et al. 1983). Without actions to manage predation losses, studies reveal that losses of adult sheep and lambs to predators can be as high as 8.4% and 29.3%, respectively (Henne 1975, Munoz 1977, O'Gara et al. 1983). Conversely, other studies indicate that sheep and lamb losses are much lower where wildlife damage management is applied (Nass 1977, Tigner and Larson 1977, Howard and Shaw 1978, Howard and Booth 1981).

Need for Coyote Damage Management to Protect Human Health and Safety

Zoonoses (*i.e.*, diseases that are transmissible from animals to people) are often a major concern of people when requesting assistance with managing threats from coyotes. Disease transmission could occur from direct interactions between people and coyotes or from interactions with pets and livestock that have direct contact with coyotes. Pets and livestock may encounter and interact with coyotes, which can increase the opportunity of transmission of disease to people.

People that request assistance with coyotes frequently are concerned about potential disease risks but are unaware of the types of diseases that animals can transmit. In those types of situations, people request assistance because of a perceived risk to human health or safety associated with wild animals that live in close association with people, from animals acting out of character by roving in human-inhabited areas during daylight, or from animals showing no fear when people are present. Although coyotes active during the day are not necessarily acting abnormally, especially in suburban environments, WS could receive requests for assistance associated with resolving those types of risks to human safety.

In many circumstances when human health concerns are the primary reason for requesting WS' assistance there may have been no actual cases of transmission of disease to people by coyotes. Thus, the risk of disease transmission would be the primary reason for requesting assistance from WS.

The most common disease concern expressed by individuals requesting assistance is the threat of rabies transmission to people, pets, and livestock. Rabies is an acute fatal viral disease of mammals, most often transmitted through the bite of a rabid animal that poses an indirect and direct threat to people. Indirect threats to people occur from exposure to pets or livestock that a rabid animal has infected. Direct threats can occur from handling infected animals or from aggressive animal behavior caused by rabies. The disease is preventable when people identify and treat exposure early. In addition, people can vaccinate domestic animals and pets for rabies.

Public awareness of zoonoses risks has increased in recent years. However, direct transmission of diseases from wildlife to people occurs infrequently. The infrequency of such transmission does not diminish the concerns of those people fearful of exposure that request assistance since disease transmission could occur. WS attempts to educate the public about the risks associated with disease transmission from wildlife to people through technical assistance and by providing technical leaflets on the risks of exposure. This EA addresses several zoonotic diseases associated with coyotes. Those zoonotic diseases remain a concern and continue to pose threats to human safety where people encounter coyotes. WS has received requests to assist with reducing damage and threats associated with coyotes in Louisiana and could conduct or assist with disease monitoring or surveillance activities. Most disease sampling would occur ancillary to other damage management activities (*i.e.*, disease sampling would occur after WS' personnel or other entities captured or lethally removed coyotes for other purposes).

In addition to disease transmission threats, WS also receives requests for assistance from perceived threats of physical harm from wildlife, especially from predatory wildlife. Human encroachment into wildlife habitat increases the likelihood of human-wildlife interactions. Those species that people are likely to encounter are those most likely to adapt to and thrive in human altered habitat. Several predatory wildlife species, including coyotes, thrive in urban habitat due to the availability of food, water, and shelter. Many people enjoy wildlife to the point of purchasing food specifically for feeding wildlife despite laws prohibiting the act in many areas. The constant presence of human created refuse, readily available water supplies, and abundant rodent populations found in some areas often increase the survival rates and carrying capacity of wildlife species that are adaptable to those habitats. Often the only limiting factor of wildlife species in and around areas inhabited by people is the prevalence of disease. Overabundant wildlife that congregate into small areas because of the unlimited amount of food, water, and shelter can confound the prevalence of diseases.

As people are increasingly living with wildlife, the lack of harassing and threatening behavior by people toward many species of wildlife has led to a decline in the fear wildlife have toward people. When wildlife species begin to habituate to the presence of people and human activity, a loss of apprehension occurs that can lead to threatening behavior toward people. This threatening behavior continues to increase as human populations expand and the populations of those species that adapt to human activity increase. Threatening behavior can be in the form of aggressive posturing, a general lack of apprehension toward people, or abnormal behavior. Although wildlife attacking people occurs rarely, the number of attacks appears to be on the increase. Coyotes can threaten and attack people in urbanized situations (Loven 1995, Baker and Timm 1998). Timm et al. (2004) reported that coyotes attacking people have increased in California and the recent, highly publicized coyote attacks, including a fatal attack on a 19-year old woman in Nova Scotia (Canadian Broadcast Company 2009), have only heightened people's awareness of the threat of such encounters.

Although attacks on people associated with coyotes occurs rarely, requests for assistance to lessen the threat of possible attacks could occur from people in Louisiana. Often, wildlife exhibiting threatening behavior or a loss of apprehension to the presence of people is a direct result and indication of an animal inflicted with a disease. Requests for assistance, therefore, could occur from a desire to reduce the threat of disease transmission and/or from fear of aggressive behavior from an animal that is less apprehensive of people or induced as a symptom of disease.

Need for Coyote Damage Management to Resolve Damage Occurring to Natural Resources

Natural resources can be those assets belonging to the public that government agencies, as representatives of the people, often manage and hold in trust. Such resources may be plants or animals, including threatened and endangered (T&E) species, historic properties, or habitats in general. Examples of natural resources in Louisiana could include parks and recreational areas, natural areas, including unique habitats or topographic features, threatened or endangered plants and animals, and any plant or animal populations that the public has identified as a natural resource.

Predation is one of many mortality factors that influence wildlife populations. Predators often play critical roles in the composition and function of wildlife populations in ecosystems (Witmer et al. 1996). Normally, predation by native predators would be part of the function of a healthy ecosystem. Many changes have occurred that have disrupted natural predator-prey relationships. Many of the changes that have occurred can be attributed to human influence, including habitat fragmentation, landscape alteration, and environmental contamination. In addition, human habitation alone can often alter the biological carrying capacity of a local environment. Those human-induced changes can negatively affect the viability of some native wildlife populations.

Predation can compound declines in bird populations when those declines are associated with habitat loss and fragmentation (Cote and Sutherland 1997). The effects of predation on birds can be detrimental to local populations; especially, when predator densities are high or when predators gain access to areas not historically occupied (Stoudt 1982, Bailey 1993). In general, ground-nesting birds suffer the highest predation rates (DeVos and Smith 1995). For example, Massey (1971) and Massey and Atwood (1981) found that predators can prevent federally endangered least terns (*Sterna antillarum*) from nesting or cause them to abandon previously occupied sites. In another study, predators adversely affected the nesting success of least terns on sandbars and sandpits (Kirsch 1996).

Guthery and Beasom (1977) demonstrated that after coyote damage management, deer fawn production was more than 70% greater after the first year and 43% greater after the second year in their southern Texas study area. Another Texas study (Beasom 1974*a*, Beasom 1974*b*) found that predators were responsible for 74% and 61% of the fawn mortality for two consecutive years. Stout (1982) increased deer production on three areas in Oklahoma by 262%, 92%, and 167% the first summer following coyote damage management, an average increase of 154% for the three areas. Garner (1976), Garner et al. (1976), and Bartush and Lewis (1981) found annual losses of deer fawns in Oklahoma to be about 88% with coyotes responsible for 88% to 97% of the mortality. Knowlton and Stoddart (1992) reviewed deer productivity data from the Welder Wildlife Refuge in Texas following coyote reduction. Deer densities tripled compared with those outside the enclosure, but without harvest management, ultimately returned to original densities due primarily to malnutrition and parasitism.

The above cases show that coyote predation can influence white-tailed deer (*Odocoileus virginianus*), mule deer, pronghorn antelope, and bighorn sheep populations. Ballard et al. (2001) reviewed published predator-deer relationship studies, including many of those above, since the mid-1970s and found that predators (coyote, mountain lion, and wolf) could cause high mortality, but managing predation may or may not result in higher populations and increased harvest levels for hunters. Ballard et al. (2001) found

that managing predation benefitted big game mostly when herds were well below forage carrying capacity, when predation was identified to be a limiting factor, when efforts sufficiently reduced the predator population, when efforts were timed correctly (prior to fawning and denning), and when management focused on a small scale (<259 mi^2). Conversely, managing predation was not effective when management activities did not meet those conditions. In addition, Ballard et al. (2001) suggested researcher should improve their experimental design when conducting research on predator management to benefit deer because it was unclear in several studies if predator management effectively protected the deer herd. The most convincing evidence of deer population increases as a result of predator management were from studies conducted in small enclosures (< 15 mi^2) because predator populations were much easier to regulate in smaller areas.

Need for Coyote Damage Management to Alleviate Property Damage

Airports provide ideal conditions for many wildlife species due to the large open grassy areas around runways and taxiways adjacent to brushy, forested habitat used as noise barriers. Access to most airport properties is restricted, so coyotes living within airport boundaries are not harvestable during hunting and trapping seasons; therefore, those restrictions insulate coyotes from many other human disturbances.

The civil and military aviation communities have acknowledged that the threat to human health and safety from aircraft collisions with wildlife is increasing (MacKinnon et al. 2001, Dolbeer et al. 2013). Collisions between aircraft and wildlife are a concern throughout the world because wildlife strikes threaten passenger safety (Thorpe 1996), result in lost revenue, and repairs to aircraft can be costly (Linnell et al. 1996, Robinson 1996, Thorpe 1997, Keirn et al. 2010). Aircraft collisions with wildlife can also erode public confidence in the air transport industry as a whole (Conover et al. 1995).

Between 1990 and 2012, there were 406 reported aircraft strikes involving coyotes in the United States (Dolbeer et al. 2013). Of those reported strikes involving coyotes, 86 strikes had a negative effect on the flight of the aircraft with 37 strikes causing damage to the aircraft. Reported aircraft strikes involving coyotes in the United States between 1990 and 2012 have resulted in 12,249 hours of aircraft down time and nearly $3.6 million in damages to aircraft (Dolbeer et al. 2013). Between 1998 and 2015, there have been 10 aircraft strikes involving coyotes at airports in Louisiana (FAA 2014). The number of strikes actually occurring is likely to be much greater, since Dolbeer (2009) estimated that entities only reported 39% of actual civil wildlife strikes.

In addition to direct damage, an aircraft striking a coyote can pose serious threats to human safety if the damage from the strike causes a catastrophic failure of the aircraft leading to a crash. For example, damage to the landing gear during the landing roll and/or takeoff run can cause a loss of control of the aircraft causing additional damage to the aircraft, which can increase the threat to human safety. Nearly 63% of the reported mammal strikes from 1990 through 2012 occurred at night, with 64% occurring during the landing roll or the takeoff run (Dolbeer et al. 2013).

Airports in Louisiana have requested assistance with managing threats to human safety and damage to property caused by coyotes present inside the area of operations of an airport. The infrequency of coyote strikes does not lessen the need to prevent threats to human safety and the prevention of damage to property. Preventing damage and reducing threats to human safety would be the goal of cooperators requesting assistance at airports in Louisiana given that a potential strike could lead to the loss of human life and considerable damage to property.

Coyote populations near or found confined within perimeter fences at airports can be a threat to human safety and cause damage to property when struck by aircraft. Coyotes confined inside an airport perimeter fence would not be considered distinct populations nor separate from those populations found

outside the perimeter fence. Coyotes found within the boundaries of perimeter fences originate from populations outside the fence. Those individuals inside the fence neither exhibit nor have unique characteristics from those individuals that occur outside the fence; therefore, those individuals confined inside an airport perimeter fence do not warrant consideration as a unique population under this analysis.

Coyotes can kill or injure pets, especially in urban and suburban areas. Coyotes in suburban and urban areas often have adapted to human altered habitats and have acclimated to the presence of people. Coyotes can be territorial and aggressive, especially during the breeding season and especially toward other canids, such as dogs. When coyotes adapt to and acclimate to the presence of people, they can act aggressive and attack pet dogs, even when people walk those dogs on a leash.

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

Actions Analyzed

This EA documents the need for managing damage caused by coyotes, the issues associated with meeting that need, and alternative approaches to address those issues and to meet the need for action. WS' mission is to provide federal leadership with managing damage and threats of damage associated with animals (see WS Directive 1.201). The WS program has developed a Policy Manual to provide guidance to WS' personnel conducting official activities (see WS Directive 1.101). The Policy Manual addresses national policy and provides general direction to WS' personnel. WS' personnel would only provide assistance when the appropriate property owner or manager requested WS' assistance. WS could receive a request for assistance from a property owner or manager to conduct activities on property they own or manage, which could include federal, state, tribal, municipal, and private land within the State of Louisiana.

Appendix B of this EA discusses the methods available for use or recommendation under each of the alternative approaches evaluated[6]. The alternatives and Appendix B also discuss how WS and other entities could recommend or employ methods to manage damage and threats associated with coyotes in the State. Therefore, the actions evaluated in this EA are the use or recommendation of those methods available under the alternatives and the employment or recommendation of those methods by WS to manage or prevent damage and threats associated with coyotes from occurring when requested by the appropriate resource owner or manager. WS' activities that could involve the lethal removal of coyotes under the alternatives would only occur when agreed upon by the requester and when authorized by the LDWF, when required, and only at levels authorized.

Federal, State, County, City, and Private Lands

WS could continue to provide damage management activities on federal, state, county, municipal, and private land in Louisiana when WS receives a request for such services by the appropriate resource owner or manager. In those cases where a federal agency requests WS' assistance with managing damage caused by coyotes on property they own or manage, the requesting agency would be responsible for analyzing those activities in accordance with the NEPA. However, this EA could cover such actions if the requesting federal agency determined the analyses and scope of this EA were appropriate for those actions and the requesting federal agency adopted this EA through their own Decision based on the analyses in this EA. Therefore, the scope of this EA analyzes actions that could occur on federal lands, state, county, municipal, and private when requested.

[6]Appendix B contains a complete list of chemical and non-chemical methods available for use under the identified alternatives. However, listing methods neither implies that all methods would be used by WS to resolve requests for assistance nor does the listing of methods imply that all methods would be used to resolve every request for assistance.

Native American Lands and Tribes

The WS program in Louisiana would only conduct damage management activities on Native American lands when requested by a Native American Tribe. WS would only conduct activities after WS and the Tribe requesting assistance signed a Memorandum of Understanding (MOU), a work initiation document, or another comparable document. Therefore, the Tribe would determine what activities would be allowed and when WS' assistance was required. Because Tribal officials would be responsible for requesting assistance from WS and determining what methods would be available to alleviate damage, no conflict with traditional cultural properties or beliefs would likely occur. Those methods available to alleviate damage associated with coyotes on federal, state, county, municipal, and private properties under the alternatives analyzed in this EA would be available for use to alleviate damage on Tribal properties when the Tribe requesting WS' assistance approved the use of those methods. Therefore, the activities and methods addressed under the alternatives would include those activities that WS could employ on Native American lands, when requested and when agreed upon by the Tribe and WS.

Period for which this EA is Valid

If the preparation of an Environmental Impact Statement (EIS) is not warranted, based on the analyses associated with this EA, WS would conduct reviews of activities conducted under the selected alternative to ensure those activities occurred within the parameters evaluated in this EA. This EA would remain valid until WS, in consultation with the LDWF, determined that new needs for action, changed conditions, new issues, or new alternatives having different environmental impacts must be analyzed. At that time, WS would supplement this analysis or conduct a separate evaluation pursuant to the NEPA. Under the alternative analyzing no involvement by WS, no review or additional analyses would occur based on the lack of involvement by WS. The monitoring of activities by WS would ensure the EA remained appropriate to the scope of damage management activities conducted by WS in Louisiana under the selected alternative.

Site Specificity

As mentioned previously, WS would only conduct damage management activities when requested by the appropriate resource owner or manager. In addition, WS' activities that could involve the lethal removal of coyotes under the alternatives would only occur when authorized by the LDWF, when required, and only at levels authorized.

This EA analyzes the potential impacts of managing damage caused by coyotes based on previous activities conducted on private and public lands in Louisiana where WS and the appropriate entities entered into a MOU, work initiation document, or another comparable document. This EA also addresses the potential impacts of managing damage in areas where WS and a cooperating entity could sign additional agreements in the future. Because the need for action would be to reduce damage and because the program's goals and directives would be to provide assistance when requested, within the constraints of available funding and workforce, it is conceivable that additional damage management efforts could occur. Thus, this EA anticipates those additional efforts and analyzes the potential effects of those efforts as part of the alternatives.

Coyotes occur statewide and throughout the year in the State; therefore, damage or threats of damage could occur wherever coyotes occur. Planning for the management of damage caused by coyotes must be viewed as being conceptually similar to the actions of other entities whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they would occur are unknown but could be anywhere in a defined geographic area. Examples of such

agencies and programs include fire departments, police departments, emergency clean-up organizations, and insurance companies. Although WS could predict some locations where coyote damage would occur, WS could not predict every specific location or the specific time where such damage would occur in any given year. In addition, the threshold triggering an entity to request assistance from WS to manage damage associated with coyotes is often unique to the individual; therefore, predicting where and when WS would receive such a request for assistance would be difficult. This EA emphasizes major issues as those issues relate to specific areas whenever possible; however, many issues apply wherever coyote damage and the resulting management actions occur and this EA treats those issues as such.

Chapter 2 of this EA identifies and discusses issues relating to managing damage caused by coyotes in Louisiana. The standard WS Decision Model (Slate et al. 1992; see WS Directive 2.201) would be the site-specific procedure for individual actions that WS could conduct in the State (see Chapter 3 for a description of the Decision Model and its application). Decisions made using the model would be in accordance with WS' directives (see WS Directive 1.101) and Standard Operating Procedures (SOPs) described in this EA, as well as relevant laws and regulations in accordance with WS Directive 2.210.

The analyses in this EA would apply to any action that may occur by WS in any locale and at any time within Louisiana. In this way, WS believes the agency meets the intent of the NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with the NEPA and still be able to accomplish the mission of the agency.

Summary of Public Involvement

WS initially developed the issues associated with conducting activities to manage damage in consultation with the LDWF. WS defined the issues and identified the preliminary alternatives through the scoping process. As part of this process, and as required by the Council on Environmental Quality (CEQ) and APHIS implementing regulations for the NEPA, WS will make this document available to the public for review and comment. WS will make the document available to the public through legal notices published in local print media, through direct notification of parties that have requested notification, or that WS has identified as having a potential interest in the reduction of threats and damage associated with coyotes in the State. In addition, WS will post this EA on the APHIS website for review and comment.

WS will provide for a minimum of a 30-day comment period for the public and interested parties to provide new issues, concerns, and/or alternatives. Through the public involvement process, WS will clearly communicate to the public and interested parties the analyses of potential environmental impacts on the quality of the human environment. WS would fully consider new issues, concerns, or alternatives the public identifies during the public involvement period to determine whether WS should revisit the EA and, if appropriate, revise the EA prior to issuance of a Decision.

1.4 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

WS' Environmental Assessment - Coyote Damage Management in the Louisiana Wildlife Services Program

As was stated previously, WS previously developed an EA that addressed WS' activities to manage damage associated with coyotes in the State (USDA 2002). This new EA will address more recently identified changes in activities and will assess the potential environmental impacts of program alternatives based on those changes, primarily a need to evaluate new information. Since this new EA will re-evaluate activities conducted under the previous EA to address the new need for action and the associated affected environment, the analysis and the outcome of the Decision issued based on the analyses in this EA will supersede the previous EA that addressed managing damage caused by coyotes.

Louisiana Comprehensive Wildlife Conservation Strategy

The LDWF has developed an extensive wildlife conservation plan that evaluates species of plants and animals within the State (LDWF 2005) and has prepared a draft state wildlife action plan (Holcomb et al. 2015). The purpose of the conservation plan developed in 2005 "*…is to develop a blueprint for guiding LDWF in the development of management actions for Louisiana's fish and wildlife species with emphasis on species of conservation concern and associated habitats they depend upon*" (LDWF 2005). The draft state wildlife action plan further states, "*The purpose of this* [Wildlife Action Plan] *is to develop a blueprint for guiding LDWF and conservation partners in the development and implementation of management actions for Louisiana's fish and wildlife species with emphasis on Species of Greatest Conservation Need…and associated habitats they depend upon*" (Holcomb et al. 2015). WS consulted the Comprehensive Wildlife Conservation Strategy (LDWF 2005) and the draft state Wildlife Action Plan (Holcomb et al. 2015) as part of this analysis and the alternatives would be consistent with both plans.

1.5 AUTHORITY OF FEDERAL AND STATE AGENCIES

Below are brief discussions of the authorities of WS and other agencies, as those authorities relate to conducting wildlife damage management.

WS' Legislative Authority

The primary statutory authorities for the WS program is the Act of March 2, 1931 (46 Stat. 1468; 7 USC 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c). The WS program is the lead federal authority in managing damage to agricultural resources, natural resources, property, and threats to human safety associated with wildlife. WS' directives define program objectives and guide WS' activities when managing wildlife damage (see WS Directive 1.201, WS Directive 1.205, WS Directive 1.210).

United States Environmental Protection Agency (EPA)

The EPA is responsible for implementing and enforcing the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which regulates the registration and use of pesticides.

Louisiana Department of Wildlife and Fisheries

The LDWF, under the direction of the Governor-appointed Louisiana Wildlife and Fisheries Commission, is specifically charged in Title 56 of the Louisiana Revised Statutes, Chapter 1, part 1, § 1A, to protect, conserve, and replenish the natural resources of the state and the wildlife of the state, including all aquatic life. The mission of the LDWF is to "*…manage, conserve, and promote wise utilization of Louisiana's renewable fish and wildlife resources and their supporting habitats through replenishment, protection, enhancement, research, development, and education for the benefit of current and future generations; to provide opportunities for knowledge of and use and enjoyment of these resources; and to provide a safe environment for the users of these resources."*

LDWF currently has a MOU with WS. The MOU establishes a cooperative relationship among WS and LDWF. Responsibilities include planning, coordinating, and implementing policies to address wildlife damage management and facilitating exchange of information.

Louisiana Department of Agriculture and Forestry

The LDAF enforces state laws pertaining to the use and application of pesticides. Under the Louisiana Pesticide Law the LDAF monitors the use of pesticides in a variety of pest management situations. It also licenses private and commercial pesticide applicators, pesticide contractors, restricted use pesticide dealers and registers all pesticide for sale and distribution in the state of Louisiana.

Louisiana State University Agricultural Center

The LSU AgCenter includes the Louisiana Agricultural Experiment Station, which conducts agricultural-based research, and the Louisiana Cooperative Extension Service, which extends the knowledge derived from research to the people of the State. The LSU AgCenter plays an integral role in supporting agricultural industries, enhancing the environment, and improving the quality of life through its 4-H youth, family and consumer sciences, and community development programs.

1.6 COMPLIANCE WITH LAWS AND STATUTES

Several laws or statutes would authorize, regulate, or otherwise affect WS' activities under the alternatives. WS would comply with applicable federal, state, and local laws and regulations in accordance with WS Directive 2.210. Below are brief discussions of those laws and regulations that would relate to damage management activities that WS could conduct in the State.

National Environmental Policy Act

All federal actions are subject to the NEPA (Public Law 9-190, 42 USC 4321 et seq.). WS follows the CEQ regulations implementing the NEPA (40 CFR 1500 et seq.) along with the USDA (7 CFR 1b) and the APHIS implementing guidelines (7 CFR 372) as part of the decision-making process. Those laws, regulations, and guidelines generally outline five broad types of activities that federal agencies must accomplish as part of any project: public involvement, analysis, documentation, implementation, and monitoring. The NEPA also sets forth the requirement that all major federal actions be evaluated in terms of their potential to significantly affect the quality of the human environment for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. In part, the CEQ, through regulations in 40 CFR, Parts 1500-1508, regulate federal activities that could affect the physical and biological environment. In accordance with regulations of the CEQ and the USDA, the APHIS has published guidelines concerning the implementation of the NEPA (see 44 CFR 50381-50384).

Pursuant to the NEPA and the CEQ regulations, this EA documents the analyses resulting from proposed federal actions, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse impacts, and serves as a decision-aiding mechanism to ensure that WS infuses the policies and goals of the NEPA into agency actions. WS prepared this EA by integrating as many of the natural and social sciences as warranted, based on the potential effects of the alternatives, including the potential direct, indirect, and cumulative effects of the alternatives.

Endangered Species Act

Under the Endangered Species Act (ESA), all federal agencies will seek to conserve T&E species and will utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts consultations with the United States Fish and Wildlife Service (USFWS) pursuant to Section 7 of the ESA 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 will use the*

best scientific and commercial data available" (Sec.7 (a)(2)). Evaluation of the alternatives in regards to the ESA will occur in Chapter 4 of this EA.

Federal Insecticide, Fungicide, and Rodenticide Act

The FIFRA and its implementing regulations (Public Law 110-426, 7 USC 136 et. seq.) require the registration, classification, and regulation of all pesticides used in the United States. The EPA is responsible for implementing and enforcing the FIFRA. The EPA and the LDAF regulate pesticides that could be available to manage damage associated with coyotes in the State.

National Historic Preservation Act of 1966, as amended

The National Historic Preservation Act (NHPA) and its implementing regulations (see 36 CFR 800) require federal agencies to initiate the Section 106 process if an agency determines that the agency's actions are undertakings as defined in Section 800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects on historic properties. If the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency official has no further obligations under Section 106. None of the methods described in this EA that would be available cause major ground disturbance, any physical destruction or damage to property, any alterations of property, wildlife habitat, or landscapes, nor would involve the sale, lease, or transfer of ownership of any property. In general, the use of such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas that could result in effects on the character or use of historic properties. Therefore, the methods that would be available under the alternatives would not generally be the types of methods that would have the potential to affect historic properties. If WS planned an individual activity with the potential to affect historic resources under an alternative selected because of a decision on this EA, WS would conduct the site-specific consultation, as required by Section 106 of the NHPA, as necessary.

The use of noise-making methods, such as firearms, at or in close proximity to historic or cultural sites for the purposes of removing wildlife have the potential for audible effects on the use and enjoyment of historic property. However, WS would only use such methods at a historic site at the request of the owner or manager of the site to resolve a damage problem, which means such use, would be to the benefit of the historic property. A built-in minimization factor for this issue is that virtually all the methods involved would only have temporary effects on the audible nature of a site and could be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. WS would conduct site-specific consultation as required by the Section 106 of the NHPA, as necessary, in those types of situations.

Coastal Zone Management Act of 1972, as amended (16 USC 1451-1464, Chapter 33; PL 92-583, October 27, 1972; 86 Stat. 1280).

This law established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. The Act authorized funds for cost-sharing grants to states to develop their programs and for implementation purposes. In order to be eligible for federal approval, each state's plan was required to define boundaries of the coastal zone, identify uses of the area to be regulated by the state, determine the mechanism (criteria, standards or regulations) for controlling such uses, and develop broad guidelines for priorities of uses within the coastal zone. In addition, this law established a system of criteria and standards requiring federal agencies to conduct activities in a manner consistent with the federally approved plan. The standard for determining consistency varied depending on whether the federal action involved a permit, license, financial assistance, or a federally authorized activity. As appropriate, WS would conduct a consistency

determination to assure management actions would be consistent with the State's Coastal Zone Management Program.

Native American Graves Protection and Repatriation Act of 1990

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

Occupational Safety and Health Act of 1970

The Occupational Safety and Health Act of 1970 and its implementing regulations (29 CFR 1910) on sanitation standards states that, "*Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practical, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected*."

Federal Food, Drug, and Cosmetic Act (21 USC 360)

This law places administration of pharmaceutical drugs, including those immobilizing drugs used for wildlife capture and handling, under the United States Food and Drug Administration.

Controlled Substances Act of 1970 (21 USC 821 et seq.)

This law requires an individual or agency to have a special registration number from the United States Drug Enforcement Administration to possess controlled substances, including controlled substances used for wildlife capture and handling.

Animal Medicinal Drug Use Clarification Act of 1994

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

Airborne Hunting Act

The Airborne Hunting Act, passed in 1971 (Public Law 92-159), and amended in 1972 (Public Law 92-502) added to the Fish and Wildlife Act of 1956 as a new section (16 USC 742j-l) that prohibits shooting or attempting to shoot, harassing, capturing or killing any bird, fish, or other animal from aircraft except for certain specified reasons. Under exception [see 16 USC 742j-l, (b)(1)], state and federal agencies are

allowed to protect or aid in the protection of land, water, wildlife, livestock, domesticated animals, human life, or crops using aircraft.

Environmental Justice in Minority and Low Income Populations - Executive Order 12898

Executive Order 12898 promotes the fair treatment of people of all races, income levels, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies, and activities on minority and low-income persons or populations.

Protection of Children from Environmental Health and Safety Risks - Executive Order 13045

Children may suffer disproportionately for many reasons from environmental health and safety risks, including the development of their physical and mental status. Federal agencies must make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. In addition, federal agencies must ensure agency policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

Outlaw Quadrupeds: Coyotes, Armadillos, and Feral Hogs (RS 56:8(144)(a)(ii))

Louisiana Revised Statute 58:8(144)(a)(ii) classifies coyotes, armadillos (*Dasypus novemcinctus*), and feral swine (*Sus scrofa*) as outlaw quadrupeds. Under Revised Statute 56:116.1(D), "*Outlaw quadrupeds may be taken at any time of year from one-half hour before official sunrise to one-half hour after official sunset, without limit as to number, except by trapping during the closed season for nongame quadrupeds, except that trapping shall be used only under special permit issued by the department*."

On private property, the landowner, or their lessee or agent, with written permission and the landowner's contact information in their possession, may take outlaw quadrupeds, nutria, or beaver during the nighttime hours from one-half hour after official sunset on the last day of February to one-half hour after official sunset the last day of August of that same year. The method of such taking may include any legal firearm and may be with or without the aid of artificial light, infrared or laser sighting devices, or night vision devices. Anyone taking part in those activities at night is required to notify the parish sheriff's office 24 hours in advance of any such activities.

Beaver, coyote, and Coydog Control Program (RS 3:371)

Under Louisiana Revised Statute 3:371(A), a control program was enacted for beaver, nuisance feral swine, coyotes, and coydogs in the State that must be developed by the LDAF and administered by the Livestock Brand Commission. The program shall provide population control of beaver, nuisance feral swine, coyotes, and coydogs on private or public lands, excluding federally owned land.

Releasing Game, Fowl, or Fish (RS 56:20)

Louisiana Revised Statue 56:20(A) states, "*No pen-raised or wild animal, fowl, or fish of any species from without the state shall be liberated within the state except upon written permission of the secretary*". Under 56:20(B), "*No wild animal or fowl of any species shall be transported for restocking purposes*

from a site within the state to any other site within the state except in accordance with rules and regulations adopted by the commission".

1.7 DECISIONS TO BE MADE

Based on agency relationships, MOUs, and legislative authorities, WS is the lead agency for this EA, and therefore, responsible for the scope, content, and decisions made. The LDWF is responsible for managing wildlife in the State of Louisiana, including coyotes. WS has consulted with and would continue to consult with the LDWF to ensure an interdisciplinary approach according to the NEPA and agency mandates, policies, and regulations. WS would coordinate activities to reduce and/or prevent coyote damage in the State that could occur under the alternatives with the LDWF, which would ensure the LDWF had the opportunity to incorporate any activities WS' conducts into population objectives established for coyote populations in the State. In addition, the LDWF establishes and enforces regulated hunting and trapping seasons in the State.

Based on the scope of this EA, the decisions to be made are: 1) should WS conduct activities to manage coyote damage, 2) should WS conduct disease surveillance and monitoring when requested, 3) should WS implement an integrated methods approach to meet the need for action, 4) if not, should WS attempt to implement one of the alternatives to an integrated methods strategy, and 5) would the proposed action or the other alternatives result in effects to the environment requiring the preparation of an EIS.

CHAPTER 2: AFFECTED ENVIRONMENT AND 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. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues. Additional descriptions of the affected environment occur during the discussion of the environmental effects in Chapter 4.

2.1 AFFECTED ENVIRONMENT

Coyotes are capable of utilizing a variety of habitats in the State. Coyotes occur throughout the year across the State where suitable habitat exists for foraging and shelter. Damage or threats of damage caused by coyotes could occur statewide in Louisiana wherever coyotes occur. However, activities to manage damage would only be conducted by WS when requested by a landowner or manager and only on properties where a MOU, work initiation document, or another comparable document were signed between WS and a cooperating entity.

Upon receiving a request for assistance, WS could conduct activities to reduce coyote damage or threats of damage on federal, state, tribal, municipal, and private properties in Louisiana. Areas where damage or threats of damage could occur include, but would not be limited to agricultural fields, vineyards, orchards, farmyards, dairies, ranches, livestock operations, aquaculture facilities, fish hatcheries, grain mills, grain handling areas, railroad yards, waste handling facilities, industrial sites, natural resource areas, park lands, and historic sites; state and interstate highways and roads; railroads and their right-of-ways; property in or adjacent to subdivisions, businesses, and industrial parks; timberlands, croplands, and pastures; private and public property where digging by coyotes cause damage to structures, dams, dikes, ditches, ponds, and levees; public and private properties in rural/urban/suburban areas where coyotes cause damage to landscaping and natural resources, property, and were a threat to human safety through the spread of disease. The area would also include airports and military airbases where coyotes were a threat to human safety and to property; areas where coyotes negatively affect wildlife, including T&E species; and public property where coyotes were negatively affecting historic structures, cultural

landscapes, and natural resources. Chapter 4 also contains additional information on the affected environment.

As stated previously, WS' personnel would only conduct activities after the property owner or manager requests such assistance and only on those properties allowed by the property owner or manager. On average, property owners or managers allowed the WS program in Louisiana to conduct damage management activities on approximately 41,372 acres per year, which represents 0.1% of the land area of the State. However, in any given year, the WS program only conducts activities on a small portion of those areas. For example, a cooperator may own 100 acres where the owner allows livestock to graze and the WS program in Louisiana could conduct activities within that 100-acre property; however, WS' personnel may actually only conduct activities on less than five acres of the property when attempting to manage damage caused by coyotes. Therefore, the area where WS' personnel actually conducted activities was likely less than 0.1% of the land area in the State.

Table 2.1 – Number and area under agreements associated with coyote damage, FY 2010 – FY 2015

Year[1]	Number of Agreements[2]	Acres under Agreements[3]	% of Total State Land Area[4]
2010	66	25,915	0.08%
2011	57	20,598	0.06%
2012	56	14,555	0.04%
2013	46	19,390	0.06%
2014	48	58,134	0.2%
2015[†]	37	109,639	0.3%
Annual Avg.	**52**	**41,372**	**0.1%**

[1]Based on federal fiscal year

[2]Number of agreements signed between WS and the property owner/manager allowing WS to conduct activities

[3]Number of acres those entities requesting assistance have agreed to allow WS to conduct activities associated with coyotes.

[4]Based on the total area of the State estimated at 52,378 square miles (United States Census Bureau 2011), which equates to 33,521,620 acres

[†]Data for FY 2015 is preliminary; therefore, data is subject to change

Preliminary data for FY 2015 indicates the WS program in Louisiana had 37 agreements to manage coyote damage that could occur on 109,639 acres in the State, which would represent 0.3% of the area in the State (see Table 2.1). Based on the number of agreements between FY 2010 and FY 2015 and the land area associated with those agreements, WS anticipates activities would continue to occur on a very small percentage of the total area in the State.

Environmental Status Quo

As defined by the NEPA implementing regulations, the "*human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment*" (40 CFR 1508.14). Therefore, when a federal action agency analyzes their potential impacts on the "*human environment*", it is reasonable for that agency to compare not only the effects of the proposed federal action, but also the potential impacts that occur or could occur in the absence of the federal action by a non-federal entity. This concept is applicable to situations involving federal assistance to reduce damage associated with wildlife species.

State authority or law manages most wildlife species without any federal oversight or protection. In some situations, with the possible exception of restrictions on methods (*e.g.*, firearms restrictions), unprotected wildlife species and certain resident wildlife species are managed with little or no restrictions, which allows anyone to lethally remove or capture those species at any time when they are committing damage.

The LDWF has the authority to manage wildlife populations in the State and the authority to allow the lethal removal or capture of wildlife for damage management purposes.

When a non-federal entity (*e.g.*, agricultural producers, municipalities, counties, private companies, individuals, or any other non-federal entity) takes an action to alleviate coyote damage or threat of damage, the action is not subject to compliance with the NEPA due to the lack of federal involvement in the action. Under such circumstances, the environmental baseline or status quo would be an environment that includes those resources as other non-federal entities manage or affect those resources in the absence of the federal action. Therefore, in those situations in which a non-federal entity has decided that a management action directed towards coyotes should occur and even the particular methods that should be used, WS' involvement in the action would not affect the environmental status quo since the entity could take the action in the absence of WS' involvement. WS' involvement would not change the environmental status quo if the requester had conducted the action in the absence of WS' involvement in the action.

People could lethally remove coyotes at any time to alleviate damage without the need for a permit from the LDWF (see Section 1.6). In addition, entities could remove coyotes to alleviate damage during the trapping season. Most methods available for resolving damage associated with coyotes would also be available for use by other entities. Therefore, WS' decision-making ability would be restricted to one of three alternatives. WS could take the action using the specific methods as decided upon by the non-federal entity, provide technical assistance only, or take no action. If WS' takes no action or provides just technical assistance, another entity could take the action at any time using the same methods without the need for a permit or removal could occur during the annual trapping season for coyotes. Under those circumstances, WS would have virtually no ability to affect the environmental status quo since the action would likely occur in the absence of WS' direct involvement.

Therefore, based on the discussion above, it is clear that in those situations where a non-federal entity has already made the decision to remove or otherwise manage coyotes to stop damage with or without WS' assistance, WS' participation in carrying out the action would not affect the environmental status quo.

2.2 ISSUES ASSOCIATED WITH COYOTE DAMAGE MANAGEMENT ACTIVITIES

Issues are concerns regarding potential effects that might occur from a proposed action. Federal agencies must consider such issues during the NEPA decision-making process. Initially, WS developed the issues related to managing damage associated with coyotes in Louisiana in consultation with the LDWF. In addition, WS will invite the public to review and comment on the EA to identify additional issues.

Chapter 4 discusses the issues, as those issues relate to the possible implementation of the alternatives, including the proposed action. WS evaluated, in detail, the following issues.

Issue 1 - Effects of Coyote Damage Management Activities on Target Coyote Populations

Under certain alternatives, WS could employ methods available to resolve damage and reduce threats to human safety that target an individual coyote or a group of coyotes after applying the WS Decision Model (Slate et al. 1992) to identify possible techniques (see WS Directive 2.101, WS Directive 2.105, WS Directive 2.201, WS Directive 2.210). A common issue when addressing damage caused by wildlife are the potential impacts of management actions on the populations of target species and the potential effects on the ability of people to harvest target species during regulated seasons. Lethal and non-lethal methods would be available to resolve coyote damage or threats to human safety. Non-lethal methods could disperse, translocate, or otherwise make an area unattractive to coyotes causing damage, which could reduce the presence of coyotes at the site and potentially the immediate area around the site where an

entity employed those methods. Employing lethal methods could remove a coyote or those coyotes responsible for causing damage or posing threats to human safety. Therefore, the use of lethal methods could result in local population reductions in the area where damage or threats were occurring. The number of individual coyotes that WS' personnel could remove from the population using lethal methods would be dependent on the number of requests for assistance received, the number of individual coyotes involved with the associated damage or threat, the efficacy of methods employed, and the number of individuals the LDWF authorizes WS to remove.

Another concern is that activities conducted by WS would affect the ability of persons to harvest coyotes either by reducing local populations through the lethal removal of coyotes or by reducing the number of coyotes present in an area through dispersal techniques. Coyotes are an "*outlaw quadruped*" in the State under Louisiana Revised Statutes. Under Louisiana Revised Statute 56:116.1(D), "*Outlaw quadrupeds may be taken at any time of year from one-half hour before official sunrise to one-half hour after official sunset, without limit as to number, except by trapping during the closed season for nongame quadrupeds, except that trapping shall be used only under special permit issued by the department*." People can also harvest coyotes during an annual trapping season in the State.

Therefore, any damage management activities conducted by WS under the alternatives addressed would be occurring along with other natural process and human-induced events, such as natural mortality, human-induced mortality from private damage management activities, mortality from regulated harvest, and human-induced alterations of wildlife habitat. Chapter 4 of this EA analyzes the effects on the populations of target coyote populations in the State from implementation of the alternatives addressed in detail, including the proposed action alternative. The analysis that occurs in Chapter 4 of this EA will measure the number of individual coyotes lethally removed in relation to the abundance of coyotes to determine the magnitude of impact to the populations from the use of lethal methods. Magnitude may be determined either quantitatively or qualitatively. Determinations based on population estimates, allowable harvest levels, and actual harvest data would be quantitative. Determinations based on population trends and harvest trend data, when available, would be qualitative.

Issue 2 - Effects of Coyote Damage Management Activities on Non-target Wildlife Species Populations, Including T&E Species

The issue of non-target species effects, including effects on T&E species, arises from the use of non-lethal and lethal methods available for use under each of the alternatives. Appendix B of this EA describes the methods available for use under the alternatives. The use of non-lethal and lethal methods has the potential to inadvertently disperse, capture, or kill non-target animals. There are also concerns about the potential for adverse effects to occur to non-target animals from the use of chemical methods. Chemical methods that would be available for use to manage damage or threats associated with coyotes could include immobilizing drugs and euthanasia chemicals. Chapter 4 and Appendix B further discuss those chemical methods available for use to manage damage and threats associated with coyotes in Louisiana.

The ESA states that all federal agencies *"...shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of the Act"* [Sec. 7(a)(1)]. WS conducts consultations with the USFWS pursuant to Section 7 of the ESA to ensure compliance. The WS program also conducts consultations 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)].

As part of the scoping process for this EA, WS consulted with the USFWS pursuant to Section 7 of the ESA to facilitate interagency cooperation between WS and the USFWS. Chapter 4 of this EA discusses the potential effects of the alternatives on this issue.

Issue 3 - Effects of Coyote Damage Management Activities on Human Health and Safety

An additional issue often raised is the potential risks to the safety of people associated with employing methods to manage damage caused by target species. Both chemical and non-chemical methods have the potential to have adverse effects on human safety. WS' employees could use and would recommend only those methods that were legally available under each of the alternatives. Still, some concerns exist regarding the safety of methods available despite their legality and selectivity. As a result, this EA will analyze the potential for proposed methods to pose a risk to members of the public. In addition to the potential risks to the public associated with the methods available under each of the alternatives, risks to WS' employees would also be an issue. Injuries to WS' employees could occur during the use of methods, as well as subject to workplace accidents. Selection of methods, under the alternatives, would include consideration for public and employee safety.

The issue of using chemical methods as part of managing damage associated with wildlife relates to the potential for human exposure either through direct contact with the chemical or from exposure to the chemical from wildlife that have been exposed. Under the alternatives identified, the use or recommendation of chemical methods could include immobilizing drugs and euthanasia chemicals. The EPA through the FIFRA and the LDAF through State laws would regulate pesticide use[7]. The United States Drug Enforcement Administration and the United States Food and Drug Administration would regulate immobilizing drugs and euthanasia chemicals. In addition, the use of all chemical methods by WS would be subject to Louisiana laws and WS' directives (see WS Directive 2.401, WS Directive 2.405, WS Directive 2.430, WS Directive 2.465).

Immobilizing drugs that could be available include ketamine and Telazol, which are anesthetics (*i.e.*, general loss of pain and sensation) used during the capture of wildlife to eliminate pain, calm fear, and reduce anxiety in wildlife when handling and transporting wildlife. Xylazine is a sedative that wildlife professionals often use in combination with ketamine to calm nervousness, irritability, and excitement in wildlife during the handling and transporting of wildlife. Euthanasia chemicals could include sodium pentobarbital, and potassium chloride, all of which WS would administer after anesthetizing an animal.

Most methods available to alleviate damage and threats associated with coyotes would be non-chemical methods. Non-chemical methods may include cultural methods, limited habitat modification, animal behavior modification, and other mechanical methods. Changes in cultural methods could include improved animal husbandry practices, altering feeding schedules, changes in crop rotations, or conducting structural repairs. Limited habitat modification would be practices that alter specific characteristics of a localized area, such as removing bushes to eliminate shelter locations. Animal behavior modification methods would include those methods designed to disperse coyotes from an area through harassment or exclusion. Behavior modification methods could include pyrotechnics, propane cannons, barriers, electronic guards (Linhart et al. 1992), guard animals (Andelt 2004), effigies, and fladry (Mettler and Shivik 2007). Other mechanical methods could include cage traps, foothold traps, cable restraints, shooting, or the recommendation that trappers reduce a local population of coyotes during the annual trapping season.

The primary safety risk of most non-chemical methods occurs directly to the applicator or those persons assisting the applicator. However, risks to others do exist when employing non-chemical methods, such as when using firearms and pyrotechnics. Most of the non-chemical methods available to address coyote

[7]Currently, the WS program in Louisiana is not considering the use of any chemical methods to manage damage associated with coyotes that require registration with the EPA under FIFRA. The only chemical methods that the WS program in Louisiana is considering for use under the appropriate alternatives are immobilizing drugs and euthanasia chemicals, which the United States Food and Drug Administration and the United States Drug Enforcement Administration are responsible for regulating.

damage in Louisiana would be available for use under any of the alternatives and by any entity, when authorized. Chapter 4 further discusses the risks to human safety from the use of non-chemical methods as this issue relates to the alternatives. Appendix B provides a complete list of non-chemical methods available to alleviate damage associated with coyotes.

Another concern is the threat to human safety from not employing methods or not employing the most effective methods to reduce the threats that coyotes could pose. The need for action in Chapter 1 addresses the risks to human safety from diseases associated with coyotes. The low risk of disease transmission from coyotes does not lessen the concerns of cooperators requesting assistance to reduce threats from zoonotic diseases. Increased public awareness of zoonotic events has only heightened the concern of direct or indirect exposure to zoonoses. Not adequately addressing the threats associated with potential zoonoses could lead to an increase in incidences of injury, illness, or loss of human life.

Additional concerns occur when inadequately addressing threats to human safety associated with aircraft striking coyotes at airports in the State. Coyotes have the potential to cause severe damage to aircraft, which can threaten the safety of passengers. Limiting or preventing the use of certain methods to address the potential for aircraft striking coyotes could lead to higher risks to passenger safety. Chapter 4 further evaluates those concerns in relationship to the alternatives.

Issue 4 - Effects of Coyote Damage Management Activities on the Aesthetic Value of Coyotes

One issue is the concern that the proposed action or the other alternatives would result in the loss of aesthetic benefits of target coyotes to the public, resource owners, or neighboring residents. People generally regard wildlife as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful.

The human attraction to animals likely started when people began domesticating animals. The public today share a similar bond with animals and/or wildlife in general and in modern societies, a large percentage of households have indoor or outdoor pets. However, some people may consider individual wild animals and coyotes as "*pets*" or exhibit affection toward those animals, especially people who enjoy viewing wildlife. Therefore, the public reaction can be variable and mixed to wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to manage conflicts/problems between people and wildlife.

Wildlife populations provide a wide range of social and economic benefits (Decker and Goff 1987). Those include direct benefits related to consumptive and non-consumptive uses, indirect benefits derived from vicarious wildlife related experiences, and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (Bishop 1987). Direct benefits are derived from a personal relationship with animals and may take the form of direct consumptive use (*e.g.*, using parts of or the entire animal) or non-consumptive use (*e.g.*, viewing the animal in nature or in a zoo, photographing) (Decker and Goff 1987).

Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and originate from experiences, such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals (*e.g.*, their use in research) (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

Public attitudes toward wildlife vary considerably. Some people believe that WS should capture and translocate all animals to another area to alleviate damage or threats those animals pose. In some cases, people directly affected by wildlife strongly support removal. Individuals not directly affected by the harm or damage may be supportive, neutral, or totally opposed to any removal of wildlife from specific locations or sites. Some people totally opposed to wildlife damage management want WS to teach tolerance for damage and threats caused by wildlife, and that people should never kill wildlife. Some of the people who oppose removal of wildlife do so because of human-affectionate bonds with individual wildlife. Those human-affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment.

In some cases, the presence of overabundant mammal species offends people, such as coyotes. To such people, those species represent pests that are nuisances, which upset the natural order in ecosystems, and are carriers of diseases transmissible to people or other wildlife. In those situations, the presence of overabundant species can diminish their overall enjoyment of other animals by what they view as a destructive presence of such species. They are offended because they feel that those wildlife species proliferate in such numbers and appear to remain unbalanced.

Issue 5 - Humaneness and Animal Welfare Concerns of Methods

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 people can interpret in a variety of ways. Schmidt (1989) indicated that vertebrate 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."*

The American Veterinary Medical Association (AVMA) has previously described suffering as a "…*highly unpleasant emotional response usually associated with pain and distress*" (AVMA 1987). However, suffering "…*can occur without pain*…," and "…*pain can occur without suffering*…". 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). Pain and physical restraint can cause stress in animals and the inability of animals to effectively deal with those stressors can lead to distress. Suffering can occur when a person does not take action to alleviate conditions that cause pain or distress in animals.

Defining pain as a component in humaneness appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior in animals can be indicators of pain. However, pain experienced by individual animals probably ranges from little or no pain to considerable pain (California Department of Fish and Game 1991).

The AVMA has previously stated "*...euthanasia is the act of inducing humane death in an animal" and "... the technique should minimize any stress and anxiety experienced by the animal prior to unconsciousness*" (Beaver et al. 2001). Some people would prefer using AVMA accepted methods of euthanasia when killing all animals, including wild and invasive animals. The AVMA has stated, "[f]*or wild and feral animals, many of the recommended means of euthanasia for captive animals are not feasible. In field circumstances, wildlife biologists generally do not use the term euthanasia, but terms such as killing, collecting, or harvesting, recognizing that a distress- free death may not be possible*" (Beaver et al. 2001).

Pain and suffering, as it relates to methods available for use to manage coyotes has both a professional and lay point of arbitration. Wildlife managers and the public must 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). Research suggests that with some methods (*e.g.*, foothold trap) changes in the blood chemistry of trapped animals indicate the existence of some level of "*stress*" (Kreeger et al. 1990). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness (Bateson 1991, Sharp and Saunders 2008, Sharp and Saunders 2011).

The decision-making process involves tradeoffs between the above aspects of pain and humaneness. 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. Chapter 4 further discusses the issue of humaneness and animal welfare. Chapter 3 discusses SOPs intended to alleviate pain and suffering.

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

WS and the LDWF identified additional issues during the scoping process of this EA. WS considered those additional issues but a detailed analysis did not occur. Discussion of those additional issues and the reasons for not analyzing those issues in detail occur below.

Appropriateness of Preparing an EA (Instead of an EIS) for Such a Large Area

The appropriateness of preparing an EA instead of an EIS was a concern WS identified during the scoping process. Wildlife damage management falls within the category of actions in which the exact timing or location of individual activities can be difficult to predict well enough ahead of time to describe accurately such locations or times in an EA or even an EIS. Although WS could predict some of the possible locations or types of situations and sites where some kinds of wildlife damage would occur, the program cannot predict the specific locations or times at which affected resource owners would determine a damage problem had become intolerable to the point that they request assistance from WS. In addition, the WS program would not be able to prevent such damage in all areas where it might occur without resorting to destruction of wild animal populations over broad areas at a much more intensive level than would be desired by most people, including WS and other agencies. Such broad scale population management would also be impractical or impossible to achieve within WS' policies and professional philosophies.

Lead agencies have the discretion to determine the geographic scope of their analyses under the NEPA (Kleppe v Sierra Club, 427 U.S. 390, 414 (1976), CEQ 1508.25). Ordinarily, according to the APHIS procedures implementing the NEPA, WS' individual wildlife damage management actions could be categorically excluded (7 CFR 372.5(c)). The intent in developing this EA has been to determine if the proposed action or the other alternatives could potentially have significant individual and/or cumulative impacts on the quality of the human environment that would warrant the preparation of an EIS. This EA addresses impacts for managing damage and threats to human safety associated with coyotes in the State to analyze individual and cumulative impacts and to provide a thorough analysis.

In terms of considering cumulative effects, one EA analyzing impacts for the entire State would provide a more comprehensive and less redundant analysis than multiple EAs covering smaller areas. If WS made a determination through this EA that the proposed action or the other alternatives could have a significant impact on the quality of the human environment, then WS would publish a notice of intent to prepare an EIS and this EA would be the foundation for developing the EIS. Based on previous requests for assistance, the WS program in Louisiana would continue to conduct coyote damage management on a small percentage of the land area in the State where damage was occurring or likely to occur.

WS' Impact on Biodiversity

The WS program does not attempt to eradicate any species of native wildlife in the State. WS operates in accordance with federal and state laws and regulations enacted to ensure species viability. WS would use available methods to target individual coyotes or groups of coyotes identified as causing damage or posing a threat of damage. Any reduction of a local population or group would frequently be temporary because immigration from adjacent areas or reproduction replaces the animals removed.

As stated previously, WS would only provide assistance under the appropriate alternatives after receiving a request to manage damage or threats. Therefore, if WS provided direct operational assistance under the alternatives, WS would provide assistance on a small percentage of the land area of Louisiana. As shown previously in Table 2.1, the WS program had agreements signed to conduct activities associated with coyote damage on an average of 0.1% of the land area in the State between FY 2010 and FY 2015. In addition, WS would only target those coyotes identified as causing damage or posing a threat. WS would not attempt to suppress wildlife populations across broad geographical areas at such intensity levels for prolonged durations that significant ecological effects would occur. The goal of WS would not be to manage wildlife populations but to manage damage caused by specific coyotes. The management of wildlife populations in the State is the responsibility of the LDWF. Therefore, those factors would constrain the scope, duration, and intensity of WS' actions under the alternatives.

Often of concern with the use of certain methods is that coyotes that WS lethally removes would only be replaced by other coyotes after WS completes activities (*e.g.*, coyotes that relocate into the area) or by coyotes the following year (*e.g.*, increase in reproduction and survivability that could result from less competition). The ability of an animal population to sustain a certain level of removal and to return to pre-management levels demonstrates that limited, localized damage management methods have minimal impacts on species' populations.

For example, studies suggest coyote territories would not remain vacant for very long after removing coyotes from an area. Gese (1998) noted that adjacent coyote packs adjusted territorial boundaries following social disruption in a neighboring pack, thus allowing for complete occupancy of the area despite removal of breeding coyotes. Blejwas et al. (2002) noted that a replacement pair of coyotes occupied a territory in approximately 43 days following the removal of the territorial pair. Williams et al. (2003) noted that temporal genetic variation in coyote populations experiencing high turnover (due to removals) indicated that "*...localized removal effort does not negatively impact effective population size...*".

Chapter 4 evaluates the environmental consequences of the alternatives on the population of coyotes and the populations of non-target species based on available quantitative and qualitative parameters. With management authority over wildlife, including coyotes, the permitting of lethal removal by the LDWF would ensure cumulative removal levels would occur within allowable levels to maintain species' populations and meet population objectives for each species. Therefore, activities conducted pursuant to any of the alternatives would not adversely affect biodiversity in the State.

A Loss Threshold Should Be Established Before Allowing Lethal Methods

One issue identified through WS' implementation of the NEPA processes is a concern that WS or other entities should establish a threshold of loss before employing lethal methods to resolve damage and that wildlife damage should be a cost of doing business. In some cases, cooperators likely tolerate some damage and economic loss until the damage reaches a threshold where the damage becomes an economic burden. The appropriate level of allowed tolerance or threshold before employing lethal methods would differ among cooperators and damage situations. In some cases, any loss in value of a resource caused by

coyotes could be financially burdensome to some people. In addition, establishing a threshold would be difficult or inappropriate to apply to human health and safety situations. For example, aircraft striking coyotes could lead to property damage and could threaten passenger safety if a catastrophic failure of the aircraft occurred because of the strike. Therefore, addressing the threats of wildlife strikes prior to an actual strike occurring would be appropriate.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie National Forest, et al., the United States District Court of Utah determined that a forest supervisor could establish a need for wildlife damage management if the supervisor could show that damage from wildlife was threatened (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 a percentage of loss of a particular resource to justify the need for damage management actions.

Coyote Damage Management Should Not Occur at Taxpayer Expense

An issue identified is the concern that WS should not provide assistance at the expense of the taxpayer or that activities should be fee-based. Funding for WS' activities could occur from federal appropriations, through state funding, and through cooperative funding. Funding for WS' activities would occur through cooperative service agreements with individual property owners or managers. WS receives a minimal federal appropriation for the maintenance of a WS program in Louisiana. The remainder of the WS program would mostly be fee-based. WS would provide technical assistance to requesters as part of the federally funded activities; however, the majority of funding to conduct direct operational assistance in which WS' employees perform damage management activities would occur through cooperative service agreements between the requester and WS.

Additionally, damage management activities are an appropriate sphere of activity for government programs, since managing wildlife is a government responsibility. Treves and Naughton-Treves (2005) and the International Association of Fish and Wildlife Agencies (2005) 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 people being impacted by their damage and has the least impacts on wildlife overall.

Cost Effectiveness of Management Methods

The CEQ does not require a formal, monetized cost benefit analysis to comply with the NEPA. Consideration of this issue is not essential to making a reasoned choice among the alternatives WS is considering. However, the methods determined to be most effective to reduce damage and threats to human safety caused by coyotes and that prove to be the most cost effective would likely receive the greatest application. As part of an integrated approach and as part of the WS Decision Model, evaluation of methods would continually occur to allow for those methods that were most effective at resolving damage or threats to be employed under similar circumstance where coyotes were causing damage or posing a threat. Additionally, management operations may be constrained by cooperator funding and/or objectives and needs. Therefore, the cost of methods can often influence the availability of methods to resolve damage, which can influence the effectiveness of methods.

Coyote Damage Should be managed by Private Nuisance Wildlife Control Agents or Trappers

People experiencing damage caused by coyotes could contact wildlife control agents and private entities to reduce coyote damage when deemed appropriate by the resource owner. In addition, WS could refer persons requesting assistance to agents and/or private individuals under all of the alternatives fully evaluated in the EA.

WS Directive 3.101 provides guidance on establishing cooperative projects and interfacing with private businesses. WS would only respond to requests for assistance received directly and would not respond to public bid notices. When responding to requests for assistance, WS would inform requesters that other service providers, including private entities, might be available to provide assistance.

Effects from the Use of Lead Ammunition in Firearms

Questions have arisen about the deposition of lead into the environment from ammunition used in firearms to remove coyotes. As described in Appendix B, the lethal removal of coyotes with firearms by WS to alleviate damage or threats could occur using a handgun, rifle, or shotgun. In an ecological risk assessment of lead shot exposure in non-waterfowl birds, ingestion of lead shot was identified as the concern rather than just contact with lead shot or lead leaching from shot in the environment (Kendall et al. 1996).

The removal of coyotes by WS using firearms in the State would occur primarily from the use of shotguns and rifles. However, WS' personnel could employ the use of handguns to euthanize coyotes. To reduce risks to human safety and property damage from bullets passing through coyotes, the use of firearms would be applied in such a way (*e.g*., caliber, bullet weight, distance) to ensure the bullet does not pass through coyotes. Coyotes that were removed using firearms would occur within areas where retrieval of coyote carcasses for proper disposal is highly likely (*e.g*., at an airport). With risks of lead exposure occurring primarily from ingestion of bullet fragments, the retrieval and proper disposal of coyote carcasses would greatly reduce the risk of scavengers ingesting lead that carcasses may contain.

However, deposition of lead into soil could occur if, during the use of a firearm, the projectile passed through a coyote, if misses occurred, or if the retrieval of the carcass did not occur. Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil generally stays within the top 20 cm (about 8 inches). In addition, concerns occur that lead from bullets deposited in soil from shooting activities could contaminate ground water or surface water from runoff. Stansley et al. (1992) studied lead levels in water subject to high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Lead did not appear to "*transport*" readily in surface water when soils were neutral or slightly alkaline in pH (*i.e*., not acidic), but lead did transport more readily under slightly acidic conditions. Although Stansley et al. (1992) detected elevated lead levels in water in a stream and a marsh that were in the shot "*fall zones*" at a shooting range, the study did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot. Stansley et al. (1992) believed the lead contamination near the parking lot was due to runoff from the lot, and not from the shooting range areas. The study also indicated that even when lead shot was highly accumulated in areas with permanent water bodies present, the lead did not necessarily cause elevated lead levels in water further downstream. Muscle samples from two species of fish collected in water bodies with high lead shot accumulations had lead levels that were well below the accepted threshold standard of safety for human consumption (Stansley et al. 1992).

Craig et al. (1999) reported that lead levels in water draining away from a shooting range with high accumulations of lead bullets in the soil around the impact areas were far below the "*action level*" of 15 parts per billion as defined by the EPA (*i.e*., requiring action to treat the water to remove lead). The study found that the dissolution (*i.e*., capability of dissolving in water) of lead declines when lead oxides form on the surface areas of the spent bullets and fragments (Craig et al. 1999). Therefore, the lead oxide deposits that form on the surface of bullets and shot serves to reduce the potential for ground or surface water contamination (Craig et al. 1999). Those studies suggest that, given the very low amount of lead that WS could deposit and the concentrations that would occur from WS' activities to reduce coyote

damage using firearms, as well as most other forms of dry land small game hunting in general, lead contamination of water from such sources would be minimal to nonexistent.

Since those coyotes removed by WS using firearms could be lethally removed by the entities experiencing damage using the same method in the absence of WS' involvement, WS' assistance with removing those coyotes would not be additive to the environmental status quo. The proficiency training received by WS' employees in firearm use and accuracy would increase the likelihood that coyotes were lethally removed humanely in situations that ensure accuracy and that misses occur infrequently, which further reduces the potential for lead to be deposited in the soil from misses or from projectiles passing through carcasses. Based on current information, the risks associated with lead projectiles that WS could contribute to the environment due to misses, the projectile passing through the carcass, or from coyote carcasses that may be irretrievable would be below any level that would pose any risk from exposure or significant contamination.

A Site Specific Analysis Should be made for Every Location Where Coyote Damage Management Would Occur

The underlying intent for preparing an EA is to determine if a proposed action might have a significant impact on the human environment. WS' EA development process is issue driven, meaning issues that were raised during the interdisciplinary process and through public involvement that were substantive, would be used to drive the analysis and determine the significance of the environmental impacts of the proposed action and the alternatives. Therefore, the level of site specificity must be appropriate to the issues listed.

The issues raised during the scoping process of this EA drove the analysis. In addition to the analysis contained in this EA, WS' personnel use the WS Decision Model (Slate et al. 1992; see WS Directive 2.201) described in Chapter 3 as a site-specific tool to develop the most appropriate strategy at each location. The WS Decision Model is an analytical thought process that WS' personnel would use to evaluate and respond to requests for assistance.

As discussed previously, one EA analyzing impacts for the entire State would provide a more comprehensive and less redundant analysis that allows for a better cumulative impact analysis. If a determination were made through this EA that the alternatives developed to meet the need for action could result in a significant impact on the quality of the human environment, then an EIS would be prepared.

CHAPTER 3: ALTERNATIVES

Section 3.1 contains a discussion of the alternatives that WS developed to meet the need for action discussed in Chapter 1 and to address the identified issues discussed in Chapter 2. WS developed the alternatives based on the need for action and issues using the WS Decision Model (Slate et al. 1992; see WS Directive 2.201). The alternatives will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences). Section 3.2 also discusses alternatives considered but not analyzed in detail, with rationale. In addition, Section 3.3 also discusses the SOPs that WS would incorporate into the relevant alternatives.

3.1 DESCRIPTION OF THE ALTERNATIVES

WS developed the following alternatives to meet the need for action and address the identified issues associated with managing damage caused by coyotes in the State.

Alternative 1 - Continue the Current Adaptive Integrated Methods Approach to Managing Coyote Damage (No Action/Proposed Action)

The proposed action/no action alternative would continue the current implementation of an adaptive integrated methods approach utilizing non-lethal and lethal techniques when WS receives a request for assistance in the State. This approach to managing damage associated with coyotes would integrate the use of the most practical and effective methods to resolve a request for damage management as determined by a site-specific evaluation for each request. WS' personnel would determine the appropriate methods to reduce damage and threats of damage by using the WS Decision Model (see discussion below on the WS Decision Model).

A major goal of the program would be to resolve and prevent damage caused by coyotes and to reduce threats to human safety. To meet this goal, WS would continue to respond to requests for assistance with, at a minimum, technical assistance, or when funding[8] was available, direct operational assistance. WS would provide those entities requesting assistance with information regarding the use of appropriate non-lethal and lethal techniques.

Under this alternative, WS could respond to requests for assistance by: 1) taking no action, if warranted, 2) providing only technical assistance to property owners or managers on actions they could take to reduce damages caused by coyotes, or 3) providing technical assistance and direct operational assistance to a property owner or manager experiencing damage. To meet the need for action, the objectives of this alternative would be to assist all of the people requesting WS' assistance, within the constraints of available funding and workforce.

WS could provide property owners or managers requesting assistance with information regarding the use of effective and practical non-lethal and lethal techniques. WS would give preference to non-lethal methods when practical and effective under this alternative (see WS Directive 2.101). Property owners or managers may choose to implement WS' recommendations on their own (*i.e*., technical assistance), use contractual services of private businesses, use volunteer services of private organizations, use the services of WS (*i.e*., direct operational assistance), take the management action themselves, or take no further action.

WS would work with those persons experiencing coyote damage to address those coyotes responsible for causing damage as expeditiously as possible. To be most effective, damage management activities should occur as soon as coyotes begin to cause damage. Once coyotes become familiar with a particular location (*i.e*., conditioned to an area), dispersing those coyotes or making the area unattractive can be difficult. WS would work closely with those entities requesting assistance to identify situations where damage could occur and begin to implement damage management activities under this alternative as early as possible to increase the likelihood of those methods achieving the level of damage reduction requested by the cooperating entity.

The WS Decision Model would be the implementing mechanism for a damage management program under the proposed action alternative that could be adapted to an individual damage situation. This alternative would allow WS to use the broadest range of methods to address damage or the threat of damage. When WS received a request for direct operational assistance, WS would conduct site visits to assess the damage or threats, would identify the cause of the damage, and would apply the Decision Model described by Slate et al. (1992) and WS Directive 2.201 to determine the appropriate methods to resolve or prevent damage. Discussion of the Decision Model and WS' use of the Model under the

[8]Funding for WS to conduct damage management activities could occur through federal appropriations, state appropriations, or from cooperative funding.

proposed action occurs below. In addition, WS would give preference to non-lethal methods when practical and effective (see WS Directive 2.101).

Non-lethal methods that would be available for use by WS under this alternative include, but are not limited to minor habitat modification, behavior modification, visual deterrents, live traps, translocation, exclusionary devices, frightening devices, and immobilizing drugs (see Appendix B for a complete list and description of potential methods). Lethal methods that would be available to WS under this alternative include cable restraints, the recommendation of harvest during the trapping season, euthanasia chemicals, and shooting, including the use of firearms from aircraft. In addition, target coyotes live-captured using non-lethal methods (*e.g.*, live-traps, immobilizing drugs) could be euthanized. The lethal control of target coyotes would comply with WS Directive 2.505.

Discussing methods does not imply that all methods would be used or recommended by WS to resolve requests for assistance and does not imply that all methods would be used to resolve every request for assistance. The most appropriate response would often be a combination of non-lethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy. For example, if an entity requesting assistance had already attempted to alleviate damage using non-lethal methods, WS would not necessarily employ those same non-lethal methods, since the previous use of those methods were ineffective at reducing damage or threats to an acceptable level to the requester.

Many lethal and non-lethal methods are intended to be short-term attempts at reducing damage occurring at the time those methods were employed. Long-term solutions to managing coyote damage could include limited habitat manipulations and changes in cultural practices, which are techniques addressed further below and in Appendix B.

Non-lethal methods can disperse or otherwise make an area unattractive to coyotes causing damage; thereby, reducing the presence of coyotes at the site and potentially the immediate area around the site where non-lethal methods were employed. WS' personnel would give preference to non-lethal methods when addressing requests for assistance (see WS Directive 2.101). However, WS' personnel would not necessarily employ non-lethal methods to resolve every request for assistance if deemed inappropriate by WS' personnel using the WS Decision Model, especially when the requesting entity had used non-lethal methods previously and found those methods to be inadequate to resolving the damage or threats of damage. WS' employees could use non-lethal methods to exclude, harass, and disperse target coyotes from areas where damage or threats were occurring. When effective, non-lethal methods would disperse coyotes from an area resulting in a reduction in the presence of those coyotes at the site where a person employed those methods. For any management methods employed, the proper timing would be essential in effectively dispersing those coyotes causing damage. Employing methods soon after damage begins or soon after a property owner or manager identifies threats, increases the likelihood that those damage management activities would achieve success in addressing damage. Therefore, coordination and timing of methods would be necessary to be effective in achieving expedient resolution of coyote damage.

Under the proposed action alternative, WS could employ only non-lethal methods when determined to be appropriate for each request for assistance to alleviate damage or reduce threats of damage using the WS Decision Model. In some situations, a cooperating entity has tried to employ non-lethal methods to resolve damage prior to contacting WS for assistance. In those cases, the methods employed by the requester were either unsuccessful or the reduction in damage or threats had not reached a level that was tolerable to the requesting entity. In those situations, WS could employ other non-lethal methods, attempt to apply the same non-lethal methods, or employ lethal methods. In many situations, the implementation of non-lethal methods, such as exclusion-type barriers, would be the responsibility of the requester, which

means that, in those situations, the only function of WS would be to implement lethal methods, if determined to be appropriate using the WS Decision Model.

WS could employ lethal methods to resolve damage associated with those coyotes identified by WS as responsible for causing damage or threats to human safety under this alternative; however, WS would only employ lethal methods after receiving a request for the use of those methods. The use of lethal methods could result in local population reductions in the area where damage or threats were occurring since people could remove individual coyotes from the population. WS and other entities often employ lethal methods to reinforce non-lethal methods and to remove coyotes that WS or other entities identify as causing damage or posing a threat to human safety. The number of coyotes removed from the population using lethal methods under the proposed action would be dependent on the number of requests for assistance received, the number of coyotes involved with the associated damage or threat, and the efficacy of methods employed.

Often of concern with the use of lethal methods is that coyotes that were lethally removed would only be replaced by other coyotes either after the application of those methods (*e.g.*, coyotes that relocate into the area) or by coyotes the following year (*e.g.*, increase in reproduction and survivability that could result from less competition). As stated previously, WS' personnel would not use lethal methods as population management tools over broad areas. The intent of using lethal methods would be to reduce the number of coyotes present at a specific location where damage was occurring by targeting those coyotes causing damage or posing threats. The intent of lethal methods would be to manage damage caused by individual coyotes and not to manage entire coyote populations.

Most lethal and non-lethal methods currently available provide only short-term benefits when addressing coyote damage. The intended use of those methods would be to reduce damage occurring at the time those methods were employed but do not necessarily ensure coyotes would not return once those methods were discontinued. Long-term solutions to resolving coyote damage would often be difficult to implement and can be costly. In some cases, long-term solutions involve exclusionary devices, such as fencing, or other practices that would not be costly or difficult to implement such as closing garbage cans. When addressing coyote damage, long-term solutions generally involve modifying existing habitat or making conditions to be less attractive to coyotes. To ensure complete success, alternative sites in areas where damage was not likely to occur would often be required to achieve complete success in reducing damage and to avoid moving the problem from one area to another. Modifying a site to be less attractive to coyotes would likely result in the dispersal of those coyotes to other areas where damage could occur or could result in multiple occurrences of damage situations.

WS may recommend coyotes be harvested during the regulated trapping season in an attempt to reduce the number of coyotes causing damage. Managing coyote populations over broad areas could lead to a decrease in the number of coyotes causing damage. Establishing trapping seasons and the allowed harvest levels during those seasons is the responsibility of the LDWF. WS does not have the authority to establish hunting or trapping seasons or to set allowed harvest numbers during those seasons.

Appendix B contains a complete list of methods available for use under this alternative. However, listing methods neither implies that all methods would be used by WS to resolve requests for assistance nor does the listing of methods imply that all methods would be used to resolve every request for assistance. As part of an integrated approach, WS may provide technical assistance and direct operational assistance to those people experiencing damage associated with coyotes when those persons request assistance from WS.

Direct Operational Assistance

Direct operational assistance would involve the direct implementation of management activities by WS' personnel. Direct operational assistance would only occur after WS provided technical assistance (see WS Directive 2.101, WS Directive 2.201) and WS has informed those persons requesting assistance of their options (see WS Directive 3.101). Initiation of operational damage management assistance could occur when the problem could not be effectively resolved through technical assistance alone and there was a written MOU, work initiation document, or other comparable document signed between WS and the entity requesting assistance. The initial investigation by WS' personnel would define the nature, history, and extent of the problem; species responsible for the damage; and methods available to resolve the problem. The professional skills of WS' personnel could be required to resolve problems effectively, especially if chemical methods were necessary or if the problems were complex.

Educational Efforts

Education is an important element of activities because wildlife damage management is about finding balance and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations, WS provides lectures, courses, and demonstrations to producers, homeowners, state and county agents, colleges and universities, and other interested groups. WS frequently cooperates with other entities in education and public information efforts. Additionally, WS' employees would continue to write technical papers and provide presentations at professional meetings and conferences so that other wildlife professionals and the public are aware of recent developments in damage management technology, programs, laws and regulations, and agency policies.

Research and Development

The National Wildlife Research Center (NWRC) functions as the research unit of WS by providing scientific information and the development of methods for wildlife damage management, which are effective and environmentally responsible (see WS Directive 2.115, WS Directive 2.120). Research biologists with the NWRC work closely with wildlife managers, researchers, and others to develop and evaluate methods and techniques for managing wildlife damage. Research biologists with the NWRC have authored hundreds of scientific publications and reports based on research conducted involving wildlife and methods.

Technical Assistance Recommendations

Under the proposed action, WS could provide technical assistance to those persons requesting assistance with managing damage as part of an integrated methods approach. Technical assistance could occur as described in Alternative 3 of this EA. From FY 2010 through FY 2015, WS conducted 452 technical assistance projects involving 961 participants that involved coyote damage to agricultural resources, property, natural resources, and threats to human safety.

WS' Decision Making Procedures

The WS Decision Model (see WS Directive 2.201) described by Slate et al. (1992) depicts how WS' personnel would use a thought process for evaluating and responding to damage complaints. WS' personnel would assess the problem and then evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic, and social considerations. Following this evaluation, WS' employees would incorporate methods deemed practical for the situation

into a damage management strategy. After WS' employees implemented this strategy, employees would continue to monitor and evaluate the strategy to assess effectiveness. If the strategy were effective, the need for further management would end. In terms of the WS Decision Model, most efforts to resolve wildlife damage consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions, including WS.

The general thought process and procedures of the WS Decision Model would include the following steps.

1. **Receive Request for Assistance:** WS would only provide assistance after receiving a request for such assistance. WS would not respond to public bid notices.
2. **Assess Problem:** First, WS would make a determination as to whether the assistance request was within the authority of WS. If an assistance request were within the authority of WS, WS' employees would gather and analyze damage information to determine applicable factors, such as what species was responsible for the damage, the type of damage, the extent of damage, and the magnitude of damage. Other factors that WS' employees could gather and analyze would include the current economic loss or current threat (*e.g.*, threat to human safety), the potential for future losses or damage, the local history of damage, and what management methods, if any, were used to reduce past damage and the results of those actions.
3. **Evaluate Management Methods:** Once a problem assessment was completed, a WS' employee would conduct an evaluation of available management methods. The employee would evaluate available methods in the context of their legal and administrative availability and their acceptability based on biological, environmental, social, and cultural factors.
4. **Formulate Management Strategy:** A WS' employee would formulate a management strategy using those methods that the employee determines to be practical for use. The WS employee would also consider factors essential to formulating each management strategy, such as available expertise, legal constraints on available methods, costs, and effectiveness.
5. **Provide Assistance:** After formulating a management strategy, a WS employee could provide technical assistance and/or direct operational assistance to the requester (see WS Directive 2.101).
6. **Monitor and Evaluate Results of Management Actions:** When providing direct operational assistance, it is necessary to monitor the results of the management strategy. Monitoring would be important for determining whether further assistance was required or whether the management strategy resolved the request for assistance. Through monitoring, a WS' employee would continually evaluate the management strategy to determine whether additional techniques or modification of the strategy was necessary.
7. **End of Project:** When providing technical assistance, a project would normally end after a WS' employee provided recommendations or advice to the requester. A direct operational assistance project would normally end when WS' personnel stop or reduce the damage or threat to an acceptable level to the requester or to the extent possible. Some damage situations may require continuing or intermittent assistance from WS' personnel and may have no well-defined termination point.

Community-based Decision Making

WS could receive requests for assistance from community leaders and/or representatives. In those situations, the WS program in Louisiana, under this alternative, would follow the "*co-managerial approach*" to solve wildlife damage or conflicts as described by Decker and Chase (1997). Within this management model, WS could provide technical assistance regarding the biology and ecology of coyotes and effective, practical, and reasonable methods available to the local decision-maker(s) to reduce damage or threats. This could include non-lethal and lethal methods. WS and other state and federal

wildlife management agencies may facilitate discussions at local community meetings when resources were available. Under this approach, resource owners within a community and other community members directly or indirectly affected by coyote damage or the management of damage would have direct input into the resolution of such problems. They may implement management recommendations provided by WS or others, or may request direct operational assistance from WS, other wildlife management agencies, local animal control agencies, private businesses, or seek no further assistance.

The community representative(s) and/or decision-maker(s) for the local community would be elected officials or representatives of the communities. The community representative(s) and/or decision-maker(s) who oversee the interests and business of the local community would generally be residents of the local community or appointees that other members of the community popularly elected. This person or persons would represent the local community's interest and make decisions for the local community or bring information back to a higher authority or the community for discussion and decision-making. Identifying the decision-maker for local business communities can be more complex because building owners may not indicate whether the business must manage wildlife damage themselves, or seek approval to manage wildlife from the property owner or manager, or from a governing Board.

Under a community based decision-making process, WS could provide information, demonstration, and discussion on available methods to the appropriate representative(s) of the community and/or community decision-maker(s) that requested assistance, which would help ensure that decisions made by representatives of the community and/or the decision-makers were based on community-based input. WS would only provide direct operational assistance if the local community representative(s) and/or decision-maker(s) requested such assistance and only if the assistance requested was compatible with WS' recommendations.

By involving community representatives and/or community decision-makers in the process, WS could present information that would allow decisions on damage management to involve those individuals that the representatives and/or decision-maker(s) represent. As addressed in this EA, WS could provide technical assistance to the appropriate representative(s) and/or decision-maker(s), including demonstrations and presentation by WS at public meetings to allow for involvement of the community. Requests for assistance to manage damage caused by coyotes often originate from the decision-maker(s) based on community feedback or from concerns about damage or threats to human safety. As representatives of the community, the community representative(s) and/or decision-maker(s) would be able to provide the information to local interests either through technical assistance provided by WS or through demonstrations and presentation by WS on damage management activities. This process would allow WS, the community representative(s), and/or decision-maker(s) to make decisions on damage management activities based on local input. The community leaders could implement management recommendations provided by WS or others, or may request management assistance from WS, other wildlife management agencies, local animal control agencies, or private businesses or organizations.

Private Property Decision-makers

In the case of private property owners, the decision-maker is the individual that owns or manages the affected property. The decision-maker has the discretion to involve others as to what occurs or does not occur on property they own or manage. Therefore, in the case of an individual property owner or manager, the involvement of others and to what degree others were involved in the decision-making process would be a decision made by that individual. WS could provide direct operational assistance when requested; however, WS would only provide assistance if the requested management actions were in accordance with WS' recommendations.

Public Property Decision-makers

The decision-maker for local, state, or federal property would be the official responsible for or authorized to manage the public land to meet interests, goals, and legal mandates for the property. WS could provide technical assistance to this person and make recommendations to reduce damage. WS could provide direct operational assistance when requested; however, WS would only provide assistance if the requested management actions were in accordance with WS' recommendations.

Alternative 2 – Coyote Damage Management by WS through an Adaptive Integrated Approach Using Only Non-lethal Methods

Under this alternative, WS would implement an adaptive integrated methods approach as described under Alternative 1; however, WS would only consider non-lethal methods when formulating approaches to resolve damage associated with coyotes, wherever a property owner requests such assistance. WS could provide technical assistance and/or direct operational assistance similar to Alternative 1. The only methods that WS could recommend or use would be the non-lethal methods described in Appendix B and those methods would be identical to those non-lethal methods available and discussed under Alternative 1. Under this alternative, non-lethal methods would include fencing, electronic guards (siren strobe-light devices), propane exploders, pyrotechnics, exclusion barriers, fladry, minor habitat alteration, cage traps, foothold traps, cable restraints, and translocation (see Appendix B for a complete list). If WS were to conduct operational assistance, WS' personnel would translocate coyotes because lethal methods would be unavailable. Under this alternative, WS would not use firearms or euthanasia chemicals.

WS would refer requests for information regarding lethal methods to the LDWF, the LDAF, and/or private entities. Although WS would not recommend or use lethal methods under this alternative, other entities, including private entities, could continue to use lethal methods to resolve damage or threats. Property owners or managers could still resort to lethal methods or other methods not recommended by WS.

Alternative 3 – Coyote Damage Management by WS through Technical Assistance Only

Under this alternative, WS would provide those cooperators requesting assistance with technical assistance only. Similar to Alternative 1 and Alternative 2, WS could receive requests for assistance from community representatives, private individuals/businesses, or from public entities. Technical assistance would provide those cooperators experiencing damage or threats associated with coyotes with information, demonstrations, and recommendations on available and appropriate methods. The implementation of methods and techniques to resolve or prevent damage would be the responsibility of the requester with no direct involvement by WS. In some cases, WS may provide supplies or materials that were of limited availability for use by private entities (*e.g.*, loaning of propane cannons). Technical assistance may be provided through a personal or telephone consultation, or during an on-site visit with the requester. Generally, WS would describe several management strategies to the requester for short and long-term solutions to managing damage. WS would base those strategies on the level of risk, need, and the practicality of their application. WS would use the Decision Model to recommend those methods and techniques available to the requester to manage damage and threats of damage. Those persons receiving technical assistance from WS could implement those methods recommended by WS, could employ other methods not recommended by WS, could seek assistance from other entities, or take no further action.

Under a technical assistance only alternative, WS would recommend an integrated approach similar to Alternative 1 and Alternative 2 when receiving a request for assistance; however, WS would not provide direct operational assistance under this alternative. WS would give preference to non-lethal methods when practical and effective under this alternative (see WS Directive 2.101). WS would base method and

technique recommendations on information provided by the individual(s) seeking assistance using the WS Decision Model. In some instances, wildlife-related information provided to the requester by WS would result in tolerance/acceptance of the situation. In other instances, WS would discuss and recommend damage management options. WS would only recommend or loan those methods legally available for use by the appropriate individual. Those methods described in Appendix B would be available to those persons experiencing damage or threats associated with coyotes in the State; however, immobilizing drugs, euthanasia chemicals, and the use of aircraft would have limited availability to the public and other entities under this alternative. Licensed veterinarians or people under their supervision would be the only entities that could use immobilizing drugs and euthanasia chemicals. The availability of aircraft would also be limited, especially shooting from an aircraft. Shooting from an aircraft by entities other than WS to alleviate damage or threats of damage would require a permit from the LDWF.

The WS program in the State regularly provides technical assistance to individuals, organizations, and other federal, state, and local government agencies for managing coyote damage. Technical assistance would include collecting information about the species involved, the extent of the damage, and previous methods that the cooperator had attempted to resolve the problem. WS would then provide information on appropriate methods that the cooperator could consider to resolve the damage themselves. Types of technical assistance projects may include a visit to the affected property, written communication, telephone conversations, or presentations to groups such as homeowner associations or civic leagues. Between FY 2010 and FY 2015, WS has conducted 452 technical assistance projects that involved coyote damage to agricultural resources, property, natural resources, and threats to human safety.

This alternative would place the immediate burden of operational damage management work on the resource owner, other governmental agencies, and/or private businesses. Those persons experiencing damage or were concerned with threats posed by coyotes could seek assistance from other governmental agencies, private entities, or conduct damage management on their own. Those persons experiencing damage or threats could take action using those methods legally available to resolve or prevent coyote damage as permitted by federal, state, and local laws and regulations or those persons could take no action.

Alternative 4 – No Coyote Damage Management Conducted by WS

This alternative would preclude all activities by WS to reduce threats to human health and safety, and to alleviate damage to agricultural resources, property, and natural resources. WS would not provide assistance with any aspect of managing damage caused by coyotes in the State. WS would refer all requests for assistance to resolve damage caused by coyotes to the LDWF, other governmental agencies, and/or private entities.

Despite no involvement by WS in resolving damage and threats associated with coyotes in the State, those persons experiencing damage caused by coyotes could continue to resolve damage by employing those methods legally available since the removal of coyotes to alleviate damage or threats could occur despite the lack of involvement by WS. The removal of coyotes by a property owner or another entity could occur during the trapping season. Landowners and their designated agents can lethally remove coyotes at any time when coyotes are causing damage in accordance with appropriate regulations (LDWF 2015). Similar to Alternative 3, those methods described in Appendix B would be available to those people experiencing damage or threats associated with coyotes in the State; however, immobilizing drugs, euthanasia chemicals, and the use of aircraft would have limited availability to the public and other entities under this alternative. Licensed veterinarians or people under their supervision would be the only entities that could use immobilizing drugs and euthanasia chemicals. The availability of aircraft would also be limited, especially shooting from an aircraft. Shooting from an aircraft by entities other than WS to alleviate damage or threats of damage would require a permit from the LDWF.

Under this alternative, those persons experiencing damage or threats of damage could contact WS; however, WS would immediately refer the requester to the LDWF, the LDAF, and/or to other entities. The requester could contact other entities for information and assistance with managing damage, could take actions to alleviate damage without contacting any entity, or could take no further action.

3.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

In addition to those alternatives analyzed in detail, WS identified several additional alternatives. However, those alternatives will not receive detailed analyses for the reasons provided. Those alternatives considered but not analyzed in detail include the following.

Non-lethal Methods Implemented Before Lethal Methods

This alternative would require that WS apply non-lethal methods or techniques described in Appendix B to all requests for assistance to reduce damage and threats to safety from coyotes in the State. If the use of non-lethal methods failed to resolve the damage situation or reduce threats to human safety at each damage situation, WS could then employ lethal methods to reduce damage or the threat of damage. WS would apply non-lethal methods to every request for assistance regardless of severity or intensity of the damage or threat until deemed inadequate to resolve the request. This alternative would not prevent the use of lethal methods by other entities or by those persons experiencing coyote damage but would only prevent the use of those methods by WS until WS had employed non-lethal methods. The WS program could recommend the use of lethal methods through technical assistance under this alternative; however, the operational use of lethal methods would only occur after the use of non-lethal methods had proven ineffective.

Some non-lethal methods available to alleviate damage or threats associated with coyotes are impractical for implementation by WS' personnel, such as altering livestock management practices (*e.g.*, night-penning, herding, carcass removal) and physical exclusion (*e.g.*, predator-proof fencing). Those persons experiencing damage often employ non-lethal methods to reduce damage or threats prior to contacting the WS program. Implementation of most non-lethal methods for livestock protection falls within the purview of the livestock producer (Knowlton et al. 1999). Many of those non-lethal methods (*e.g.*, fencing and guard animals) require a large investment in time to implement and have a high initial cost (Mitchell et al. 2004). Even with the additional effort and costs, those methods are not always effective at reducing damage and potentially have side effects (*e.g.*, concentrating livestock can cause unwanted damage to particular pasture areas) (Knowlton et al. 1999).

Producers in the United States spent nearly $188.5 million dollars on non-lethal methods to reduce cattle and calf losses from predation by animals in 2010 (NASS 2011). The primary non-lethal method employed by cattle producers in Louisiana that used at least one non-lethal method was the use of exclusion fencing with a reported 38.5% of producers using fencing. Producers that used at least one non-lethal method also reported using additional non-lethal methods, with 31.0% reporting the use of guard animals, 24.5% using frequent checks, 19.7% using culling, 18.9 using other non-lethal methods, 17.9% using livestock carcass removal, 7.9% using herding, and 2.0% using fright tactics (NASS 2011).

Verification of the methods used would be the responsibility of WS. No standard exists to determine requester diligence in applying those methods, nor are there any standards to determine how many non-lethal applications are necessary before the initiation of lethal methods. Thus, WS could only evaluate the presence or absence of non-lethal methods. Alternative 1 and Alternative 2 would be similar to a non-lethal before lethal alternative because WS' personnel would give preference to the use of non-lethal

methods before lethal methods (see WS Directive 2.101). Adding a non-lethal before lethal alternative and the associated analysis would not contribute additional information to the analyses in the EA.

Use of Lethal Methods Only by WS

This alternative would require the use of lethal methods only to reduce threats and damage associated with coyotes. However, non-lethal methods can be effective in preventing damage in certain instances. Under WS Directive 2.101, WS must consider the use of non-lethal methods before lethal methods. In those situations where application of the WS Decision Model determines that using non-lethal methods would effectively reduce or prevent damage, WS' personnel would employ or recommend those methods. Therefore, WS did not consider this alternative in detail.

Live-capture and Translocation of Coyotes Only

Under this alternative, WS would address all requests for assistance using live-capture methods or the recommendation of live-capture methods and WS would translocate all coyotes live-captured. Coyotes would be live-captured using immobilizing drugs, live-traps, foothold traps, or cable restraints. The success of translocation efforts would depend on efficiently capturing target coyotes and the existence of an appropriate release site (Nielsen 1988). WS would identify release sites prior to live-capture to ensure appropriate sites were available before initiating any activities.

The LDWF would have to approve and authorize the translocation and release of the individual target coyote. The translocation of coyotes could only occur under the authority of the LDWF. Therefore, the translocation of coyotes by WS would only occur as directed by the LDWF. In addition, the property owner would have to authorize WS to release target animals on their property. When the LDWF authorizes translocation of target coyotes and when a property owner approves of WS releasing coyotes on their property, WS could translocate coyotes or recommend translocation under Alternative 1 and could recommend translocation under the technical assistance only alternative (Alternative 2). Translocation by other entities could also occur under all of the alternatives.

Translocation may be appropriate in some situations when the population is low. However, coyotes are abundant in much of the suitable habitat in Louisiana, and translocation is not necessary for the maintenance of viable populations in the State. Because coyotes are abundant in Louisiana, the coyotes that WS translocated and released into suitable habitat would very likely encounter other coyotes with established territories. Coyotes are territorial, and introducing translocated coyotes into new areas often disorientates the coyotes because they are unfamiliar with their surroundings. Therefore, translocated coyotes could often be at a disadvantage. Territorial coyotes often viciously attack other coyotes that wander into their territories and those injuries sustain during those attacks oftentimes causes the death of translocated coyote. Survival of translocated animals is generally very poor due to the stress of translocation, and in many cases, released animals suffer mortality in a new environment (Craven et al. 1998).

Translocation of wildlife is also discouraged by WS policy (see WS Directive 2.501) because of the stress to the translocated animal, threat of spreading diseases, poor survival rates, and the difficulties that translocated wildlife have with adapting to new locations or habitats (Nielsen 1988). Since WS does not have the authority to translocate coyotes in the State unless permitted by the LDWF, WS did not consider this alternative in detail.

Use of Non-lethal Methods and Approved Euthanasia Only

Under this alternative, WS would continue to employ an integrated methods approach but would only employ non-lethal methods to exclude, harass, or live-capture coyotes. When deemed appropriate, WS could continue to remove target coyotes lethally; however, under this alternative, WS would only use methods that captured target coyotes alive. Once live-captured, WS' personnel would euthanize target coyotes using methods that meet the definition of euthanasia as defined by the AVMA.

Euthanasia methods would be restricted to those defined by the AVMA (2013) as acceptable or conditionally acceptable, and would include sodium pentobarbital, potassium chloride, carbon dioxide, and firearms (once live-captured). This alternative would be similar to the proposed action alternative since WS would give preference to the use of non-lethal methods when practical and effective (see WS Directive 2.101). In addition, WS' personnel would be familiar with the euthanasia methods described by the AVMA and would use those methods to euthanize captured or restrained animals, whenever practicable (see WS Directive 2.430, WS Directive 2.505). Therefore, WS did not consider this alternative in detail.

Reducing Damage by Managing Coyote Populations through the Use of Reproductive Inhibitors

Under this alternative, the only method that would be available to resolve requests for assistance by WS would be the recommendation and the use of methods that reduce or prevent reproduction in coyotes responsible for causing damage. Wildlife professionals often consider reproductive inhibitors for use where wildlife populations are overabundant and where traditional hunting or lethal control programs were not publicly acceptable (Muller et al. 1997). Wildlife professionals could achieve a reduction in local wildlife populations through natural mortality combined with reduced fecundity. However, population dynamic characteristics (*e.g.*, longevity, age at onset of reproduction, population size, and biological/cultural carrying capacity), habitat and environmental factors (*e.g.*, isolation of target population, cover types, and access to target individuals), socioeconomic, and other factors often limit the use and effectiveness of reproductive control as a tool for wildlife population management. 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 1998). Additionally, the need to treat a sufficiently large number of target animals, multiple treatments, and population dynamics of free-ranging populations place considerable logistic and economic constraints on the adoption of reproduction control technologies as a wildlife management tool for some species.

Reproductive control for wildlife can occur through sterilization (permanent) or contraception (reversible). Sterilization could be accomplished through: 1) surgical sterilization (vasectomy, castration, and tubal ligation), 2) chemosterilization, and 3) through gene therapy. Contraception could be accomplished through: 1) hormone implantation (synthetic steroids such as progestins), 2) immunocontraception (contraceptive vaccines), and 3) oral contraception (progestin administered daily). Currently, chemical reproductive inhibitors are not available for use to manage coyote populations.

Bromley and Gese (2001*a*, 2001*b*) conducted studies to determine if surgically sterilized coyotes would maintain territories and pair bond behavior characteristics of unsterilized coyotes, and if predation rates by sterilized coyote pairs would decrease. The results indicated that behaviorally, sterile coyote pairs appeared to be no different from unsterilized pairs, except for predation rates on lambs. Unsterilized coyote packs were six times more likely to prey on sheep than were sterilized packs (Bromley and Gese 2001*b*). Bromley and Gese (2001*b*) believed this occurred because sterile packs did not have to provision pups and food demands were lower. Therefore, sterilization could be an effective method to reduce lamb predation if wildlife professionals could capture and sterilize enough coyote breeding pairs. Bromley and Gese (2001*a*, 2001*b*) captured as many coyotes as possible from all packs on their study area and

controlled coyote exploitation (mortality) on their study area. During their studies, Bromley and Gese (2001*a*, 2001*b*) found survival rates for coyotes in the unexploited study area were similar to those survival rates reported for mostly unexploited wild coyote populations. Similar results were found by Seidler and Gese (2012). Bromley and Gese (2001*b*) concluded a more effective and economical method of sterilizing resident coyotes was needed to make sterilization a practical management tool on a larger scale.

Surgical sterilization would require that each animal be captured and sterilization conducted by licensed veterinarians, which could be labor intensive and expensive. Given the costs associated with live-capturing and performing sterilization procedures on coyotes and the lack of availability of chemical reproductive inhibitors for the management of coyote populations, this alternative was not evaluated in detail. As alternative methods of delivering chemosterilants are developed, sterilization may prove to be a practical tool in some circumstances (DeLiberto et al. 1998). If reproductive inhibitors become available to manage a large number of coyotes and if an inhibitor has proven effective in reducing localized coyote populations, WS could evaluate the use of the inhibitor as a method available to manage damage.

Compensation for Coyote Damage

The compensation alternative would require WS to establish a system to reimburse persons impacted by coyote damage and to seek funding for the program. Under such an alternative, WS would continue to provide technical assistance to those persons seeking assistance with managing damage. In addition, WS would conduct site visits to verify damage. Evaluation of this alternative indicates that a compensation only alternative has many drawbacks. Compensation would require large expenditures of money and labor to investigate and validate all damage claims, and to determine and administer appropriate compensation. Compensation most likely would be below full market value and would give little incentive to resource owners to limit damage through improved cultural or other practices and management strategies. In addition, providing compensation would not be practical for reducing threats to human health and safety.

Short Term Eradication and Long Term Population Suppression

An eradication alternative would direct all WS' program efforts toward total long-term elimination of coyote populations wherever a person initiated a cooperative program with WS in Louisiana. Eradication of native wildlife species is not a desired population management goal of State agencies or WS. WS did not consider eradication as a general strategy for managing coyote damage because WS and other state and federal agencies with interest in, or jurisdiction over, wildlife oppose eradication of any native wildlife species and eradication is not acceptable to most people.

Suppression would direct WS' program efforts toward managed reduction of certain problem populations or groups. In areas where WS could attribute damage to localized populations of coyotes, WS could decide to implement local population suppression using the WS Decision Model. However, large-scale population suppression would not be realistic or practical to consider as the basis of the WS program. Problems with the concept of suppression would be similar to those described above for eradication. Typically, WS would conduct activities on a very small portion of the sites or areas inhabited or frequented by coyotes in the State.

Establish a Bounty System for Coyotes

Most wildlife professionals have not supported payment of funds (bounties) for removing animals suspected of causing damage, or posing threats of damage, for many years (Latham 1960). WS concurs

because of several inherent drawbacks and inadequacies in the payment of bounties. Bounties are often ineffective at controlling damage over a wide area, such as across the entire State. The circumstances surrounding the removal of animals are typically unknown and completely unregulated because it is difficult or impossible to assure people did not remove animals claimed for bounty from outside the area where damage was occurring. In addition, WS does not have the authority to establish a bounty program.

WS should use Lithium Chloride as an Aversive Agent

This alternative would require WS to use only lithium chloride to prevent coyote predation on livestock. Researchers have evaluated lithium chloride as a taste aversion agent to condition coyotes to avoid livestock, especially sheep. Despite extensive research, the efficacy of this technique remains unproven (Conover et al. 1977, Sterner and Shumake 1978, Burns 1980, Burns and Connolly 1980, Burns 1983, Horn 1983, Burns and Connolly 1985). Results of studies evaluating lithium chloride as a taste aversion agent to prevent coyote predation have reported varying results. Some studies report success using lithium chloride (Gustavson et al. 1974, Ellins and Martin 1981, Gustavson et al. 1982, Forthman-Quick et al. 1985*a*, Forthman-Quick et al. 1985*b*), while other studies have shown lithium chloride to be ineffective, especially in field situations (Conover et al. 1977, Burns 1980, Bourne and Dorrance 1982, Burns 1983, Burns and Connolly 1985). The United States General Accounting Office (2001) reported "…*while the coyotes learned not to eat lambs, they still killed them*". In addition, lithium chloride is currently not registered for use with the EPA to prevent predation. Therefore, at the time this EA was developed, products containing lithium chloride were not available to prevent predation. If a product containing lithium chloride becomes available to manage damage and if the product is effective in reducing predation rates, WS could consider the use of the lithium chloride as a method available that could be used to manage damage.

3.3 STANDARD OPERATING PROCEDURES FOR COYOTE DAMAGE MANAGEMENT

SOPs improve the safety, selectivity, and efficacy of activities intended to resolve animal damage. The WS program in Louisiana uses many such SOPs. Under the appropriate alternatives, WS' personnel would incorporate those SOPs into activities when addressing coyote damage and threats in the State.

Some key SOPs pertinent to resolving coyote damage in the State include the following:

- WS' employees would consistently use and apply the WS Decision Model when addressing coyote damage to identify effective strategies to managing damage and the potential effects.

- WS' personnel would follow EPA-approved label directions for all pesticide use. The intent of the registration process for chemical pesticides is to assure minimal adverse effects occur to the environment when people use the chemicals in accordance with label directions.

- WS' employees would use approved immobilizing drugs and euthanasia chemicals according to the United States Drug Enforcement Administration, United States Food and Drug Administration, and WS' directives and procedures (see WS Directive 2.430).

- WS' employees would follow approved procedures outlined in the WS' Field Manual for the Operational Use of Immobilizing and Euthanizing Drugs (Johnson et al. 2001).

- WS' employees that use controlled substances would receive training to use each material and would receive certification to use controlled substances.

- WS' employees who use pesticides and controlled substances would participate in State-

approved continuing education to keep current of developments and maintain their certifications.

- Pesticide and controlled substance use, storage, and disposal would conform to label instructions and other applicable laws and regulations, and Executive Order 12898.

- WS would provide Material Safety Data Sheets for pesticides and controlled substances to personnel involved with specific damage management activities.

- All personnel who use firearms would receive training according to WS' Directive 2.615.

- WS' employees participating in any aspect of aerial operations would receive training and/or would receive certification in their role and responsibilities during the operations. All WS' personnel would follow the policies and directives set forth in WS Directive 2.620; WS' Aviation Operations Manual; WS' Aviation Safety Manual and its amendments; Title 14 CFR; and Federal Aviation Regulations, Part 43, 61, 91, 119, 133, 135, and 137.

- WS' personnel would consider the use of non-lethal methods prior to the use of lethal methods when managing coyote damage.

- The removal of coyotes by WS under the proposed action alternative would only occur when authorized by the LDWF, when applicable, and only at levels authorized.

- WS' personnel would direct management actions toward localized populations, individuals, or groups of coyotes. WS' personnel would not conduct generalized population suppression across Louisiana, or even across major portions of the State.

- WS' personnel would release non-target animals live-captured in traps unless an employee determined that the animal would not survive and/or that releasing the animal could not occur safely.

- The use of all traps, cable devices, and other capture devices by WS' personnel would adhere to WS Directive 2.450.

- WS would adhere to the restriction zones for the use of cable restraints to avoid incidental capture of Louisiana black bears (see Appendix E).

- WS would abide by all reasonable and prudent measures, including the terms and conditions that implement the reasonable and prudent measures, as outlined in the Biological Opinion issued by the USFWS to avoid jeopardizing the status of the Louisiana black bear.

3.4 ADDITIONAL STANDARD OPERATING PROCEDURES SPECIFIC TO THE ISSUES

Several additional SOPs are applicable to the alternatives and the issues identified in Chapter 2 including the following:

Issue 1 - Effects of Coyote Damage Management Activities on Target Coyote Populations

- The WS program in Louisiana would report annual activities to the LDWF so the LDWF has the opportunity to evaluate population trends and the magnitude of WS' activities in the State.

- WS would only target those individuals or groups of coyotes identified as causing damage or posing a threat to human safety.

- WS' personnel would use the WS Decision Model, designed to identify the most appropriate damage management strategies and their impacts, to determine strategies for resolving coyote damage.

- The WS program would monitor activities under the selected alternative to ensure activities continued to occur pursuant to the selected alternative. However, under the no involvement by WS alternative, no monitoring would occur by WS.

- WS' personnel would give preference to non-lethal methods, when practical and effective pursuant to WS Directive 2.101.

Issue 2 - Effects of Coyote Damage Management Activities on Non-target Wildlife Species Populations, Including T&E Species

- When conducting removal operations via shooting, identification of the target would occur prior to application.

- As appropriate, WS' personnel would use suppressed firearms to minimize the noise associated with the discharge of a firearm.

- Personnel would use lures, trap placements, and capture devices that personnel would place strategically at locations likely to capture a target coyote and minimize the potential of non-target animal captures.

- Personnel would release any non-target animals live-captured in cage traps, foothold traps, or any other restraining device whenever it was possible and safe to do so.

- WS' personnel would check methods in accordance with WS Directive 2.210 and WS Directive 2.450. Personnel would directly monitor some live-capture methods (*e.g.*, immobilizing drugs administered through a dart gun), which ensures that personnel could release non-target species quickly, if captured. In most cases, WS' personnel would check other live-traps (*e.g.*, cage traps, foothold traps, restraining cables), which do not require direct monitoring, at least once a day or in accordance with Louisiana laws and regulations. Checking traps frequently would help ensure that personnel could release live-captured non-target species in a timely manner.

- Personnel would dispose of the carcasses retrieved in accordance with WS Directive 2.515.

- WS has consulted with the USFWS and the LDWF to evaluate activities to resolve coyote damage and threats to ensure the protection of T&E species.

- WS would adhere to the restriction zones for the use of cable restraints to avoid incidental capture of Louisiana black bears (see Appendix E).

- WS would abide by all reasonable and prudent measures, including the terms and conditions that implement the reasonable and prudent measures, as outlined in the Biological Opinion issued by the USFWS to avoid jeopardizing the status of the Louisiana black bear.

- WS would monitor activities conducted under the selected alternative, if activities were determined to have no significant impact on the environment and an EIS was not required, to ensure those activities do not negatively affect non-target species.

- WS' personnel would review all projects proposed for implementation for potential to take[9] bald eagles in accordance with the provisions of the Bald and Golden Eagle Protection Act. If WS' personnel identify potential risks of take, WS would work with the USFWS on measures to reduce risks and the need for a non-purposeful take permit.

Issue 3 - Effects of Coyote Damage Management Activities on Human Health and Safety

- WS' personnel would conduct damage management activities professionally and in the safest manner possible. Whenever possible, personnel would conduct damage management activities away from areas of high human activity. If this were not possible, then personnel would conduct activities during periods when human activity was low (*e.g.*, early morning).

- WS' personnel would use the WS' Decision Model (see WS Directive 2.201) when selecting methods to use and/or recommend (see WS Directive 2.101), including consideration for the safety of people and employees (see WS Directive 2.210, WS Directive 2.601, WS Directive 2.605, WS Directive 2.615, WS Directive 2.620, WS Directive 2.625).

- WS' personnel would conduct shooting during times when public activity and access to the control areas were restricted. Personnel involved in shooting operations would receive training in the proper and safe application of this method.

- All personnel employing chemical methods would receive proper training and certification in the use of those chemicals. All chemicals used by WS would be securely stored and properly monitored to ensure the safety of the public. WS Directive 2.401, WS Directive 2.405, WS Directive 2.430, and WS Directive 2.465 outline WS' use of chemicals and the training requirements to use those chemicals.

- All chemical methods used by WS or recommended by WS would be registered with the EPA, the United States Drug Enforcement Administration, the United States Food and Drug Administration, and/or the LDAF, as appropriate.

- WS' personnel would dispose of carcasses retrieved after damage management activities in accordance with WS Directive 2.515.

Issue 4 - Effects of Coyote Damage Management Activities on the Aesthetic Value of Coyotes

- WS' personnel would direct management actions to reduce or prevent damage caused by coyotes toward specific individuals identified as responsible for the damage, identified as posing a threat to human safety, or identified as posing a threat of damage.

- WS and the entity requesting assistance would agree upon all methods or techniques applied to resolve damage or threats to human safety by signing a work initiation document, MOU, or comparable document prior to the implementation of those methods.

[9]The Bald and Golden Eagle Protection Act defines "*take*" as "*pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb*." Disturb is defined as any activity that can result in injury to an eagle, or cause nest abandonment or decrease in productivity by impacting breeding, feeding, or sheltering behavior.

- WS' personnel would give preference to non-lethal methods, when practical and effective.

Issue 5 - Humaneness and Animal Welfare Concerns of Methods

- WS' personnel would receive training in the latest and most humane devices/methods for removing target coyotes causing damage.

- WS' personnel would check methods in accordance with WS Directive 2.210 and WS Directive 2.450. Personnel would directly monitor some live-capture methods (*e.g*., immobilizing drugs administered through a dart gun), which ensures that personnel could release non-target species quickly, if captured. In most cases, WS' personnel would check other live-traps (*e.g*., cage traps, foothold traps, restraining cables), which do not require direct monitoring, at least once a day or in accordance with Louisiana laws and regulations. Checking traps frequently would help ensure that personnel could release live-captured non-target species in a timely manner.

- When deemed appropriate using the WS Decision Model, WS' use of lethal methods would comply with WS' directives (*e.g*., see WS Directive 2.401, WS Directive 2.430, WS Directive 2.505).

- The NWRC is continually conducting research to improve the selectivity and humaneness of wildlife damage management devices used by personnel in the field.

- WS' personnel would consider the use of non-lethal methods prior to the use of lethal methods when managing coyote damage.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions when selecting the appropriate alternative to address the need for action described in Chapter 1 and the issues described in Chapter 2. This chapter analyzes the environmental consequences of each alternative as that alternative relates to the issues identified.

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

This section analyzes the environmental consequences of each alternative in comparison to determine the extent of actual or potential impacts on the issues. Therefore, the proposed action/no action alternative (Alternative 1) serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. The analysis also takes into consideration mandates, directives, and the procedures of WS and the LDWF.

The WS program does not expect the alternatives to affect soils, geology, minerals, water quality/quantity, flood plains, wetlands, designated critical habitats, visual resources, air quality, prime/unique farmlands, aquatic resources, timber, and range significantly. Therefore, no further analysis associated with those resources occurs. The activities proposed in the alternatives would have a negligible effect on atmospheric conditions, including the global climate. Meaningful direct or indirect emissions of greenhouse gases by WS would not occur because of any of the alternatives. Those alternatives would meet the requirements of applicable laws, regulations, and Executive Orders, including the Clean Air Act and Executive Order 13514.

Issue 1 - Effects of Coyote Damage Management Activities on Target Coyote Populations

Coyotes are a familiar species of mammal to most people. Their coloration is blended, primarily gray mixed with a reddish tint. The belly and throat are generally a paler color than the rest of the body (Bekoff 1982, Bekoff and Gese 2003). Coyotes have long, rusty or yellowish legs with dark vertical lines on the lower foreleg. However, coloration can vary greatly in some individuals and local populations from nearly black to red or nearly white. Most have dark or black guard hairs over their back and tail (Green et al. 1994). The size of coyotes varies from about 20 to 40 lbs (9 to 18 kg) (Voigt and Berg 1987).

Coyotes often include many items in their diet. Rabbits are one of their most common prey items. Other items in the coyote's diet include carrion, rodents, deer (usually fawns), insects (such as grasshoppers), as well as livestock and poultry. Coyotes readily eat fruits, such as watermelons, berries, persimmons and other vegetative matter when it is available. In some areas, coyotes feed on human refuse at dumpsites and take small domestic pets, such as cats and dogs (Voigt and Berg 1987). They sometimes breed with domestic dogs (Bekoff and Gese 2003).

Coyotes are highly mobile animals with home ranges (territories) that vary by sex and age of the animal, food abundance, habitat, and season of the year (Pyrah 1984, Bekoff and Gese 2003). Coyote populations are comprised of territorial and non-territorial individuals. The average territory size in Louisiana is 6,600 acres (Hall 1979). Each territory contains a dominant pair, associated subordinates, and pups. Pre-whelping pack size ranges from two to 10 individuals (Gese et al. 1996, Knowlton et al. 1999). Coyotes breed between January and March and are able to breed prior to reaching one year of age (Kennelly and Johns 1976), but the percentage of yearlings having litters varies from zero to 80% in different populations (Gier 1968). A number of factors can influence this variation, which can cause large annual variations in total number of coyotes breeding. During a study in Texas, the percentage of females having litters varied from 48% to 81% (Knowlton 1972). Pups are born after a gestation period of 60 to 63 days, with litter sizes varying primarily with prey availability. Each dominant pair can produce a single litter of four to eight pups (Knowlton 1972, Hall 1979, Crabtree 1988, Gese et al. 1996). Gier (1968) reported average litter sizes of 4.8 to 5.1 in years with low rodent numbers, but litters of 5.8 to 6.2 during years with high rodent numbers.

Many references indicate that coyotes originally occurred in relatively open habitats, particularly grasslands and sparsely wooded areas of the western United States. The distribution of coyotes in eastern North America began to expand from 1900 to 1920. Now, all eastern states and Canadian provinces have at least a small population of coyotes (Voigt and Berg 1987). Today, coyotes range throughout the United States. Coyotes have adapted to, and now exist in virtually every type of habitat, arctic to tropic, in North America. Coyotes live in deserts, swamps, tundra, grasslands, brush, dense forests, from below sea level to high mountain ranges, and at all intermediate altitudes. High densities of coyotes also appear in the suburbs of major cities (Green et al. 1994).

The coyote is probably the most extensively studied carnivore (Bekoff and Gese 2003), and considerable research has been conducted on population dynamics. Predator abundance indices suggest that densities of coyotes in North America increase from north to south (Knowlton and Stoddart 1985, Parker 1995, Knowlton et al. 1999). Coyote densities can vary considerably between habitat types and vary based on numerous environmental variables. Coyote densities can range from 0.5 coyotes per square mile to six coyotes per square mile (Voigt and Berg 1987, Knowlton et al. 1999, Bekoff and Gese 2003). Knowlton (1972) concluded that coyote densities might approach a high of five to six coyotes per square mile under extremely favorable conditions. Such an estimate is speculative but represents some of the best available information for estimating coyote populations.

The cost to determine absolute coyote densities accurately over large areas can be prohibitive (Connolly 1992) and given the coyote's overall relative abundance, the cost is not likely justifiable. The presence of unusual food concentrations and the assistance provided to a breeding pair by non-breeding coyotes at the den can influence coyote densities and complicate efforts to estimate abundance (Danner and Smith 1980). Coyote densities are lowest in late winter prior to whelping, highest immediately after whelping, followed by a continued decline to the next whelping season (Parker 1995, Knowlton et al. 1999). Because determinations of absolute coyote densities are frequently unknown (Knowlton 1972), many researchers have estimated coyote populations using various methods (Clark 1972, Knowlton 1972, Camenzind 1978, Pyrah 1984, Knowlton et al. 1999). The methods for estimating carnivore populations are often crude and often produce estimates with broad confidence intervals (Crawford et al. 1993).

Coyotes began to expand their range into Louisiana around the time that red wolves were declining in the State (Paradiso and Nowak 1972, Riley and McBride 1972, Lowery 1974). Lowery (1974) reported coyotes first appeared in Louisiana sometime after 1942, and the first coyote was captured in Vernon Parish in 1949 (Goertz et al. 1975). Today, coyotes occur in all parishes of the State. However, actual population estimates and density information for coyotes in Louisiana are not currently available. Coyotes are common throughout the State and inhabit a variety of habitats. Since population information is not available for coyotes in Louisiana, this analysis calculates an estimate based upon the published densities of coyotes.

As stated previously, coyote densities can vary considerably between habitat types and vary based on numerous environmental variables. From available literature, coyote densities can range from 0.5 coyotes per square mile to six coyotes per square mile (Voigt and Berg 1987, Knowlton et al. 1999, Bekoff and Gese 2003). Using the current densities ranges published (Voigt and Berg 1987, Knowlton et al. 1999, Bekoff and Gese 2003), the statewide coyote population could range from 21,602 to 259,224 coyotes based on the land area of the State estimated at 43,204 square miles (United States Census Bureau 2011).

A common issue when conducting activities to alleviate damage or the threat of damage associated with animals is whether damage management actions would adversely affect the population of the target species, especially when an entity employs lethal methods. Non-lethal methods that would be available include habitat/behavior modification, pyrotechnics, visual deterrents, live traps, translocation, cable restraints, exclusionary devices, frightening devices, and immobilizing drugs (see Appendix B for a complete list and description of potential methods). Lethal methods that would be available to address coyote damage include live-capture followed by euthanasia, shooting, and cable restraints. For any methods employed, the proper timing would be essential in effectively addressing those coyotes causing damage. Employing methods soon after damage begins or soon after a person identified a threat of damage would increase the likelihood that those damage management activities would achieve success in addressing damage. Therefore, the coordination and timing of methods would be necessary to be effective in achieving expedient resolution of coyote damage.

WS' personnel would give preference to non-lethal methods when addressing requests for assistance under Alternative 1 and Alternative 3 (see WS Directive 2.101). However, WS would not necessarily employ or recommend non-lethal methods to alleviate every request for assistance under those alternatives if WS' personnel deemed those methods to be inappropriate using the WS Decision Model. For example, if a cooperator requesting assistance had already used non-lethal methods, WS would not likely recommend or continue to employ those particular methods since their use had already been proven ineffective in adequately resolving the damage or threat. Many non-lethal methods available to alleviate damage or threats associated with coyotes, such as livestock management practices (*e.g.*, night-penning, herding, carcass removal) and physical exclusion (*e.g.*, predator-proof fencing), are not practical for implementation by WS' personnel. Implementation of most non-lethal methods for livestock protection falls within the purview of the livestock producer (Knowlton et al. 1999).

Those persons experiencing damage often employ non-lethal methods to reduce damage or threats prior to contacting the WS program. Many livestock producers already use non-lethal methods to reduce predation (NASS 2000, NASS 2001, NASS 2005, NASS 2011). The NASS (2011) reported Louisiana cattle producers, that used at least one non-lethal method, used exclusion fencing (39%), guard animals (31%), frequent checks (25%), culling (20%), other non-lethal methods (19%), carcass removal (18%), herding (8%), and fright tactics (2%) to reduce predation. Many of those non-lethal methods (*e.g.*, fencing and guard animals) require a large investment in time to implement and have a high initial cost (Mitchell et al. 2004). For example, fencing large areas with predator-proof fencing may be cost prohibitive (deCalesta and Cropsey 1978, Thompson 1979, Nass and Theade 1988). In addition, the continued use of many non-lethal methods can often lead to the habituation of coyotes to those methods, which can decrease the effectiveness of those methods.

Mitchell et al. (2004) indicated that non-lethal methods to alleviate predation could be effective. However, Mitchell et al. (2004) and others, such as Knowlton et al. (1999), indicate that, although certain non-lethal methods have shown promise, further research is needed to determine their effectiveness and practicality. Non-lethal methods would be an important part of the mix of current strategies used to meet the need for action; however, in some cases, the use of only non-lethal methods would not keep damage or threats of damage at a level that would be acceptable to some people. Andelt (1992) reported that about a third of sheep producers using guard dogs indicated that the use of dogs did not reduce their reliance on other predator control techniques or on predator control agencies. Furthermore, livestock losses could increase as coyotes become accustomed to non-lethal practices (Pfiefer and Goos 1982). Green et al. (1994) found that guard dogs decrease in effectiveness over time, possibly due to an increase in coyotes and/or increase in predatory activities. Shivik (2006) provided a comparison of non-lethal tools for managing predation associated with carnivores, including the duration of effectiveness of those non-lethal tools. For example, Shivik (2006) noted that electronic guards would only be effective for 40 to 50 days when used to deter coyotes. When evaluating the effectiveness of fladry to exclude coyotes from livestock pastures in Michigan, Davidson-Nelson and Gehring (2010) found "…*no long-term exclusion of coyotes from fladry-protected livestock pastures*." However, design modification may improve the effectiveness of fladry (Young et al. 2015).

Non-lethal methods could disperse or otherwise make an area unattractive to coyotes causing damage; thereby, reducing the presence of coyotes at the site and potentially the immediate area around the site where non-lethal methods were employed. The dispersal of coyotes to other areas would have a minimal effect on coyote populations. People would not employ non-lethal methods over large geographical areas or apply those methods at such intensity that essential resources (*e.g.*, food sources, habitat) would be unavailable for extended durations or over such a wide geographical scope that long-term adverse effects would occur to the coyote population. Non-lethal methods generally have minimal impacts on overall populations of animals since those methods do not harm target species. Therefore, the use of non-lethal methods would not have adverse effects on coyote populations in the State under any of the alternatives.

The use of lethal methods by any entity could result in local population reductions in the area where damage or threats were occurring. Therefore, the use of lethal methods could result in local reductions of coyotes in the area where damage or threats were occurring. As stated previously, coyotes are an "*outlaw quadruped*" in the State, which allows people to remove coyotes at any time and without limit using hunting methods. In addition, coyotes are a furbearer species that people can harvest in the State during the annual trapping season. Under the designation as an "*outlaw quadruped*", people can lethally remove coyotes throughout the year during legal daylight shooting hours when those persons hold a legal hunting license. The LDWF places no limit on the number of coyotes that people can remove. On private property, a landowner, or their lessee or agent, with written permission and the landowner's contact information in possession, may lethally remove coyotes at night using legal methods from the last day of

February to the last day of August (LDWF 2015). During the length of the annual trapping season, there is no harvest limit for coyotes.

Therefore, activities conducted by any entity to alleviate damage associated with coyotes would be occurring along with other natural process and human-induced events, such as natural mortality, mortality from regulated harvest, and human-induced alterations of wildlife habitat. Table 4.1 shows the estimated harvest or removal of coyotes in the State between 2009 and 2014. Information on the harvest or removal of coyotes in the State for 2015 is currently not available. The trapper and hunter harvest from 2009 through 2013 was taken from the National Furbearer Harvest Statistics Database that the Association of Fish and Wildlife Agencies maintains (Association of Fish and Wildlife Agencies 2015). In addition to the removal of coyotes by hunters, trappers, and to alleviate damage, the LDWF promulgated a special trapping season for coyotes that are live-captured and sold to running pens for training dogs. Coyotes live-captured during the special trapping season are not killed but released into enclosures; however, they are removed from the wild population. The actual number of coyotes live-captured annually during this special trapping season prior to 2014 is unknown. The LDWF provided estimated harvest and removal data for 2014 (M. Collins, LDWF pers. comm. 2015). However, the annual mortality rate of coyotes in the State is unknown.

It is unclear if the data maintained by the Association of Fish and Wildlife Agencies is cumulative harvest (*i.e.*, both trapper and hunter harvest) or represents only trapper harvest or only hunter harvest. Therefore, under a worst-case scenario, the analysis will evaluate hunters and trappers harvesting the same number of coyotes from 2009 through 2013 based on the similar number of coyotes that hunters harvested during 2014 versus the number of coyotes that trappers harvested (see Table 4.1)[10]. Similarly, the number of coyotes removed for the live-market is unknown from 2009 through 2013; therefore, under a worst-case scenario, the analyses will evaluate the same number of coyotes were removed from the population annually from 2009 through 2013 as were removed during 2014.

Hunters and trappers harvested or removed an estimated 4,609 coyotes in the State between 2009 and 2014, which is an average annual harvest of 768 coyotes. If the statewide population of coyotes ranged from 21,602 to 259,224 coyotes, based on the land area of the State and available density data, the average lethal removal of 768 coyotes by hunters and trappers in the State would represent 0.3% to 3.5% of the estimated coyote population in the State. The highest estimated annual harvest of coyotes in the State from 2009 through 2014 occurred during 2014 when people harvested approximately 1,211 coyotes in the State. The lethal removal of 1,211 coyotes in the state would represent 0.5% to 5.6% of the estimated statewide population.

Population modeling information suggests that a viable coyote population can withstand an annual removal of 70% of their population without causing a decline in the population (Connolly and Longhurst 1975, Connolly 1995). The unique resilience of the coyote, its ability to adapt, and its perseverance under adverse conditions is commonly recognized among biologists and land managers. Despite intensive historical damage management efforts in livestock production areas and despite sport hunting and trapping for fur, coyotes continue to thrive and expand their range, occurring widely across North and Central America (Miller 1995). Connolly and Longhurst (1975) determined that, "*...if 75% of the coyotes are killed each year, the population would be exterminated in slightly over 50 years*." However, Connolly and Longhurst (1975) go on to explain that their "*...model suggests that coyotes, through compensatory reproduction, can withstand an annual population mortality of 70%*" and that coyote populations would regain pre-control densities (through recruitment, reproduction, and migration) by the

[10]The LDWF estimates trappers harvested 346 coyotes during 2014, which was similar to the estimated 317 coyotes that hunters harvested; therefore, under a worst-case scenario, estimating hunters harvested the same number of coyotes as trappers in the State from 2009 through 2013 would be similar to the ratio of coyotes that trappers harvested versus hunter harvested during 2014.

end of the fifth year after control was terminated even though 75% mortality had occurred for 20 years. In addition, other researchers (Windberg and Knowlton 1988) recognized that immigration, (not considered in the Connolly and Longhurst (1975) model) could result in rapid occupancy of vacant territories, which helps to explain why coyotes have thrived in spite of intensive damage management activities (Connolly 1978).

Table 4.1 – Annual harvest and live-market removal of coyotes in Louisiana, 2009-2014

Year	Method of Removal			TOTAL
	Harvest by Trappers†	Harvest by Hunters†	Live Market‡	
2009	72	72	548	**692**
2010	35	35	548	**618**
2011	23	23	548	**594**
2012	49	49	548	**646**
2013	150	150	548	**848**
2014	346	317	548	**1,211**
TOTAL	**675**	**646**	**3,288**	**4,609**

†Based on data from the National Furbearer Harvest Statistics Database (Association of Fish and Wildlife Agencies 2015)

‡Based on data provided by the LDWF (M. Collins, LDWF pers. comm. 2015)

When evaluating the potential impacts of management actions on the population of coyotes in the State, of primary concerns would be the cumulative effects associated with the number of individual coyotes that an entity removed and the cumulative impacts of that removal on the population of coyotes. Using lethal methods to alleviate damage or threats of damage could remove coyotes from the statewide population. Therefore, if WS used lethal methods, the removal of a coyote or coyotes could result in local population reductions in the area where damage or threats were occurring. To evaluate the potential cumulative effects associated with implementing the alternatives, the magnitude associated with lethally removing coyotes to alleviate damage occur below for each alternative.

Alternative 1 - Continue the Current Adaptive Integrated Methods Approach to Managing Coyote Damage (No Action/Proposed Action)

Under this alternative, WS could respond to requests for assistance to manage damage and threats associated with coyotes by taking no action, if warranted, by providing only technical assistance, or by providing technical and direct operational assistance. However, WS' response to requests for assistance would be dependent upon people initiating the request. Chapter 3 of this EA discusses technical assistance and direct operational assistance that WS could provide.

As discussed previously, the most effective approach to resolving any wildlife damage problem would be to use an adaptive integrated approach, commonly known as integrated management, which may call for the use of several methods simultaneously or sequentially. The philosophy behind integrated management is to implement methods in the most effective manner while minimizing the potentially harmful effects to people, target and non-target species, and the environment. Under this alternative, integrated damage management may incorporate both non-lethal and lethal methods depending upon the circumstances of the specific damage problem. When providing direct operational assistance, WS could employ a single method to alleviate damage or use several methods simultaneously or sequentially. When using methods, WS would give preference to non-lethal methods; however, WS would not necessarily use only non-lethal methods and in some cases, WS could employ only lethal methods if the requester had already used non-lethal methods without success.

Between FY 2010 and FY 2015, WS' personnel conducted 452 technical assistance projects associated with damage and threats of damages caused by coyotes, which includes those projects where WS provided information on managing damage or threats caused by coyotes. Requests for assistance were primarily associated with predation of animals. WS also provided direct operational assistance associated with coyotes from FY 2009 through FY 2014, primarily to alleviate livestock predation. During direct operational assistance projects, WS lethally removed 753 coyotes from FY 2009 through FY 2014 (see Table 4.2), which is an average annual removal of 126 coyotes.

Of the 753 coyotes WS lethally removed from FY 2009 through FY 2014, WS removed eight coyotes unintentionally as non-targets during other damage management activities. The highest annual lethal removal occurred during FY 2012 when WS' personnel removed 164 coyotes. Of the 164 coyotes WS lethally removed during FY 2012, WS lethally removed three coyotes unintentionally in cable restraints as non-targets during other damage management activities conducted by WS. A coyote was also live-captured in a cable restraint during FY 2013 but WS was able to release the coyote unharmed. In addition, WS dispersed 23 coyotes to alleviate the threat of damage between FY 2009 and FY 2014. Although preliminary and subject to change, the WS program lethally removed 94 coyotes during FY 2015 during activities to alleviate damage in the State.

The number of coyotes removed from the population annually by WS using lethal methods under Alternative 1 would be dependent on the number of requests for assistance received, the number of coyotes involved with the associated damage or threat, and the efficacy of methods employed. Based on the number of requests for assistance received previously and in anticipation of conducting additional efforts to alleviate damage caused by coyotes, WS could remove up to 400 coyotes annually under Alternative 1 to alleviate damage or threats of damage.

Table 4.2 – Number of coyotes WS removed by method in Louisiana, FY 2009 – FY 2015

	Method of Lethal Removal					
Fiscal Year	**Firearms**	**Foot Snare†**	**Foothold†**	**Neck Snare**	**Aerial**	**TOTAL**
2009	17	0	42	38	0	**97**
2010	13	0	34	47	0	**94**
2011	12	1	53	63	0	**129**
2012	56	0	37	71	0	**164**
2013	31	0	52	68	0	**151**
2014	13	0	42	44	19	**118**
2015‡	6	0	20	28	40	**94**

†Target animals were live-captured and subsequently lethally removed by other methods

‡Data for FY 2015 is preliminary and subject to change

In addition, WS could receive requests to assist with sampling and managing the spread of diseases found in coyote populations. If a disease outbreak occurred, WS could receive requests to remove coyotes for sampling and/or to prevent further spread of diseases. WS could also collect samples from coyotes that personnel lethally remove to alleviate damage or threats of damage. In addition, sampling strategies that WS could employ may involve sampling live-captured coyotes that WS' personnel could release on site after sampling occurs. The sampling (*e.g.*, drawing blood, collecting fecal samples) and the subsequent release of live-captured coyotes would not result in adverse effects since those coyotes would be released unharmed on site. In addition, the sampling of coyotes that were sick, dying, or harvested by trappers or hunters would not result in the additive lethal removal of coyotes that would not have already occurred in the absence of disease sampling. Therefore, WS' total annual removal would not exceed 400 coyotes annually under Alternative 1, including activities associated with disease sampling. WS' personnel could

also lethally remove coyotes unintentionally during other damage management activities; however, WS does not anticipate the cumulative lethal removal of coyotes to exceed 400 coyotes annually.

Using a statewide coyote population that ranges from 21,602 to 259,224 coyotes, the lethal removal of up to 400 coyotes annually would represent from 0.2% to 1.9% of the estimated statewide population. As stated previously, hunters and trappers in the State have harvested or removed an estimated 768 coyotes per year in the State from 2009 through 2014. Table 4.3 shows the known cumulative removal of coyotes in the State and the magnitude of the removal if the actual statewide coyote population occurred between 21,602 coyotes and 259,224 coyotes. If the average annual harvest and removal of coyotes by trappers and hunters represented future harvest, the cumulative removal of coyotes by hunters, trappers, and WS would be 1,168 coyotes. The cumulative removal of 1,168 coyotes would represent 5.4% of a statewide population estimated at 21,602 coyotes. If the statewide population were 259,224 coyotes, the cumulative removal of 1,168 coyotes would represent 0.5% of the estimated statewide population.

During 2014, hunters, trappers, and other people removed an estimated 1,211 coyotes in the State, which represented the highest estimated annual removal from 2009 through 2014. If the annual removal of coyotes by hunters, trappers, and other people continued to reach 1,211 coyotes annually, the cumulative removal, including the highest anticipated removal by WS of 400 coyotes, would represent 7.5% of a statewide population estimated at 21,602 coyotes.

Removal of 7.5% of the estimated coyote population would be below the 70% harvest level required to cause population declines calculated by Connolly and Longhurst (1975) and Connolly (1995). However, the statewide population of coyotes likely exceeds 21,602 coyotes. As shown in Table 4.3, the cumulative annual removal of coyotes between 2009 and 2014 has not exceeded 6.2% of a population estimated at 21,602 coyotes and likely ranged from 0.3% to 6.2% of the estimated population. Although exact population estimates for coyotes in Louisiana and annual harvest rates are not available, the unlimited harvest allowed by the LDWF for the species during trapping seasons and the classification of coyotes as an "*outlaw quadruped*" indicates the species is not at risk of overharvesting.

Table 4.3 – Cumulative known removal of coyotes in Louisiana and potential impacts, 2009 - 2014

Year	Dispersed by WS[1]	Take by Entity		Total Removal	% of Highest Population[2]	% of Lowest Population[3]
		WS[1]	Harvest			
2009	0	97	692	**789**	0.3%	3.7%
2010	0	94	618	**712**	0.3%	3.3%
2011	2	129	594	**723**	0.3%	3.4%
2012	8	164	646	**810**	0.3%	3.8%
2013	8	151	848	**999**	0.4%	4.6%
2014	5	118	1,211	**1,329**	0.5%	6.2%

[1]Reported by fiscal year

[2]Percentage based on a statewide coyote population estimated at 259,224 coyotes

[3]Percentage based on a statewide coyote population estimated at 21,602 coyotes, which represents a worst-case scenario

WS would maintain ongoing contact with the LDWF to ensure activities occurred within management objectives for coyotes under this alternative. Therefore, the LDWF would have the opportunity to monitor the cumulative removal of coyotes from all sources and could factor in survival rates from predation, disease, and other mortality data. In addition, ongoing contact with the LDWF would assure the LDWF had the opportunity to consider local, state, and regional knowledge of population trends. Based on the limited annual removal proposed by WS, WS' removal of coyotes annually would have no effect on the ability of those persons interested to harvest or live-capture coyotes during the regulated harvest season. The cumulative lethal removal of coyotes by WS and other entities appears to be far

beneath the level that would begin to cause a decline in the overall statewide coyote population, but some local population reductions may occur.

Alternative 2 – Coyote Damage Management by WS through an Adaptive Integrated Approach Using Only Non-lethal Methods

This alternative would require personnel from the WS program to use only non-lethal methods to resolve damage or threats of damage. WS' personnel would only employ those methods discussed in Appendix B that were non-lethal. No intentional lethal removal of coyotes would occur by WS. The use of lethal methods could continue under this alternative by other entities or by those persons experiencing damage by coyotes. The non-lethal methods used or recommended by WS under this alternative would be identical to those non-lethal methods identified in any of the alternatives. As discussed and evaluated previously, non-lethal methods generally have minimal impacts on overall populations of animals since those methods do not harm target species. Therefore, the use of non-lethal methods would not have adverse effects on coyote populations in the State under any of the alternatives.

As stated previously, those persons experiencing damage often employ non-lethal methods to reduce damage or threats prior to contacting the WS program. For example, many livestock producers already use non-lethal methods to reduce predation (NASS 2000, NASS 2001, NASS 2005, NASS 2011), including livestock producers in Louisiana (NASS 2005, NASS 2011). Many non-lethal methods available to alleviate damage or threats associated with coyotes, such as livestock management practices (*e.g.*, night-penning, herding, carcass removal) and physical exclusion (*e.g.*, predator-proof fencing), are not practical for implementation by WS' personnel. Implementation of most non-lethal methods for livestock protection falls within the purview of the livestock producer (Knowlton et al. 1999). The continued use of many non-lethal methods can often lead to the habituation of coyotes to those methods, which can decrease the effectiveness of those methods. Therefore, those persons experiencing damage or threats of damage associated with coyotes may seek assistance with the use of available lethal methods.

Other entities could continue to use lethal methods under this alternative. If those non-lethal methods employed by the WS program did not reduce damage or threats of damage to levels acceptable to the requester, the requester could seek assistance from the LDWF, the LDAF, other entities, or could conduct damage management activities on their own. For example, Andelt (1992) reported that about a third of sheep producers using guard dogs indicated that the use of dogs did not reduce their reliance on other predator control techniques or on predator control agencies. In some cases, property owners or managers may misuse some methods or use some methods in excess of what was necessary, which could then become hazardous and pose threats to the safety of people and wildlife species. People have resorted to the illegal use of chemicals and methods to alleviate the damage that coyotes cause (*e.g.*, see Allen et al. 1996, United States Department of Justice 2014, United States Department of Justice 2015).

The WS program could refer those persons experiencing damage or threats of damage to the LDWF, the LDAF, and/or to other entities for information and implementation of lethal methods. Therefore, if other entities increased their efforts to manage damage caused by coyotes in proportion to those activities that the WS program would have conducted using lethal methods, the potential effects on the statewide coyote population would be similar to Alternative 1.

Alternative 3 – Coyote Damage Management by WS through Technical Assistance Only

Under a technical assistance only alternative, WS would recommend an integrated methods approach similar to Alternative 1; however, WS would not provide direct operational assistance under this alternative. Therefore, this alternative would place the immediate burden of resolving damage on the people requesting assistance. Using information that a requester provides or from a site visit by an

employee, WS would recommend methods and techniques based on the application of the WS Decision Model. In some instances, wildlife-related information provided to the requester by WS could result in tolerance/acceptance of the situation. In other instances, WS would discuss and recommend damage management options.

When WS discussed damage management options with the person requesting assistance, WS could recommend and demonstrate for use both non-lethal and lethal methods legally available for use to alleviate coyote damage. Those persons receiving technical assistance from WS could implement those methods recommended by WS, could employ other methods not recommended by WS, could seek assistance from other entities, or take no further action.

Despite WS not providing direct operational assistance to resolve damage and threats associated with coyotes, those people experiencing damage caused by coyotes could continue to alleviate damage by employing those methods legally available or by seeking assistance from other entities. Appendix B discusses the methods available for use in managing damage and threats associated with coyotes. Similar to Alternative 1, those methods described in Appendix B would be available to those persons experiencing damage or threats associated with coyotes in the State; however, immobilizing drugs, euthanasia chemicals, and the use of aircraft would have limited availability to the public and other entities under this alternative and under Alternative 4.

As stated previously, coyotes are an "*outlaw quadruped*" in the State, which allows people to remove coyotes at any time of year during legal shooting hours using hunting methods without the need for a specific permit. With some restrictions, people can also remove coyotes at night on private property (see LDWF 2015). In addition, people can use trapping equipment to remove coyotes during the annual trapping season. People can also seek a permit from the LDWF to use trapping equipment to remove coyotes outside of the annual trapping season. People can remove coyotes without limit. Management actions taken by non-federal entities would represent the *environmental status quo* (see Section 2.1).

Therefore, those persons experiencing threats or damage associated with coyotes in the State could lethally remove coyotes or request assistance from other entities despite WS' lack of direct involvement in the management action. The WS program in Louisiana would have no direct effect on coyote populations from a program implementing technical assistance only. The number of coyotes lethally removed annually would likely be similar to the other alternatives since removal could occur without the need for authorization from the LDWF, and removal would continue to occur during the trapping season for coyotes. Local coyote populations could decline, stay the same, or increase depending on actions taken by those persons experiencing coyote damage. WS' participation in a management action would not be additive to an action that would occur in the absence of WS' participation.

With the oversight of the LDWF, it is unlikely that damage management activities conducted by other entities would adversely affect coyote populations by implementation of this alternative by WS. Under this alternative, other entities could provide damage management actions and direct operational assistance, such as the LDWF, the LDAF, and/or private entities. If direct operational assistance was not available from WS or other entities, it is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal removal, which could lead to real but unknown effects on the population of coyotes and other wildlife. People have resorted to the illegal use of chemicals and methods to alleviate the damage that coyotes cause (*e.g.*, see Allen et al. 1996, United States Department of Justice 2014, United States Department of Justice 2015).

Alternative 4 – No Coyote Damage Management Conducted by WS

Under this alternative, WS would have no direct involvement with any aspect of addressing damage caused by coyotes and would provide no technical assistance. No removal of coyotes by WS would occur under this alternative. While WS would provide no assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in lethal removal levels similar to the proposed action. WS would refer all requests for assistance associated with coyotes to other entities, such as the LDWF, the LDAF, and/or private entities.

Despite no involvement by WS in resolving damage and threats associated with coyotes in the State, those people experiencing damage caused by coyotes could continue to alleviate damage by employing both non-lethal and lethal methods. Similar to Alternative 1 and Alternative 2, those methods described in Appendix B would be available to those persons experiencing damage or threats associated with coyotes in the State; however, immobilizing drugs, euthanasia chemicals, and the use of aircraft would have limited availability to the public and other entities under this alternative. Like Alternative 1 and Alternative 2, the use of non-lethal methods by those entities experiencing damage associated with coyotes or their agents would not occur at such levels that adverse effects would occur to the coyote population in the State.

Similar to all the alternatives, people could continue to alleviate damage by lethally removing coyotes at any time of year during legal shooting hours using hunting methods without the need for a specific permit. People can also remove coyotes at night on private property with some restrictions. In addition, people can use trapping equipment to remove coyotes during the annual trapping season. People can also seek authorization from the LDWF to use trapping equipment to remove coyotes outside of the annual trapping season. There is no limit on the number of coyotes that people can remove using hunting and trapping methods. Therefore, local coyote populations could decline, stay the same, or increase depending on actions taken by those persons experiencing coyote damage. Management actions taken by non-federal entities would represent the *environmental status quo*.

The number of coyotes that other entities would lethally remove annually under this alternative would be unknown but could be similar to the other alternatives. Local coyote populations could decline, stay the same, or increase depending on actions taken by those persons experiencing coyote damage. Some resource/property owners may take illegal, unsafe, or environmentally harmful action against local populations of coyotes out of frustration or ignorance. In the past, people have resorted to the illegal use of chemicals and methods to alleviate the damage that coyotes cause (*e.g.*, see Allen et al. 1996, United States Department of Justice 2014, United States Department of Justice 2015).

Since other entities could still remove coyotes under this alternative, the potential effects on the coyote population in the State would be similar to the other alternatives for this issue. WS' involvement would not be additive to removal that could occur since the cooperator requesting WS' assistance could conduct coyote damage management activities without WS' direct involvement. Therefore, any actions to resolve damage or reduce threats associated with coyotes could occur by other entities despite WS' lack of involvement under this alternative.

Issue 2 - Effects of Coyote Damage Management Activities on Non-target Wildlife Species Populations, Including T&E Species

As discussed previously, a concern would be the potential impacts to non-target species, including T&E species, from the use of methods to resolve damage caused by coyotes. Discussion on the potential effects of the alternatives on the populations of non-target wildlife species, including T&E species, occurs below.

Alternative 1 - Continue the Current Adaptive Integrated Methods Approach to Managing Coyote Damage (No Action/Proposed Action)

The potential for adverse effects to non-targets occurs from the employment of methods to address coyote damage. Under the proposed action, WS could provide both technical assistance and direct operational assistance to those people requesting assistance. The risks to non-targets from the use of non-lethal methods, as part of an integrated direct operational assistance program, would be similar to those risks to non-targets discussed in the other alternatives.

Personnel from WS would be experienced with managing wildlife damage and would receive training in the employment of methods, which would allow WS' employees to use the WS Decision Model to select the most appropriate methods to address damage caused by targeted coyotes and excluding non-target species. To reduce the likelihood of capturing non-target wildlife, WS would employ the most selective methods for coyotes, would employ the use of attractants that were as specific to coyotes as possible, and determine placement of methods to avoid exposure to non-targets. A discussion of the SOPs to prevent and reduce any potential adverse effects on non-targets occurs in Chapter 3 of this EA. Despite the best efforts to minimize non-target exposure to methods during program activities, the potential for WS to disperse or lethally remove non-targets exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety.

Non-lethal methods have the potential to cause adverse effects to non-targets primarily through exclusion, harassment, and dispersal. Any exclusionary device erected to prevent access by coyotes also potentially excludes species that were not the primary reason for erecting the exclusion; therefore, exclusion methods potentially could adversely affect non-target species if the area excluded was large enough. The use of auditory and visual dispersal methods to reduce damage or threats caused by coyotes would also likely disperse non-targets in the immediate area the methods were employed. Therefore, non-targets may disperse permanently from an area while employing non-lethal dispersal techniques. However, like target species, the potential impacts on non-target species would likely be temporary with target and non-target species often returning after the cessation of dispersal methods.

Non-lethal methods that use auditory and visual stimuli to reduce or prevent damage elicit fright responses in wildlife. When employing those methods to disperse or harass target species, any non-targets nearby when employing those methods would also likely disperse from the area. Similarly, any exclusionary device constructed to prevent access by coyotes could also exclude access to some non-target species. The persistent use of non-lethal methods would likely result in the dispersal or abandonment of those areas where non-lethal methods were employed of both coyotes and non-target species. Therefore, any use of non-lethal methods would likely elicit a similar response from both non-target and coyotes. Although non-lethal methods do not result in the lethal removal of non-targets, the use of non-lethal methods could restrict or prevent access of non-targets to beneficial resources. However, long-term adverse effects would not occur to a species' population since WS would not employ non-lethal methods over large geographical areas or at such intensity levels that resources (*e.g.*, food sources, habitat) would be unavailable for extended durations or over a wide geographical scope. Non-lethal methods would generally have minimal impacts on overall populations of animals since individuals of those species were unharmed. Overall, the use of non-lethal methods would not adversely affect populations of animals since those methods would often be temporary.

Other non-lethal methods available for use under this alternative would include live traps and immobilizing drugs. Live traps restrain wildlife once captured; therefore, those methods are live-capture methods. Live traps would have the potential to capture non-target species. Trap placement in areas where coyotes were active and the use of target-specific attractants would likely minimize the capture of

non-targets. Attending to traps appropriately would allow the release of any non-targets captured unharmed.

WS could employ immobilizing drugs to handle and transport coyotes. WS' personnel would apply immobilizing drugs directly to target animals through hand injection or by projectile (*e.g.*, dart gun). WS would make reasonable efforts to retrieve projectiles containing immobilizing drugs if misses occurred or if the projectile detached from target animals. Therefore, no direct effects to non-target animals would be likely since identification would occur prior to application. Animals anesthetized using immobilizing drugs recover once the animal has fully metabolized the drug. Therefore, non-targets that may consume animals that recover are unlikely to receive a dosage that would cause any impairment. When using immobilizing drugs to handle or transport target animals, WS would monitor anesthetized animals until that animal recovers sufficiently to leave the site.

Potential impacts to non-targets from the use of non-lethal methods would be similar to the use of non-lethal methods under any of the alternatives. Non-targets would generally be unharmed from the use of non-lethal methods under any of the alternatives since no lethal removal would occur. Non-lethal methods would be available under all the alternatives analyzed. Using the WS Decision Model, WS' personnel would consider the potential effects to non-targets from the potential use of non-lethal methods. Potential impacts to non-targets under this alternative from the use of and/or the recommendation of non-lethal methods are likely to be low.

WS' personnel could also employ and/or recommend lethal methods under the proposed action alternative to alleviate damage, when employees, using the WS Decision Model, deemed those methods appropriate for use. Lethal methods available for use to manage damage caused by coyotes under this alternative would include the recommendation of harvest during the trapping season, shooting, cable restraints, euthanasia chemicals, and euthanasia after live-capture. Available methods and the application of those methods to resolve coyote damage is further discussed in Appendix B.

The use of firearms would essentially be selective for coyotes since WS' personnel would identify animals prior to application; therefore, WS does not anticipate any adverse effects from use of this method. Similarly, the use of euthanasia methods would not result in non-target removal since identification would occur prior to euthanizing an animal.

An issue that has arisen is the potential for low-level flights to disturb wildlife, including T&E species. Aerial operations could be an important method of damage management in Louisiana when used to address damage or threats associated with feral swine and/or coyotes in remote areas where access was limited due to terrain and habitat. Aerial operations involving shooting would only occur in those areas where WS and the property owner/manager signed a work initiation document allowing the use of aircraft. WS could also use aircraft for aerial surveys of wildlife or radio telemetry. WS would typically conduct aerial operations with aircraft between the months of December and April when the foliage has fallen; however, WS could use aircraft at any time of year. The amount of time spent conducting aerial operations would vary depending on the survey area, severity of damage, the size of the area where damage or threats were occurring, and the weather, as low-level aerial activities would be restricted to visual flight rules and would be impractical in high winds or at times when animals were not easily visible.

Aircraft play an important role in the management of various wildlife species for many agencies. Resource management agencies rely on low flying aircraft to monitor the status of many animal populations, including large coyotes (Lancia et al. 2000), birds of prey (Fuller and Mosher 1987), waterfowl (Bellrose 1976), and colonial waterbirds (Speich 1986). Low-level flights also occur when

entities use aircraft to track animal movements by radio telemetry (Gilmer et al. 1981, Samuel and Fuller 1996).

A number of studies have looked at responses of various wildlife species to aircraft overflights. The National Park Service (1995) reviewed the effects of aircraft overflights on wildlife and suggested that adverse effects could occur to certain species. Some species will frequently or at least occasionally show an adverse response to even minor overflights. In general though, it appears that the more serious potential adverse effects occur when overflights are chronic (*i.e.*, they occur daily or more often over long periods). Chronic exposures generally involve areas near commercial airports and military flight training facilities. Aerial operations conducted by WS rarely occur in the same areas on a daily basis, and aircraft used by WS actually spend little time flying over those particular areas.

The effects on wildlife from military-type aircraft have been studied extensively (Air National Guard 1997), and were found to have no expected adverse effects on wildlife. Examples of species or species groups that people have studied with regard to the issue of aircraft-generated disturbance are as follows:

WATERBIRDS AND WATERFOWL: Low-level overflights of two to three minutes in duration by a fixed-wing airplane and a helicopter produced no "*drastic*" disturbance of tree-nesting colonial waterbirds, and, in 90% of the observations, the individual birds either showed no reaction or merely looked up (Kushlan 1979). Belanger and Bedard (1989, 1990) observed responses of greater snow geese (*Chen caerulescens atlantica*) to man-induced disturbance on a sanctuary area and estimated the energetic cost of such disturbance. Belanger and Bedard (1989, 1990) observed that disturbance rates exceeding two per hour reduced goose use of the sanctuary by 50% the following day. They also observed that about 40% of the disturbances caused interruptions in feeding that would require an estimated 32% increase in nighttime feeding to compensate for the energy lost. They concluded that managers should strictly regulate overflights of sanctuary areas to avoid adverse effects. Conomy et al. (1998) quantified behavioral responses of wintering American black ducks (*Anas rubripes*), American wigeon (*A. americana*), gadwall (*A. strepera*), and American green-winged teal (*A. crecca carolinensis*) exposed to low-level military aircraft and found that only a small percentage (2%) of the birds reacted to the disturbance. They concluded that such disturbance was not adversely affecting the "*time-activity budgets*" of the species. Low-level aerial operations conducted by WS would not occur over federal, state, or other governmental agency property without the concurrence of the managing entity. If requested, WS would conduct those flights to reduce threats and damages occurring to natural resources, which should not result in impacts to bird species. Thus, there is little to no potential for any adverse effects on waterbirds and waterfowl.

RAPTORS: The Air National Guard analyzed and summarized the effects of overflight studies conducted by numerous federal and state government agencies and private organizations (Air National Guard 1997). Those studies determined that military aircraft noise initially startled raptors, but negative responses were brief and did not have an observed effect on productivity (see Ellis 1981, Fraser et al. 1985, Lamp 1989, United States Forest Service 1992 as cited in Air National Guard 1997). A study conducted on the impacts of overflights to bald eagles (*Haliaeetus leucocephalus*) suggested that the eagles were not sensitive to this type of disturbance (Fraser et al. 1985). During the study, observations were made of more than 850 overflights of active eagle nests. Only two eagles rose out of either their incubation or brooding postures. This study also showed that perched adults were flushed only 10% of the time during aircraft overflights. Evidence also suggested that golden eagles (*Aquila chrysaetos*) were not highly sensitive to noise or other aircraft disturbances (Ellis 1981, Holthuijzen et al. 1990). Finally, one other study found that eagles were particularly resistant to disturbances flushing them from their nests (see Awbrey and Bowles 1990 as cited in Air National Guard 1997). Therefore, there is considerable evidence that overflights during aerial operations would not adversely affect eagles.

Mexican spotted owls (*Strix occidentalis lucida*) (Delaney et al. 1999) did not flush when chain saws and helicopters were greater than 110 yards away; however, owls flushed to these disturbances at closer distances and were more prone to flush from chain saws than helicopters. Owls returned to their pre-disturbance behavior 10 to 15 minutes following the event and researchers observed no differences in nest or nestling success (Delaney et al. 1999), which indicates that aircraft flights did not result in adverse effects on owl reproduction or survival.

Andersen et al. (1989) conducted low-level helicopter overflights directly at 35 red-tailed hawk (*Buteo jamaicensis*) nests and concluded their observations supported the hypothesis that red-tailed hawks habituate to low level flights during the nesting period since results showed similar nesting success between hawks subjected to overflights and those that were not. White and Thurow (1985) did not evaluate the effects of aircraft overflights, but found that ferruginous hawks (*B. regalis*) were sensitive to certain types of ground-based human disturbance to the point that reproductive success may be adversely affected. However, military jets that flew low over the study area during training exercises did not appear to bother the hawks, nor did the hawks become alarmed when the researchers flew within 100 feet in a small fixed-wing aircraft (White and Thurow 1985). White and Sherrod (1973) suggested that disturbance of raptors by aerial surveys with helicopters may be less than that caused by approaching nests on foot. Ellis (1981) reported that five species of hawks, two falcons (*Falco* spp.), and golden eagles (*Aquila chrysaetos*) were "*incredibly tolerant*" of overflights by military fighter jets, and observed that, although birds frequently exhibited alarm, negative responses were brief and the overflights never limited productivity.

Grubb et al. (2010) evaluated golden eagle response to civilian and military (Apache AH-64) helicopter flights in northern Utah. Study results indicated that golden eagles exposed to flights ranging from 100 to 800 meters along, towards, and from behind occupied cliff nests did not adversely affect eagle courtship, nesting, and fledglings, indicating that no special management restrictions were required in the study location.

The above studies indicate raptors were relatively unaffected by aircraft overflights, including those by military aircraft that produce much higher noise levels. Therefore, aerial operations would have little or no potential to affect raptors adversely.

PASSERINES: Reproductive losses have been reported in one study of small territorial passerines ("*perching*" birds that included sparrows, blackbirds) after exposure to low altitude overflights (see Manci et al. 1988 as cited in Air National Guard 1997), but natural mortality rates of both adults and young are high and variable for most species. The research review indicated passerine birds cannot be driven any great distance from a favored food source by a non-specific disturbance, such as military aircraft noise, which indicated quieter noise would have even less effect. Passerines avoid intermittent or unpredictable sources of disturbance more than predictable ones, but return rapidly to feed or roost once the disturbance ceases (Gladwin et al. 1988, United States Forest Service 1992). Those studies and reviews indicated there is little or no potential for aerial operations to cause adverse effects on passerine bird species.

PRONGHORN (ANTELOPE) AND MULE DEER: Krausman et al. (2004) found that Sonoran pronghorn (*Antilocapra americana sonoriensis*) were not adversely affected by military fighter jet training flights and other military activity on an area of frequent and intensive military flight training operations. Krausman et al. (1986) reported that only three of 70 observed responses of mule deer (*Odocoileus hemionus*) to small fixed-wing aircraft overflights at 150 to 500 feet above ground level resulted in the deer changing habitats. The authors believed that the deer might have been accustomed to overflights because the study area was near an interstate highway that aircraft frequently followed. Krausman et al. (2004) also reported that pronghorn and mule deer do not hear noise from military aircraft as well as people, which potentially indicates why they appeared not to be disturbed as much as previously thought.

MOUNTAIN SHEEP: Krausman and Hervert (1983) reported that, of 32 observations of the response of mountain sheep to low-level flights by small fixed-wing aircraft, 60% resulted in no disturbance, 81% in no or "*slight*" disturbance, and 19% in "*great*" disturbance. Krausman and Hervert (1983) concluded that flights less than 150 feet above ground level could cause mountain sheep to leave an area. When Weisenberger et al. (1996) evaluated the effects of simulated low altitude jet aircraft noise on desert mule deer (*Odocoileus hemionus crooki*) and mountain sheep (*Ovis canadensis mexicana*), they found that heart rates of the ungulates increased according to the dB levels, with lower noise levels prompting lesser increases. When they were elevated, heart rates rapidly returned to pre-disturbance levels suggesting that the animals did not perceive the noise as a threat. Responses to the simulated noise levels decreased with increased exposure.

BISON: Fancy (1982) reported that only two of 59 bison (*Bison bison*) groups showed any visible reaction to small fixed-winged aircraft flying at 200 to 500 feet above ground level. The study suggests that bison were relatively tolerant of aircraft overflights.

DOMESTIC ANIMALS AND SMALL MAMMALS: A number of studies with laboratory animals (*e.g*., rodents [Borg 1979]) and domestic animals (*e.g*., sheep [Ames and Arehart 1972]) have shown that these animals can habituate to noise. Long-term lab studies of small coyotes exposed intermittently to high levels of noise demonstrate no changes in longevity. The physiological "*fight or flight*" response, while marked, does not appear to have any long-term health consequences on small coyotes (Air National Guard 1997). Small coyotes habituate, although with difficulty, to sound levels greater than 100 dbA (United States Forest Service 1992).

Although many of those wildlife species discussed above are not present in Louisiana, the information demonstrates the relative tolerance most wildlife species have of overflights, even those that involve noise at high decibels, such as from military aircraft. In general, the greatest potential for impacts to occur exists when overflights are frequent, such as hourly and over many days that could represent "*chronic*" exposure. Chronic exposure situations generally involve areas near commercial airports and military flight training facilities. Even then, many wildlife species often habituate to overflights, which would naturally minimize any potential adverse effects where such flights occur on a regular basis. Therefore, aircraft used by WS should have far less potential to cause any disturbance to wildlife than military aircraft because the military aircraft produce much louder noise and would be flown over certain training areas many more times per year, and yet were found to have no expected adverse effects on wildlife (Air National Guard 1997).

WS would only conduct aerial activities on a very small percentage of the land area of the State, which indicates that WS would not even expose most wildlife to aerial overflights. Further lessening the potential for any adverse effects would be that such flights occur infrequently throughout the year.

EFFECTS ON NON-TARGET ANIMAL POPULATIONS FROM WS' PREVIOUS ACTIVITIES

While WS' personnel take precautions to safeguard against taking non-targets during operational use of methods and techniques, the use of such methods could result in the incidental live-capture or lethal removal of unintended species. Of the non-chemical methods available to WS, foothold traps and neck snares potentially pose the greatest risk to non-target species. However, non-target captures can be minimized by selective trap placement, breakaway snare locks (Phillips et al. 1990, Phillips and Blom 1991), trap pan-tension devices (Phillips and Gruver 1996), and proper site selection in accordance with WS' policy (see WS Directive 2.101, WS Directive 2.450, WS Directive 2.455). Nevertheless, WS could remove some non-target animals incidentally during activities conducted to alleviate coyote damage. Raccoons (*Procyon lotor*), Virginia opossum (*Didelphis virginiania*), white-tailed deer (*Odocoileus*

virginianus), dogs (*Canis familiaris*), and bobcats (*Lynx rufus*) are the most commonly captured non-target species. WS' personnel would continue to use breakaway snare locks to reduce the risk of potentially capturing white-tailed deer.

Table 4.4 shows the number of non-targets lethally removed unintentionally during activities conducted by WS to alleviate damage caused by coyotes from FY 2009 through FY 2014. The previous non-targets lethally removed unintentionally by WS are representative of non-targets that WS' personnel could lethally remove under Alternative 1. Although WS' personnel could lethally remove additional species of non-targets unintentionally, the removal of individuals from any species would not be likely to increase substantively above the number of non-targets removed annually by WS during previous damage management activities.

Between FY 2009 and FY 2014, the WS program in Louisiana has lethally removed an average of nine opossum per year unintentionally during activities targeting coyotes, which is the highest annual removal of any of the species lethally removed unintentionally. Red fox, opossum, raccoons, and striped skunks are species of animals that people can harvest in the State. People in Louisiana can harvest opossum and raccoons throughout the year and the LDWF places no limit on the number a person can harvest. People can harvest red fox during annual trapping seasons in the State with no limit on the number of fox that people can harvest during the length of the season. Although the lethal removal of non-targets could result in declines in the number of individuals in a population, the lethal removal of non-targets by WS during damage management activities would be of low magnitude when compared to the actual statewide population of those species and the number that people harvest in the State annually. WS would continue to monitor activities, including non-target removal, to ensure the annual removal of non-targets does not result in adverse effects to a species' population.

Table 4.4 – WS' lethal removal of non-targets by method in Louisiana, FY 2009 – FY 2014

Species	Method of Lethal Removal		TOTAL
	Foothold	Neck Snare	
Feral Dog	0	1	**1**
Red Fox	0	2	**2**
Opossum	52	3	**55**
Raccoon	11	7	**18**
Striped Skunk	1	0	**1**

Table 4.5 shows those non-targets live-captured and released unharmed by WS from FY 2009 through FY 2014 during activities targeting coyotes. Those species could also be live-captured and released during activities conducted under the proposed action alternative addressed in this EA; however, additional species of animals could also be live-captured unintentionally by WS' personnel. As discussed previously, most people generally regard the use of non-lethal methods to address damage or threats as having no effect on a species' population since those individuals addressed using non-lethal methods would be unharmed and no actual reduction in the number of individuals in a species' population occurs. Similarly, the live-capture and release of non-target animals would generally be regarded as having no adverse effects on a species' population since those individuals would be released unharmed and no actual reduction in the number of individuals in a population occurs. Therefore, the live-capture and subsequent releasing of non-targets during damage management activities conducted under the proposed action alternative would not result in declines in the number of individuals in a species' population.

Table 4.5 – Non-targets live-captured and released by WS in Louisiana, FY 2009 – FY 2014

Species	Method of Live-Capture		TOTAL
	Foothold†	Neck Snare†	
Feral Dog	1	4	**5**
Red Fox	0	4	**4**
Opossum	3	2	**5**
Raccoons	4	2	**6**

†Animals captured in foothold or neck snares by the tail or other extremity would be released if they are unharmed and can be released safely.

WS would monitor the removal of non-target species to ensure program activities or methodologies used in coyote damage management would not adversely affect non-targets. Methods available to resolve and prevent coyote damage or threats when employed by trained, knowledgeable personnel would be selective for coyotes. WS would report to the LDWF any non-target removal to ensure the LDWF had the opportunity to consider removal by WS as part of management objectives for those species. The potential for adverse effects to occur with non-targets would be similar to the other alternatives and would be minimal to non-existent based on previous non-target removal. While WS' personnel would take precautions to safeguard against taking non-target animals during operational use of methods and techniques for resolving damage and reducing threats caused by coyotes, the use of such methods could result in the incidental removal of unintended species. Those occurrences would be rare and should not affect the overall populations of any species under the proposed action alternative.

T&E SPECIES EFFECTS

WS would make special efforts to avoid jeopardizing T&E species through biological evaluations of potential effects and the establishment of special restrictions or minimization measures through consultation with the USFWS. The WS program has established guidelines for activities conducted by personnel in association with threatened or endangered species (see WS Directive 2.310). Chapter 3 of this EA describes several SOPs to avoid effects to T&E species.

Federally Listed Species – During the development of this EA, WS reviewed the current list of species designated as threatened or endangered in Louisiana as determined by the USFWS and the National Marine Fisheries Service. Appendix C contains the federal list of species currently threatened or endangered in the State along with their common and scientific names. As part of the development of this EA, WS consulted with the USFWS pursuant to Section 7 of the ESA. As part of that consultation process, WS conducted a review of potential impacts of the proposed action on each of the species listed at the time WS developed the EA. The evaluation took into consideration the direct and indirect effects of available methods, including resource management methods, physical exclusion methods, and wildlife management methods. As part of the review process, WS prepared and submitted a biological evaluation to the USFWS pursuant to Section 7 of the ESA. For several species listed within the State, WS determined that the proposed activities "*may affect*" those species but those effects would be solely beneficial, insignificant, or discountable, which would warrant a "*not likely to adversely affect*" determination (see Appendix C). WS also determined the proposed action alternative would have no effect on several species listed as threatened, endangered, proposed for listing, or considered a candidate species by the USFWS and the National Marine Fisheries Service (see Appendix C). The USFWS concurred with WS' effects determination (J. Weller, USFWS pers. comm. 2015).

In addition, some of those methods that WS could employ to alleviate damage or reduce threats of damage could result in the unintentional "*take*" of Louisiana black bears (*Ursus americanus luteolus*) as defined in the ESA (see 16 USC 1532). Therefore, a "*may affect, likely to adversely affect*" determination was warranted for the Louisiana black bear, which required initiation of a formal consultation with the

USFWS (50 CFR 402.14). As discussed in Section 1.4 of this EA, WS previously developed an EA that addressed WS' activities to manage damage associated with coyotes in the State. As part of the development of the previous EA, WS initiated the formal consultation process with the USFWS pursuant to Section 7 of the ESA relating to WS' potential activities and the status of the Louisiana black bear.

After reviewing the status of the Louisiana black bear, the environmental baseline for the action area, the effects of the proposed activity, and the cumulative effects, the USFWS issued a biological opinion that managing damage caused by coyotes using those methods available would not jeopardize the continued existence of the Louisiana black bear (D. Fruge, USFWS pers. comm. 2001). Additionally, the USFWS did not anticipate any destruction or adverse modification of Louisiana black bear critical habitat. To minimize the incidental take of black bears, WS would abide by the following reasonable and prudent measures under the proposed action alternative as outlined in the biological opinion.

- WS' personnel shall take all necessary precautions to minimize the likelihood of incidental capture of Louisiana black bears (*e.g.*, avoid trap sites and techniques with a high potential to capture non-targets and training on the use of drugs for animal immobilization and restraint).

- WS' personnel shall monitor incidental take to ensure compliance with exempted take levels.

In addition, WS would abide by all terms and conditions outlined by the USFWS in the biological opinion that implement the reasonable and prudent measures. Those terms and conditions are:

- WS shall remain current in training on the use of drugs for animal immobilization and restraint.
- WS shall survey for Louisiana black bear signs prior to conducting activities targeting coyotes in areas adjacent to and within occupied bear habitat.
- WS will educate cooperators on the appropriate precautions for avoiding incidental trapping of bears.
- If a Louisiana black bear is captured, the cooperator will contact a WS employee trained in animal immobilization and restraint immediately. WS shall respond to any such calls as soon as practicable.
- Snares with "*break-away*" locks shall be used in areas occupied or frequented by Louisiana black bears (*i.e.*, those areas where bear signs are present)(see Appendix E).
- WS shall check all foothold traps and snares set in areas occupied or frequented by Louisiana black bears (*i.e.*, those areas where bear signs are present) at least once a day, as early as possible.
- To help ensure that the extent of incidental take is not exceeded, monitoring reports will be submitted annually (at the end of the fiscal year) to the Ecological Services office of the USFWS in Lafayette, Louisiana. Those reports shall contain, but not be limited to, the location of trapping activities, the type of trapping activities conducted, the number and species of non-target individuals trapped and/or killed, and the types of traps responsible for non-target captures.
- Immediately upon locating a dead, injured, or sick Louisiana black bear in or adjacent to a work area, as an apparent result of the proposed project, initial notification must be made to the Law Enforcement Office of the USFWS in Lafayette, Louisiana. WS must also notify the Ecological Services Field Office of the USFWS in Lafayette, Louisiana. WS should take care in handling and caring for injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The intent of reasonable and prudent measures, with their implementing terms and conditions, is to minimize incidental take that might otherwise result from the proposed action. The USFWS believes the proposed activities described in Alternative 1 would not incidentally take any more than two Louisiana black bears per year through harassment and one bear per year through death resulting from methods available to manage coyote damage. Those methods addressed in the biological assessment that WS

submitted to the USFWS as part of the formal consultation, pursuant to Section 7 of the ESA, would continue to be available for use by WS under this proposed action alternative[11]. In addition, no previous take of Louisiana black bears has occurred during WS' activities to manage coyote damage or threats of damage. The only method that could be available for use by WS under this alternative that the biological assessment that WS submitted in 2001 did not evaluate was the use of aircraft by WS to remove coyotes using firearms and for surveillance.

As part of the development of this current EA, WS re-initiated formal consultation with the USFWS related to current activities proposed under the proposed action, including the use of aircraft, and the status of the Louisiana black bear. WS submitted a biological assessment to the USFWS as part of the formal consultation process. Based on the biological assessment, the USFWS again determined the proposed activities in this EA would not jeopardize the continued existence of the Louisiana black bear. The USFWS also concluded the anticipated and exempted level of incidental take, the reasonable and prudent measures, and the terms and conditions as defined in the biological opinion issued during 2001 (described above in this EA) remain applicable (J. Weller, USFWS pers. comm. 2015).

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered or threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. WS would work with the USFWS as part of the consideration for the implementation of those conservation recommendations.

State Listed Species – Appendix D contains the current list of species the LDWF lists as endangered or threatened in State. Based on the review of species listed in the State, WS has determined that using those methods available in an integrated methods approach to alleviate damage would have no effect on those species currently listed by the State. However, the removal of coyotes could benefit some species by reducing predation if WS removed coyotes in the general area where threatened or endangered species occurred.

Alternative 2 – Coyote Damage Management by WS through an Adaptive Integrated Approach Using Only Non-lethal Methods

A non-lethal management alternative would require the WS program to only recommend and use non-lethal methods to manage and prevent damage associated with coyotes. WS would provide technical assistance and direct operational assistance under this alternative recommending and using only non-lethal methods. Non-lethal methods have the potential to cause adverse effects to non-targets primarily through exclusion, harassment, and dispersal. Any exclusionary device erected to prevent access of target species also potentially excludes species that are not the primary reason the exclusion was erected; therefore, individual non-target species excluded from areas may potentially be adversely affected if the area excluded was large enough. The use of auditory and visual dispersal methods would also likely disperse non-targets in the immediate area the methods were employed. Therefore, when employing non-lethal dispersal techniques, non-targets may disperse permanently from an area. However, like target species, the potential impacts on non-target species would be temporary with target and non-target species often returning after the cessation of dispersal methods.

[11]The biological assessment submitted to the USFWS pursuant to Section 7 of the ESA included the possible use of M-44s, Livestock Protection collars, and gas cartridges to alleviate coyote damage; however, WS is no longer considering the use of M-44s, Livestock Protection Collars, and gas cartridges.

Live traps (*e.g*., cage traps, foothold traps) restrain wildlife once captured and are considered live-capture methods. Live traps have the potential to capture non-target species. Trap placement in areas where coyotes were active and the use of target-specific attractants could minimize the capture of non-targets. If traps were attended to appropriately, any non-targets captured could be released on site unharmed.

WS' involvement in the use of or recommendation of non-lethal methods would ensure non-target impacts were considered under WS' Decision Model. Most non-lethal methods would be available under all the alternatives analyzed. Impacts to non-targets from the use of non-lethal methods would be similar to the use of those non-lethal methods under any of the alternatives. Non-targets would generally be unharmed from the use of non-lethal methods under any of the alternatives since no lethal removal would occur from their use. Similar to the other alternatives, other entities could and would likely continue to use lethal methods and those activities could increase in proportion to the reduction of assistance using lethal methods provided by the WS program. Risks to non-targets and T&E species would continue to occur from activities conducted by other entities, including from those people who implement damage management activities on their own similar to Alternative 3 and Alternative 4.

Alternative 3 – Coyote Damage Management by WS through Technical Assistance Only

Under a technical assistance alternative, WS would have no direct impact on non-target species, including T&E species. Those persons requesting assistance could employ methods that WS' personnel recommend or provide through loaning of equipment. Using the WS Decision Model, WS' personnel would base recommendations from information provided by the person requesting assistance or through site visits. Recommendations would include methods or techniques to minimize non-target impacts associated with the methods that personnel recommend or loan. Methods recommended could include non-lethal and lethal methods as deemed appropriate by the WS Decision Model and as permitted by laws and regulations.

The potential impacts to non-targets under this alternative would be variable and based on several factors. If people employed methods as recommended by WS, the potential impacts to non-targets would likely be similar to the proposed action. If recommended methods and techniques were not followed or if other methods were employed that were not recommended, the potential impacts on non-target species, including T&E species would likely be higher compared to the proposed action.

The potential impacts of harassment and exclusion methods on non-target species would be similar to those described under the proposed action. Harassment and exclusion methods would be easily obtainable and simple to employ. Since identification of targets would occur when employing shooting as a method, the potential impacts to non-target species would likely be low under this alternative. However, the knowledge and experience of the person could influence their ability to identify coyotes correctly.

Those persons experiencing damage from coyotes may implement methods and techniques based on the recommendations of WS. The knowledge and skill of those persons implementing recommended methods would determine the potential for impacts to occur. If those persons experiencing damage do not implement methods or techniques correctly, the potential impacts from providing only technical assistance could be greater than the proposed action. The incorrect implementation of methods or techniques recommended by WS could lead to an increase in non-target removal when compared to the non-target removal that could occur by WS under the proposed action alternative.

If requesters were provided technical assistance but do not implement any of the recommended actions and conducted no further action, the potential to remove non-targets would be lower when compared to the proposed action. If those persons requesting assistance implement recommended methods

appropriately and as instructed or demonstrated, the potential impacts to non-targets would be similar to the proposed action. If WS made recommendations on the use of methods to alleviate damage but those methods were not implemented as recommended by WS or if those methods recommended by WS were used inappropriately, the potential for lethal removal of non-targets would likely increase under a technical assistance only alternative. Therefore, the potential impacts to non-targets, including T&E species, would be variable under a technical assistance only alternative.

Under this alternative, if those people requesting assistance from WS deemed recommended non-lethal methods ineffective, those people experiencing damage could employ lethal methods. The potential impacts on non-targets by those persons experiencing damage would be highly variable. People whose coyote damage problems were not effectively resolved by non-lethal control methods would likely resort to other means of legal or illegal lethal control. This could result in less experienced people implementing control methods and could lead to greater removal of non-target wildlife than the proposed action. When those persons experiencing damage caused by wildlife reach a level where assistance does not adequately reduce damage or where no assistance is available, people have resorted to using chemical toxicants that are illegal for use on the intended target species. The illegal use of methods often results in loss of both target and non-target wildlife (*e.g*., see Allen et al. 1996, United States Department of Justice 2014, United States Department of Justice 2015). The use of illegal toxicants by those persons frustrated with the lack of assistance or assistance that inadequately reduces damage to an acceptable level can often result in the indiscriminate removal of wildlife species.

The ability to reduce negative effects caused by coyotes to wildlife species and their habitats, including T&E species, would be variable under this alternative. The skills and abilities of the person implementing damage management actions would determine the risks to non-target animals. This alternative would likely have a greater chance of reducing damage than Alternative 4 since WS would be available to provide information and advice on appropriately employing methods and reducing the risk of non-target removal.

Alternative 4 – No Coyote Damage Management Conducted by WS

Under this alternative, WS would not provide any assistance with managing damage associated with coyotes in the State. Therefore, no direct impacts to non-targets or T&E species would occur by WS under this alternative. People could continue to harvest coyotes during the annual trapping seasons and people could continue to remove coyotes at any time to alleviate damage or threats of damage without the need for a permit from the LDWF. Risks to non-targets and T&E species would continue to occur from those people who implement damage management activities on their own or through recommendations by other federal, state, and private entities. Although some risks could occur from those people that implement coyote damage management in the absence of any involvement by WS, those risks would likely be low, and would be similar to those risks under the other alternatives.

The ability to reduce negative effects caused by coyotes to other wildlife species and their habitats, including T&E species, would be variable based upon the skills and abilities of the person implementing damage management actions under this alternative.

Issue 3 - Effects of Coyote Damage Management Activities on Human Health and Safety

A common concern is the potential adverse effects that methods available could have on human health and safety. Each of the alternatives below evaluates the threats to human safety of methods available under those alternatives.

Alternative 1 - Continue the Current Adaptive Integrated Methods Approach to Managing Coyote Damage (No Action/Proposed Action)

The cooperator requesting assistance would be made aware through a MOU, work initiation document, or a similar document that those methods agreed upon could potentially be used on property owned or managed by the cooperator. Therefore, the cooperator would be made aware of the possible use of those methods on property they own or manage to identify any risks to human safety associated with the use of those methods. Cooperators would be made aware by signing a MOU, work initiation document, or another similar document, which would assist WS and the cooperating entity with identifying any risks to human safety associated with methods at a particular location.

Under the proposed action, WS could use or recommend those methods discussed in Appendix B singularly or in combination to resolve and prevent damage associated with coyotes in the State. WS would use the Decision Model to determine the appropriate method or methods that would effectively resolve the request for assistance. Those methods would be continually evaluated for effectiveness and if necessary, additional methods could be employed. Non-lethal and lethal methods could be used under the proposed action. WS would continue to provide technical assistance and/or direct operational assistance to those persons seeking assistance with managing damage or threats from coyotes. Risks to human safety from technical assistance conducted by WS would be similar to those risks addressed under Alternative 3. Those non-lethal methods that could be used as part of an integrated approach to managing damage that would be available for use by WS as part of direct operational assistance, would be similar to those risks associated with the use of those methods under the other alternatives.

Lethal methods available under the proposed action would include the use of euthanasia chemicals, cable restraints, the recommendation of harvest during trapping seasons, and shooting. In addition, target coyotes live-captured using non-lethal methods (*e.g.*, live-traps, immobilizing drugs) could be euthanized. Those lethal methods available under the proposed action alternative or similar products would also be available under the other alternatives. None of the lethal methods available would be restricted to use by WS only. Euthanasia chemicals would not be available to the public but those coyotes live-captured could be killed using other methods.

WS' employees who conduct activities to manage damage caused by coyotes would be knowledgeable in the use of those methods available, the wildlife species responsible for causing damage or threats, and WS' directives. That knowledge would be incorporated into the decision-making process inherent with the WS Decision Model that would be applied when addressing threats and damage caused by coyotes. When employing lethal methods, WS' employees would consider risks to human safety when employing those methods based on location and method. For example, risks to human safety from the use of methods would likely be lower in rural areas that are less densely populated. Consideration would also be given to the location where damage management activities would be conducted based on property ownership. If locations where methods would be employed occur on private property in rural areas where access to the property could be controlled and monitored, the risks to human safety from the use of methods would likely be less. If damage management activities occurred at public parks or near other public use areas, then risks of the public encountering damage management methods and the corresponding risk to human safety would increase. Activities would generally be conducted when human activity was minimal (*e.g.*, early mornings, at night) or in areas where human activities was minimal (*e.g.*, in areas closed to the public).

The use of live-capture traps and restraining devices (*e.g.*, foothold traps, some cable restraints) has been identified as a potential issue. Live-capture traps available for coyotes would typically be walk-in style traps where coyotes enter but are unable to exit. Live-traps and restraining devices would typically be set in situations where human activity was minimal to ensure public safety. Those methods rarely cause

serious injury and would only be triggered through direct activation of the device. Therefore, human safety concerns associated with live traps and restraining devices used to capture wildlife, including coyotes, would require direct contact to cause bodily harm. Therefore, if left undisturbed, risks to human safety would be minimal. Signs warning of the use of those tools in the area could be posted for public view at access points to increase awareness that those devices were being used and to avoid the area, especially pet owners.

Safety issues related to the misuse of firearms and the potential human hazards associated with the use of firearms were issues identified. To help ensure the safe use of firearms and to increase awareness of those risks, WS' employees who use firearms during official duties would be required to attend an approved firearm safety training course and to remain certified for firearm use must attend a safety training course in accordance with WS Directive 2.615. As a condition of employment, WS' employees who carry and use firearms are subject to the Lautenberg Domestic Confiscation Law, which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence (18 USC § 922(g)(9)). A safety assessment based on site evaluations, coordination with cooperating and local agencies (if applicable), and consultation with cooperators would be conducted before firearms were deemed appropriate to alleviate or reduce damage and threats to human safety when conducting activities. WS would work closely with cooperators requesting assistance to ensure all safety issues were considered before firearms would be deemed appropriate for use. The use of all methods, including firearms, would be agreed upon with the cooperator to ensure the safe use of those methods. The security of firearms would also occur pursuant to WS Directive 2.615.

The issue of using chemical methods as part of managing damage associated with wildlife relates to the potential for human exposure either through direct contact with the chemical or exposure to the chemical from wildlife that have been exposed. Under the alternatives identified, the use of chemical methods could include immobilizing drugs and euthanasia chemicals.

The use of immobilizing drugs would only be administered to coyotes that have been live-captured using other methods or administered through injection using a projectile (*e.g.*, dart gun). Immobilizing drugs used to sedate wildlife would be used to temporarily handle and transport animals to lessen the distress of the animal from the experience. Drug delivery would likely occur on site with close monitoring of the animal to ensure proper care of the animal. Immobilizing drugs would be reversible with a full recovery of sedated animals occurring. Drugs used in capturing and handling wildlife that would be available include ketamine, a mixture of ketamine/Xylazine, and Telazol. A list and description of immobilizing drugs available for use under the identified alternatives can be found in Appendix B.

Euthanizing chemicals would be administered under similar circumstances to immobilizing drugs and would be administered to animals live-captured using other methods. Euthanasia chemicals would include sodium pentobarbital, potassium chloride, and Beuthanasia-D. Euthanized animals would be disposed of in accordance with WS Directive 2.515; therefore, would not be available for harvest and consumption. Euthanasia of target animals would occur in the absence of the public to minimize risks, whenever possible.

The recommendation by WS that coyotes be harvested during the regulated trapping season that is established by the LDWF would not increase risks to human safety above those risks already inherent with trapping coyotes. Recommendations of allowing hunting or trapping on property owned or managed by a cooperator to reduce coyote populations, which could then reduce damage or threats, would not increase risks to human safety. Safety requirements established by the LDWF for the hunting and trapping season would further minimize risks associated with those activities. Although hunting and trapping accidents do occur, the recommendation of allowing hunting or trapping to reduce localized populations of coyotes would not increase those risks.

CONSEQUENCES OF AERIAL WILDLIFE OPERATIONS ACCIDENTS

Aerial wildlife operations, like any other flying, may result in an accident. WS' pilots and crewmembers would be trained and experienced to recognize the circumstances that lead to accidents. The national WS Aviation Program has increased its emphasis on safety, including funding for additional training, the establishment of a WS Flight Training Center and annual recurring training for all pilots. Still, accidents may occur and the environmental consequences should be evaluated.

***Major Ground or Wild/Forest Fires*:** Although fires could result from aircraft-related accidents, no such fires have occurred from aircraft incidents previously involving government aircraft and low-level flights.

Fuel Spills and Environmental Hazard from Aviation Accidents: A representative of the National Transportation Safety Board has stated previously 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 (USDA 2005). The fuel capacity for aircraft used by WS varies. For fixed-winged aircraft, a 52-gallon capacity would generally be the maximum, while 91 gallons would generally be the maximum fuel capacity for helicopters. In some cases, little or none of the fuel would be spilled if an accident occurs. Thus, there should be little environmental hazard from unignited fuel spills.

Oil and Other Fluid Spills: With the size of aircraft used by WS, the quantities of oil (*e.g.*, 6 to 8 quarts maximum for reciprocating (piston) engines and 3 to 5 quarts for turbine engines) capable of being spilled in any accident would be small with minimal chance of causing environmental damage. Aircraft used by WS would be single engine models, so the greatest amount of oil that could be spilled in one accident would be about eight quarts.

When exposed to oxygen, petroleum products biodegrade through volatilization and bacterial action (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 that would generally be expected to involve larger quantities than would ever be involved in a small aircraft accident, the 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 were not cleaned up, the oil does not persist in the environment or persists in such small quantities that no adverse effects would be expected. In addition, 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 to nonexistent.

For these reasons, the risk of ground fires or fuel/oil pollution from aviation accidents could be considered low. In addition, based on the history and experience of the program in aircraft accidents, it appears the risk of significant environmental damage from such accidents is exceedingly low.

EXECUTIVE ORDERS RELATING TO CHILDREN AND ENVIRONMENTAL JUSTICE

WS would use only legal, effective, and environmentally safe damage management methods, tools, and approaches. The EPA through the FIFRA, the LDAF, the United States Drug Enforcement Administration, MOUs with land managing agencies, and WS' directives would regulate chemical methods that could be available for use by WS pursuant to the alternatives (see WS Directive 2.401, WS Directive 2.405, WS Directive 2.430, WS Directive 2.465). WS would properly dispose of any excess solid or hazardous waste. WS does not anticipate the alternatives would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations. In contrast,

the alternatives may benefit minority or low-income populations by reducing threats to public health and safety and property damage.

Children may suffer disproportionately for many reasons from environmental health and safety risks, including the development of their physical and mental status. WS 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 activities would occur by using only legally available and approved methods where it is highly unlikely that activities conducted pursuant to the alternatives would adversely affect children. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing the alternatives. Additionally, the need for action identified a need to reduce threats to human safety, including risks to children; therefore, cooperators could request WS' assistance with reducing threats to the health and safety of children posed by coyotes.

No adverse effects to human safety have occurred from WS' use of methods to alleviate coyote damage in the State from FY 2009 through FY 2014. The risks to human safety from the use of non-lethal and lethal methods, when used appropriately and by trained personnel, would be considered low. Based on the use patterns of methods available to address damage caused by coyotes, this alternative would comply with Executive Order 12898 and Executive Order 13045.

Alternative 2 – Coyote Damage Management by WS through an Adaptive Integrated Approach Using Only Non-lethal Methods

A non-lethal management alternative would require the WS program to only recommend and use non-lethal methods to manage and prevent damage caused by coyotes. WS would provide technical assistance and direct operational assistance under this alternative recommending and using only non-lethal methods. Similar to the other alternatives, other entities could and would likely continue to use lethal methods and those activities could increase in proportion to the reduction of assistance using lethal methods provided by the WS program. Threats to human safety would continue to occur from activities conducted by other entities, including from those people who implement damage management activities on their own similar to Alternative 3 and Alternative 4.

Non-lethal methods recommended or employed by the WS program have the potential to threaten human safety. Threats to human safety associated with non-lethal methods that would be available under this alternative were addressed under Alternative 1. The threats to human safety associated with non-lethal methods under this alternative would be the same as those threats addressed under Alternative 1. The recommendation and use of non-lethal methods by WS would comply with Executive Order 12898 and Executive Order 13045 under this alternative.

Other entities could still provide assistance using lethal methods under this alternative. Those entities would likely continue to employ those lethal methods discussed in Appendix B. If the assistance using lethal methods provided by those entities increased in proportion to assistance that the WS program would have provided using lethal methods, the potential threats to human safety from methods available would be similar to other alternatives. If those entities increase assistance using lethal methods in proportion to the assistance that the WS program would have provided, risks would be similar to Alternative 1. This could result in less experienced persons implementing lethal methods and could lead to greater risks to human safety. Other entities could use lethal methods where the personnel of the WS program may not because WS' personnel would follow those SOPs outlined in Chapter 3 to reduce threats to human safety. Lethal methods employed by those persons not experienced in the use of methods or were not trained in their proper use, could increase threats to human safety.

Alternative 3 – Coyote Damage Management by WS through Technical Assistance Only

Under this alternative, WS would be restricted to making recommendations on the use of methods and the demonstration of methods to resolve damage. WS would only provide technical assistance to those people requesting assistance with coyote damage and threats. Although hazards to human safety from non-lethal methods exist, those methods are generally regarded as safe when used by trained individuals who are experienced in their use. Risks to human safety associated with non-chemical methods, such as resource management methods (*e.g.*, crop selection, limited habitat modification, modification of human behavior), exclusion devices, frightening devices, and cage traps, could be considered low based on their use profile for alleviating damage associated with wildlife. Although some risk of fire and bodily harm exists from the use of pyrotechnics and propane cannons, when used appropriately and in consideration of those risks, those methods could be used with a high degree of safety.

Under a technical assistance only alternative, the availability of immobilizing drugs, euthanasia chemicals, and aircraft to those persons experiencing damage or other entities would be limited. Immobilizing drugs and euthanasia chemicals used in capturing and handling wildlife could be administered under the direction and authority of state veterinary authorities, either directly or through procedures agreed upon between those authorities and other entities, such as the LDWF. Without access to immobilizing drugs or euthanizing chemicals, those persons capturing coyotes using live-traps or other live-capture methods would be responsible for euthanizing or handling live-captured captive animals. Since the availability of immobilizing drugs and euthanizing chemicals would be limited under this alternative, a gunshot would likely be the primary method of euthanasia. The use of aircraft, primarily the use of firearms from an aircraft, would require a permit from the LDWF.

The recommendation by WS that coyotes be harvested during the regulated trapping season, which would be established by the LDWF, would not increase risks to human safety above those risks already inherent with trapping coyotes. Recommendations of allowing trapping on property owned or managed by a cooperator to reduce local coyote populations that could then reduce coyote damage or threats would not increase risks to human safety. Safety requirements established by the LDWF for the regulated trapping season would further minimize risks associated with those activities. Although trapping accidents do occur, the recommendation of allowing trapping to reduce localized coyote populations would not increase those risks.

The recommendation of shooting with firearms as a method of direct lethal removal could occur under this alternative. Safety issues do arise related to misusing firearms and the potential human hazards associated with firearms use when employed to reduce damage and threats. When used appropriately and with consideration for human safety, risks associated with firearms would be minimal. If firearms were employed inappropriately or without regard to human safety, serious injuries could occur. Under this alternative, recommendations of the use of firearms by WS would include human safety considerations. Since the use of firearms to alleviate coyote damage would be available under any of the alternatives and the use of firearms by those persons experiencing coyote damage could occur whether WS was consulted or contacted, the risks to human safety from the use of firearms would be similar among all the alternatives.

If non-chemical methods were employed according to recommendations and as demonstrated by WS, the potential risks to human safety would be similar to the proposed action. If methods were employed without guidance from WS or applied inappropriately, the risks to human safety could increase. The extent of the increased risk would be unknown and variable. Non-chemical methods inherently pose minimal risks to human safety given the design and the extent of the use of those methods.

The cooperator requesting assistance would also be made aware of threats to human safety associated with the use of those methods. SOPs for methods are discussed in Chapter 3 of this EA. Risks to human safety from activities and methods recommended under this alternative would be similar to the other alternatives since the same methods would be available. If misused or applied inappropriately, any of the methods available to alleviate coyote damage could threaten human safety. However, when used appropriately, methods available to alleviate damage would not threaten human safety. The recommendation of methods by WS to people requesting assistance and the pattern of use recommended by WS would comply with Executive Order 12898 and Executive Order 13045.

Alternative 4 – No Coyote Damage Management Conducted by WS

Under the no involvement by WS alternative, WS would not be involved with any aspect of managing damage associated with coyotes in the State, including technical assistance. Due to the lack of involvement in managing damage caused by coyotes, no impacts to human safety would occur directly from WS. This alternative would not prevent those entities experiencing threats or damages associated with coyotes from conducting damage management activities in the absence of WS' assistance. The direct burden of implementing permitted methods would be placed on those people experiencing damage or would require those people to seek assistance from other entities.

Similar to the technical assistance only alternative, immobilizing drugs, euthanasia chemicals, and the use of aircraft would have limited availability under this alternative to the public. Since most methods available to resolve or prevent coyote damage or threats would be available to anyone, the threats to human safety from the use of those methods would be similar between the alternatives. However, methods employed by those persons not experienced in the use of methods or were not trained in their proper use, could increase threats to human safety. Overall, the methods available to the public, when applied correctly and appropriately, would pose minimal risks to human safety.

Issue 4 - Effects of Coyote Damage Management Activities on the Aesthetic Value of Coyotes

Another concern often raised is the potential impact the alternatives could have on the aesthetic value that people often regard for coyotes. The effects of the alternatives on this issue are analyzed below by alternative.

Alternative 1 - Continue the Current Adaptive Integrated Methods Approach to Managing Coyote Damage (No Action/Proposed Action)

Under the proposed action, methods would be employed that would result in the dispersal, exclusion, or removal of individuals or small groups of coyotes to resolve damage and threats. In some instances where coyotes were dispersed or removed, the ability of interested persons to observe and enjoy those coyotes would likely temporarily decline.

Even the use of exclusionary devices can lead to the dispersal of wildlife if the resource being damaged was acting as an attractant. Thus, once the attractant was removed or made unavailable, the wildlife would likely disperse to other areas where resources would be more vulnerable.

The use of lethal methods would result in temporary declines in local populations resulting from the removal of coyotes to address or prevent damage and threats. The goal under the proposed action would be to respond to requests for assistance and to manage those coyotes responsible for the resulting damage. Therefore, the ability to view and enjoy coyotes would remain if a reasonable effort were made to locate coyotes outside the area in which damage management activities were occurring. In most cases, the

coyotes removed by WS could be removed by the person experiencing damage or removed by other entities if no assistance was provided by WS.

All activities would be conducted where a request for assistance was received and only after the cooperator and WS had signed a MOU, work initiation document, or similar document. Some aesthetic value would be gained by the removal of some coyotes and the return of a more natural environment, including the return of native wildlife and plant species that may be suppressed or displaced by high coyote densities.

Since those coyotes that could be removed by WS under this alternative could be removed by other entities, WS' involvement in removing those coyotes would not likely be additive to the number of coyotes that could be removed in the absence of WS' involvement. Other entities could remove coyotes at any time without the need for a permit or during the regulated trapping seasons.

WS' removal of coyotes from FY 2009 through FY 2014 has been of low magnitude compared to the total mortality and population of coyotes. WS' activities would not likely be additive to the coyotes that could be lethally removed in the absence of WS' involvement. Although coyotes removed by WS would no longer be present for viewing or enjoying, those coyotes would likely be removed by the property owner or manager if WS were not involved in the action. Removal by the property owner or manager could occur during the regulated trapping seasons, or removal could occur without the need for a permit at any time using legally available methods. Given the limited removal proposed by WS under this alternative when compared to the known sources of mortality of coyotes and the population estimate of coyotes, WS' coyote damage management activities conducted pursuant to the proposed action would not adversely affect the aesthetic value of coyotes. The impact on the aesthetic value of coyotes and the ability of the public to view and enjoy coyotes under the proposed action would be similar to the other alternatives and would likely be low.

Alternative 2 – Coyote Damage Management by WS through an Adaptive Integrated Approach Using Only Non-lethal Methods

Under this alternative, WS would only use methods that would result in the exclusion, harassment, dispersal, and translocation of coyotes from areas where coyote damage or threats of damage were occurring in Louisiana. The use of non-lethal methods would result in the translocation, dispersal, or exclusion of coyotes from areas where damage was occurring or could occur. Therefore, a reduction in the number of coyotes present in those locations would occur and those individual coyotes translocated, dispersed, or excluded would no longer be available for viewing in the area where damage was occurring or could occur.

Those methods would also be available for use by other entities in the absence of WS' direct involvement. In addition, lethal removal of coyotes could still occur under this alternative. Therefore, the lethal removal of coyotes could continue despite WS' use of only non-lethal methods. If trained, non-WS individuals used lethal methods, the number of coyotes removed annually could be similar under all the alternatives despite the use of only non-lethal methods by WS.

Although WS' personnel would translocate, disperse, or exclude coyotes under this alternative, coyotes could still be viewed and enjoyed under this alternative if people made a reasonable effort to find coyotes outside the area where damage was occurring or could occur. The impacts to the aesthetic value of coyotes from the use of non-lethal methods by WS under this alternative would be low.

Alternative 3 – Coyote Damage Management by WS through Technical Assistance Only

If those persons seeking assistance from WS were those persons likely to conduct damage management activities in the absence of WS' involvement, then technical assistance provided by WS would not adversely affect the aesthetic value of coyotes in the State similar to Alternative 1. Coyotes could be lethally removed under this alternative by those entities experiencing coyote damage or threats, which could result in localized reductions in the presence of coyotes at the location where damage was occurring. The presence of coyotes where damage was occurring could be reduced where damage management activities were conducted under any of the alternatives. Even the recommendation of non-lethal methods would likely result in the dispersal of coyotes from the area if those non-lethal methods recommended by WS were employed by those persons receiving technical assistance. Therefore, technical assistance provided by WS would not prevent the aesthetic enjoyment of coyotes since any activities conducted to alleviate coyote damage could occur in the absence of WS' participation in the action, either directly or indirectly.

Under this alternative, the effects on the aesthetic values of coyotes would be similar to those addressed in the proposed action. When people seek assistance with managing damage from either WS or another entity, the damage level has often reached an unacceptable threshold for that particular person. Therefore, in the case of coyote damage, the social acceptance level of those coyotes causing damage has reached a level where assistance has been requested and those persons would likely apply methods or seek those entities that would apply those methods based on recommendations provided by WS or by other entities. Based on those recommendations, methods could be employed by the requester that could result in the dispersal and/or removal of coyotes responsible for damage or threatening safety. If those coyotes causing damage were dispersed or removed by those persons experiencing damage based on recommendations by WS or other entities, the potential effects on the aesthetic value of those coyotes would be similar to the proposed action alternative. In addition, those persons could contact other entities to provide direct assistance with dispersing or removing those coyotes causing damage.

The potential impacts on aesthetics from a technical assistance program would only be lower than the proposed action if those individuals experiencing damage were not as diligent in employing those methods as WS would be if conducting an operational program or if no further action was taken by the requester. If those persons experiencing damage abandoned the use of those methods or conducted no further actions, then coyotes would likely remain in the area and available for viewing and enjoying for those persons interested in doing so. Similar to the other alternatives, the geographical area in which damage management activities could occur would not be such that coyotes would be dispersed or removed from such large areas that opportunities to view and enjoy coyotes would be severely limited

Alternative 4 – No Coyote Damage Management Conducted by WS

Under the no coyote damage management by WS alternative, the actions of WS would have no impact on the aesthetic value of coyotes in the State. Those people experiencing damage or threats from coyotes would be responsible for researching, obtaining, and using all methods as permitted by federal, state, and local laws and regulations. Coyotes could continue to be dispersed and lethally removed under this alternative in the State. Lethal removal could continue to occur during the regulated trapping season and removal could occur any time without the need for a permit.

Since coyotes would continue to be lethally removed under this alternative, despite WS' lack of involvement, the ability to view and enjoy coyotes would likely be similar to the other alternatives. The lack of WS' involvement would not lead to a reduction in the number of coyotes dispersed or removed since WS' has no authority to regulate removal or the harassment of coyotes in the State. The LDWF, with management authority over coyotes could continue to adjust all removal levels based on population

objectives for those coyotes in the State. Therefore, the number of coyotes lethally removed annually during the trapping season would be regulated and adjusted by the LDWF.

Those people experiencing damage or threats could continue to use those methods they feel appropriate to resolve coyote damage or threats, including lethal removal or could seek the direct assistance of other entities. Therefore, WS' involvement in managing damage would not be additive to the coyotes that could be dispersed or removed. The impacts to the aesthetic value of coyotes would be similar to the other alternatives.

Issue 5 - Humaneness and Animal Welfare Concerns of Methods

As discussed previously, a common issue often raised is concerns about the humaneness of methods available under the alternatives for resolving coyote damage and threats. The issues of method humaneness relating to the alternatives are discussed below.

Alternative 1 - Continue the Current Adaptive Integrated Methods Approach to Managing Coyote Damage (No Action/Proposed Action)

Under the proposed action, WS would integrate methods using the WS Decision Model as part of technical assistance and direct operational assistance. Methods available under the proposed action could include non-lethal and lethal methods integrated into direct operational assistance conducted by WS. Under this alternative, non-lethal methods would be used by WS that were generally regarded as humane. Non-lethal methods that would be available include resource management methods (*e.g.*, limited habitat modification, modification of human behavior), translocation, exclusion devices, frightening devices, cage traps, foothold traps, and immobilizing drugs.

As discussed previously, humaneness, in part, appears to be a person's perception of harm or pain inflicted on an animal. 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.

Some individuals believe any use of lethal methods to resolve damage associated with wildlife is inhumane because the resulting fate is the death of the animal. Others believe that certain lethal methods can lead to a humane death. Others believe most non-lethal methods of capturing wildlife to be humane because the animal is generally unharmed and alive. Still others believe that any disruption in the behavior of wildlife is inhumane. With the multitude of attitudes on the meaning of humaneness and the varying perspectives on the most effective way to address damage and threats in a humane manner, agencies are challenged with conducting activities and employing methods that are perceived to be humane while assisting those persons requesting assistance to manage damage and threats associated with wildlife. The goal of WS would be to use methods as humanely as possible to resolve requests for assistance to reduce damage and threats to human safety. WS would continue to evaluate methods and activities to minimize the pain and suffering of methods addressed when attempting to resolve requests for assistance.

Some methods have been stereotyped as "*humane*" or "*inhumane*". However, many "*humane*" methods can be inhumane if not used appropriately. For instance, a cage trap would generally be considered by most members of the public as "*humane*", since the animal would be alive and generally unharmed. Yet, without proper care, live-captured wildlife in a cage trap could be treated inhumanely if not attended to appropriately.

Therefore, the goal would be to address requests for assistance effectively using methods in the most humane way possible that minimizes the stress and pain to the animal. Overall, the use of resource

management methods, harassment methods, and exclusion devices would be regarded as humane when used appropriately. Although some concern arises from the use of live-capture methods, the stress of animals is likely temporary.

Although some issues of humaneness could occur from the use of cage traps, foothold traps, translocation, and immobilizing drugs, those methods, when used appropriately and by trained personnel, would not result in the inhumane treatment of wildlife. Concerns from the use of those non-lethal methods would be from injuries to animals while those animals were restrained and from the stress of the animal while being restrained or during the application of the method. Pain and physical restraint can cause stress in animals and the inability of animals to effectively deal with those stressors can lead to distress. Suffering occurs when action is not taken to alleviate conditions that cause pain or distress in animals.

If coyotes were to be live-captured by WS, WS' personnel would be present on-site during capture events or capture devices would be checked at least once in a 24-hour period to ensure coyotes captured were addressed in a timely manner and to prevent injury. Although stress could occur from being restrained, timely attention to live-captured wildlife would alleviate suffering. Stress would likely be temporary.

Under the proposed action, lethal methods could also be employed to alleviate or prevent coyote damage and threats, when requested. Lethal methods would include shooting, cable restraints, euthanasia chemicals, and the recommendation of harvest during the trapping season. In addition, coyotes that are live-captured using non-lethal methods could be euthanized by WS. WS' use of lethal control methods under the proposed action would follow those required by WS' directives (see WS Directive 2.505, WS Directive 2.430).

The euthanasia methods being considered for use under the proposed action for live-captured coyotes are carbon dioxide, carbon monoxide, gunshot, and barbiturates or potassium chloride in conjunction with general anesthesia. Those methods are considered acceptable methods by the AVMA for euthanasia and the use of those methods would meet the definition of euthanasia (AVMA 2013). The use of carbon dioxide, carbon monoxide, barbiturates, and potassium chloride for euthanasia would occur after the animal had been live-captured and would occur away from public view. Although the AVMA guideline also lists gunshot as a conditionally acceptable method of euthanasia for free-ranging wildlife, there is greater potential the method may not consistently produce a humane death (AVMA 2013). WS' personnel that employ firearms to address coyote damage or threats to human safety would be trained in the proper placement of shots to ensure a timely and quick death.

Research and development by WS has improved the selectivity and humaneness of management techniques. Research is continuing to bring new findings and products into practical use. Until new findings and products were found practical, a certain amount of animal suffering could occur when some methods were used in situations where non-lethal damage management methods were not practical or effective. As stated previously, research suggests that some methods, such as restraint in foothold traps or changes in the blood chemistry of trapped animals, indicate "*stress*" (Kreeger et al. 1990). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness (Bateson 1991, Sharp and Saunders 2008, Sharp and Saunders 2011).

Personnel from WS would be experienced and professional in their use of management methods (see WS Directive 1.301). Consequently, management methods would be implemented in the most humane manner possible. Many of the methods discussed in Appendix B to alleviate coyote damage and/or threats in the State could be used under any of the alternatives by those persons experiencing damage regardless of WS' direct involvement. The only methods that would have limited availability to those people experiencing damage associated with coyotes would be immobilizing drugs, euthanasia chemicals,

and the use of aircraft. Therefore, the issue of humaneness associated with methods would be similar across any of the alternatives since those methods could be employed by other entities in the absence of WS' involvement. Those persons who view a particular method as humane or inhumane would likely continue to view those methods as humane or inhumane under any of the alternatives. SOPs that would be incorporated into WS' activities to ensure methods were used by WS as humanely as possible are listed in Chapter 3.

Alternative 2 – Coyote Damage Management by WS through an Adaptive Integrated Approach Using Only Non-lethal Methods

Under this alternative, the WS program would only use non-lethal methods, which most people would generally regard as humane. Non-lethal methods would include resource management methods (*e.g.*, minor habitat modification, modification of human behavior), translocation, exclusion devices, frightening devices, live traps, foothold traps, and cable restraints.

Although some issues of humaneness could occur from the use of non-lethal methods, those methods, when used appropriately and by trained personnel, would not result in the inhumane treatment of coyotes. Concerns from the use of those non-lethal methods would be from injuries to animals while restrained, from the stress of the animal while being restrained, or during the application of the method. Pain and physical restraint can cause stress in animals and the inability of animals to effectively deal with those stressors can lead to distress. Suffering occurs when people do not take action to alleviate conditions that cause pain or distress in animals.

Overall, many people would regard the use of resource management methods, harassment methods, live-capture methods, and exclusion devices as humane when used appropriately. Although some concern arises from the use of live-capture methods, the stress of animals would likely be temporary and would cease once a person released the animal. Similar to the other alternatives, other entities could continue to use lethal methods under this alternative.

Alternative 3 – Coyote Damage Management by WS through Technical Assistance Only

The issue of humaneness of methods under this alternative would be similar to the humaneness issues discussed under the proposed action. This similarity would be derived from WS' recommendation of methods that some people may consider inhumane. WS would not directly be involved with damage management activities under this alternative. However, the recommendation of the use of methods would likely result in the requester employing those methods. Therefore, by recommending methods and thus a requester employing those methods, the issue of humaneness would be similar to the proposed action. Under this alternative, WS would recommend the use of euthanasia methods pursuant to WS Directive 2.505. However, the person requesting assistance would determine what methods to use to euthanize or kill a live-captured animal.

WS would instruct and demonstrate the proper use and placement of methodologies to increase effectiveness in capturing target coyotes and to ensure methods were used in such a way as to minimize pain and suffering. However, the efficacy of methods employed by a cooperator would be based on the skill and knowledge of the requester in resolving the threat to safety or damage situation despite WS' demonstration. Therefore, a lack of understanding of the behavior of coyotes or improperly identifying the damage caused by coyotes along with inadequate knowledge and skill in using methodologies to resolve the damage or threat could lead to incidents with a greater probability of being perceived as inhumane. In those situations, the potential for pain and suffering would likely be regarded as greater than discussed in the proposed action.

Alternative 4 – No Coyote Damage Management Conducted by WS

Under this alternative, WS would not be involved with any aspect of coyote damage management in Louisiana. Those people experiencing damage or threats associated with coyotes could continue to use those methods legally available. Those methods would likely be considered inhumane by those persons who would consider methods proposed under any alternative as inhumane. The issue of humaneness would likely be directly linked to the methods legally available to the public since methods are often labeled as inhumane by segments of society no matter the entity employing those methods.

The humaneness of methods would be based on the skill and knowledge of the person employing those methods. A lack of understanding regarding the behavior of coyotes or methods used could lead to an increase in situations perceived as being inhumane to wildlife despite the method used. Despite the lack of involvement by WS under this alternative, those methods perceived as inhumane by certain individuals and groups would still be available to the public to use to resolve damage and threats caused by coyotes. Those persons employing methods to live-capture coyotes would determine when and how to euthanize or kill those animals.

4.2 CUMULATIVE IMPACTS OF THE PROPOSED ACTION BY ISSUE

WS follows CEQ regulations implementing the NEPA (40 CFR 1500 et seq.), USDA (7 CFR 1b), and APHIS Implementing Guidelines (7 CFR 372) as part of the decision-making process. Cumulative impacts, as defined by the CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Under Alternative 1, Alternative 2, and Alternative 3, WS would address damage associated with coyotes either by providing technical assistance only (Alternative 3) or by providing technical assistance and direct operational assistance (Alternative 1, Alternative 2) in the State. WS would be the primary federal agency conducting direct operational coyote damage management in the State under Alternative 1 and Alternative 2. However, other federal, state, and private entities could also be conducting coyote damage management in the State.

WS does not normally conduct direct damage management activities concurrently with such agencies or other entities in the same area, but may conduct damage management activities at adjacent sites within the same period. In addition, commercial companies may conduct damage management activities in the same area. The potential cumulative impacts could occur from either WS' damage management program activities over time or from the aggregate effects of those activities combined with the activities of other agencies and private entities. Through ongoing coordination and collaboration between WS and the LDWF, activities of each agency and the removal of coyotes would be available. Damage management activities in the State would be monitored to evaluate and analyze activities to ensure they were within the scope of analysis of this EA.

Issue 1 - Effects of Coyote Damage Management Activities on Target Coyote Populations

The issue of the effects on the statewide coyote population arises from the use of non-lethal and lethal methods to address the need for reducing damage and threats. As part of an integrated methods approach to managing damage and threats, WS could apply both lethal and non-lethal methods when requested by those persons experiencing damage.

Non-lethal methods could disperse or otherwise make an area unattractive to coyotes causing damage; thereby, reducing the presence of coyotes at the site and potentially the immediate area around the site where non-lethal methods were employed. WS' employees would give non-lethal methods priority when addressing requests for assistance (see WS Directive 2.101). However, WS would not necessarily employ non-lethal methods to resolve every request for assistance if deemed inappropriate by WS' personnel using the WS Decision Model. For example, if a cooperator requesting assistance, had already attempted to disperse coyotes using non-lethal harassment methods, WS would not necessarily employ those methods again during direct operational assistance since those methods had already been proven to be ineffective in that particular situation. WS and other entities could use non-lethal methods to exclude, harass, and disperse target wildlife from areas where damage or threats were occurring. When effective, non-lethal methods would disperse coyotes from an area resulting in a reduction in the presence of those coyotes at the site where WS or another entity employed those methods. However, coyotes responsible for causing damage or threats would likely disperse to other areas with minimal impacts occurring to the coyote populations. WS would not employ non-lethal methods over large geographical areas or apply those methods at such intensity that essential resources (*e.g.*, food sources, habitat) would be unavailable for extended durations or over a wide geographical scope that long-term adverse effects would occur to a species' population. WS and most people generally regard non-lethal methods as having minimal impacts on overall populations of wildlife since individuals of those species would be unharmed. Therefore, the use of non-lethal methods would not have cumulative effects on coyote populations in the State.

WS' employees could employ lethal methods to resolve damage associated with coyotes that WS identifies as responsible for causing damage or threats to human safety. However, lethal removal by WS would only occur after receiving a request for such assistance and only after the LDWF authorized WS to use lethal methods, when required. Therefore, the use of lethal methods could result in local reductions in the number of target animals in the area where damage or threats were occurring since WS would remove those target individuals from the population. WS would often employ lethal methods to reinforce non-lethal methods and to remove coyotes that have been identified as causing damage or posing a threat to human safety. The use of lethal methods could therefore result in local reductions of coyotes in the area where damage or threats were occurring. The number of coyotes removed from the coyote population using lethal methods under the proposed action would be dependent on the number of requests for assistance received, the number of coyotes involved with the associated damage or threat, and the efficacy of methods employed.

WS would maintain ongoing contact with the LDWF to ensure activities were within management objectives for coyotes. WS would submit annual activity reports to the LDWF. The LDWF would have the opportunity to monitor the total removal of coyotes from all sources and could factor in survival rates from predation, disease, and other mortality data.

WS would monitor removal by comparing the number of coyotes killed with overall populations or trends in populations to assure the magnitude of removal was below the level that would cause undesired adverse effects to the viability of coyote populations. This EA analyzed the potential cumulative impacts on the coyote population from the implementation of the proposed action alternative in Section 4.1.

Evaluation of activities relative to coyotes indicated that program activities would likely have no cumulative adverse effects on coyote populations when targeting those individual coyotes responsible for damage at the levels addressed in this EA. WS' actions would be occurring simultaneously, over time, with other natural processes and human generated changes that are currently taking place. These activities include, but would not be limited to:

- Natural mortality of coyotes
- Mortality through vehicle strikes, aircraft strikes, and illegal harvest

- Human-induced mortality of coyotes through private damage management activities
- Human-induced mortality through regulated harvest
- Human and naturally induced alterations of wildlife habitat
- Annual and perennial cycles in wildlife population densities

All those factors play a role in the dynamics of coyote populations. In many circumstances, requests for assistance arise when some or all of those elements have contrived to elevate coyote populations or place coyotes at a juncture to cause damage to resources. The actions taken to minimize or eliminate damage would be constrained as to scope, duration, and intensity for the purpose of minimizing or avoiding impacts to the environment. WS would use the Decision Model to evaluate the damage occurring, including other affected elements and the dynamics of coyotes, to determine appropriate strategies to minimize effects on environmental elements. The Model would allow WS to implement damage management actions and to monitor those actions to adjust/cease damage management actions, which would allow WS to take into consideration other influences in the environment, such as those listed above, in order to avoid cumulative effects on coyotes (Slate et al. 1992).

With management authority over coyote populations in the State, the LDWF could adjust removal levels, including the removal of WS, to ensure population objectives for coyotes were achieved. Consultation and reporting of removal by WS would ensure the LDWF had the opportunity to consider any activities WS conducts.

WS' removal of coyotes in Louisiana from FY 2009 through FY 2014 was of a low magnitude when compared to the total known removal of coyotes and when compared to the statewide population of coyotes. The LDWF could consider all known removal when determining population objectives for coyotes and could adjust the number of coyotes that could be harvested during the regulated harvest season and the number of coyotes removed for damage management purposes to achieve the population objectives. Any coyote population declines or increases would be the collective objective for coyote populations established by the LDWF through the regulation of lethal removal. Therefore, the cumulative removal of coyotes annually or over time by WS would occur at the desire of the LDWF as part of management objectives for coyotes in the State. No cumulative adverse effects on target and non-target wildlife would be expected from WS' damage management activities based on the following considerations:

Historical outcomes of WS' damage management activities on wildlife

WS would conduct damage management activities associated with coyotes only at the request of a cooperator to reduce damage that was occurring or to prevent damage from occurring and only after methods to be used were agreed upon by all parties involved. WS would monitor activities to ensure any potential impacts were identified and addressed. WS would work closely with resource agencies to ensure damage management activities would not adversely affect coyote populations and that WS' activities were considered as part of management goals established by those agencies. Historically, WS' activities to manage damage caused by coyotes in Louisiana have not reached a magnitude that would cause adverse effects to coyote populations in the State.

SOPs built into the WS program

SOPs are designed to reduce the potential negative effects of WS' actions on coyotes, and have been tailored to respond to changes in wildlife populations that could result from unforeseen environmental changes. This would include those changes occurring from sources other than WS. Alteration of

activities would be defined through SOPs, and implementation would be insured through monitoring, in accordance with the WS Decision Model (see WS Directive 2.201; Slate et al. 1992).

Issue 2 - Effects of Coyote Damage Management Activities on Non-target Wildlife Species Populations, Including T&E Species

Potential effects on non-target species from conducting coyote damage management arise from the use of non-lethal and lethal methods to alleviate or prevent those damages. The use of non-lethal methods during activities to reduce or prevent damage caused by coyotes has the potential to exclude, disperse, or capture non-target animals. However, the effects of non-lethal methods are often temporary and often do not involve the removal (killing) of non-target animal species. When using exclusion devices both target and non-target wildlife can be prevented from accessing the resource being damaged. Since exclusion does not involve lethal removal, cumulative impacts on non-target species from the use of exclusionary methods would not occur but would likely disperse those individuals to other areas. Exclusionary method can require constant maintenance to ensure effectiveness. Therefore, the use of exclusionary devices would be somewhat limited to small, high-value areas and not used to the extent that non-targets would be excluded from large areas that would cumulatively impact populations from the inability to access a resource, such as potential food sources or denning sites. The use of visual and auditory harassment and dispersion methods would generally be temporary with non-target species returning after the cessation of those activities. Dispersal and harassment do not involve the removal (killing) of non-target species and similar to exclusionary methods would not be used to the extent or at a constant level that would prevent non-targets from accessing critical resources that would threaten survival of a population.

The use of lethal methods or those methods used to live-capture coyotes followed by euthanasia also have the potential to affect non-target wildlife through the removal (killing) or capture of non-target species. Capture methods used are often methods that would be set to confine or restrain target wildlife after being triggered by a target individual. Capture methods would be employed in such a manner as to minimize the threat to non-target species by placement in those areas frequently used by coyotes, using baits or lures that were as specific to coyotes as possible, and modification of individual methods to exclude non-targets from capture. Most methods described in Appendix B are methods that would be employed to confine or restrain wildlife that would be subsequently euthanized using humane methods. With all live-capture devices, non-target wildlife captured could be released on site if determined to be able to survive following release. SOPs are intended to ensure removal of non-target wildlife was minimal during the use of methods to capture target wildlife.

The use of firearms and euthanasia methods would essentially be selective for coyotes since identification of an individual would be made prior to the application of the method. Euthanasia methods would be applied through direct application to target wildlife. Therefore, the use of those methods would not affect non-target species.

All chemical methods would be tracked and recorded to ensure proper accounting of used and unused chemicals occurs. All chemicals would be stored and transported according with WS' Directives and relevant federal, state, and local regulations. Chemical methods available for use under the proposed action would include immobilizing drugs and euthanasia chemicals, which are described in Appendix B. Immobilizing drugs and euthanasia chemicals would be applied directly to coyotes; therefore, risks to non-targets would be minimal. The use of those methods often requires an acclimation period and monitoring of potential bait sites for non-target activity. All chemicals would be used according to product labels, which would ensure that proper use would minimize non-target threats. WS' adherence to Directives and SOPs governing the use of chemicals would also ensure non-target hazards would be minimal.

The methods described in Appendix B have a high level of selectivity and could be employed using SOPs to ensure minimal impacts to non-target species. The unintentional removal of animals would likely be limited and would not reach a magnitude where adverse effects would occur. Based on the methods available to resolve coyote damage and/or threats, WS does not anticipate the number of non-targets lethally removed to reach a magnitude where declines in those species' populations would occur. Therefore, removal under the proposed action of non-targets would not cumulatively affect non-target species. WS has reviewed the T&E species listed by the LDWF, the USFWS, and the National Marine Fisheries Service and consulted with those agencies. WS would adhere to the restriction zones for the use of cable restraints to avoid incidental capture of Louisiana black bears (see Appendix E). WS would abide by all reasonable and prudent measures, including the terms and conditions that implement the reasonable and prudent measures, as outlined in the biological opinion issued by the USFWS to avoid jeopardizing the status of the Louisiana black bear. Cumulative impacts would be minimal on non-targets from any of the alternatives discussed.

Issue 3 - Effects of Coyote Damage Management Activities on Human Health and Safety

Non-chemical methods described in Appendix B would be used within a limited period, would not be residual, and do not possess properties capable of inducing cumulative effects on human health and safety. WS' personnel would use non-chemical methods after careful consideration of the safety of those persons employing methods and to the public. When possible, WS' personnel would use capture methods where human activity was minimal to ensure the safety of the public. Capture methods also require direct contact to trigger, which ensures that those methods, when left undisturbed, would have no effect on human safety. WS' personnel would only use methods the requester agreed to when signing a MOU, work initiation document, or another comparable document. Therefore, WS' personnel would make those entities requesting assistance aware of the safety issues of those methods when entering into a MOU, work initiation document, or another comparable document. SOPs would also ensure the safety of the public from those methods used to capture or remove wildlife. WS' personnel would use firearms in situations that ensure the safety of employees and the public.

Personnel employing non-chemical methods would continue to receive training to be proficient in the use of those methods to ensure the safety of the applicator and to the public. Based on the use patterns of non-chemical methods, those methods would not cumulatively affect human safety.

WS has received no reports or documented any effects to human safety from WS' coyote damage management activities conducted from FY 2009 through FY 2014. WS does not expect any cumulative effects from the use of those methods discussed in Appendix B given the use patterns of those methods for resolving coyote damage in the State.

Issue 4 - Effects of Coyote Damage Management Activities on the Aesthetic Value of Coyotes

The activities of WS could result in the removal of coyotes from those areas where damage or threats were occurring. Therefore, the removal of coyotes could reduce the aesthetic value of coyotes in those areas where WS' personnel conduct damage management activities. However, for some people, the removal of coyotes may increase the aesthetic value of a more natural environment, including the return of native species that coyotes may suppress or disperse.

Some people experience a decrease in aesthetic enjoyment of wildlife because they feel that overabundant species are objectionable and interfere with their enjoyment of wildlife in general. Continued increases in numbers of individuals or the continued presence of coyotes may lead to further degradation of some people's enjoyment of any wildlife or the natural environment.

The LDWF would establish and enforce coyote population objectives by regulating harvest during the statewide trapping seasons after consideration of other known mortality factors. Therefore, WS would have no direct impact on the status of coyote populations since removal by WS would occur at the discretion of the LDWF. Since those persons seeking assistance could remove coyotes from areas where damage was occurring when permitted by the LDWF, WS' involvement would have no effect on the aesthetic value of coyotes in the area where damage was occurring. When damage caused by coyotes has occurred, any removal of coyotes by the property or resource owner would likely occur whether WS was involved with taking the coyotes or not.

In the wild, few animals in the United States have life spans approaching that of people. Mortality is high among wildlife populations and specific individuals among a species may experience death early in life. Mortality in wildlife populations is a natural occurrence and people who form affectionate bonds with animals experience loss of those animals over time in most instances. A number of professionals in the field of psychology have studied human behavior in response to attachment to pet animals (Gerwolls and Labott 1994, Marks et al. 1994, Zasloff 1996, Archer 1999, Ross and Baron-Sorensen 1998, Meyers 2000). Similar observations were probably applicable to close bonds that could exist between people and wild animals. As observed by researchers in human behavior, normal human responses to loss of loved ones proceed through phases of shock or emotional numbness, sense of loss, grief, acceptance of the loss or what cannot be changed, healing, and acceptance and rebuilding which leads to resumption of normal lives (Lefrancois 1999). Those people who lose companion animals, or animals for which they may have developed a bond and affection, tend to proceed through the same phases as with the loss of human companions (Gerwolls and Labott 1994, Boyce 1998, Meyers 2000). However, they usually establish a bond with other individual animals after such losses. Although they may lose the sense of enjoyment and meaning from the association with those animals that die or are no longer accessible, they usually find a similar meaningfulness by establishing an association with new individual animals or through other relational activities (Weisman 1991). Through this process of coping with the loss and establishing new affectionate bonds, people may avoid compounding emotional effects resulting from such losses (Lefrancois 1999).

WS may remove some coyotes with which people have established affectionate bonds from some project sites. However, other individual coyotes would likely continue to be present in the affected area and people would tend to establish new bonds with those remaining animals. In addition, human behavior processes usually result in individuals ultimately returning to normalcy after experiencing the loss of association with a wild animal that an entity might remove from a specific location. WS' activities would not have any cumulative effects on this element of the human environment.

Issue 5 - Humaneness and Animal Welfare Concerns of Methods

WS would continue to seek new methods and ways to improve current technology to improve the humaneness of methods used to manage damage caused by wildlife. Cooperation with individuals and organizations involved in animal welfare continues to be an agency priority for the purpose of evaluating strategies and defining research aimed at developing humane methods.

All methods not requiring direct supervision during employment (*e.g.*, live traps) would be checked at least once a day in accordance with Louisiana laws and regulations to ensure any wildlife confined or restrained were addressed in a timely manner to minimize distress of the animal. WS' personnel would apply euthanasia methods according to WS' directives. Shooting would occur in some situations and WS' personnel would receive training in the proper use of firearms to minimize pain and suffering of coyotes removed by this method.

WS would employ methods as humanely as possible by applying SOPs to minimize pain. In addition, WS' personnel would address animals live-captured in a timely manner to minimize distress. Through the establishment of SOPs that guide WS in the use of methods, the cumulative impacts on the issue of method humaneness would be minimal. WS would continually evaluate methods to ensure SOPs were adequate and that WS' personnel address live-captured animals in a timely manner to minimize distress.

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APPENDIX A
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APPENDIX B
METHODS AVAILABLE FOR RESOLVING OR PREVENTING COYOTE DAMAGE IN LOUISIANA

The most effective approach to resolving wildlife damage problems would be to integrate the use of several methods, either simultaneously or sequentially. An adaptive plan would integrate and apply practical methods of prevention and reduce damage by wildlife while minimizing harmful effects of damage reduction measures on people, other species, and the environment. An adaptive plan may incorporate resource management, physical exclusion and deterrents, and population management, or any combination of these, depending on the characteristics of specific damage problems.

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

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

Non-chemical Wildlife Damage Management Methods

Non-chemical management methods consist primarily of tools or devices used to repel, capture, or kill a particular animal or local population of wildlife to alleviate damage and conflicts. Methods may be non-lethal (*e.g.*, fencing, frightening devices) or lethal (*e.g.*, firearms). If WS' personnel apply those methods, a MOU, work initiation document, or another similar document must be signed by the landowner or administrator authorizing the use of each damage management method. Non-chemical methods used or recommended by WS could include:

Exclusion pertains to preventing access to resources through fencing or other barriers. Fencing of small critical areas can sometimes prevent animals that cannot climb from entering areas of protected resources. Fencing installed with an underground skirt can prevent access to areas for many mammal species that dig, including coyotes, fox, feral cats, and striped skunks. Areas such as airports, yards, or gardens may be fenced. Hardware cloth or other metal barriers can sometimes be used to prevent the entry of mammals into buildings through existing holes or gaps.

Fences are widely used to prevent damage from predators. Exclusionary fences constructed of woven wire or multiple strands of electrified wire can be effective in keeping predators from some areas such as a sheep pasture or an airport. The size of the wire grid and height of the fence must be able to keep the predators out. In addition, an underground apron (*e.g.*, fencing in the shape of an "*L*" going outward) about 2 feet down and 2 feet out helps make a fence more wildlife proof; the "*L*" keeps predators out that dig crawl holes under the fence. However, fencing has limitations. Even an electrified fence is not always wildlife-proof and the expense of the fencing can often exceed the benefit. In addition, if large

areas are fenced, the wildlife being excluded has to be removed from the enclosed area to make it useful. Some fences inadvertently trap, catch or affect the movement of non-target wildlife and may not be practical or legal in some areas (*e.g.*, restricting access to public land).

Cultural Methods includes the application of practices that seek to minimize exposure of the protected resource to damaging animals through processes other than exclusion. They may include animal husbandry practices such as employing guard dogs, herders, shed lambing, carcass removal, or pasture selection. Strategies may also include minimizing cover where damaging coyotes might hide, manipulating the surrounding environment through barriers or fences to deter animals from entering a protected area.

For example, WS may talk with residents of an area to eliminate the feeding of wildlife that occurs in parks, recreational sites, or residential areas to reduce damage by certain predators, such as coyotes. Some coyotes that cause damage in urban environments are attracted to homes by the presence of garbage or pet food left outside and unprotected. Removal or sealing of garbage in tight trash receptacles, and elimination of all pet foods from outside areas can reduce the presence of unwanted animals. However, many people who are not directly affected by problems caused by wildlife enjoy wild animals and engage in activities that encourage their presence.

Another example of human behavior modification consists of assisting people that have a fear of an animal. WS receives calls about species, such as coyotes, that are not causing damage. Their mere presence is perceived as a threat to the callers even though the animal is in its natural habitat. Personnel of WS provide educational information and reassurance about these species.

Guard Animals are used in damage management to protect a variety of resources, primarily livestock, and can provide adequate protection at times (Andelt 2004). Guard animals (*e.g.*, dogs, burros, and llamas) have proven successful in many sheep and goat operations. The effectiveness of guarding animals may not be sufficient in areas where there is a high density of wildlife to be deterred, where the resource (*e.g.*, sheep foraging on open range) is widely scattered, or where the guard animal to resource ratios are less than recommended. In addition, some guard animals intended for protection against small to medium size predators, like coyotes, may be prey to larger predators like mountain lions and black bears. The WS program often recommends the use of guard animals, but does not have an operational guard animal program.

Animal Husbandry Techniques 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 (herders) 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 increase, so does the degree of protection (Robel et al. 1981). 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 predators are most active. It is also possible to reduce predation of sheep by concentrating sheep in smaller areas (Sacks and Neale 2002). 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 two 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 predators. The use of herders can also provide some protection from predators, especially those herders accompanying bands of sheep on open range where they are highly susceptible to predation.

Animal behavior modification refers to tactics that deter or repel damaging coyotes and thus, reduce damage to the protected resource. Those techniques are usually aimed at causing target animals to respond by fleeing from the site or remaining at a distance. They usually employ extreme noise or visual stimuli. Unfortunately, many of these techniques are only effective for a short time before wildlife habituate to them (Conover 1982, Mitchell et al. 2004). Devices used to modify behavior in coyotes include fladry (Mettler and Shivik 2007, Young et al. 2015), electronic guards (siren strobe-light devices) (Linhart et al. 1992), propane exploders, pyrotechnics, laser lights, human effigies, and the noise associated with the discharge of a firearm.

The success of frightening methods depends on an animal's fear of, and subsequent aversion to, offensive stimuli (Shivik and Martin 2001, Shivik et al. 2003, Mettler and Shivik 2007). 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 (*e.g.*, see Dolbeer et al. 1986, Bomford 1990, Shivik et al. 2003, Mitchell et al. 2004, Shivik 2006). 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 and operated by private individuals or personnel of WS working in the field. However, several of these devices, such as scarecrows and propane exploders, are automated.

Harassment and other methods to frighten animals are probably the oldest methods of combating wildlife damage. These devices may be either auditory or visual and 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 (*e.g.*, electronic distress sounds, propane cannons, and pyrotechnics) is the most popular. Other methods include harassment with visual stimuli (*e.g.*, flashing or bright lights, scarecrows, human effigies), vehicles, or people. Some methods such as the electronic guard use a combination of stimuli (siren and strobe light). These are used to frighten predators from the immediate vicinity of the damage prone area. As with other damage management 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 or other local population reduction methods.

Live Capture and Translocation can be accomplished using hand capture, hand nets, catch poles, cage traps, cable restraints, or with foothold traps to capture coyotes for the purpose of translocating them for release in other areas. WS could employ those methods in Louisiana when the target animal(s) can legally be translocated or can be captured and handled with relative safety by WS' personnel. Live capture and handling of coyotes poses an additional level of human health and safety threat if coyotes are aggressive or extremely sensitive to the close proximity of people. For that reason, WS may limit this method to specific situations. In addition, moving damage-causing individuals to other locations can typically result in damage at the new location, or the translocated individuals can move from the relocation site to areas where they are unwanted. Although translocation is not necessarily precluded in all cases, it would be logistically impractical, in most cases, and biologically unwise in Louisiana due to the risk of disease transmission. High population densities of some animals may make this a poor wildlife management strategy for those species. Translocation would be evaluated by WS on a case-by-case basis. Translocation would only occur with the prior authorization of the LDWF.

Trapping can utilize a number of devices, including foothold traps, cage-type traps, foot snares, and neck/body snares. Trapping methods would be available to all entities under the alternatives.

Foothold Traps can be effectively used to capture coyotes. Foothold traps can be placed beside, or in some situations, in travel ways being actively used by the target species. Placement of traps is contingent upon the habits of the respective target species, habitat conditions, and presence of non-target animals. Effective trap placement and adjustment and the use and placement of appropriate baits and lures by trained WS' personnel also contribute to the selectivity of foothold traps. An additional advantage is that foothold traps can allow for the on-site release of non-target animals since animals are captured alive. The use of foothold traps requires more skill than some methods. Foothold traps would generally be available for use by the public and other state or federal agencies.

Cable Restraints are typically made of wire or cable, and can be set to capture an animal by the neck, body, or foot. Cable restraints may be used as either lethal or live-capture devices depending on how or where they are set. Cable restraints set to capture an animal by the neck are usually lethal but stops can be attached to the cable to increase the probability of a live capture depending on the trap check interval. Snares positioned to capture the animal around the body can be a useful live-capture device, but are more often used as a lethal control technique. Snares can incorporate a breakaway feature to release non-target wildlife and livestock where the target animal is smaller than potential non-targets (Phillips et al. 1990, Phillips 1996). Snares can be effectively used wherever a target animal moves through a restricted travel lane (*e.g.*, under fences or trails through vegetation). When an animal moves forward into the loop formed by the cable, the noose tightens and the animal is held. Snares must be set in locations where the likelihood of capturing non-target animals is minimized.

The foot or leg snare can be set as a spring-powered non-lethal device, activated when an animal places its foot on the trigger or pan. In some situations, using snares to capture wildlife is impractical due to the behavior or morphology of the animal, or the location of many wildlife conflicts. In general, cable restraints would be available to all entities to alleviate damage.

The WS program in Louisiana could conduct activities targeting coyotes in habitats that the Louisiana black bear could use and in areas where black bears occur. The use of cable restraints may result in the incidental capture of Louisiana black bears and may result in injury or death to adults and/or cubs. The death of a captured bear could occur due to stress, dehydration, strangulation (if captured around the neck), or from another animal attacking while the cable restraint held the bear. For this reason, WS' personnel would only use breakaway snares with no greater than 350 lbs tinsel strength when conducting coyote damage management activities in areas known to have black bears. Breakaway restraints would allow bears to break open the restraint and free themselves. Appendix E includes a map and written description of two distinct zones that summarizes snaring restrictions (breakaway snares), that WS will abide by (see further discussion in Section 4.1).

Cage traps come in a variety of styles to live-capture animals. The most commonly known cage traps are box traps. Box traps are usually rectangular and are made from various materials, including metal, wire mesh, plastic, and wood. These traps are used to capture animals alive and can often be used where many lethal tools were impractical. These traps are well suited for use in residential areas and work best when baited with foods attractive to the target animal. Box traps are generally portable and easy to set-up.

Cage traps of some disadvantages. Some individual target animals may avoid cage traps (*i.e.*, become trap shy). Some non-target animals may associate the traps with available food and they purposely enter the traps to eat the bait, making the trap unavailable to catch target animals. Cage traps must be checked frequently to ensure that captured animals are not subjected to extreme

environmental conditions. Some animals will fight to escape, which may cause injuries to the animal. Cage traps can be expense to purchase.

Trap monitors are devices that send a radio signal to a receiver if a set trap is disturbed and alerts field personnel that an animal may be captured. Trap monitors can be attached directly to the trap or attached to a string or wire and then placed away from the trap in a tree or shrub. When the monitor is hung above the ground, it can be detected from several miles away, depending on the terrain in the area. There are many benefits to using trap monitors, such as saving considerable time when checking traps, decreasing fuel usage, prioritizing trap checks, and decreasing the need for human presence in the area.

Trap monitoring devices would be employed, when applicable, that indicate when a trap has been activated. Trap monitoring devices would allow personnel to prioritize trap checks and decrease the amount of time required to check traps, which decreases the amount of time captured target or non-targets would be restrained. By reducing the amount of time targets and non-targets are restrained, pain and stress can be minimized and captured wildlife can be addressed in a timely manner, which could allow non-targets to be released unharmed. Trap monitoring devices could be employed where applicable to facilitate monitoring of the status of traps in remote locations to ensure any captured wildlife was removed promptly to minimize distress and to increase the likelihood non-targets could be released unharmed.

Denning is the practice of locating coyote and lethally removing the young, adults or both to stop an ongoing predation problem or prevent future depredation of livestock. Denning is used in coyote damage management, but is limited because dens are often difficult to locate and den use by coyotes is restricted to about 2 to 3 months during the spring. Coyote depredations on livestock and poultry often increase in the spring and early summer due to the increased food requirements associated with feeding and rearing litters of pups (Till and Knowlton 1983, Till 1992). Removal of pups will often stop depredations even if the adults are not taken (Till 1992). When the adults are taken at or near a known den location, it is customary to euthanize the pups to prevent their starvation because they would be unable to survive on their own. Pups are typically euthanized by digging out the den and euthanizing the pups with sodium pentobarbital (see discussion of sodium pentobarbital). Denning is labor intensive with no guarantee of finding the den of the target animal. Denning is very target-specific and is most often used in open terrain where dens are comparatively easy to find.

Harvest during the Hunting/Trapping Season is sometimes recommended by WS to resource owners. WS could recommend resource owners consider legal hunting/trapping as an option for reducing coyote damage. Although legal hunting/trapping is impractical and/or prohibited in many urban-suburban areas, it can be used to reduce some populations of coyotes.

Shooting with firearms is very selective for the target species and would be conducted with rifles, handguns, and shotguns. Methods and approaches used by WS may include use of vehicles or aircraft, illuminating devices, bait, firearm suppressors, night vision/thermal equipment, and elevated platforms. Shooting is an effective method in some circumstances, and can often provide immediate relief from the problem. Shooting may at times be one of the only methods available to effectively and efficiently resolve a wildlife problem.

Ground shooting is sometimes used as the primary method to alleviate damage or threats of damage. Shooting predators is frequently performed in conjunction with calling, particularly for coyotes. Vocal calls, handheld mouth-blown calls, and electronic calls could be used to mimic target species (*e.g.*, coyote howls and raccoons fighting) or prey (*e.g.*, injured jackrabbit and chicken) vocalizations. Shooting would

be limited to locations where it is legal and safe to discharge a weapon. A shooting program, especially conducted alone, can be expensive because it often requires many staff hours to complete.

Shooting can also be used in conjunction with an illumination device at night, which is especially useful for nocturnal animals, such as coyotes. Spotlights may or may not be covered with a red lens, which nocturnal animals may not be able to see, making it easier to locate them undisturbed. Night shooting may be conducted in sensitive areas that have high public use or other activity during the day, which would make daytime shooting unsafe. The use of night vision and Forward Looking Infrared (FLIR) devices can also be used to detect and shoot coyotes at night, and is often the preferred equipment due to the ability to detect and identify animals in complete darkness. Night vision and FLIR equipment aid in locating wildlife at night when wildlife may be more active. Night vision and FLIR equipment could be used during surveys and in combination with shooting to remove target coyotes at night. WS' personnel most often use this technology to target coyotes in the act of causing damage or likely responsible for causing damage. Those methods aid in the use of other methods or allow other methods to be applied more selectively and efficiently. Night vision and FLIR equipment allow for the identification of target species during night activities, which reduces the risks to non-targets and reduces human safety risks. Night vision equipment and FLIR devices only aid in the identification of wildlife and are not actual methods of lethal removal. The use of FLIR and night vision equipment to remove target coyotes would increase the selectivity of direct management activities by targeting those coyotes most likely responsible for causing damage or posing threats.

Aerial Shooting (*i.e.*, shooting from an aircraft) is a commonly used damage management method for coyotes. Aerial shooting can be especially effective in removing offending coyotes that have become "*bait-shy*" to trap sets or are not susceptible to calling and shooting. Aerial shooting consists of visually sighting target animals in the problem area and personnel shooting the coyote from the aircraft. Local depredation problems (*e.g.*, calf predation by coyotes) can often be resolved quickly through aerial shooting. Aerial shooting is mostly species-selective (there is a slight potential for misidentification) 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 brush covered ground, timbered areas, steep terrain, or broken land where animals are more difficult to spot.

Cain et al. (1972) rated aerial shooting as "*very good*" in effectiveness for problem solving, safety, and lack of adverse environmental impacts. Connolly and O'Gara (1987) documented the efficacy of aerial shooting in taking confirmed sheep-killing coyotes. Wagner (1997) and Wagner and Conover (1999) found that aerial shooting might be an especially appropriate tool as it reduces risks to non-target animals and minimizes contact between damage management operations and recreationists. They also stated that aerial shooting was an effective method for reducing livestock predation and that aerial hunting 3 to 6 months before sheep are grazed on an area was cost-effective when compared with areas without aerial hunting.

Good visibility and relatively clear and stable weather conditions are required for effective and safe aerial shooting. Summer conditions limit the effectiveness of aerial shooting as heat reduces coyote activity and visibility is greatly hampered by vegetative ground cover. Air temperature (high temperatures), which influences air density affects low-level flight safety and may restrict aerial shooting activities. In broken timber or deciduous cover, aerial shooting is more effective in winter when the leaves have fallen or in early spring before the leaves emerge, which improves visibility. The WS program aircraft-use policy helps ensure that aerial shooting is conducted in a safe and environmentally sound manner, in accordance with federal and state laws. Pilots and aircraft must be certified under established WS program procedures and only properly trained WS' employees are approved as gunners. Ground crews are often

used with aerial operations for safety reasons. Ground crews can also assist with locating and recovering target animals, as necessary.

Aircraft overflights have created concerns about disturbing wildlife. The National Park Service (1995) reviewed studies on the effects of aircraft overflights on wildlife. Their report revealed that a number of studies documented responses by certain wildlife species that could suggest adverse impacts may occur. Few, if any studies, have proven that aircraft overflights cause significant adverse impacts to wildlife populations, although the report stated it is possible to draw the conclusion that affects to populations could occur. 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 occur in areas near commercial airports and military flight training facilities. The use of firearms from aircraft would occur in remote areas where tree cover and vegetation allows for visibility of target animals from the air. WS spends relatively little time over any one area.

WS has used fixed-wing aircraft and helicopters for aerial shooting in areas inhabited by wildlife for years. WS conducts aerial activities on areas only under signed agreement and concentrates efforts during certain times of the year and to specific areas. WS' Predator Damage Management Environmental Assessments (*e.g.*, see USDA 2005) that have looked at the issue of aerial hunting overflights on wildlife have found that WS has annually flown less than 10 minutes per mi^2 on properties under agreements. WS flies very little over any one property under agreement in any given year. As a result, no known problems to date have occurred with WS' aerial shooting overflights on wildlife, nor are they anticipated in the future.

Aerial Surveying is a commonly used tool for evaluating and monitoring damage and establishing population estimates and locations of various species of wildlife. WS uses aerial surveying throughout the United States to monitor damages and/or populations of coyotes, fox, wolves, feral swine, feral goats, feral dogs, bobcats, mountain lions, white-tailed deer, pronghorn antelope, elk, big-horn sheep, and wild horses but any wildlife species big enough to see from a moving aircraft could be surveyed using this method. As with aerial shooting, the WS program aircraft-use policy helps ensure that aerial surveys are conducted in a safe and environmentally sound manner, in accordance with Federal and State laws. Pilots and aircraft must also be certified under established WS program procedures and policies.

Aerial Telemetry is used in research projects studying the movements of various wildlife species. Biologists will frequently place radio-transmitting collars on selected individuals of a species and then monitor their movements over a specified period. Whenever possible, the biologist attempts to locate the research subject using a hand-held antennae and radio receiver, however, occasionally animals will make large movements that prevent biologists from locating the animal from the ground. In these situations, WS can utilize either fixed wing aircraft or helicopters and elevation to conduct aerial telemetry and locate the specific animal wherever it has moved to. As with any aerial operations, the WS program aircraft-use policy helps ensure that aerial surveys would be conducted in a safe and environmentally sound manner, in accordance with federal and state laws.

Chemical Wildlife Damage Management Methods

The EPA through the FIFRA, the LDAF, the United States Drug Enforcement Administration, MOUs with land managing agencies, and WS' directives would regulate chemical methods that could be available for use by WS pursuant to the alternatives (see WS Directive 2.401, WS Directive 2.405, WS Directive 2.430, WS Directive 2.465). All pesticides used by WS would be registered under the FIFRA and administered by the EPA and the LDAF. All WS' personnel in Louisiana who apply restricted-use

pesticides would be certified pesticide applicators by LDAF and have specific training by WS for pesticide application. The EPA and the LDAF require pesticide applicators to adhere to all certification requirements set forth in the FIFRA. Pharmaceutical drugs, including those used in wildlife capture and handling, are administrated by the United States Food and Drug Administration and/or the United States Drug Enforcement Administration. Employees of WS that use immobilizing drugs and euthanasia chemicals would be certified for their use and follow the guidelines established in the WS Field Operational Manual for the Use of Immobilization and Euthanasia Drugs (Johnson et al. 2001).

Chemicals would not be used by WS on public or private lands without authorization from the land management agency or property owner or manager. Under certain circumstances, personnel of WS could be involved in the capture of animals where the safety of the animal, personnel, or the public could be compromised and chemical immobilization would provide a good solution to reduce those risks. For example, chemical immobilization could be used to capture coyotes where public safety was at risk. Immobilizing drugs are most often used by WS to remove animals from cage traps to be examined (*e.g.*, for disease surveillance) or in areas such as 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). Immobilization is usually followed by release (*e.g.*, after radio collaring a coyote for a study), translocation, or euthanasia. Chemically euthanized animals would be disposed of by incineration or deep burial to avoid secondary hazards. Immobilizing drugs and euthanasia chemicals would be monitored closely and stored in locked boxes or cabinets according to WS' policies and United States Drug Enforcement Administration guidelines. Most drugs fall under restricted-use categories and must be used under the appropriate license from the United States Drug Enforcement Administration. The following chemical methods have been proven to be selective and effective in reducing damage by coyotes.

Ketamine (Ketamine HCl) is a fast acting dissociative anesthetic (*i.e.*, loss of sensation with or without loss of consciousness) that is used to capture wildlife. Ketamine produces catatonia (*i.e.*, lack of movement, activity, or expression) and profound analgesia (*i.e.*, insensibility to pain without loss of consciousness), but not muscle relaxation. It is used to eliminate pain, calm fear, and allay anxiety. Ketamine is possibly the most versatile drug for chemical capture, and it has a wide safety margin (Johnson et al. 2001). When used alone, this drug may produce muscle tension, resulting in shaking, staring, increased body heat, and, on occasion, seizures. Usually, ketamine is combined with other drugs, such as xylazine. The combination of such drugs is used to control an animal, maximize the reduction of stress and pain, and increase human and animal safety.

Telazol is a more powerful anesthetic and usually used for larger animals. Telazol is a combination of equal parts of tiletamine hydrochloride and zolazepam hydrochloride (a tranquilizer). The product is generally supplied sterile in vials, each containing 500 mg of active drug, and when dissolved in sterile water has a pH of 2.2 to 2.8. Telazol produces a state of unconsciousness in which protective reflexes, such as coughing and swallowing, are maintained during anesthesia. Schobert (1987) listed the dosage rates for many wild and exotic animals. Before using Telazol, the size, age, temperament, and health of the animal are considered. Following a deep intramuscular injection of Telazol, onset of anesthetic effect usually occurs within 5 to 12 minutes. Muscle relaxation is optimum for about the first 20 to 25 minutes after the administration, and then diminishes. Recovery varies with the age and physical condition of the animal and the dose of Telazol administered, but usually requires several hours.

Xylazine is a sedative (analgesic) that calms nervousness, irritability, and excitement, usually by depressing the central nervous system. Xylazine is commonly used with ketamine to produce a relaxed anesthesia. It can also be used alone to facilitate physical restraint. Because xylazine is not an anesthetic, sedated animals are usually responsive to stimuli. Therefore, personnel should be even more attentive to minimizing sight, sound, and touch. When using ketamine/xylazine combinations, xylazine will usually overcome the tension produced by ketamine, resulting in a relaxed, anesthetized animal (Johnson et al.

2001). This reduces heat production from muscle tension, but can lead to lower body temperatures when working in cold conditions.

Sodium Pentobarbital is a barbiturate that rapidly depresses the central nervous system to the point of respiratory arrest. Barbiturates are a recommended euthanasia drug for free-ranging wildlife (AVMA 2013). Sodium pentobarbital would only be administered after target animals have been live-captured and properly immobilized to allow for direct injection. There are United Stated Drug Enforcement Administration restrictions on who can possess and administer this drug. Some states may have additional requirements for personnel training and particular sodium pentobarbital products available for use in wildlife. Certified WS' personnel are authorized to use sodium pentobarbital and dilutions for euthanasia in accordance with United States Drug Enforcement Administration and state regulations. All animals euthanized using sodium pentobarbital and all of its dilutions (*e.g.* Beuthanasia-D, Fatal-Plus) are disposed of immediately through incineration or deep burial to prevent secondary poisoning of scavenging animals and introduction of these chemicals to non-target animals.

Potassium Chloride used in conjunction with prior general anesthesia is used as a euthanasia agent for animals, and is considered acceptable and humane by the AVMA (2013). Animals that have been euthanized with this chemical experience cardiac arrest followed by death, and are not toxic to predators or scavengers.

Beuthanasia®-D combines pentobarbital with another substance to hasten cardiac arrest. Intravenous (IV) and intracardiac (IC) are the only acceptable routes of injection. As with pure sodium pentobarbital, IC injections with Beuthanasia®-D are only acceptable for animals that are unconscious or deeply anesthetized. With other injection routes, there are concerns that the cardiotoxic properties may cause cardiac arrest before the animal is fully unconscious. It is a Schedule III drug, which means it can be obtained directly from the manufacturer by anyone with a United States Drug Enforcement Administration registration. However, Schedule III drugs are subject to the same security and record-keeping requirements as Schedule II drugs.

Fatal-Plus® combines pentobarbital other substances to hasten cardiac arrest. IV is the preferred route of injection; however, IC is acceptable as part of the two-step procedure used by WS. Animals are first anesthetized and sedated using a combination of ketamine/xylazine and once completely unresponsive to stimuli and thoroughly sedated, Fatal-Plus® is administered. Like Beuthanasia®-D, it is a Schedule III drug requiring a United States Drug Enforcement Administration registration for purchase and is subject to the security and record-keeping requirements of Schedule II drugs.

Carbon dioxide is sometimes used to euthanize coyotes that are captured in live traps and when relocation is not a feasible option. Live coyotes are placed in a sealed chamber. CO_2 gas is released into the chamber and the animal quickly dies after inhaling the gas. This method is approved as a euthanizing agent by the AVMA. CO_2 gas is a byproduct of animal respiration, is common in the atmosphere, and is required by plants for photosynthesis. It is used to carbonate beverages for human consumption and is the gas released by dry ice. The use of CO_2 by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society.

APPENDIX C
FEDERAL LIST OF THREATENED AND ENDANGERED SPECIES

Common Name	Scientific Name	Status[†]	Determination[‡]
Animals			
Invertebrates			
Alabama Heelsplitter	*Potamilus inflatus*	T	MANLAA
Pink Mucket	*Lampsilis abrupta*	E	MANLAA
Louisiana Pearlshell	*Margaritifera hembeli*	T	MANLAA
Fat Pocketbook	*Potamilus capax*	E	MANLAA
Rabbitsfoot	*Quadrula cylindrical cylindrical*	T	MANLAA
Reptiles & Amphibians			
Green Sea Turtle	*Chelonia mydas*	T	NE
Hawksbill Sea Turtle	*Eretmochelys imbricata*	E	NE
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	MANLAA
Leatherback Sea Turtle	*Dermochelys coriacea*	E	MANLAA
Loggerhead Sea Turtle	*Caretta caretta*	T	MANLAA
Gopher Tortoise	*Gopherus polyphemus*	T	MANLAA
Ringed Map Turtle	*Graptemys oculifera*	T	MANLAA
Ducky Gopher Frog	*Rana sevosa*	E	MANLAA
Dusky Gopher Frog Critical Habitat	*Rana sevosa*	H	NE
Louisiana Pine Snake	*Pituophis ruthveni*	C	MANLAA
Fish			
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*	T	NE
Gulf Sturgeon Critical Habitat	*Acipenser oxyrinchus desotoi*	H	NE
Pallid Sturgeon	*Scaphirhynchus albus*	E	NE
Pearl Darter	*Percina aurora*	C	MANLAA
Mammals			
Louisiana Black Bear	*Ursus americanus luteolus*	T	MALAA
Louisiana Black Bear Critical Habitat	*Ursus americanus luteolus*	H	NE
West Indian Manatee	*Trichechus manatus*	E	NE
Northern Long-Eared Bat	*Myotis septentrionalis*	T	NE
Birds			
Piping Plover	*Charadrius melodus*	T	MANLAA
Piping Plover Critical Habitat	*Charadrius melodus*	H	NE
Interior Least Tern	*Sterna antillarum*	E	MANLAA
Red-cockaded Woodpecker	*Picoides borealis*	E	NE
Whooping Crane	*Grus Americana*	T	MANLAA
Red Knot	*Calidris canutus rufa*	T	MANLAA
Spraque's pipit	*Anthus spragueii*	C	MANLAA
Plants			
American Chaff-seed	*Schwalbea americana*	E	MANLAA
Earth Fruit	*Geocarpon minimum*	T	MANLAA
Louisiana Quillwort	*Isoetes louisianensis*	E	MANLAA

[†]T=Threatened; E=Endangered; C=Candidate; P=Proposed; H=Habitat

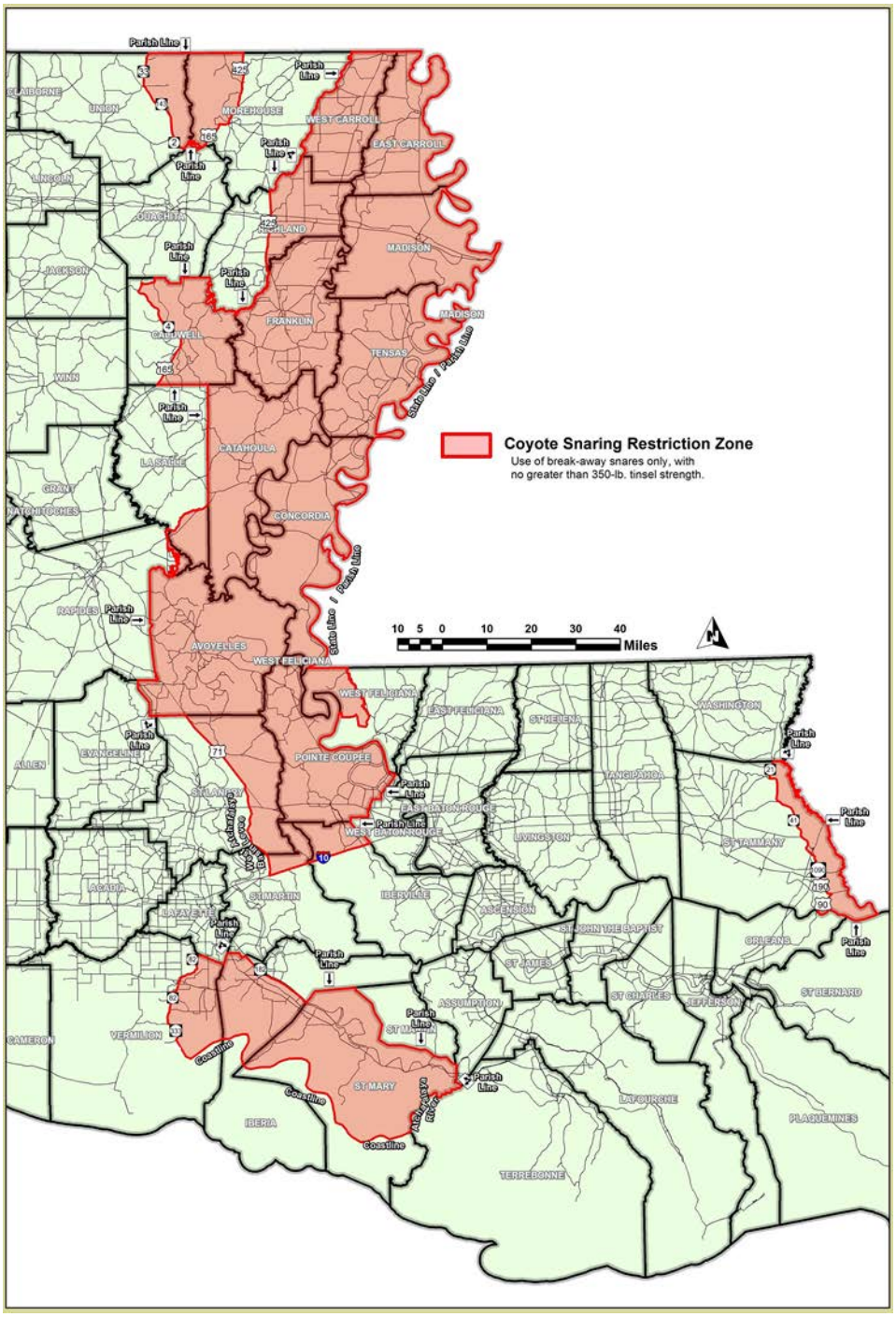
[‡]NE=No effect; MANLAA=May affect, not likely to adversely affect; MALAA=May affect, likely to adversely affect

APPENDIX D
STATE LIST OF THREATENED AND ENDANGERED SPECIES

Common Name	Scientific Name	State Status
Invertebrates		
American burying beetle	*Nicrophorus americanus*	E
inflated heelsplitter	*Potamilus inflatus*	T
Louisiana pearlshell	*Margritifera hembeli*	T
Fish		
pallid sturgeon	*Scaphirhynchus albus*	E
gulf sturgeon	*Acipenser oxyrhinchus desotoi*	T
Reptiles		
green sea turtle	*Chelonia mydas*	T
hawksbill sea turtle	*Eretmochelys imbricata*	E
Kemp's Ridley sea turtle	*Lepidochelys kempii*	E
leatherback sea turtle	*Dermochelys coriacea*	E
loggerhead sea turtle	*Caretta caretta*	T
gopher tortoise	*Gopherus polyphemus*	T
ringed map turtle	*Graptemys oculifera*	T
Birds		
brown pelican	*Pelecanus occidentalis*	E
bald eagle	*Haliaeetus leucocephalus*	E
peregrine falcon	*Falco peregrinus*	T/E
Attwater's greater prairie chicken	*Tympanuchus cupido attwateri*	E
whooping crane	*Grus americana*	E
Eskimo curlew	*Numenius borealis*	E
piping plover	*Charadrius melodus*	T/E
interior least tern	*Sterna antillarum athalassos*	E
ivory-billed woodpecker	*Campephilus principalis*	E
red-cockaded woodpecker	*Picoides borealis*	E
Bachman's warbler	*Vermivora bachmanii*	E
Mammals		
manatee	*Trichechus manatus*	E
blue whale	*Balaenoptera musculus*	E
finback whale	*Balaenoptera physalus*	E
Sei whale	*Balaenoptera borealis*	E
sperm whale	*Physeter macrocephalus*	E
red wolf	*Canis rufus*	E
Louisiana black bear	*Ursus americanus luteolus*	T
Florida panther	*Felis concolor coryi*	E

APPENDIX E
SNARING ZONES AND RESTRICTIONS

Map and description of two zones for the use of snares in coyote damage management in Louisiana. Red zone depicts areas where breakaway snares are required. Green zone depicts areas with no restrictions to the use of snares.



Zone 1: **Snaring allowed, but must be executed with breakaway snares with no greater than 350 lbs. tensil strength.**

The following portions of these parishes must follow the above guidelines for coyote snaring:

Avoyelles:
East of La. 107, La. 1, and the Red River
Catahoula:
South of U.S. 84 and La. 28
Concordia:
ALL
East Carroll:
South of La. 580 and west of U.S. 65
Franklin:
East of Bayou Macon
Iberia:
South of U.S. 90
North of the Vermilion Bay coastline
Iberville:
North of I-10
LaSalle:
South of La. 28
Madison:
ALL
Avoyelles:
West of La. 107, La. 1, and the Red River
Caldwell:
East of La. 846, La. 4, and U.S. 165
Catahoula:
North of U.S. 84 and La. 28
East Carroll:
North of La. 580 and west of U.S. 65
Franklin:
West of Bayou Macon
Iberia:
North of U.S. 90 and La. 14
South of La. 182
Morehouse:
West of U.S. 425 and U.S. 165
Richland:
Between U.S. 425 and La. 17
St. Landry:
Pointe Coupee:
ALL
Richland:
East of La. 17
St. Mary:
South of U.S. 90
West of the Atchafalaya River
North of the coastline
Tensas:
ALL
Vermilion:
South of La. 14
East of La. 82, La. 333, and Freshwater Bayou
North of the Vermilion Bay coastline
West Carroll:
South of La. 134 and east of La. 17.
West Feliciana:
West of La. 15

East of U.S. 71 and
the West Atchafalaya Basin Levee
St. Martin:
East of the West Atchafalaya Basin Levee and
north of Interstate 10
St. Mary:
North of U.S. 90
West of the Atchafalaya River
St. Tammany
East of La. 21, La. 41, La. 1090, U.S. 190, and
U.S. 90
Union:
East of La. 33, La. 143, La. 2
Vermilion:
North of La. 14 and east of La. 82
West Carroll:
All, except portions occurring south of La. 134 and
east of La. 17 (i.e., Zone 1 portions)

Zone 2: Completely open for snaring - no restrictions.

The following portions of these parishes are completely open for coyote snaring:

Caldwell:
West of La. 846, La. 4, and U.S. 165
Iberia:
North of La. 182
Iberville:
South of I-10
LaSalle:
North of La. 28
Morehouse:
East of U.S. 425 and U.S. 165
Richland:
West of U.S. 425
St. Landry:
West of U.S. 71 and
the West Atchafalaya Basin Levee
St. Martin:
West of the West Atchafalaya Basin Levee and
south of Interstate 10
St. Tammany:
West of La. 21, La. 41, La. 1090, U.S. 190, and
U.S. 90
Union:
West of La. 33, La. 143, La. 2
Vermilion:
West of La. 82, La. 333, and Freshwater Bayou
West Feliciana:
East of La. 15

All portions of these parishes are completely open for coyote snaring:

Acadia
Allen
Ascension
Assumption
Beauregard
Bienville
Bossier
Caddo
Calcasieu
Cameron
Claiborne
De Soto
East Baton Rouge
East Feliciana
Evangeline
Grant
Jackson
Jefferson
Jefferson Davis
Lafayette
Lafourche
Lincoln
Livingston
Natchitoches
Orleans
Ouachita
Plaquemines
Rapides
Red River
Sabine
St. Bernard
St. Charles
St. Helena
St. James
St. John The Baptist
Tangipahoa
Terrebonne
Vernon
Washington
Webster
West Baton Rouge
Winn