ENVIRONMENTAL ASSESSMENT

Managing Blackbird Damage to Sprouting Rice in Southwestern Louisiana

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Animal and Plant Health Inspection Service
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August 2015

TABLE OF CONTENTS

PAGE

ACRONYMS

APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BBS	Breeding Bird Survey
CBC	Christmas Bird Count
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FR	Federal Register
FY	Fiscal Year
IUCN	International Union for Conservation of Nature and Natural Resources
LD	Median Lethal Dose
LDAF	Louisiana Department of Agriculture and Forestry
LC	Median Lethal Concentration
LDWF	Louisiana Department of Wildlife and Fisheries
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWRC	National Wildlife Research Center
PPE	Personal Protective Equipment
SOP	Standard Operating Procedure
USC	United States Code
USGS	United States Geological Survey
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WS	Wildlife Services

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 continues to receive requests for assistance to resolve or prevent damage occurring to sprouting rice in southwestern Louisiana associated with mixed species flocks of blackbirds[2]. Outside of the breeding season, blackbirds are gregarious (*i.e.*, form large flocks) and congregations often consist of several species mixed together. During the spring, fall, and winter, blackbirds often feed in large mixed species flocks and roost at night in large mixed species groups (Dolbeer 1994). When food sources are limited, such as during the winter and early spring, a readily available food source, such as newly seeded rice and sprouting rice, can attract large congregations of blackbirds. Rice fields are a predominant feature of southwestern Louisiana and fields of rice have replaced many natural habitats. Consequently, byproducts of rice culture provide a readily available food supply for resident and migrant blackbirds.

The tendency of blackbirds to form large communal roosts in rice-growing areas and to travel and feed in large social flocks often results in locally serious damage to rice crops, and monetary losses to individual farmers can be substantial. Red-winged blackbirds (*Agelaius phoeniceus*), brown-headed cowbirds (*Molothrus ater*), common grackles (*Quiscalus quiscula*), and boat-tailed grackles (*Quiscalus major*) are the primary blackbird species responsible for causing damage to sprouting rice (Meanley 1971, Cummings et al. 2005). In addition, Brewer's blackbirds (*Euphagus cyanocephalus*), great-tailed grackles (*Quiscalus mexicanus*), and European starlings (*Sturnus vulgaris*) could be present in those mixed species flocks found in the rice growing areas of southwestern Louisiana. This EA will collectively refer to those bird species as blackbirds, including European starlings[3].

All federal actions are subject to the National Environmental Policy Act (NEPA; Public Law 9-190, 42 USC 4321 et seq.), including the actions of WS[4]. The NEPA sets forth the requirement that all 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 significant effects. In part, the Council of Environmental Quality (CEQ) regulates federal activities affecting the physical and biological environment through regulations in 40 CFR 1500-1508. The NEPA and the CEQ guidelines generally outline five broad types of activities that federal agencies conducting projects must accomplish. Those five types of activities are public involvement, analysis, documentation, implementation, and monitoring.

Normally, individual wildlife damage management projects conducted by the WS program could be categorically excluded from further analysis under the NEPA, in accordance with APHIS implementing regulations (see 7 CFR 372.5, 60 FR 6000-6003). However, the purpose of this Environmental Assessment (EA)[5] is to evaluate cumulatively the individual projects that WS could conduct to manage the damage and threats that blackbirds cause. Pursuant to the NEPA and the CEQ regulations, WS is

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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]In North America, the term "*blackbird*" generally refers to about 10 species of birds in the subfamily Icterinae that share several common traits, including males that are predominately black in color or iridescent (Dolbeer 1994). However, only those blackbird species discussed in Section 1.1 of this EA will be included in the term "*blackbird*" used throughout this document.

[3]For ease of discussion, the term "*blackbird*" will include starlings, since starlings can also occur in mixed species flocks with other blackbirds.

[4]The WS program follows the CEQ regulations implementing the NEPA (40 CFR 1500 et seq.) along with USDA (7 CFR 1b) and APHIS Implementing Guidelines (7 CFR 372) as part of the decision-making process.

[5]The CEQ defines an EA as documentation that "*...(1) briefly provides sufficient evidence and analysis for determining whether to prepare an* [Environmental Impact Statement]*; (2) aids an agency's compliance with NEPA when no environmental impact statement is necessary; and (3) facilitates preparation of an Environmental Impact Statement when one is necessary*" (CEQ 2007).

preparing this EA to document the analyses associated with proposed activities and to inform decision-makers and the public of reasonable alternatives capable of avoiding or minimizing significant effects. This EA will also serve as a decision-aiding mechanism to ensure that WS infuses the policies and goals of the NEPA into the actions of the agency. Preparing the EA will assist in determining if the proposed cumulative management of blackbird damage could have a significant impact on the environment based on previous activities conducted and based on the anticipation of conducting additional efforts to manage damage. The goal of WS would be to conduct a coordinated program to alleviate blackbird damage in accordance with plans, goals, and objectives developed to reduce damage. Because the goals and directives[6] 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 the rice growing regions of southwestern Louisiana during those months when rice is sprouting.

More specifically, WS is preparing this EA to: 1) facilitate planning between agencies, 2) promote interagency coordination, 3) streamline program management, 4) clearly communicate to the public the analysis of individual and cumulative impacts of proposed activities; 5) evaluate and determine if there could be any potentially significant or cumulative effects associated with managing blackbird damage, and 6) to comply with the NEPA. Developing the EA will assist WS with determining 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 Environmental Impact Statement (EIS). The EA addresses impacts for managing damage to sprouting rice associated with blackbirds in southwestern Louisiana to analyze individual and cumulative impacts and to provide a thorough analysis of individual projects conducted by WS.

This EA analyzes the potential effects of blackbird damage management when a rice grower requests such assistance from WS. The analyses contained in this EA are based on information derived from WS' Management Information System, published documents (see Appendix A), interagency consultations, public involvement, and other environmental documents.

The EA evaluates the need for action to manage damage to sprouting rice associated with blackbirds, the potential issues associated with blackbird damage management, and the environmental consequences of conducting alternative approaches to meeting the need for action while addressing the identified issues. WS initially developed the issues and alternatives associated with blackbird damage management in consultation with the United States Fish and Wildlife Service (USFWS) and the Louisiana Department of Wildlife and Fisheries (LDWF). The USFWS has overall regulatory authority to manage populations of bird species, while the LDWF has the authority to manage wildlife populations in the State of Louisiana. To assist with identifying additional issues and alternatives to managing damage, WS will make the EA available to the public for review and comment prior to the issuance of a Decision[7].

WS has previously developed an EA that analyzed the need for action to manage damage to sprouting rice caused by blackbirds in southwestern Louisiana. The previous EA identified the issues associated with managing damage associated with blackbirds 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 blackbird damage to sprouting rice.

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

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

1.2 NEED FOR ACTION

Some species of wildlife 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.

To resolve wildlife damage problems, people must consider both sociological and biological carrying capacities. The wildlife acceptance capacity, or cultural 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. The biological carrying capacity is the ability of the land or habitat 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. The available habitat may have a biological carrying capacity to support higher populations of wildlife; however, 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.

The alleviation of damage or other problems caused by or related to the behavior of wildlife is termed wildlife damage management and The Wildlife Society (2015*a*) has recognized wildlife damage management as an integral component of wildlife management. The imminent threat of damage or loss of resources is often sufficient for people to initiate individual actions and the need for damage management occurs from the specific threats to resources. Those animals, including blackbirds, have no intent to do harm. They utilize habitats (*e.g.*, reproduce, walk, forage) where they can find a niche. If their activities result in lost economic value of resources or threaten human safety, people characterize this as damage. When damage exceeds or threatens to exceed an economic threshold and/or poses 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 (*e.g.*, economic, social, aesthetics) can define the need for action. Therefore, how people define damage can often be unique to an individual person. What one individual person considers damage, another person may not consider damage. However, the term "*damage*" is consistently used to describe situations where an individual person has determined the loss associated with wildlife is actual damage requiring assistance (*i.e.*, has reached an individual threshold). People often associate the term "*damage*" with economic losses to resources or threats to human safety. However, damage could also include a loss in aesthetic value and other situations where the actions of wildlife are no longer tolerable to an individual person.

The need for action to manage damage and threats associated with blackbirds arises from requests for assistance[8] received by WS to reduce and prevent damage from occurring to sprouting rice in the rice growing regions of southwestern Louisiana. WS has identified those bird species most likely to be responsible for causing damage to sprouting rice based on previous requests for assistance and available research. Various agencies and rice growers associations consider resolving blackbird damage to rice a high priority (Cummings et al. 2011).

According to the National Agricultural Statistics Service (NASS), the 395,063 acres planted to rice in Louisiana during 2012 ranked third in the United States (NASS 2015). In 2014, the NASS (2015) estimated the value of all rice production in the State at $454 million. The five parishes with the highest rice production in the State during 2013 were Jefferson Davis, Acadia, Evangeline, Vermillion, and Saint Landry Parishes (NASS 2013). Over 75% of the rice production in Louisiana generally occurs in eight Parishes located in southwestern Louisiana. Rice production in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes during 2013 accounted for nearly 76% of the rice production in the State.

In Louisiana, the seeding dates of rice can substantially influence grain yield (Slaton et al. 2003, Linscombe et al. 2004, Louisiana State University Agricultural Center 2011). Although many factors can influence planting dates for rice, research suggests the highest rice yields in southwestern Louisiana occur when planting seeds in late February and early March. Research conducted in Louisiana during 2011 using 13 different varieties and experimental lines of rice planted on eight different dates from February 24 through June 15, found the highest mean rice yields occurred from fields planted on February 24 and March 11 (Louisiana State University Agricultural Center 2011). Slaton et al. (2003) found that modern varieties of rice planted near Crowley, Louisiana in Acadia Parish produced the highest yields when planted from February 16 through March 28. Blanche et al. (2009) recommended planting rice in southwest Louisiana between March 15 and April 20. In general, rice yields decrease as the date of planting is delayed (Slaton et al. 2003, Linscombe et al. 2004, Louisiana State University Agricultural Center 2011). For example, the mean yield of 13 different varieties and experimental lines of rice planted on February 24, 2011 was 10,542 pounds per acre, which compared to 3,996 pounds per acre in areas planted with those same varieties on June 15 (Louisiana State University Agricultural Center 2011).

Planting dates for rice occurring in late February and March coincide with the presence of large numbers of blackbirds in the rice growing areas of southwestern Louisiana. After the nesting season, northern breeding populations of many blackbird species migrate southward during the fall to winter in the southern United States, which augments local breeding populations that are common throughout the year in states along the Gulf Coast (Meanley et al. 1966). Outside of the breeding season, blackbirds often feed in large mixed species flocks and roost at night in large mixed species groups (Dolbeer 1994). Blackbird roosts are common in the rice growing areas of southwestern Louisiana (Brugger 1988). The locations of roosts is likely influenced by available roosting habitat and available food supply (Meanley 1965). Roosting locations are generally associated with dense vegetation in water but roosts can occur in dry land areas, such as deciduous thickets, coniferous tree stands, canebrakes, and sugarcane fields (Meanley 1965). For example, 18 million blackbirds roosted in tupelo (*Nyssa aquatica*) and buttonbush (*Cephalanthus occidentalis*) that covered approximately 70% of a 2,500-hectare (6,178-acre) shallow lake in the rice growing area of southwestern Louisiana during 1988 (Brugger et al. 1992).

Considering the forces that affect the rice market in the United States is essential to understanding the importance of blackbird damage to the rice industry (Cummings et al. 2005). Rice production in the

[8]WS only conducts bird damage management after receiving a request for assistance. Before initiating blackbird damage activities, a Memorandum of Understanding, work initiation document, or another comparable document must be signed between WS and the cooperating entity that lists all the methods the property owner or manager will allow to be used on property they own and/or manage.

United States accounts for less than 2% of the global production of rice; however, the United States ranks among the top five nations in exporting rice (USA Rice Federation 2014). Therefore, the world rice market can strongly influence the market value of rice produced in the United States (Cummings et al. 2005). Approximately 50% of the rice production in the United States supplies the domestic market (USA Rice Federation 2014). The production of rice, like many agricultural commodities, is subject to the pressures of supply and demand, which can also influence the market value of rice. Consumers determine demand; therefore, producers of rice have little influence over demand factors. In contrast, producers do have some control over supply factors that can influence production. One such supply factor that rice producers can control is blackbird damage to rice production (Cummings et al. 2005).

Blackbirds begin leaving roosts each morning around dawn and return in the evening, generally before sunset (Meanley 1965). Although foraging and roosting groups of blackbirds vary in numbers, congregations of blackbirds can exceed one million birds (Dolbeer 1994). Cummings and Avery (2003) reported the number of blackbird roosts occurring in a five-parish area of southwestern Louisiana and the locations of those roosts remained similar between 1996 and 2003. However, the number of blackbirds estimated to be present in the same five-parish area of southwestern Louisiana between 1996 and 2005 fluctuated from 1.3 million blackbirds to 15 million blackbirds prior to rice planting (Cumming and Avery 2003). During the Christmas Bird Count (CBC)[9] that occurs at the end of December and the first part of January, surveyors counted an annual average of 5.3 million blackbirds in the State between 2004 and 2013, with the highest count occurring in 2004 when surveyors observed over 14 million blackbirds (National Audubon Society 2010). The three most abundant bird species observed in the State during the CBC conducted during 2013 were brown-headed cowbirds (6,972,586 cowbirds counted), red-winged blackbirds (5,851,254 red-winged blackbirds counted), and common grackles (370,714 grackles counted) (Johnson 2015).

Evangeline Parish in southern Louisiana is one of the top rice producing parishes in the State. One area that people survey in the State during the CBC is the survey area known as the Pine Prairie count in Evangeline Parish. In the Pine Prairie count survey area, participants of the CBC observed over 2.6 million blackbirds per year between 2004 and 2013, with the highest count occurring in 2004 when observers recorded over 12 million blackbirds (National Audubon Society 2010). During the 2013 CBC survey, observers recorded nearly 11.4 million blackbirds in the survey area. The Pine Prairie count has also recorded one of the largest concentrations of winter blackbirds in the nation when observers recorded nearly 109 million blackbirds during 1986 (National Audubon Society 2010). In 1987, observers recorded nearly 104 million blackbirds during the survey (National Audubon Society 2010). As mentioned previously, participants in the CBC recorded 6,972,586 brown-headed cowbirds in areas of the State surveyed during 2013. Nearly 98% of 6,972,586 cowbirds observed in the State occurred in the Pine Prairie count survey area (Johnson 2015). Of the 5,851,254 red-winged blackbirds counted in areas of the State surveyed during the 2013 CBC, 73% of those red-winged blackbirds occurred in the Pine Prairie count survey area (Johnson 2015).

During the non-breeding seasons, red-winged blackbirds (Dolbeer et al. 1978, White et al. 1985, Linz et al. 1984), Brewer's blackbirds (Martin 2002), common grackles (Peer and Bollinger 1997), boat-tailed grackles (Post et al. 2014), great-tailed grackles (Johnson and Peer 2001), brown-headed cowbirds (Lowther 1993), and starlings (Cabe 1993) feed primarily on plant matter, such as weed seeds and agricultural grains (Neff and Meanley 1957). When food sources are limited, such as during the winter and early spring, a readily available food source, such as seeded and sprouting rice in southwestern Louisiana, can attract large congregations of blackbirds. Rice fields are a predominant feature of southwestern Louisiana and fields of rice have replaced many natural habitats. Consequently, byproducts of rice culture provide a readily available food supply for resident and migrant blackbirds. The tendency

[9] See Section 2.2 of this EA for more information on the CBC

of blackbirds to form large communal roosts in rice-growing areas and to travel and feed in large social flocks often results in locally serious damage to rice crops, and monetary losses to individual farmers can be substantial (Wilson 1985). The number of blackbirds feeding and the subsequent damage is proportional to the presence and size of nearby blackbird roosts. Therefore, blackbird feeding and the associated damage occur locally and do not occur uniformly across the rice producing areas (Wilson 1985, Cummings et al. 2005). In some areas, rice producers report a complete loss of the rice crop and replanting of entire fields are necessary (Cummings et al. 2005).

Rice fields near blackbird roosts often experience the most damage (Neff and Meanley 1957, Pierce 1970) and feeding by blackbirds may cause heavy financial losses from decreased yield or increased costs for replanting (Holler et al. 1982, Brugger 1988). Rice growers began reporting severe damage to the rice crop in Louisiana as early as 1924 (Kalmbach 1937). During a crop survey conducted in 2001, rice producers in Louisiana, Arkansas, California, Texas, and Missouri reported the minimum economic loss to rice production in those States from blackbird damage was $21.5 million (Cummings et al. 2005)[10]. Respondents to the survey from Louisiana also reported the highest damage to rice production of the five states (Cummings et al. 2005). Scientists at the Louisiana State University Rice Research Station have estimated that blackbird depredation on newly seeded rice costs Louisiana growers at least $4 million annually, including the costs of bird management operations (Wilson et al. 1990). Individual growers have reported losses as high as $13,500 annually (Glahn and Wilson 1992). Most damage occurs in southwestern Louisiana, where farmers seed rice before resident flocks of blackbirds have dispersed to breed and prior to the departure of all the wintering migrants.

Damage to rice occurs from a mixture of pre-breeding resident blackbirds (*i.e*., blackbirds that breed locally in Louisiana) and northern migrants that continue to flock and roost during rice planting season (Wilson 1985, Brugger and Dolbeer 1990). From mid-December through March, Meanley (1971) estimated that 84% of the blackbirds present in the rice growing states were from breeding populations further north. Of the 7.2 million red-winged blackbirds marked using Day-Glo pigment in January and February 1995 at four roosts in southern Louisiana, Cummings and Avery (2003) reported marked blackbirds were later collected from 13 states and three Canadian provinces. The highest recovery rates of marked blackbirds occurred from Iowa, with some blackbirds collected as far north as central Manitoba (Cummings and Avery 2003). However, some evidence suggests that blackbirds feeding in rice fields during the spring are primarily local resident birds, especially red-winged blackbirds that breed locally (Wilson 1985, Brugger and Dolbeer 1990). The red-winged blackbird is one of the most abundant breeding birds in the rice growing area of southwestern Louisiana (Kalmbach 1937).

Damage occurs to both rice that is water seeded (*i.e*., rice seed that is broadcast into flooded fields to begin germination before the water is drawn off) and to rice that is drilled (*i.e*., planted beneath the soil) (Meanley 1971). Blackbirds may consume the rice seed that an agricultural producer broadcasts on the ground before the seed sprouts, or if the producer drills the seed into the ground, blackbirds may pull sprouts out of the ground as the sprout emerges from the soil to feed on the rice seed still attached to the sprout. Blackbirds will begin consuming seeded rice once the rice producer plants the seed up until the plant is about 2 inches tall (Cummings and Avery 2003). Cummings and Avery (2003) stated that 500 blackbirds could destroy an acre of newly seeded rice per day. Species composition of roosts and blackbird flocks can vary and the composition of species present in a roost or in flocks can depend on many factors (*e.g*., time of year, roosting habitat, proximity to food sources). Meanley (1965) found the feeding habits of the individual blackbird species could influence the species composition of blackbird roosts. For example, the diet of common grackles during the winter season in the southern United States contains more acorns (*Quercus* spp.) and hackberry (*Celtis* spp.) mast than red-winged blackbirds;

[10]Estimate includes damage to the ripening crop in the fall and damage to the newly seed/sprouting crop in the spring. Most of the damage reported by respondents occurred to ripening rice.

therefore, common grackles tend to dominate roosts that occur in bottomland hardwood where those food items are more prevalent (Meanley 1965). Although flocks comprised of several species of blackbirds and starlings can cause damage to seeded and sprouting rice, red-winged blackbirds appear to be responsible for most of the damage (Meanley 1971, Cummings et al. 2005). Damage can also occur to ripening rice in the fall but most of the damage to the ripening crop occurs from local blackbirds and not migrants (Meanley 1971).

From 1960 to 1965, major roosts in the rice growing areas of Louisiana consisted of 48% red-winged blackbirds, 20% common grackles, 14% brown-headed cowbirds, 9% boat-tailed grackles, and 8% starlings, with trace amounts of rusty blackbirds (*Euphagus carolinus*) and Brewer's blackbirds (Meanley 1971). During a CBC survey conducted annually in Evangeline Parish from 1975 through 2013, the average annual composition of blackbirds observed was 53.4% red-winged blackbirds, 34.6% brown-headed cowbirds, 7.5% common grackles, 3.8% European starlings, 0.3% great-tailed grackles, and 0.3% Brewer's blackbirds (National Audubon Society 2010). The species composition of a roost located in the rice growing areas of southwestern Louisiana that researchers surveyed in February 1988 consisted of European starlings, red-winged blackbirds, brown-headed cowbirds, and common grackles, which corresponded with the highest roost count of approximately 18 million blackbirds (Brugger et al. 1992). By April 1988, the number of blackbirds using the roost had declined to 6,300 blackbirds and the roost consisted primarily of female red-winged blackbirds (Brugger et al. 1992).

Blackbird damage to sprouting rice is most often associated with large communal roost sites, with the greatest rice losses being associated with proximity to roosts. Based on observations by WS' personnel, severe damage can occur within a 10-mile radius of an active blackbird roost (A. Wilson, WS. pers. comm. 2014), but blackbirds may travel up to 35-miles from a roost to forage (Cummings and Avery 2003). In addition, blackbirds may move amongst roosts (Cummings and Avery 2003). Blackbirds may roost in the same locations year after year but in areas where roosting sites are common, blackbirds may shift roosting locations from year to year (Meanley 1965).

In 1980, in response to requests from southwestern Louisiana rice growers and the indictment of several individuals who used or sold unregistered pesticides for blackbird control, the United States Congress directed WS[11] to assist growers experiencing blackbird damage to rice (A. Wilson, WS pers. comm. 2014). At that time, the use of firearms to remove and harass blackbirds was the most common tool employed by rice producers to reduce damage. WS began to assist growers in establishing harassment programs using propane cannons, pyrotechnics, and electronic noisemakers to disperse blackbirds. WS loaned and provided technical assistance on the use of various techniques to reduce blackbird damage. During a survey conducted in 2002, Louisiana rice producers indicated they had spent approximately $154,000 to manage blackbird damage to rice, which was the highest amount spent by rice producers in the five states surveyed (Cummings et al. 2005). Shooting and the use of propose cannons were the most common methods employed by rice producers to reduce damage (Cummings et al. 2005). Despite efforts by agricultural producers to reduce rice damage associated with blackbirds, damage to newly seeded and sprouting rice continues to occur at levels that are unacceptable to individual rice producers and the rice industry.

The abandonment of rice production due to economically unsustainable damage associated with blackbirds and the subsequent conversion of land to other forms of agriculture could reduce the availability of important habitats to many wildlife species in southwestern Louisiana. Rice production typically occurs in areas where wetlands were converted to agricultural production. In general, rice fields are intentionally or naturally flooded for at least part of the year, which can act as surrogate wetland habitats that are valuable to waterbirds (Taft and Elphick 2007). In North America, 104 species of

[11] At that time, WS was a program under the United States Department of the Interior Fish and Wildlife Service called Animal Damage Control.

waterbirds can occur in rice fields, including 30 species the National Audubon Society considers "*Conservation Priority Species*" (Taft and Elphick 2007). Taft and Elphick (2007) stated, "…*ricelands provide extremely valuable habitat to waterbirds, particularly in regions where wetlands have been significantly reduced*…" including those areas where producers grow rice in southwestern Louisiana. If a decline in rice production occurs and those acres are converted to other agricultural production, those areas may have less value to wildlife than rice production (Eadie et al. 2008).

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

Actions Analyzed

This EA evaluates the need for managing damage to sprouting rice caused by blackbirds in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes, wherever a property owner requests such assistance. This EA discusses the issues associated with conducting damage management activities in those Parishes to meet the need for action and evaluates different alternatives to meet that need while addressing the issues.

Appendix B discusses the methods available to manage damage caused by blackbirds. The alternatives and Appendix B also discuss how WS would employ methods to manage damage and threats associated with blackbirds. Therefore, the actions evaluated in this EA are the use of those methods available under the alternatives and the employment of those methods by WS to manage or prevent damage and threats associated with blackbirds from occurring when permitted by USFWS pursuant to the Migratory Bird Treaty Act (MBTA).

The MBTA makes it unlawful to pursue, hunt, take, capture, kill, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, nests, or eggs (16 USC 703-711). A list of bird species protected under the MBTA occurs in 50 CFR 10.13. The MBTA does allow for the lethal take of those bird species listed in 50 CFR 10.13 when depredation occurs through the issuance of depredation permits or the establishment of depredation orders. Under authorities in the MBTA, the USFWS is the federal agency responsible for the issuance of depredation permits or the establishment of depredation orders for the take of those protected bird species when damage or threats of damage are occurring. Information regarding migratory bird permits and depredation orders occurs at 50 CFR 13 and 50 CFR 21. Pursuant to the MBTA under 50 CFR 21.43, a depredation permit is not required to lethally remove certain blackbird species when those species are found committing or about to commit depredation or constituting a health hazard or other nuisance. Except for European starlings, take of those blackbird species addressed in this EA can occur without the need for a depredation permit from the USFWS when the criteria specified in the blackbird depredation order occur. European starlings are not native to the United States, including Louisiana, and the MBTA does not afford starlings protection from take. Therefore, a depredation permit is not required at any time to take starlings.

Native American Lands

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), work initiation document, or another comparable document. Therefore, the Tribe would determine when WS' assistance was required and the Tribe would determine what activities to allow. Because Tribal officials would be responsible for requesting assistance from WS and determining what methods would be available to alleviate damage, WS does not anticipate any conflict with traditional cultural properties or beliefs. Those methods available to alleviate damage associated with blackbirds under the alternatives analyzed in this EA would be available for use to alleviate damage on Tribal properties when the Tribe requesting

WS' assistance had 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 between the Tribe and WS.

Private Lands

WS could continue to provide assistance under some of the alternatives analyzed in detail. Under those alternatives, WS could conduct activities on private land in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes when WS receives a request for such assistance by the appropriate property owner or manager.

Period for which this EA is Valid

If the preparation of an EIS is not warranted based on the analyses associated with this EA, WS would continue to review 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 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 property owner or manager. In addition, WS' activities that could involve the lethal removal of blackbirds under the alternatives would only occur when permitted by the USFWS, when required, and in collaboration with the LDWF, and only at levels permitted.

This EA analyzes the potential impacts of managing damage to sprouting rice caused by blackbirds based on previous activities conducted on private land in the rice grow region of southwestern Louisiana where WS and the appropriate entities entered into a MOU, work initiation document, or another comparable document. WS has provided assistance to rice growers in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes and WS could continue to receive requests to provide assistance in those parishes.

This EA also addresses the potential impacts of conducting damage management approaches in areas of Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes 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 goals and directives of WS are to provide assistance when requested, within the constraints of available funding and workforce, it is conceivable that additional efforts could occur. Thus, this EA anticipates those additional efforts and analyzes the impacts of such efforts as part of the alternatives.

During the winter, blackbirds often form large mixed species flocks that roost and forage together in the southern United States, including southwestern Louisiana. Therefore, damage or threats of damage associated with those blackbird species could occur wherever those birds occur in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes. Planning for the management of damage that blackbirds cause 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 site 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 blackbird 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 to sprouting rice associated with blackbirds 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 blackbird damage and the resulting management actions occurs and are treated as such.

Chapter 2 of this EA identifies and discusses issues relating to blackbird damage management in rice growing parishes of southwestern 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 (see Chapter 3 for a description of the Decision Model and its application). Decisions made using the model would occur in accordance with WS' directives (see WS Directive 1.101) and Standard Operating Procedures (SOPs) described in Chapter 3 of this EA, as well as relevant laws and regulations.

The analyses in this EA would apply to any action that may occur in any locale and at any time within the rice growing areas of Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes. In this way, WS believes it 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 address damage and threats associated with blackbirds.

Summary of Public Involvement

WS initially developed the issues associated with managing blackbird damage to rice and the alternatives to address those issues in consultation with the LDWF and the USFWS. As part of this process, and as required by the CEQ and APHIS implementing regulations for the NEPA, WS will make this document available to the public for review and comment. WS will make this EA 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 blackbirds. 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 DOCUMENT TO OTHER ENVIRONMENTAL DOCUMENTS

WS' Environmental Assessment

WS has previously developed an EA that analyzed the need for action to manage damage to sprouting rice caused by blackbirds. That EA identified the issues associated with managing damage associated with blackbirds in southwestern Louisiana and analyzed alternative approaches to meet the specific need identified in the EA while addressing the identified issues. This EA will assess the potential environmental impacts of program alternatives based on information available since the completion of the

EA. Since this EA will re-evaluate activities conducted under the previous EA, the analysis and outcome of the Decision for this EA will supersede the previous EA.

In addition, the WS program in Louisiana has also developed an EA that analyzes the need to alleviate damage associated with rock pigeons (*Columba livia*), European starlings, and house sparrows (*Passer domesticus*). The analyses in that EA would remain appropriate for WS' activities conducted to reduce threats associated with pigeons, starlings, and house sparrows. The WS program in Louisiana is also in the initial stages of developing a new EA to evaluate the damages that a wide range of bird species causes in the State. This assessment discusses the analyses in those EAs to ensure a cumulative evaluation occurs of WS' activities to address blackbird damage. A cumulative assessment of activities conducted by WS would ensure those activities are not sufficient to warrant the preparation of an EIS.

1.5 AUTHORITY OF FEDERAL AND STATE AGENCIES

A discussion of WS' authority and the authority of other agencies, as those authorities relate to conducting activities to alleviate wildlife damage, occurs by agency below.

WS' Legislative Authority

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

United States Fish and Wildlife Service Authority

The USFWS is the primary federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife resources and their habitat. The USFWS has specific responsibilities for the protection of migratory birds, threatened or endangered species, inter-jurisdictional fish, and certain marine mammals, as well as for lands and waters that the USFWS administers for the management and protection of those resources, such as National Wildlife Refuge System. The USFWS has statutory authority for enforcing the Fish and Wildlife Improvement Act of 1978 (16 USC 7.12), the Fish and Wildlife Act of 1956 (16 USC 742 a-j), and the MBTA (16 USC 703-711).

The USFWS is responsible for managing and regulating take of bird species that are listed as migratory under the MBTA. The USFWS authority for migratory bird management is based on the MBTA of 1918 (as amended), which implements treaties with the United States, Great Britain (for Canada), the United Mexican States, Japan, and the former Soviet Union. Although the MBTA makes it unlawful to take birds listed as migratory, Section 3 of this Act authorized the Secretary of Agriculture[12]:

"*From time to time, having due regard to the zones of temperature and distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, to determine when, to what extent, if at all, and by what means, it is compatible with the terms of the convention to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations, which regulations shall become effective when approved by the President*."

[12]The authority of the Secretary of Agriculture, with respect to the MBTA, was transferred to the Secretary of the Interior in 1939 pursuant to Reorganization Plan No. II. Section 4(f), 4 FR 2731, 53 Stat. 1433.

Therefore, the USFWS can and does authorize depredation permits or orders for the take of migratory birds when certain criteria are met pursuant to the Act.

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, including avicides and repellents available for use to manage bird damage.

Louisiana Department of Agriculture and Forestry

The Louisiana Department of Agriculture and Forestry (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. The WS program has signed a MOU with the LDAF related to the management of damage to rice associated with blackbirds in the State.

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.*"

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

Louisiana State University Agricultural Center

The Louisiana State University 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 Louisiana State University 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. The WS program has also signed a MOU with the Louisiana State University AgCenter related to the management of damage to rice associated with blackbirds in the State.

1.6 COMPLIANCE WITH LAWS AND STATUTES

Several laws or statutes authorize, regulate, or otherwise would affect WS' activities. WS would comply with those laws and statutes and would consult with other agencies as appropriate. WS would comply with all 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 (42 USC 4321 et seq.), as amended

The NEPA requires federal agencies to incorporate environmental planning into federal agency actions and decision-making processes. The two primary objectives of the NEPA are: 1) agencies must have available and fully consider detailed information regarding environmental effects of federal actions and 2) agencies must make information regarding environmental effects available to interested persons and agencies before making decisions and before taking actions.

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.). In addition, WS follows 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. The CEQ, through regulations in 40 CFR 1500-1508 (in part), regulates federal activities affecting the physical and biological environment. In accordance with the CEQ and USDA regulations, APHIS guidelines concerning the implementation of the NEPA, as published in the Federal Register (44 CFR 50381-50384), provide guidance to the WS regarding the NEPA process.

Pursuant to the NEPA and the CEQ regulations, this EA documents the analyses of potential federal actions, informs decision-makers, and the public of reasonable alternatives capable of avoiding or minimizing significant effects, 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.

Migratory Bird Treaty Act of 1918 (16 USC 703-711; 40 Stat. 755), as amended

The MBTA makes it unlawful to pursue, hunt, take, capture, kill, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, nests, or eggs (16 USC 703-711). The MBTA also provides the USFWS regulatory authority to protect families of migratory birds. The USFWS has published a list of bird species protected under the MBTA in 50 CFR 10.13. The law prohibits "*take*" of those migratory bird species listed in the Act except as permitted. Under permitting guidelines in the Act, the USFWS may issue depredation permits to requesters experiencing damage caused by bird species protected under the Act. Information regarding migratory bird permits occurs in 50 CFR 13 and 50 CFR 21. The Migratory Bird Treaty Reform Act of 2004 further clarified the law to include only those birds afforded protection from take in the United States. Under the Reform Act, the USFWS published a list of bird species not protected under the MBTA (70 FR 12710-12716). Of those bird species addressed in this EA, the MBTA does not protect European starlings from take (70 FR 12710-12716). A depredation permit from the USFWS is not required to take European starlings.

As mentioned in Section 1.5, the MBTA provides the USFWS with statutory authority for enforcing the MBTA. Under this authority, the USFWS may issue depredation/control orders or depredation permits to resolve damage caused by bird species protected under the Act. Information regarding permits and orders occurs in 50 CFR 13 and 50 CFR 21.

Under a blackbird depredation order established by the USFWS pursuant to the MBTA, a depredation permit is not required to lethally remove blackbirds, cowbirds, grackles, crows, and magpies when individuals of those species are *"found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance"* (see 50 CFR 21.43). Those bird species addressed in this EA that anyone can lethally remove pursuant to the blackbird depredation order include red-winged blackbirds, Brewer's blackbirds, common grackles, boat-tailed grackles, great-tailed grackles, and brown-headed cowbirds. Under 50 CFR 21.43(a), an entity must attempt to manage damage associated with blackbirds using non-lethal methods before using lethal methods. In addition, under 50 CFR 21.43(b), an entity addressing blackbirds pursuant to the blackbird depredation must use non-toxic shot or nontoxic bullets unless using an air rifle, air pistol, or .22 caliber rimfire firearm. All actions conducted in this EA would comply with the regulations of the MBTA, as amended.

Endangered Species Act (16 USC 1531-1544)

Under the Endangered Species Act (ESA), all federal agencies will seek to conserve threatened or endangered species and will utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts consultations with the 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.

National Historic Preservation Act (16 USC 470 et seq.), as amended

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation an opportunity to comment on such undertakings if an agency determines that the agency's actions are "*undertakings*". Undertakings are defined in Section 800.16(y) as a *"project, activity, or program funded in whole or part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; and those requiring a federal permit, license or approval"*. 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 for use under the alternatives cause major ground disturbance, any physical damage to property, any alterations of property, wildlife habitat, or landscapes, nor involves the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they were used that could result in effects on the character or use of historic properties. Therefore, the methods that WS could use under the relevant alternatives are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources were planned under an alternative selected because of a decision on this EA, the site-specific consultation as required by Section 106 of the NHPA would be conducted, as necessary.

Noise-making methods, such as firearms, that are used at or in close proximity to historic or cultural sites for the purposes of hazing or removing animals have the potential for audible effects on the use and enjoyment of historic property. However, such methods would only be used at a historic site at the request of the owner or manager of the site to resolve a damage problem. Therefore, those activities would be conducted to benefit 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 can be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. Site-specific consultation as required by the Section 106 of the NHPA would be conducted as necessary in those types of situations.

The Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.)

The Native American Graves Protection and Repatriation Act 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 projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

Federal Insecticide, Fungicide, and Rodenticide Act (7 USC 136 et seq.)

The FIFRA requires 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 regulates those chemical methods described in Appendix B and WS would use or recommend those methods in compliance with labeling procedures and requirements.

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 minorities and low-income persons or populations. APHIS implements Executive Order 12898 principally through its compliance with the NEPA. All WS' activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. WS would only use or recommend legal, effective, and environmentally safe methods, tools, and approaches. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minorities and persons or populations of low income.

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

Children may suffer disproportionately from environmental health and safety risks because their physical and mental systems are still developing. Each federal agency must therefore, *"make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children"* and *"ensure that its policies, programs, activities and standards address disproportionate risks to children"*. WS has considered the impacts that the alternatives might have on children in Chapter 4.

Responsibilities of Federal Agencies to Protect Migratory Birds - Executive Order 13186

Executive Order 13186 requires, "*each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement a Memorandum of Understanding with the USFWS that shall promote the conservation of migratory bird populations*". The APHIS has developed a MOU with the USFWS as required by this Executive Order and WS would abide by the MOU.

Invasive Species - Executive Order 13112

Executive Order 13112 establishes guidance to federal agencies to prevent the introduction of invasive species, provide for the control of invasive species, and to minimize the economic, ecological, and human health impacts that invasive species cause. The Order states that, *"each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law: 1) reduce invasion of exotic species and the associated damages, 2) monitor invasive species populations and provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education of invasive species"*. Pursuant to Executive Order 13112, the National Invasive Species Council has designated the European starling as meeting the definition of an invasive species.

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. Management of migratory birds is the responsibility of the USFWS. As the authority for the overall management of bird populations, the USFWS has provided input and WS has consulted with the USFWS since WS began providing assistance to ensure an interdisciplinary approach in accordance with the NEPA and agency mandates, policies, and regulations. The LDWF is responsible for managing wildlife in the State of Louisiana, including blackbirds. The depredation order for blackbirds requires that all entities report any lethal take to the USFWS annually. Therefore, the USFWS would have the opportunity to incorporate WS' activities involving blackbirds into population objectives.

Based on the scope of this EA, the decisions to be made are: 1) should WS continue to conduct blackbird damage management activities to alleviate damage to sprouting rice, 2) should WS implement an adaptive methods strategy to meet the need action, 3) if not, should WS attempt to implement one of the other alternatives, and 4) would the 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 WS identified but will not be considered in detail, with rationale. Pertinent portions of the affected environment will be included in this chapter during the discussion of issues used to develop the SOPs. Additional descriptions of affected environments will be incorporated into the discussion of the environmental effects in Chapter 4.

2.1 AFFECTED ENVIRONMENT

The Gulf Coastal Prairie region (Bird Conservation Region 37)[13] dominates southwestern Louisiana. The Gulf Coastal Prairie region comprises the flat grasslands and marshes of the coastal areas extended from portions of Mexico near the mouth of the Rio Grande River up into the rice country of southeastern Texas and southwestern Louisiana through to the Louisiana marshlands at the mouth of the Mississippi River (USFWS 2000). Important wetland habitats in this region include coastal marshes, shallow estuarine bays and lagoons, and the wetlands associated with the rice prairies (USFWS 2000). Some of the greatest concentrations of colonial waterbirds in the world occur in this region, which also provides habitat for

[13]Bird Conservation Regions are areas in North America that are characterized by distinct ecological habitats that have similar bird communities and resource management issues.

migrating shorebirds and most of the neotropical migrant forest birds of the eastern United States (USFWS 2000). The region also provides habitat for waterfowl with winter concentrations of waterfowl among the highest in North America (USFWS 2000).

Some of the highest concentrations of wintering blackbirds in the southern United States occur in southwest Louisiana. During the winter, blackbird species often form large mixed species flocks that roost and forage together in the southern United States, including areas of southwestern Louisiana where rice is grown. The size of roosts can vary from a few hundred individuals to millions of blackbirds, with some roost counts reaching 25 million blackbirds in the rice growing regions of southwest Louisiana (Meanley 1976, Wilson 1985, Brugger 1988).

Agricultural producers planted 308,200 acres of rice in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes during 2013, which accounted for nearly 76% of the rice production in the State. Therefore, damage or threats of damage associated with blackbird species could occur in agricultural fields wherever those birds occur in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes. Pursuant to three of the alternatives analyzed in the EA, WS could continue to provide assistance on private land in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes when the appropriate resource owner or manager requests assistance.

Rice production during 2013 occurred on approximately 6.7% of the land area in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes. Since federal fiscal year (FY) 1995, WS has conducted damage management activities on less than 0.002% of the land area in southwestern Louisiana. WS would only provide assistance when a landowner or manager requests such assistance and WS would only provide direct operational assistance on properties where WS and the property owner or manager had signed a MOU, work initiation document, or another comparable document. Upon receiving a request for assistance, WS could conduct the proposed action alternative or those actions described in the other alternatives in the rice growing areas of southwestern Louisiana to reduce damages and threats associated with blackbirds to sprouting rice. The analyses in this EA are intended to apply to actions taken under the selected alternative that could occur in any locale and at any time within the analysis area. This EA analyzes the potential impacts of blackbird damage management and addresses activities in southwestern Louisiana that are currently being conducted under a MOU, work initiation document, or another comparable document with WS. This EA also addresses the potential impacts of blackbird damage management where WS and people requesting assistance sign additional agreements in the future.

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 agency analyzes its 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 could or would occur from a non-federal entity conducting the action in the absence of the federal action. This concept is applicable to situations involving federal assistance in managing damage associated with resident wildlife species managed by the state natural resources agency, invasive species, or unprotected wildlife species.

Most bird species are protected under state and/or federal law and to address damage associated with those species, a permit must be obtained from the appropriate federal and/or state agency. However, in some situations, with the possible exception of restrictions on methods (*e.g.*, pesticide regulations), some species can be managed without the need for a permit when they are causing damage (*e.g.*, take under depredation orders, unprotected bird species). Pursuant to the MBTA, the USFWS can issue depredation permits to those entities experiencing damage associated with birds, when deemed appropriate. Under the blackbird depredation order, entities can lethally remove red-winged blackbirds, brown-headed cowbirds, common grackles, boat-tailed grackles, great-tailed grackles, and Brewer's blackbirds without the need to obtain a depredation permit when those species are found committing damage, when about to commit damage, or when posing a human safety threat.

If the MBTA does not afford protection to a bird species (see 50 CFR 10.13), an entity does not need a depredation permit from the USFWS to address damage or threats of damage associated with those species. The MBTA does not protect the European starlings from take; therefore, no permit would be required from the USFWS to resolve damage or to take starlings.

When a non-federal entity (*e.g.*, agricultural producers, private companies, individuals, or any other non-federal entity) takes an action involving a bird species, the action is not subject to compliance with the NEPA due to the lack of federal involvement[14] in the action. Under such circumstances, the environmental baseline or status quo must be viewed as an environment that includes those resources as they are managed or impacted by non-federal entities in the absence of the federal action being proposed.

Therefore, in those situations in which a non-federal entity has decided that a management action directed towards birds 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. Since take of blackbirds could occur under depredation orders, through the issuance of depredation permits, or for starlings, take can occur at any time without the need for a depredation permit, an entity could take an action in the absence of WS' involvement. WS' involvement would not change the environmental status quo if the requestor had conducted the action in the absence of WS' involvement in the action.

In addition, most methods for resolving damage would be available to WS and to other entities. Therefore, WS' decision-making ability would be restricted to one of three alternatives. Under those three alternatives, WS could provide technical assistance with managing damage only, take the action using the specific methods as decided upon by the non-federal entity, or take no action. If no action were taken by WS, the non-federal entity could take the action anyway either without the need for a permit, under a depredation order, or through the issuance of a depredation permit by the USFWS. 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, in those situations where a non-federal entity has already made the decision to remove or otherwise manage blackbirds to stop damage with or without WS' assistance, WS' participation in carrying out that action would not affect the environmental status quo.

2.2 ISSUES ADDRESSED IN THE ANALYSIS OF THE ALTERNATIVES

Issues are concerns of the public and/or professional community raised regarding potential effects that might occur from a proposed action. Agencies must consider such issues in the decision-making process associated with the NEPA. WS, in consultation with the USFWS and the LDWF, developed the issues related to managing damage caused by blackbirds in the rice-growing areas of southwestern Louisiana. This EA will also be made available to the public for review and comment to identify additional issues.

[14]If a federal permit were required to conduct damage management activities, the issuing federal agency would be responsible for compliance with the NEPA for issuing the permit.

The issues as those issues relate to the possible implementation of the alternatives, including the proposed action alternative, are discussed in Chapter 4. The issues analyzed in detail are the following:

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

A common issue when addressing damage caused by wildlife is the potential impacts of management actions on the populations of target species. Methods available to resolve damage or threats of damage can be categorized as lethal and non-lethal. Non-lethal methods available can disperse or otherwise make an area unattractive to the target species causing damage, which reduces the presence of those species at the site and potentially the immediate area around the site where non-lethal methods were employed. Under 50 CFR 21.43(a), attempts to manage damage associated with blackbirds must occur using non-lethal methods prior to using lethal methods, except when addressing damage caused by European starlings[15]. Lethal methods would also be available to remove a blackbird or those blackbirds responsible for causing damage or posing a threat of damage. Therefore, if WS used lethal methods, the removal of a blackbird or blackbirds could result in local population reductions in the area where damage or threats were occurring. The number of individuals from a target species that WS could remove from a population using lethal methods under the alternatives would be dependent on the number of requests for assistance that WS receives, the number of individual blackbirds involved with the associated damage or threat, and the efficacy of the methods that WS employs.

The analysis to determine the magnitude of impacts on the populations of those species addressed in this EA from the use of lethal methods would be based on a measure of the number of individuals lethally removed in relation to that species' abundance. Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations of magnitude would involve the use of population estimates, while qualitative determinations would involve the use of population trends. Take would be monitored by comparing the number of birds lethally removed with overall populations or trends. WS would only use lethal methods when appropriate to alleviate damage and only after the person requesting assistance agreed to allow WS to use those methods to resolve their assistance request. In addition, the use of lethal methods would only occur after the USFWS authorized the take of those bird species pursuant to the MBTA, when required. Therefore, any activities conducted by WS and permitted by the USFWS 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, and human-induced alterations of wildlife habitat.

WS could employ or recommend those methods available under each of the alternatives to alleviate damage that target an individual of a blackbird species or a group of individuals after applying the WS' Decision Model (Slate et al. 1992) to identify possible techniques. Chapter 4 analyzes the effects on the populations of target bird populations from implementation of the alternatives addressed in detail, including the proposed action. The Breeding Bird Survey (BBS), the CBC, the Partners in Flight Landbird Population database, and published literature provide information on bird populations and trends. Further information on those sources of information is provided below.

Breeding Bird Survey

The BBS is a large-scale inventory of North American birds coordinated by the United States Geological Survey (USGS), Patuxent Wildlife Research Center (Sauer et al. 2014). The BBS is a combined set of over 3,700 roadside survey routes primarily covering the continental United States and southern Canada. The BBS is conducted annually in the United States and Canada, across a large geographical area, under

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[15]The MBTA does not afford protection to European starlings and starlings are not a species addressed under the blackbird depredation order (see 50 CFR 21.43).

standardized survey guidelines. Under established guidelines, observers count birds at established survey points along roadways for a set duration along a pre-determined route. Routes are 24.5 miles long and are surveyed once per year with the observer stopping every 0.5 miles along the route to conduct the survey. The numbers of birds observed and heard within 0.25 miles of each of the survey points are recorded during a 3-minute sampling period at each point. Surveys were started in 1966 and are conducted in June, which is generally considered as the period of time when those birds present at a location are likely breeding in the immediate area.

The primary objective of the BBS has been to generate an estimate of population change for all breeding birds. Populations of birds tend to fluctuate, especially locally, because of variable local habitat and climatic conditions. Trends can be determined using different population equations and statistically tested to determine if a trend is statistically significant. Current estimates of population trends from BBS data are derived from hierarchical model analysis (Link and Sauer 2002, Sauer and Link 2011) and are dependent upon a variety of assumptions (Link and Sauer 1998).

Christmas Bird Count

Numerous volunteers under the guidance of the National Audubon Society conduct the CBC on an annual basis in December and early January. Participants count the number of birds observed within a 15-mile diameter circle around a central point (177 mi^2). The CBC reflects the number of birds frequenting a location during the winter months. The CBC data does not provide a population estimate, but the count can be used as an indicator of trends in the population of a particular bird species over time. Researchers have found that population trends reflected in CBC data tend to correlate well with those from censuses taken by more stringent means (National Audubon Society 2010).

Partners in Flight Population Estimate Database

The BBS data are intended for use in monitoring bird population trends, but it is also possible to use BBS data to develop a general estimate of the size of bird populations (Rich et al. 2004, Blancher et al. 2013). Using relative abundances derived from the BBS conducted between 1998 and 2007, the Partners in Flight Science Committee (2013) extrapolated population estimates for many bird species in North America as part of the Partners in Flight Population Estimate Database. The Partners in Flight system involves extrapolating the number of birds in the 50 quarter-mile circles (total area/route = 10 mi^2) surveyed during the BBS to an area of interest. The model used by Rich et al. (2004) and updated by the Partners in Flight Science Committee (2013) makes assumptions on the detectability of birds, which can vary for each species. Some species of birds that are more conspicuous (visual and auditory) are more likely to be detected during bird surveys when compared to bird species that are more secretive and do not vocalize often. Information on the detectability of a species is combined to create a detectability factor, which may be combined with relative abundance data from the BBS to yield a population estimate (Rich et al. 2004, Blancher et al. 2013).

Issue 2 - Effects of Damage Management Activities on Non-target Wildlife Populations, Including Threatened or Endangered Species

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on non-target species, including threatened and endangered species. The use of non-lethal and lethal methods to alleviate damage or threats caused by target species also has the potential to inadvertently disperse, capture, or kill non-target wildlife.

To reduce the risk to non-target wildlife, including threatened and endangered species, persons employing damage management activities should select methods or implement methods in a specific way that targets the specific species causing the damage. For example, persons should implement methods in locations that target individuals use extensively and if possible, exclusively. WS would also use SOPs designed to reduce the effects on non-target species' populations. Chapter 3 further discusses SOPs. Appendix B describes the methods available for use under the alternatives.

People have expressed concerns about the potential for adverse effects to occur to non-target wildlife from the use of chemical methods. The only chemical method currently available to manage damage or threats of damage associated with blackbirds is the avicide DRC-1339[16]. No taste repellents are currently available to alleviate blackbird damage to sprouting rice. Appendix B contains further discussion on the chemical methods that could be available for use to manage damage and threats associated with blackbirds in southwestern Louisiana.

The ESA makes it illegal for any person to '*take*' any listed endangered or threatened species or their critical habitat. The ESA defines take as, "*to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct*" (16 USC 1531-1544). Critical habitat is a specific geographic area or areas that are essential for the conservation of a threatened or endangered species. The ESA requires that federal agencies conduct their activities in a way to conserve species. It also requires that federal agencies consult with the appropriate implementing agency (either the USFWS or the National Marine Fisheries Service) prior to undertaking any action that may take listed endangered or threatened species or their critical habitat pursuant to Section 7(a)(2) of the ESA.

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

An additional issue often raised is the potential risks to human health and safety associated with the methods employed to manage damage caused by target blackbird species. Both chemical and non-chemical methods have the potential to have adverse effects on human health and safety. Risks can occur to persons employing methods and to persons that may encounter methods. Risks can be inherent to the method itself or related to the misuse of the method.

Safety of Chemical Methods Employed

Potential risks to human health and safety associated with chemical methods are related to the potential for human exposure either through direct or indirect contact with the chemical. Under the alternatives analyzed in detail, the only chemical method available would be the avicide DRC-1339. Avicides are those chemical methods used to remove birds lethally. DRC-1339 is the only avicide currently being considered for use to manage damage in this EA. The active ingredient of DRC-1339 is 3-chloro-p-toluidine hydrochloride. DRC-1339 is currently registered with the EPA for use to manage damage associated with blackbirds at staging areas associated with blackbird roosts. The avicide DRC-1339 is currently only available for use by employees of WS.

Several avian repellents are commercially available to disperse birds from an area or to discourage birds from feeding on desired resources. However, there are currently no taste repellents available for use to manage blackbird damage to newly seeded rice. If the EPA registers a taste repellent to alleviate blackbird damage to sprouting rice pursuant to the FIFRA and the LDAF approves the use of a product in the State, taste repellents would be available under all of the alternatives analyzed in detail.

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[16]There are currently several formulations of the avicide DRC-1339 available; however, the WS program could use the Compound DRC-1339 Concentrate – Staging Areas label (EPA Registration Number 56228-30) formulation to reduce damage to newly seeded rice near blackbird roosts in southwestern Louisiana.

Research scientists with the National Wildlife Research Center (NWRC), the research unit of the WS program, have been involved with conducting research on taste repellents to discourage blackbirds from feeding on rice (*e.g*., see Besser 1973, Mott et al. 1976, Ruelle and Bruggers 1979, Holler et al. 1985, Decker et al. 1990, Avery et al. 1995, Avery et al. 2005). Research has focused on seed treatments (*i.e*., applying the repellent directly to the seed before planting) since damage is caused by blackbirds feeding on the seed or pulling sprouts to feed on the seed. Research scientist with the NWRC have evaluated a non-toxic clay-based seed coating (Decker et al. 1990), methiocarb (Besser 1973, Mott et al. 1976, Ruelle and Bruggers 1979, Holler et al. 1985), methyl anthranilate (Avery et al. 1995), anthraquinone (Avery et al. 1998), and caffeine (Avery et al. 2005). Despite extensive research efforts, the commercial development and regulatory approval of an effective repellent for sprouting rice remains elusive (Avery et al. 2005). Based on previous research, repellents that could be available for use in the future to prevent blackbirds from feeding on newly planted rice are likely to be seed treatments that the seed manufacturer or the farmer mixes directly onto the seed prior to planting. Since the WS program in Louisiana would not be responsible for planting rice, no direct use of taste repellents that were applied directly to the seed would occur by WS.

The EPA through the FIFRA would regulate the use of chemical methods, including those chemical methods available to alleviate damage to rice associated with blackbirds. The LDAF and WS' directives (*e.g*., see WS Directive 2.401) would also regulate the use of chemical methods. Appendix B further discusses those chemical methods available for use.

Safety of Non-Chemical Methods Employed

Most methods available to manage damage and threats associated with birds are considered non-chemical methods. Non-chemical methods may include cultural methods, limited habitat modification, animal behavior modification, and other mechanical methods. Changes in cultural methods that could reduce the susceptibility of rice to blackbird damage includes delayed seeding, drill seeding, continuous flooding, pinpoint flooding, block planting, and planting lure crops. Abandonment of rice fields in areas of historically high blackbird damage or the cultivation of crops that were less susceptible to blackbird damage could also be viable changes in cultural methods. Limited habitat modification would be practices that alter specific characteristic of a localized area, such as pruning trees to discourage birds from roosting. Animal behavior modification methods would include those methods designed to disperse birds from an area through harassment or exclusion. Behavior modification methods could include pyrotechnics, propane cannons, electronic distress calls, effigies, mylar tape, lasers, and eyespot balloons. Other mechanical methods could include live-traps, mist nests, cannon nets, bird proof netting, and shooting.

Like chemical methods, non-chemical methods, if misused, could potentially be hazardous to human health and safety. The primary safety risk of most non-chemical methods occurs directly to the person employing the method or those people assisting. However, risks to others do exist when employing non-chemical methods, such as when using firearms, cannon nets, or pyrotechnics. All of the non-chemical methods available to address blackbird damage in southwest Louisiana would be available for use by any entity, when permitted, under all of the alternatives analyzed in detail.

Issue 4 – 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 can be interpreted 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*."

Suffering has previously been described by the American Veterinary Medical Association (AVMA) 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 occurring over time, 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 occurs when action is not taken 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 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 AVMA accepted methods of euthanasia to be used when killing all animals, including wild animals. The AVMA has previously stated that "[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). The AVMA (2013) currently defines euthanasia as "…*ending the life of an individual animal in a way that minimizes or eliminates pain and distress*".

Pain and suffering, as it relates to methods available for use to manage birds has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since *"…neither medical nor veterinary curricula explicitly address suffering or its relief"* (California Department of Fish and Game 1991). Research suggests that some methods can cause "*stress*", such as being restrained in traps (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).

The decision-making process can involve trade-offs between the above aspects of pain and humaneness (AVMA 2013). 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 discusses the issue of humaneness and discusses animal welfare concerns as those concerns relate to the methods available for use. Chapter 3 discusses SOPs to alleviate pain and suffering that WS would incorporate into the alternative approaches to managing blackbird damage when those SOPs were applicable to each approach.

Issue 5 – Effects of Damage Management Activities on the Aesthetic Values of Blackbirds

An additional issue raised is that activities to reduce damage associated with blackbirds would result in the loss of the aesthetic benefits of target blackbirds to persons in the area where damage management activities occur. Wildlife is generally regarded as providing utilitarian, monetary, recreational, scientific, ecological, existence, and historic values (Conover 2002). Those benefits can be tangible or intangible. Both recreational and existence values are related in part to aesthetics. Aesthetics is the philosophy dealing with the nature of beauty or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature and dependent upon what an observer regards as beautiful.

Many people enjoy watching and interacting with birds and take pleasure from knowing they exist. In modern societies, a large percentage of households have pets. However, some people may consider individual wild animals including birds as "*pets*" and exhibit affection towards those animals.

The values people place on wildlife is unique to the individual and can be based on many factors. Because those values differ, public attitudes toward wildlife vary considerably. To alleviate damage caused by wildlife, some people support removal, some people believe that all wildlife should be captured and relocated to another area, while others strongly oppose any management and want wildlife agencies to teach tolerance. Some of the people who oppose removal of wildlife do so because of human-affectionate bonds with individual wildlife similar to attitudes of a pet owner. Attitudes can also differ depending upon if the damage or threats of damage directly affect a person. As stated previously, methods available to alleviate damage or to reduce threats disperse or otherwise make an area where damage was occurring unattractive to the target species causing the damage, or alternatively, lethally removes individuals of the species causing the damage. Those activities reduce the presence of target species in the area where damage was occurring. Therefore, these activities have the potential to affect the aesthetic values of wildlife depending upon the values, philosophies, attitudes, and opinions of individuals.

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

During the scoping process for this EA, WS, in consultation with the USFWS and the LDWF, identified additional issues associated with meeting the need for action identified in Chapter 1. WS considered those issues during the development of this EA; however, this EA will not analyze those issues in detail for the reasons provided. A brief description of those issues and the rationale for not analyzing those issues in detail occur below.

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

A concern would be that an EA for an area that encompasses eight parishes in southwestern Louisiana would not meet the NEPA requirements for site specificity. Wildlife damage management falls within the category of federal or other regulatory agency actions in which the exact timing or location of individual activities cannot usually be predicted well enough ahead of time to describe accurately such locations or times in an EA or EIS. Although WS could predict some of the possible locations or types of situations where blackbird damage to rice would occur, WS cannot predict the specific locations or times at which affected persons determine a damage or threat of damage caused by blackbirds has become intolerable to the point that they request assistance. In addition, WS would not be able to prevent such damage in all areas where it might occur without resorting to destruction of blackbird 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 vs. Sierra Club, 427 United States 390, 414 (1976), CEQ 1508.25). Ordinarily, according to 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 is to determine if the proposed action would 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 the potential individual and cumulative impacts of managing damage and threats associated with blackbirds to managing blackbird damage to rice occurring in southwestern Louisiana. In terms of cumulative impacts, a single EA that analyzes impacts will provide a more comprehensive and less redundant analysis than multiple EAs that cover smaller areas. If a determination occurs through the development of this EA that the proposed action alternative or the other alternatives might have a significant impact on the quality of the human environment, WS would notice the public of the intent to prepare an EIS and this EA would become the foundation during the preparation of the EIS.

A Site Specific Analysis Should be made for Every Location Where Blackbird Damage Management Activities Could Occur

The underlying intent for preparing an EA is to determine if a proposed action might have a significant impact on the human environment. The EA development process of WS is issue driven, meaning issues that were raised during the interdisciplinary process and through public involvement that were substantive were used to drive the analysis and determine the significance of the environmental impacts of the proposed action and the alternatives. Therefore, the scale of the analysis must be appropriate to the issues. Many of the issues identified relate to the potential effects on populations of wildlife. Wildlife populations are managed on state or regional, and not localized scales. This is especially true for birds because of their ability to fly and move large distances. Therefore, it is only appropriate to analyze impacts at this scale. Additionally, as discussed previously, one EA analyzing the potential impacts associated with managing damage to rice associated with blackbirds would provide a more comprehensive and less redundant analysis than multiple EAs covering smaller areas. 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, WS would notice the public of the intent to prepare an EIS.

Effects of Blackbird Damage Management Activities on Biodiversity

Another issue identified as a concern is that managing blackbird damage could affect biodiversity or the diversity of species. WS does not attempt to eradicate any species of native wildlife. WS operates in accordance with federal and state laws and regulations enacted to ensure species viability. As stated previously, the purpose of damage management is to reduce or alleviate the damage or threats of damage by targeting individual or groups of blackbirds identified as causing damage or posing a threat of damage. Any reduction of a local population or group is frequently 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 in southwestern Louisiana. In addition, WS would only target those blackbirds identified as causing damage or posing a threat. WS would not attempt to suppress blackbird 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 blackbird populations but to manage damage caused by specific individuals of a blackbird species. The MBTA protects all native blackbird species addressed in this EA. Take of native blackbird species can only occur at the discretion of the USFWS, which ensures that take occurs within allowable take levels to achieve desired population objectives for blackbird species addressed in this EA. 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 blackbirds that WS lethally removes would only be replaced by other blackbirds after WS completes activities (*e.g.*, blackbirds that relocate into the area) or by blackbirds 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.

Chapter 4 evaluates the environmental consequences of the alternatives on the populations of target and non-target species based on available quantitative and qualitative parameters. The permitting of lethal removal by the USFWS 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.

A Loss Threshold Should Be Established Before Allowing Lethal Methods

An issue commonly identified as a concern is that a threshold of damage or economic loss should be established and reached before employing lethal methods to resolve damage and that damage should be a cost of doing business. For any given damage situation there are varying thresholds of tolerance exhibited by those people affected. The point at which people begin to implement damage management methods is often unique to an individual person and can be based on many factors (*e.g.*, economic, social, aesthetics). How damage is defined is also often unique to the individual person, and damage occurring to one individual may not be considered damage by another individual. Therefore, the threshold of damage or economic loss that can be tolerated is also unique to the individual person.

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 found that a forest supervisor only needed to show that damage from wildlife was threatened, to establish a need for wildlife damage management (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.

Cost Effectiveness of Management Methods

A formal, monetary cost benefit analysis is not required to comply with the NEPA and consideration of this issue is not essential to selecting an alternative. However, methods that are not only the most effective in reducing damage or threats but are also the most cost effective are likely to receive the greatest application in any effective damage management program. As part of any damage management program, methods should continually be evaluated for their cost effectiveness. Damage management is often constrained by the financial means of those people experiencing damage. The cost effectiveness of methods and the effectiveness of methods are therefore linked.

Impacts of Avian Influenza on Blackbird Populations

Wild and domestic waterfowl, as well as a variety of other species, are the acknowledged natural reservoirs for a variety of avian influenza viruses (Davidson and Nettles 1997, Alexander 2000, Stallknecht 2003, Pedersen et al. 2010). Most strains of avian influenza circulate among those birds without clinical signs and are not an important mortality factor in wild waterfowl (Davidson and Nettles 1997, Clark and Hall 2006). There are two types of avian influenza viruses, low pathogenic and high pathogenic (USGS 2006). The low and high refer to the potential of the viruses to kill domestic poultry (USGS 2006). In wild birds, low pathogenic avian influenza strains rarely cause signs of illness and are not an important mortality factor for wild birds (Davidson and Nettles 1997, Clark and Hall 2006). In contrast, high pathogenic avian influenza has sickened and killed large numbers of wild birds in China (USGS 2006). However, there have been reports of apparently healthy wild birds being infected with high pathogenic avian influenza (USGS 2006). Previously, high pathogenic strains have only been found to exist in wild waterfowl species in China (Brown et al. 2006, USGS 2006, Keawcharoen et al. 2008).

However, in December 2014, the highly pathogenic avian influenza virus was isolated from a northern pintail (*Anas acuta*) in Washington State making it the first detection of the highly pathogenic avian influenza virus in wild birds in North America (USGS 2015*a*). The detection of the highly pathogenic avian influenza virus in North America has coincided with detection of the virus in poultry across the western and central United States (USDA 2015). WS has been one of several agencies and organizations conducting surveillance and monitoring of avian influenza in migratory birds. Between December 8, 2014 and July 15, 2015, the USGS (2015*b*) reports 84 cases of highly pathogenic avian influenza cases in wild birds across the United States. Most cases have involved waterfowl and raptors (USGS 2015*b*). Many of the 84 cases involved detection of the virus in waterfowl that people harvested during the annual hunting season that agencies have sampled as part of monitoring efforts (USGS 2015*b*). Although mortality events involving the highly pathogenic avian influenza virus have occurred in waterfowl, there have been no reports of major waterfowl die-offs from the virus. In addition, no reports of major die-offs of blackbirds have occurred. Therefore, there is no evidence to suggest that the avian influenza virus is or will have an effect on the blackbird population.

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. Under any of the alternatives, birds causing damage or posing threats could be lethally removed with firearms. Lead is a metal that can be poisonous to animals and people. Risks of lead exposure from the use of firearms occur primarily when animals and people ingest lead shot or bullet fragments. The take of blackbirds under the blackbird depredation order requires the use of non-toxic shot and bullets, unless using an air rifle, air pistol, or .22-caliber rimfire firearm. However, people implementing damage management methods for unprotected non-native birds, such as the European starling, may use lead shot and bullets at any time. However, WS' use of ammunition would comply with those restrictions occurring under the blackbird depredation order when targeting starlings to reduce damage to rice.

In general, WS would not use air rifles, air pistols, or .22-caliber rimfire firearms to remove blackbirds. One exception could be the collection of specific blackbirds for scientific purposes, if requested. In those situations, deposition of lead into soil could occur if, during the use of an air rifle, air pistol, or .22-caliber rimfire firearm, the projectile passes through a blackbird, if misses occur, or if retrieval of the blackbird 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 is generally retained within the top 20 cm (about 8 inches). In addition, concerns have been raised that lead from bullets introduced into the environment from shooting activities could lead to the contamination of either ground water or surface water from runoff. Stansley et al. (1992) studied lead levels in water that was directly subjected to high concentrations of lead shot because of intensive target shooting at shooting ranges. Lead did not appear to "*transport*" readily in surface water when soil at the shooting ranges were neutral or slightly alkaline in pH (*i.e.*, not acidic), but lead did transport more readily under slightly acidic conditions. Stansley et al. (1992) did however detect elevated lead levels in water in a stream and a marsh that were in the shot "*fall zones*" at one shooting range, although the study did not find higher lead levels in a lake into which the stream drained, with the exception of 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. Stansley et al. (1992) also indicated that even when lead shot has accumulated in high levels in areas with permanent water bodies present, the lead does not necessarily cause elevated lead contamination of water downstream. Muscle samples from two species of fish collected in water bodies with high levels of lead shot 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 transport of lead from bullets distributed across the landscape is reduced once the bullets and shot form crusty lead oxide deposits on their surfaces, which serves to reduce further the potential for ground or surface water contamination (Craig et al. 1999). Those studies suggest that the very low amounts of lead that activities could deposit would have minimal effects on lead levels in soil and water.

Since the take of blackbirds could occur by other entities, WS' assistance with removing blackbirds would not be additive to the environmental status quo. WS' assistance would not be additive to the environmental status quo since those birds removed by WS using firearms could be lethally removed by the entities experiencing damage using the same method in the absence of WS' involvement. The amount of lead deposited into the environment may be lowered by WS' involvement in activities due to efforts by WS to ensure projectiles do not pass through, but are contained within the bird carcass, which would limit the amount of lead potentially deposited into soil from projectiles passing through the carcass. The proficiency training received by WS' employees in firearm use and accuracy increases the likelihood that birds are lethally removed humanely in situations that ensure accuracy and that misses occur infrequently, which would further reduce the potential for lead to be deposited in the soil from misses or from projectiles passing through carcasses. In addition, WS' involvement would ensure efforts were made to retrieve bird carcasses lethally removed using firearms to prevent the ingestion of lead in carcasses by scavengers. WS' involvement would also ensure carcasses were disposed of properly to limit the availability of lead. Based on current information, the risks associated with lead bullets that would be deposited into the environment from WS' activities due to misses, the bullet passing through the carcass, or from bird carcasses that may be irretrievable would be below any level that would pose any risk from exposure or significant contamination. As stated previously, when using shotguns, only non-toxic shot would be used by WS pursuant to 50 CFR 20.21(j). Additionally, WS may utilize non-toxic ammunition in rifles and air rifles as the technology improves and ammunition becomes more effective and available.

Impacts of Dispersing a Blackbird Roost

Another issue often raised is that dispersing blackbirds from a roost location to alleviate damage or threats could result in new damage and threats when blackbirds establish a new roost location. While those people originally experiencing damage or threats may see resolution of the problem when WS disperses a roost, persons near the new blackbird roost may see the blackbird problem as imposed on them. Thus, overall there is no resolution to the original bird problem.

Blackbird roosts are common in the rice growing areas of southwestern Louisiana (Brugger 1988). Roost locations are likely influenced by available roosting habitat and available food supply (Meanley 1965). Planting dates for rice occurring in late February and March coincide with the presence of large numbers of blackbirds in the rice growing areas of southwestern Louisiana. Blackbird damage to sprouting rice is most often associated with large communal roost sites, with the greatest rice losses being associated with proximity to roosts. Based on observations by WS' personnel, the most severe damage occurs within a 10-mile radius of an active blackbird roost (A. Wilson, WS. pers. obs. 2014), but blackbirds may travel up to 35-miles from a roost to forage (Cummings and Avery 2003). In addition, blackbirds may move amongst roosts (Cummings and Avery 2003). Blackbirds may roost in the same locations year after year but in areas where roosting location are common, blackbirds may shift roosting locations from year to year (Meanley 1965). Cummings and Avery (2003) reported the number of blackbird roosts occurring in a five-parish area of southwestern Louisiana and the locations of those roosts remained similar between 1996 and 2003.

A roost located in the rice growing areas of southwestern Louisiana that researchers surveyed in February 1988 contained approximately 18 million blackbirds; however, by April 1988, the number of blackbirds using the roost had declined to 6,300 blackbirds (Brugger et al. 1992). Most blackbirds had abandoned the roost by late February (Brugger et al. 1992). Blackbird species present in the rice-growing region of southwestern Louisiana generally begin their spring migration to northern nesting areas in February (see Chapter 4 for further discussion of the migratory patterns of each blackbird species). Although the migration may begin in February, the migratory movement of blackbirds in southwestern Louisiana generally peaks in March and blackbirds may be present into April.

In many cases, blackbird roosts occur in areas that are inaccessible or difficult to access and blackbird roosts can cover many acres of suitable roosting habitat, which can make efforts to disperse the roost using available methods difficult. In most cases, the use of dispersal methods would occur at sites where damage was occurring or in area where damage to rice could occur to disperse blackbirds. In addition, the natural movement of blackbirds may shift roosts as blackbirds begin moving northward during the spring migration. Blackbirds may also fly up to 35-miles from a roost to feed. The WS program is not aware of any previous activities that caused a major blackbird roost to relocate into an area where damage or the threat of damage was not already occurring. Coordination between agencies and local entities would ensure the identification and monitoring of any new roosts formed from the dispersal of blackbirds.

Bird Damage Should Be Managed by Private Nuisance Wildlife Control Agents

Those rice producers experiencing damage could contact wildlife control agents and private entities to reduce blackbird damage when deemed appropriate by the resource owner under any of the alternatives. In addition, WS could refer persons requesting assistance to agents and/or private entities 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 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.

Bird 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. In addition, funding for WS' activities could occur through cooperative service agreements with individual property owners or managers. Managing damage that wildlife cause is 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 being impacted by their damage and has the least impacts on wildlife overall.

Lethal Methods are Ineffective because up to 65% of Blackbird Populations die each Year

Because the natural annual mortality of many blackbird species may reach up to 65% of the population, some people contend that using lethal methods to manage damage would be ineffective. However, the rate of natural mortality has little or no relationship to the effectiveness of damage management because natural mortality generally occurs throughout a population and throughout the course of a year. Although it is generally unknown if lethal methods have an additive effect on natural mortality, there is some evidence to suggest that mortality from damage management activities would be compensatory and not additive to the natural mortality of blackbirds. The use of lethal methods by WS to alleviate damage to newly seeded rice in southwestern Louisiana occurs during the winter when populations may be near their lowest; thus, lethal removal could have an additive effect on populations (see Chapter 4 for further discussion).

However, to meet the need for action, the goal of WS would be to manage the damage that blackbirds cause to newly seeded rice and not to manage blackbird populations. Therefore, the effectiveness of the methods must meet the goal of reducing damage. The WS program would only target those blackbirds causing damage and would not conduct activities to manage overall blackbird populations. Based on the need for action and the goals of the WS program, WS did not consider this issue in detail.

Risk from Avian Cholera and Botulism from Killing Blackbirds

Another concern identified was the potential for blackbirds killed during damage management activities to die in wetlands, which could increase the risk of avian botulism and avian cholera outbreaks.

Avian botulism is a paralytic disease of birds resulting from ingestion of toxin produced by the bacterium *Clostridium botulinum* (Rosen 1971, Rocke and Friend 1999). Seven distinct types of botulism toxins occur and each of the seven types have a letter designation from A through G. Waterfowl are the most common group of wildlife associated with die-offs from avian botulism. Waterfowl die-offs from botulism are usually associated with the Type C toxin (Rocke and Friend 1999). However, Type C botulism in the wild can affect many species of birds and some mammals. Waterfowl, shorebirds, and gulls are most commonly affected and songbirds are only infrequently affected (Rocke and Friend 1999). However, not enough is known about avian botulism to precisely identify the factors leading to an outbreak (Rocke and Friend 1999). Many botulism outbreaks occur on the same wetland year after year, and within a wetland, there may be localized "*hot spots*." In addition, outbreaks often follow a fairly consistent and predictable period (Rocke and Friend 1999).

Most outbreaks occur west of the Mississippi River usually during late summer from July through September. The *C. botulinum* bacterium persists in wetlands in a spore form that can persist for many seasons since it is resistant to heat and drying (Rocke and Friend 1999). The primary factors that contribute to the onset and maintenance of avian botulism outbreaks include water quality, depth and fluctuations, rotting vegetation, presence of invertebrate and vertebrate carcasses, high fly populations, and high ambient temperatures (above 77^{o} Fahrenheit) (Rosen 1971, Rocke and Friend 1999). Onset usually occurs following fluctuating water levels during the hot summer months, which can produce high mortality in the invertebrate fauna and this in turn could initiate rapid bacterial growth and toxin production within the wetland. Once animals begin to die of the toxins, their carcasses are the source of further amplification in fly maggot-bird transmission cycles (Reed and Rocke 1992). A single waterfowl carcass can sustain several thousand infected maggots. Consumption of just a few of these maggots can intoxicate a duck. If high concentrations of toxin are produced and persist in a wetland, this toxin can be the direct source of intoxication for winter and spring botulism outbreaks. In addition, the occurrence of carcass-maggot cycles of botulism is dependent on a number of factors in addition to the presence of carcasses with botulism spores, including fly density, and environmental conditions that facilitate fly egg laying, maggot development, and maggot dispersal from carcasses (Reed and Rocke 1992).

There is little information available on infection or mortality of songbirds, including blackbirds, from avian botulism. Generally, this bacterial toxin infrequently affects songbirds (Rocke and Friend 1999). Goldberg et al. (2004) found the likelihood of blackbird carcasses causing botulism outbreaks would be minimal in the wetlands of North Dakota during the late summer and early autumn. Rocke and Friend (1999) indicated the probability of an avian botulism outbreak occurring from December through April was low. If high numbers of blackbird carcasses were added to wetlands, it would appear that little risk of avian botulism to the waterfowl present in the same wetlands would occur. This is mainly because of the low ambient temperatures and lack of sufficient flies to produce a bird-maggot amplification cycle. If the blackbird carcasses were present during late summer baiting when temperatures were high and flies abundant, the carcasses could present some additional risk. The amount of additional risk above what would already be present would be difficult to determine. There is no evidence and it is unlikely that the blackbird carcasses themselves could initiate rapid bacterial growth and amplification of bird-maggot transmission (Goldberg et al. 2004). Therefore, WS did not evaluate this issue in detail.

The bacteria *Pasteurella multocida* can cause avian cholera, which can infect most species of birds and mammals. The majority of bird species are susceptible to the clinical disease when exposed to virulent strains of this bacterium. Avian cholera commonly occurs in waterfowl and major die-offs occur almost yearly; whereas, it occurs less frequently with only occasional die-offs in coots and scavenging gulls and crows. There are only a small number of reports in shorebirds, cranes, and songbirds. Losses can occur any time of year, but predictable seasonal patterns exist in areas where avian cholera has become well established as a disease of wild waterfowl, particularly in waterfowl movement corridors west of the Mississippi River. Transmission occurs by direct bird-to-bird contact or by ingestion of contaminated food or water and possibly by aerosols. Transmission is enhanced by the gregarious nature of most waterfowl species and by dense concentrations of migratory water birds. The bacteria can persist in water for several weeks, in soil for up to 4 months and in decaying bird carcasses for at least 3 months. Acute infections in birds can result in rapid death 6 to 12 hours after exposure; therefore, early detection of outbreaks is crucial in stopping the disease.

The presence of blackbird carcasses in wetlands shared by waterfowl should present less risk to initiating and amplifying an avian cholera outbreak than the infected waterfowl carcasses themselves. There is little evidence of infection of blackbirds with *P. multocida* bacteria nor any evidence of their involvement in avian cholera outbreaks. Based on the available information and the unlikelihood of blackbird carcasses causing an outbreak, WS did not consider this issue in detail.

Blackbird Carcasses would Attract Predators, Increasing Predation on Other Wildlife

Concern was expressed that by killing blackbirds, which could subsequently die in roosts, there would be more predators drawn to the area and thus, more predation on other wildlife. The inter- and intraspecific relationships between predator species range from antagonistic to beneficial (Sargeant et al. 1993), with the species often preying on each other. Many of the predators found in wetland complexes are also omnivorous (*e.g.*, raccoon, skunks) (Greenwood 1981).

Blackbird carcasses in and around wetlands would act as supplementation to the existing food base associated with wetlands. Greenwood et al. (1998) found no increase in the presence of predators in wetlands supplemented with an alternative food source nor an increase in nest depredation of upland waterfowl by predators in wetlands where food supplementation was available. Greenwood et al. (1998) showed predator depredation on waterfowl nests was not concentrated around areas of supplemental food plots. In addition, damage management activities would likely occur prior to the onset or during the early stages of nesting; therefore, WS did not consider this issue in detail.

Value of Blackbirds to Reduce Weed Seeds and Insects

Blackbird species are generally omnivorous but their diet can vary depending on habitat and season (Dolbeer 1994). In general, the diet of blackbirds consists primarily of insects during the breeding season and transitions to grain and weed seeds during the fall and winter (Dolbeer 1994). During the scoping process, WS identified a concern relating to the use of lethal methods and the potential effects of reducing blackbird populations on the ability of the blackbird population to reduce weed seeds and insects. A concern would be that people would have to rely more on chemicals to control the potential increase in weeds and insects because the use of lethal methods reduced the blackbird population.

Considerable information exists on the agricultural damage caused by blackbirds; however, little information exists on the beneficial feeding habits of blackbirds (Dolbeer 1980, Woronecki and Dolbeer 1980). Dolbeer (1980) estimated that 8 million breeding red-winged blackbirds and their nestlings consumed 12 million pounds of insects, which was an average of 300 pounds of insects per square mile in Ohio. Despite documenting red-winged blackbirds often fed on earworms (*Heliothis zea*) in sweet corn fields found in Idaho, Mott and Stone (1973) was not able to find substantial reductions in earworm damage to corn because of the blackbird feeding. Other studies have also been unable to show a substantial reduction in insect damage to corn despite blackbirds feeding on those insect in the fields where the insect damage occurred (Woronecki and Dolbeer 1980).

Several studies have indicated that insect populations within sunflowers and cornfields can serve as an attractant to blackbirds and thus have an important influence on subsequent bird damage (Mott and Stone 1973, Stickley and Ingram 1976, Woronecki and Dolbeer 1980, Okurut-Akol et al. 1990). Fields with large numbers of weeds were also the fields with a higher percentage of blackbird damage (Kopp et al. 1980, Linz et al. 1984). The studies have shown that even though blackbirds readily feed on insects, research was unable to show any significant reduction in insect populations (Mott and Stone 1973, Woronecki and Dolbeer 1980).

In addition, damage management activities that could possibly involve the use of lethal methods to reduce damage generally occur during those periods when blackbirds roost and feed in large flocks, which occurs in the fall and winter. Those birds that form large flocks in the southern United States, including southwestern Louisiana, likely originate from breeding populations across a wide geographical area. For example, Cummings and Avery (2003) collected red-winged blackbirds in the spring from 13 states and 3 Canadian provinces that were marked at winter roosts in southern Louisiana. Therefore, the blackbirds found in the rice growing areas of southwestern Louisiana likely are from a wide geographical area and any lethal removal would not represent a large portion of the blackbird breeding population in any one specific area.

Only 50% to 60% of blackbirds survive annually (Dolbeer 1994). As discussed further in Chapter 4, lethal removal in the winter is likely a substitute for natural mortality and does not add to the mortality that occurs annually. Therefore, the use of lethal methods to alleviate damage would not likely represent a large portion of a local blackbird population and those blackbirds lethally removed would likely represent blackbirds that would have died annually despite damage management activities. Based on those considerations, WS did not consider this issue in detail.

CHAPTER 3: ALTERNATIVES

Chapter 3 contains a discussion of the alternatives developed to address the identified issues discussed in Chapter 2. Alternatives were developed for consideration based on the issues using the WS Decision model (Slate et al. 1992). The alternatives will receive detailed analysis in Chapter 4. Chapter 3 also discusses alternatives considered but not analyzed in detail, with rationale. In addition, Chapter 3 discusses the SOPs that WS would incorporate into the alternatives, when appropriate to the alternative.

3.1 DESCRIPTION OF THE ALTERNATIVES

WS developed the following alternatives to address the identified issues associated with managing damage to rice caused by blackbirds in southwestern Louisiana:

Alternative 1 – WS Would Continue to Address Blackbird Damage through an Adaptive Integrated Approach Using Lethal and Non-lethal Methods (Proposed Action/No Action Alternative)

The proposed action/no action alternative would continue the current implementation of an adaptive integrated approach utilizing non-lethal and lethal[17] techniques, as deemed appropriate using the WS Decision Model, to reduce damage and threats that blackbird cause to rice in southwestern Louisiana. WS could provide assistance with managing blackbird damage to sprouting rice in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes, wherever a property owner requests such assistance. Activities to reduce damage to newly seeded and sprouting rice under this alternative would primarily occur from February through May as farmers begin seeding rice in those parishes. Once the sprouting rice reaches approximately 2 inches tall, blackbirds no longer pull the sprout to feed on the rice seed (Cummings and Avery 2003). In addition, the number of birds roosting in rice producing areas begins to decline during February and March as migratory birds disperse northward and local blackbirds disperse to local breeding areas.

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 requests for assistance. 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 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

[17] As previously stated, the lethal take of European starlings can occur without the need for a depredation permit from the USFWS. The lethal take of red-winged blackbirds, brown-headed cowbirds, common grackles, boat-tailed grackles, great-tailed grackles, and Brewer's blackbirds can also occur without the need for a depredation permit pursuant to the blackbird depredation order.

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.
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.

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). People seeking assistance may request direct operational assistance from WS when the damage occurring could not effectively be alleviated through technical assistance alone. WS would only provide direct operational assistance after a MOU, work initiation document, or another comparable document listing all the methods the property owner or manager would allow to be used on property they own and/or manage was signed by WS and the person requesting assistance. WS could provide direct operational assistance when funding was available through federal appropriations or through cooperative funding. The initial investigation would define the nature, history, and extent of the problem, the species responsible for the damage, and methods available to alleviate the problem.

If WS provided direct assistance, WS would continue to monitor and evaluate the situation, which would allow WS to reduce the damage to an acceptable level by modifying the strategy and methods. In terms of the WS Decision Model, most efforts would consist of continuous feedback between receiving the request and monitoring the results of the strategy to alleviate or prevent damage. WS' Decision Model would be the implementing mechanism for selecting methods under the proposed action alternative that would be adapted to each request.

A key component of assistance provided by WS would be providing information to the requester about wildlife and wildlife damage. Education would be important because managing wildlife damage 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. When responding to a request for assistance, WS would provide those entities with information regarding the use of appropriate methods. WS would provide property owners or managers requesting assistance with information regarding the use of effective and practical techniques and methods. In addition to the routine dissemination of recommendations and information to individuals or organizations experiencing damage, WS provides lectures, courses, and demonstrations to producers, 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 could present technical papers at professional meetings and conferences so that other wildlife professionals and the public are up to date on recent developments in damage management technology, programs, laws and regulations, and agency policies. Providing information about blackbird damage and methods would be a primary component of technical assistance and direct operational assistance available from WS under this alternative.

The WS program in Louisiana regularly provides technical assistance to individuals, organizations, and other federal, state, and local government agencies for managing blackbird damage. Technical assistance includes collecting information about the species involved, the extent of the damage, and previous methods that the cooperator has employed to alleviate the problem. WS would then provide information on appropriate methods that the cooperator could consider to alleviate 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 rice grower groups. Between FY 2009 and FY 2014, WS conducted 1,184 technical assistance projects in Louisiana associated with the blackbird species addressed in this assessment. Technical assistance provided by WS would occur as described in Alternative 3 of this EA.

Under this alternative, the WS program 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 blackbirds and effective, practical, and reasonable methods available to a local decision-maker(s) to reduce damage or threats. WS and other state and federal wildlife management agencies may facilitate discussions at local community meetings when resources were available. Those entities requesting assistance could choose to use the services of private businesses, use volunteer services of private individuals, implement WS' recommendations on their own (*i.e*., technical assistance), request direct assistance from WS (*i.e*., direct operational assistance), or take further no action. Generally, a decision-maker seeking assistance from WS would be a private property owner or manager.

In the case of private property owners or managers, the decision-maker would be the individual that owns or manages the affected property. The private property owner would have 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 the property owner or manager.

WS would work with those persons experiencing blackbird damage to address those blackbirds responsible for causing damage as expeditiously as possible. To be most effective, damage management activities should begin as soon as blackbirds begin to cause damage or begin congregating in roost locations. Blackbird damage that has been ongoing can be difficult to alleviate using available methods since birds have likely become familiar with feeding, roosting, and loafing at a particular location. Subsequently, making that area unattractive using available methods can be difficult to achieve once damage has been ongoing. 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.

In many cases, damage to sprouting rice can be associated with large congregations of blackbirds that roost each night nearby. Blackbirds can also travel long distances from roosts to food sources. Based on observations by WS' personnel, the most severe damage occurs within a 10-mile radius of an active blackbird roost (A. Wilson, WS. pers. obs. 2014), but blackbirds may travel up to 35-miles from a roost to forage (Cummings and Avery 2003). Blackbirds often use the same roosting locations (*e.g*., dense vegetation in wetlands) and cause damage to sprouting rice in areas near the roost. Therefore, roosting locations can be predictable, in some cases. However, blackbirds often change roost locations from year to year depending on available food sources (Meanley 1965, A. Wilson, WS pers. comm. 2014). Although roosting locations can be somewhat predictable, modifying those roosting locations to the degree necessary to disperse those blackbirds or prevent them from returning to roost annually would not be practical and would likely not be socially or environmentally appropriate actions to alleviate damage to rice. For example, draining a wetland to prevent vegetation growth or removing large areas of vegetation (*e.g*., trees) that blackbirds use for roosting could force blackbirds to disperse and reduce nearby damage; however, such large-scale actions would not be appropriate actions for WS to recommend or conduct.

In general, the most effective approach to resolving any wildlife damage problem would be to use an adaptive integrated approach that may call for the use of several methods simultaneously or sequentially. People commonly refer to this approach as integrated management (see WS Directive 2.105). 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[18]. Integrated damage management may incorporate both non-lethal and lethal methods depending upon the circumstances of the specific damage problem. Non-lethal methods disperse or otherwise make an area where the damage was occurring unattractive to the species causing the damage; thereby, reducing the presence of those species in the area. Lethal methods remove individuals of the target species causing the damage; thereby, reducing the number of individuals of the target species in the area. Appendix B contains a additional discussion of the methods available for use in managing damage and threats associated with blackbirds under this alternative. Those methods listed in Appendix B would be available for use by WS under this alternative.

Non-lethal methods that would be available for use by WS would include, but would not be limited to, habitat/behavior modification, cultural practices, lure crops, visual deterrents, lasers, live traps, translocation, exclusionary devices, frightening devices, nets, and chemical repellents (if registered for use) (see Appendix B for a complete list and description of potential methods). As part of movement studies, WS could band target birds for identification purposes using appropriately sized leg bands. Lethal methods that would be available to address blackbird damage include live-capture followed by euthanasia, DRC-1339, and shooting. When euthanizing blackbirds live-captured, WS would use cervical dislocation or carbon dioxide. The AVMA (2013) considers cervical dislocation and carbon dioxide conditionally acceptable[19] forms of euthanasia for birds. Currently, WS is the only entity that could use the avicide DRC-1339; therefore, DRC-1339 would only be available for use to manage damage when WS was providing direct operational assistance.

In many cases, WS would provide technical assistance to a rice grower on methods they could legally use to alleviate damage, such as repellents (if registered), shooting, pyrotechnics, propane cannons, and changes in cultural practices; therefore, the rice grower would be responsible for the implementation of those methods. In those cases, the role of WS may be limited to the operational use of the avicide DRC-1339 since the rice grower would be responsible for implementing other methods. Most of the methods available would be more appropriate for the rice grower to implement themselves since they often live in close proximity to rice fields and can implement those methods more efficiently and consistently than a WS' employee who may be required to travel long distances to rice fields experiencing damage. Many of the methods (*e.g*., pyrotechnics, harassment by shooting) require consistent and persistent implementation to be effective, which may be difficult for a WS' employee to provide when addressing multiple damage situations and long travel times. In addition, the use of repellents on seed or sprouting rice (if registered) would be more appropriate for the rice grower to implement during planting and to monitor during sprouting.

[18]The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns.

[19]The AVMA (2013) defines acceptable with conditions as "A *method considered to reliably meet the requirements of euthanasia when specified conditions are met.*"

WS could also recommend changes to the cultural practices (*e.g.*, delaying seeding) of individual rice producers, which the producer would be responsible for implementing. Blanche et al. (2009) recommends planting rice in southwestern Louisiana between March 15 and April 20, which can coincide with a high number of blackbirds in the area. Delaying the planting of rice would likely reduce blackbird damage to newly seeded rice (Wilson et al. 1989), but would be impractical in areas where agricultural producers plant multiple crops on the same fields within the same season (Pipas et al 2003). In addition, the seeding dates of rice can substantially influence grain yield (Slaton et al. 2003, Linscombe et al. 2004, Louisiana State University Agricultural Center 2011). Although many factors can influence planting dates for rice, research suggests the highest rice yields in southwestern Louisiana occur when planting seeds in late February and early March (Louisiana State University Agricultural Center 2011). Slaton et al. (2003) found that modern varieties of rice planted near Crowley, Louisiana in Acadia Parish produced the highest yields when planted from February 16 through March 28. Blanche et al. (2009) recommended planting rice in southwest Louisiana between March 15 and April 20. In general, rice yields decrease as the date of planting is delayed (Slaton et al. 2003, Linscombe et al. 2004, Louisiana State University Agricultural Center 2011). Therefore, planting rice after the large concentrations of blackbirds have dispersed to nesting areas is not practical for rice producers in many cases. Further discussion of cultural practices that WS could recommend occurs in Appendix B.

WS' employees would give preference to non-lethal methods when practical and effective under this alternative (see WS Directive 2.101). However, WS would not necessarily employ non-lethal methods to alleviate every request for assistance if WS' personnel deemed those methods to be inappropriate using the WS Decision Model. For example, if a person requesting assistance had already used non-lethal methods or were currently implementing other non-lethal methods, WS would not likely recommend or employ those particular methods.

The WS program also researches and actively develops methods to address blackbird damage through the NWRC. The NWRC functions as the research unit of the WS program by providing scientific information and by developing methods to address damage caused by animals. Research biologists with the NWRC work closely with wildlife managers, researchers, and others to develop and evaluate methods and techniques. For example, research biologists from the NWRC were involved with developing and evaluating repellents for blackbirds. Research biologists with the NWRC have authored hundreds of scientific publications and reports based on research conducted involving wildlife and methods.

Alternative 2 - WS Would Address Blackbird Damage 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 to rice in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes, 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. WS would not use the avicide DRC-1339 under this alternative. WS could continue to recommend and/or use firearms to disperse blackbirds from areas where damage was occurring (*i.e.*, using the sound associated with the discharge of a firearm to scare blackbirds from areas).

WS would refer requests for information regarding lethal methods to the USFWS, 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. As stated previously, other entities could lethally remove red-winged blackbirds, brown-headed cowbirds, common grackles, boat-tailed grackles, great-tailed grackles, and Brewer's blackbirds without the need for a depredation permit from the USFWS when those species commit or were about to commit damage. The MBTA does not afford protection to the European starling; therefore, any entity could lethally remove starlings at any time. The methods that rice producers and other entities are likely to employ to manage damage to rice associated with blackbirds would be propane cannons supplemented with shooting (Glahn and Wilson 1992). Depending on the persistence of the user, the use of propane cannons and shooting often produce variable results and demonstrate limited effectiveness at reducing blackbird damage to rice (Wilson 1985). The only method that would not be available to all entities under this alternative would be the avicide DRC-1339, which is restricted to use by WS' personnel only. However, in the absence of WS' involvement with the use of DRC-1339, other entities could pursue registration of DRC-1339 for use in the State.

Alternative 3 – WS Would Address Blackbird Damage Using Technical Assistance Only

Under this alternative, WS would provide those persons requesting assistance with managing damage and threats associated with blackbirds with technical assistance only. An important component of technical assistance would be education. Technical assistance provides people requesting assistance with information, recommendations, and demonstrations on available and appropriate methods. Technical assistance may also include providing supplies or materials not readily available (*e.g*., loaning propane cannons). The implementation of methods to resolve damage and threats associated with blackbirds would be entirely the responsibility of the requester with no direct involvement by WS.

Technical assistance would involve collecting information about the nature and extent of the damage, the species involved with causing damage, the number of individual blackbirds involved, and previous actions taken to address the damage. Using the WS Decision Model, WS would then provide information on appropriate methods that the requester may consider to resolve damage or threats. This process may include site visits to the location where damage or threats were occurring, written information, telephone conversations, presentations, or demonstrations. Generally, WS would describe several management strategies to the requester for short and long-term solutions. WS would base those strategies on the level of risk, need, and the practicality of their application. In some instances, providing information about the species causing damage results in tolerance and/or acceptance of the situation. In other instances, WS would discuss and recommend management options to resolve damage. WS would only recommend those methods legally available for use by the appropriate individual.

Those persons receiving technical assistance could 1) take no further action, 2) choose to implement WS' recommendations on their own, 3) use the services of a private companies, individuals, or organizations, or 4) could seek assistance from other state and/or federal agencies. WS would not provide direct operational assistance under this alternative. Appendix B contains additional discussion of the methods available for use in managing damage and threats associated with blackbirds. With the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative, although not all methods would be available for direct implementation by all persons because several chemical methods would only be available to those persons with pesticide applicators licenses (if registered for use). The standard technique for managing damage to newly seeded rice has involved using propane cannons supplemented with shooting (Glahn and Wilson 1992). However, results can often be variable and limited in effectiveness depending on the persistence of the user (Wilson 1985). DRC-1339 would only be available for use by WS and therefore would be unavailable for use under this alternative. However, other entities could pursue registration of DRC-1339 for use in the State.

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 threats could take action using those methods legally available to resolve or prevent blackbird damage as permitted by federal, state, and local laws and regulations or those persons could take no action.

Alternative 4 – WS Would Not Address Blackbird Damage to Sprouting Rice

Under this alternative, WS would not conduct technical or direct operational assistance to reduce threats or to alleviate damage to sprouting rice associated with blackbirds in southwest Louisiana. WS would not provide assistance with any aspect of managing blackbird damage to sprouting rice. WS would refer all requests for assistance to the USFWS, the LDWF, the LDAF, and/or private entities. This alternative would not deny other federal, state, and/or local agencies, including private entities, from conducting damage management activities directed at alleviating damage and threats associated with blackbirds. Similar to Alternative 3, with the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative, although not all methods would be available for direct implementation by all persons because several chemical methods (if registered) would only be available to those persons with pesticide applicators licenses. DRC-1339 is only available for use by WS and therefore would be unavailable for use under this alternative. However, other entities could pursue registration of DRC-1339 for use in the State.

Similar to Alternative 3, 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 threats could take action using those methods legally available to resolve or prevent blackbird damage as permitted by federal, state, and local laws and regulations or those persons could take no action.

3.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

In addition to those alternatives analyzed in detail, WS, the USFWS, and the LDWF identified several additional alternatives that will not receive detailed analyses for the reasons provided below.

WS Would Implement Non-lethal Methods 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 associated with blackbirds. If the use of non-lethal methods failed to resolve the damage or threat, WS would then use lethal methods to resolve the damage. WS would apply non-lethal methods to every request for assistance regardless of the severity or intensity of the damage or threat until WS or the agricultural producer deemed those methods were inadequate to resolve the damage or threat.

Those people experiencing damage or threats associated with blackbirds often employ non-lethal methods prior to contacting WS for assistance. 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 were necessary before the initiation of lethal methods. Thus, WS could only evaluate the presence or absence of non-lethal methods. The proposed action (Alternative 1) would be similar to a non-lethal before lethal alternative because WS must consider the use of non-lethal methods before lethal methods (see WS Directive 2.101). In addition, under 50 CFR 21.43(a), an entity must attempt to manage damage associated with blackbirds using non-lethal methods before using lethal methods. Adding a non-lethal before lethal alternative and the associated analysis would not add additional information to the analyses in the EA.

WS Would Use Lethal Methods Only

Under this alternative, the only methods available for recommendation and use in resolving damage or threats associated with blackbirds would be the lethal methods described in Appendix B. This is in direct conflict with WS Directive 2.101, which requires WS to consider the use of non-lethal methods before lethal methods. In addition, recent changes to the blackbird depredation order require the use of non-lethal methods prior to the use of lethal methods. Therefore, WS did not consider this alternative in detail.

WS Would Only Trap and Translocate Blackbirds

Under this alternative, all requests for assistance would be addressed using live-capture methods or the recommendation of live-capture methods. Birds would be live-captured using live-traps, cannon nets, rocket nets, mist nests, or other methods describe in Appendix B. All birds live-captured through direct operational assistance by WS would be translocated. Translocation of blackbirds could only occur under the authority of the USFWS and the LDWF. Therefore, the translocation of blackbirds by WS would only occur as directed by those agencies. Translocation sites would be identified and have to be approved by the USFWS, the LDWF, and/or the property owner where the translocated birds would be placed prior to live-capture. When authorized by the USFWS and/or the LDWF, WS could translocate birds under Alternative 1 and Alternative 2 when WS provides direct operational assistance. Since WS does not have the authority to translocate blackbirds in the State unless permitted by the USFWS and the LDWF, and since translocation of blackbirds by WS could occur under Alternative 1 and Alternative 2, this alternative was not considered in detail.

Translocation of blackbirds causing damage to other areas following live-capture is generally ineffective because blackbirds are highly mobile and can easily return to damage sites from long distances, blackbirds generally already inhabit other areas, and translocation may result in blackbird damage problems at the new location. In addition, WS would need to capture and translocate hundreds or thousands of blackbirds to solve some damage problems; therefore, translocation would be unrealistic. Translocation of wildlife is also discouraged by WS policy (see WS Directive 2.501) because of stress to the relocated animal, poor survival rates, and difficulties animals have in adapting to new locations or habitats (Nielsen 1988).

WS Would Reduce Damage by Managing Bird Populations Through the Use of Reproductive Inhibitors

Under this alternative, the only method available for resolving damage or threats associated with blackbirds would be the recommendation of and the use of reproductive inhibitors to reduce or prevent reproduction in species of blackbirds responsible for causing damage or threats. Reproductive inhibitors are often considered for use where wildlife populations are overabundant and where traditional hunting or lethal control programs are restricted, infeasible, or not publicly acceptable (Muller et al. 1997, The Wildlife Society 2015*b*). The use and effectiveness of reproductive control as a wildlife population management tool is limited by characteristics of the species (*e.g.*, life expectancy, age at onset of reproduction, population size), environmental factors (*e.g.*, isolation of target population, access to target individuals), socioeconomic, and other factors. Reproductive control for wildlife could be accomplished through sterilization (permanent) or contraception (reversible) means.

Population modeling indicates that reproductive control is only more efficient than lethal control for some rodent and bird species with high reproductive and low survival rates (Dolbeer 1998). In addition, in order to be effective, a sufficiently large number of blackbirds, which are, in many cases, migratory or at the very least have the ability to fly and move long distances, must be the same individual birds that remain at the site where damage is occurring with no immigration of other birds from adjacent areas.

Currently, the only reproductive inhibitor that is registered with the EPA for application with birds is Nicarbazin. Nicarbazin is registered for use to manage local populations of Canada geese, domestic waterfowl, and rock pigeons. Chemical reproductive inhibitors (contraceptives) are not available for use to manage most bird species, including those blackbird species causing damage to rice. Given the lack of availability of chemical reproductive inhibitors for the management of most bird species, and the costs associated with live-capturing and performing sterilization procedures on blackbirds, WS did not evaluate this alternative in detail. If a reproductive inhibitor that has proven effective in reducing large populations of several blackbird species becomes available, WS would review and supplement this EA to the degree necessary to evaluate the use of the new reproductive inhibitor.

WS Would Compensate Those Rice Producer Affected by Bird Damage

This alternative would require WS to establish a system to reimburse persons impacted by blackbird damage. Under such an alternative, WS would continue to provide technical assistance to those persons seeking assistance with managing damage and threats associated with blackbirds. In addition, WS would conduct site visits to verify damage. Analysis of this alternative indicates that a compensation only alternative had many drawbacks. Compensation would: 1) require large expenditures of money and labor to investigate and validate all damage claims, and to determine and administer appropriate compensation, 2) most likely be below full market value, and 3) give little incentive to resource owners to limit damage through improved cultural or other practices and management strategies.

WS Would Implement a Program using Lure Crops Only

Lure crops are planted and then left for consumption by wildlife as an alternative food source. This approach could provide relief to more valuable crops by sacrificing less important or specifically planted fields. Establishing lure crops, however, is sometimes expensive, requires considerable time and planning to implement, and may attract other unwanted species to the area. Furthermore, there are no guarantees that lure crops would be attractive enough for blackbirds to visit and consume on a regular basis to reduce damage to producer crops.

WS Should Require that Producers Avoid Planting Rice near Blackbird Roosts

In many cases, damage to sprouting rice can be associated with large congregations of blackbirds that roost each night nearby. However, blackbirds can travel long distances from roosts to food sources. Based on observations by WS' personnel, the most severe damage occurs within a 10-mile radius of an active blackbird roost (A. Wilson, WS. pers. obs. 2014), but blackbirds may travel up to 35-miles from a roost to forage (Cummings and Avery 2003). Dolbeer (1980) found that the most economically serious blackbird damage to corn occurred within 5 miles of roosts. Blackbirds often use the same roosting locations and cause damage to sprouting rice in areas near the roost. Therefore, roosting locations can be predictable, in some cases. However, blackbirds often change roost locations from year to year depending on available food sources (Meanley 1965, A. Wilson, WS pers. comm. 2014).

Changes in cultural practices, such as not planting rice near blackbird roosts, are more appropriate for the property owner or manager to implement. WS could recommend changes in cultural practices (see Appendix B) under several of the alternatives analyzed in detail. However, WS does not have the authority to specify where agricultural producers can or cannot plant rice. Therefore, WS did not evaluate this alternative in detail.

WS Should Require Producers Plant Rice after Blackbirds Have Left to Avoid Damage

Although many factors can influence planting dates for rice, research suggests the highest rice yields in southwestern Louisiana occur when planting seeds in late February and early March (Louisiana State University Agricultural Center 2011), which can coincide with large concentrations of blackbirds in southwest Louisiana. Slaton et al. (2003) found that modern varieties of rice planted near Crowley, Louisiana in Acadia Parish produced the highest yields when planted from February 16 through March 28. Blanche et al. (2009) recommended planting rice in southwest Louisiana between March 15 and April 20. In general, rice yields decrease as the date of planting is delayed (Slaton et al. 2003, Linscombe et al. 2004, Louisiana State University Agricultural Center 2011). Therefore, planting rice after the large concentrations of blackbirds have dispersed to nesting areas is not practical for rice producers in many cases.

Changes in cultural practices, such as planting rice later in the spring, are more appropriate for the property owner or manager to implement. WS could recommend changes in cultural practices (see Appendix B) under several of the alternatives analyzed in detail, such as planting later in the spring. However, WS does not have the authority to specify when agricultural producers can or cannot plant rice. Therefore, WS did not evaluate this alternative in detail.

3.3 STANDARD OPERATING PROCEDURES FOR BLACKBIRD DAMAGE MANAGEMENT

WS' directives and SOPs improve the safety, selectivity, and efficacy of those methods available to alleviate or prevent damage. Under the appropriate alternatives and when relevant to the alternative, WS would incorporate directives and SOPs into activities when addressing blackbird damage and threats in southwestern Louisiana.

Some key SOPs pertinent to the proposed action and the alternatives include the following:

- WS' employees would use the WS' Decision Model, designed to identify the most appropriate damage management strategies and their potential impacts, to determine damage management strategies.

- All pesticides that WS recommends and/or uses would be registered with the EPA and must have agency approved labels that detail the product's ingredients, the type of pesticide, the formulation, classification, approved uses and formulations, potential hazards to humans, animals, and the environment, as well as directions for use. The intent of the registration process for pesticides is to assure minimal adverse effects to people, animals, and the environment when using chemicals in accordance with label directions. Under the FIFRA and its implementing guidelines, using any pesticide in a manner that is inconsistent with the label of the pesticide is a violation of federal law. WS would follow and use all pesticides according to their label.

- Non-target animals captured in traps or nets would be released unless it was determined that the animal would not survive and/or that the animal could not be released safely.

- WS' employees would monitor for the presence of non-target species before using DRC-1339 to reduce the risk of non-target mortality.

- WS has reviewed the threatened or endangered species within the project area and determined the proposed activities would have no effect on those species.

- All personnel who use chemicals would be trained and certified to use such substances or they would be supervised by trained or certified personnel.

- All personnel who use firearms would be trained according to WS' Directive 2.615.

- The use of non-lethal methods would be considered prior to the use of lethal methods when providing technical assistance and direct operational assistance (see WS' Directive 2.101).

- WS would direct management actions toward specific blackbirds or groups of blackbirds posing a threat to human safety, causing agricultural damage, causing damage to natural resources, or causing damage to property.

- When WS conducts activities on private lands or other lands of restricted public access, the risk of hazards to the public would be further reduced.

- WS would use non-toxic ammunition pursuant to the blackbird depredation order (see 50 CFR 21.43).

3.4 ADDITIONAL STANDARD OPERATING PROCEDURES SPECIFIC TO THE ISSUES

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

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

- Pursuant to 50 CFR 21.43, WS would report the lethal take of blackbirds (except starlings) to the USFWS annually, which would ensure the USFWS had the opportunity to monitor blackbird populations and to ensure cumulative take was considered as part of population management objectives.

- WS would monitor damage management activities to ensure activities did not adversely affect blackbird populations.

- WS would only target those individuals or groups of target blackbird species identified as causing damage or posing a threat.

- The WS' Decision Model, designed to identify the most appropriate damage management strategies and their potential impacts, would be used to determine damage management strategies.

- WS' employees would give preference to non-lethal methods when practical and effective under WS Directive 2.101.

Issue 2 - Effects of Damage Management Activities on Non-target Wildlife Populations, Including Threatened or Endangered Species

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

- WS' personnel would use bait, trap placements, and capture devices that were strategically placed at locations likely to capture target blackbirds and minimize the potential of non-target animal captures.

- Non-target animals captured in traps or nets would be released unless it was determined that the animal would not survive and/or that the animal could not be released safely.

- Carcasses of birds retrieved after damage management activities have been conducted would be disposed of in accordance with WS Directive 2.515.

- WS would retrieve all dead birds to the extent possible following the use of bait treated with DRC-1339.

- WS has reviewed the threatened or endangered species within the project area and determined the proposed activities would have no effect on those species.

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

- Damage management activities would be conducted professionally and in the safest manner possible.

- Damage management activities would be conducted away from areas of high human activity. If this were not possible, then activities would be conducted during periods when human activity was low (*e.g.*, early morning).

- Personnel involved in shooting operations would be fully trained in the proper and safe application of the method.

- All personnel employing chemical methods would be properly trained and certified 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' use of chemicals and training requirements to use those chemicals are outlined in WS Directive 2.401.

- All chemical methods used by WS or recommended by WS would be registered with the EPA and the LDAF.

- Carcasses of birds retrieved after damage management activities have been conducted would be disposed of in accordance with WS Directive 2.515.

- The WS program would notify property owners of the rotational crop (plantback) restrictions associated with the use of the staging area label of DRC-1339 and a property owner would be required to agree to adhere to those restrictions before WS would use DRC-1339 treated bait on their property.

Issue 4 – Humaneness and Animal Welfare Concerns of Methods

- Personnel would be trained in the latest and most humane devices and methods for removing problem blackbirds.

- WS' use of euthanasia methods would comply with 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.

- During the use of the WS Decision Model, WS' personnel would consider the humaneness of the methods available when formulating a management strategy.

Issue 5 – Effects of Damage Management Activities on the Aesthetic Values of Blackbirds

- Management actions would be directed toward specific blackbirds or groups of blackbirds causing damage.

- Preference would be given to non-lethal methods when practical and effective under WS Directive 2.101.

- Direct operational assistance would only be conducted by WS after a memorandum of understanding, work initiation document, or another comparable document listing all the methods the property owner or manager would allow to be used on property they own and/or manage was signed by WS and those requesting assistance.

- Pursuant to 50 CFR 21.43, WS would report the lethal take of blackbirds (except starlings) to the USFWS annually, which would ensure the USFWS had the opportunity to monitor blackbird populations and to ensure cumulative take was considered as part of population management objectives.

- WS would monitor damage management activities to ensure activities do not adversely affect blackbird populations.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in 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 those alternatives relate to the issues identified.

The following resource values are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, critical habitats (areas listed in threatened and endangered species recovery plans), visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. Those resources will not be analyzed further. 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.

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

This section analyzes the environmental consequences of each of the alternatives in comparison to determine the extent of actual or potential impacts on the issues. The proposed action/no action alternative 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, the USFWS, the LDWF, and the LDAF.

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

A common issue when addressing damage caused by wildlife is the potential impacts of management actions on the populations of target species. As discussed previously, methods available to address blackbird damage or threats of damage that would be available for use or recommendation by WS under Alternative 1 (technical and operational assistance) and Alternative 3 (technical assistance only) would be either lethal methods or non-lethal methods. Only non-lethal methods would be available for WS' employees to use if WS implemented Alternative 2. Under Alternative 3, WS could recommend lethal and non-lethal methods as part of an integrated approach to resolving requests for assistance but would provide no direct operational assistance. WS would provide no assistance under Alternative 4. All of the methods available to alleviate blackbird damage would also be available to other entities to use, except the avicide DRC-1339. Currently, DRC-1339 would only be available for WS to use under Alternative 1.

Precise population estimates are unavailable for all of the blackbird species. Therefore, the best information currently available for monitoring blackbird populations is trend data from the BBS (Sauer et al. 2014) and the CBC (National Audubon Society 2010) along with breeding population estimates from the Partners in Flight Population Estimates Database (Partners in Flight Science Committee 2013). Section 2.2 of this EA discusses the BBS, the CBC, and the Partners in Flight Population Estimates Database and the parameters associated with those surveys and estimates. Meanley and Royall (1976) estimated the wintering population of blackbirds in the United States at 538 million birds from surveys conducted during the winter period from December 1974 through February 1975, with approximately 398 million blackbirds occurring in the eastern United States. Of the 723 blackbird roosts reported during the 1974-1975 survey, 137 roosts exceeded one million blackbirds with 22 of those roosts occurring in Louisiana (Meanley and Royall 1976).

Table 4.1 – Blackbird trend data and blackbird population estimates by species

Species[1]	BBS Data[2]					CBC Data[3,4]		U.S. Breeding Population[5]	North America Breeding Population[5]
	LA	Central Region	Eastern Region	U.S.	Survey-wide	LA	U.S.		
EUST	-1.0%	-0.9%	-1.3%	-0.9%	-1.3%	~	-	45 million	57 million
RWBL	-2.2%	-0.6%	-1.6%	-1.0%	-1.0%	-	-	99 million	120 million
BRBL	n/a*	-0.8%	-5.7%	-1.9%	-2.4%	+	-	15 million	20 million
COGR	-3.3%	-1.2%	-2.1%	-1.9%	-1.8%	o	-	55 million	61 million
BTGR	-0.3%	-0.1%	-0.6%	-0.4%	-0.4%	+	+	2 million	2 million
GTGR	5.4%	1.4%	n/a	1.8%	1.8%	+	+	5 million	5 million
BHCO	-1.1%	-0.2%	-1.7%	-0.5%	-0.7%	~	~	91 million	110 million

[1]RWBL = red-winged blackbird, BHCO = brown-headed cowbird, COGR = common grackle, GTGR = great-tailed grackle, BTGR = boat-tailed grackle; BRBL= Brewer's blackbird; EUST = European starling
[2]Data from Sauer et al. (2014); reflects data from 1966 through 2013
[3]Data from National Audubon Society (2010); reflects data from 1966 through 2013
[4](-) = declining trend, (+) = increasing trend, (~) = variable trend, o = stable trend
[5]Data from Partners in Flight Science Committee (2013)
*Data is unavailable

The large-scale winter roost surveys occurring in the 1960s and 1970s for blackbirds are no longer conducted and current estimates of winter blackbird populations are not available (A. Wilson, WS pers. comm. 2014). Although precise population estimates are unavailable, the Partners in Flight Science

Committee (2013) used relative abundance data from the BBS and a detectability factor to estimate breeding populations for most bird species (see Section 2.2). Table 4.1 shows the available trend data and population estimates for target blackbird species.

Many migratory bird species traditionally follow distinct migration corridors or flyways as they move between breeding areas and wintering areas. Louisiana is part of the Mississippi Flyway, which also includes the states of Alabama, Arkansas, Indiana, Illinois, Iowa, Kentucky, Michigan, Minnesota, Mississippi, Missouri, Ohio, Tennessee, and Wisconsin, along with the Canadian provinces of Saskatchewan, Manitoba, and Ontario. Birds of the Mississippi Flyway include those migratory species that breed, winter, and migrate through those states and providences. Birds in the Mississippi Flyway generally travel along the Mississippi River valley from their northern breeding grounds to their southern wintering grounds along the Gulf Coast and further south. As stated previously, those blackbirds present in the rice-growing region of Louisiana consist of local resident blackbirds and migratory blackbirds from breeding populations further north. Banding analyses showed that most of the blackbirds associated with damage to rice in the southern United States were birds from the Mississippi Flyway, with birds travelling through the lower Mississippi Valley from various points between Canada and the Gulf Coast (Meanley 1971).

Specific population and density information for southwestern Louisiana and across the Mississippi Flyway for target blackbird species is not available and is unknown. As noted previously, winter roost surveys for blackbirds no longer occur in the southern United States, including those counties in southwestern Louisiana where blackbirds cause damage to newly seeded rice. Frequently, population information is not available for a species and people can calculate conservative estimates based upon the population parameters available. To evaluate the potential impacts to the populations of the target species and to evaluate the magnitude of the potential impacts from activities that WS could conduct under the proposed action alternative, the analyses included a winter population estimate for many of the target species calculated using available information from published literature. The analyses primarily derive the population estimates from available breeding population estimates and reproductive data for individual species, when available.

When evaluating the potential impacts of management actions on the populations of target species, of primary concern would be the cumulative effects associated with the number of individuals from a species that an entity removed and the cumulative impacts of that removal on the population of a species. Using lethal methods to alleviate damage or threats of damage could remove birds from a species' population. Therefore, if WS used lethal methods, the removal of a blackbird or blackbirds could result in local population reductions in the area where damage or threats were occurring. In addition, since blackbirds are migratory and migratory blackbirds could be present in the rice growing areas where WS could conduct activities, the effects could extend to blackbird populations outside of Louisiana. To evaluate the potential cumulative effects associated with implementing the alternatives, the magnitude associated with lethally removing blackbirds to alleviate damage occur below for each alternative.

Alternative 1 – WS Would Continue to Address Blackbird Damage through an Adaptive Integrated Approach Using Lethal and Non-lethal Methods (Proposed Action/No Action Alternative)

Under this alternative, WS could respond to requests for assistance to manage damage and threats associated with blackbirds 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 on 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. For example, netting can protect small areas of high value crops. The WS program in Louisiana has provided assistance with erecting bird proof netting around high value research crops of less than two acres in size to prevent blackbird damage. Exclusion with wire grids or netting may be impractical for large areas (*e.g*., commercial agriculture) but can be practical in small areas (*e.g*., less than 2 acres) or for high-value crops (*e.g*., research crops). 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.

Appendix B discusses the methods available for use in managing damage and threats to sprouting rice associated with blackbirds under this alternative. All of the methods listed in Appendix B would be available to WS and to other entities under this alternative, except the avicide DRC-1339. DRC-1339 would only be available for use by WS under this alternative.

Non-lethal methods can disperse or otherwise make an area unattractive to the target species causing damage, which reduces the presence of those species at the site and potentially the immediate area around the site. WS would not employ non-lethal methods over large geographical areas nor would WS apply those methods at such an intensity level 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 a species' population. Since birds would be unharmed from the use of non-lethal methods, people often regard the use of non-lethal methods as having minimal effects on overall populations.

WS could also address requests for assistance using live-capture methods and the subsequent translocation of target blackbird species. Any of the target blackbirds could be live-captured using live-traps, cannon nets, rocket nets, mist nests, or other methods and translocated. Translocation of birds could only occur under the authority of the USFWS, when required. Therefore, the translocation of blackbirds by WS would only occur as directed by the USFWS. Translocation sites would be identified and have to be approved by the USFWS, the LDWF, and/or the property owner where the translocated blackbirds would be placed prior to live-capture. When WS released blackbirds into appropriate habitat and when translocation occurred during the migration periods, WS does not anticipate translocation to affect target blackbird populations adversely or to affect individual blackbirds adversely.

As part of translocating birds and for other purposes (*e.g*., movement studies), WS could band target birds for identification using appropriately sized leg bands. Banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low*". Therefore, WS does not expect the use of appropriately sized leg bands to affect populations or individual blackbirds adversely.

Lethal methods would also be available to remove a blackbird or those blackbirds responsible for causing damage or posing a threat of damage. Lethal methods remove individuals of target species causing the damage, which reduces the presence of those species in the area and reduces the local population. The number of individuals from a target species that WS could lethally remove would be dependent upon the magnitude of the damage occurring, the level of damage acceptable to individual persons experiencing the damage, the numbers of individual blackbirds involved, and the efficacy of methods that a WS employee uses.

Although large flocks can consist of a single species, blackbirds will often form large mixed species congregations, which can include other non-blackbird species, primarily the European starling (Meanley 1965, Dolbeer 1994). In southwest Louisiana, winter flocks of blackbirds can be composed of migrants from Canada and the northern United States along with birds that are present in the State throughout the year. The tendency of blackbirds and starlings to form large communal roosts in agricultural producing areas of the State and to travel and feed in large social flocks often results in locally serious damage to crops where monetary losses to individual agricultural producers can be substantial (Wilson 1985, Wilson et al. 1989, Glahn and Wilson 1992). Therefore, when employing methods under this alternative, WS would often target groups of blackbirds that could consist of several species; therefore, activities associated with the lethal removal of blackbirds could result in the removal of multiple species.

The avicide DRC-1339 would be available to manage damage to newly seeded rice under this alternative. The compound DRC-1339 was originally selected for managing bird damage because it is very highly toxic (LD_{50}<10 mg/kg) to certain bird species, such as starlings, gulls, blackbirds, and crows. The use of DRC-1339 treated rice baits in blackbird staging areas has shown the potential for reducing blackbird and starling populations associated with winter roosts in areas where damage occurs (West 1968, Knittle et al. 1980). Glahn and Wilson (1992) demonstrated that baiting using DRC-1339 treated rice is a cost-effective way of reducing rice damage caused by blackbirds in Louisiana. Using DRC-1339 treated rice at bait sites near blackbird roosts is more effective and requires less effort and time than baiting several widely scattered areas (Knittle et al. 1980). Glahn and Wilson (1992) estimated the use of DRC-1339 resulted in the annual reduction of 83% in losses to newly seeded rice and an annual cost saving of $4,257 per farm when compared to years when no baiting with the avicide DRC-1339 occurred. Glahn and Wilson (1992) estimated an overall savings of $2.8 million to rice producers might occur from the use of DRC-1339 in southwestern Louisiana. The efficacy of DRC-1339 does not result from mortality of all the birds in a blackbird roost but rather a portion of the local roosting population die, which the remaining blackbirds associated with the roost location causing the remaining birds in the roost to disperse.

The use of DRC-1339 treated brown rice in Louisiana would generally be restricted to a period between December and April, with most baiting occurring from February 15 through March 15. The use of DRC-1339 treated brown rice would be limited to blackbird staging areas that include stubble fields, bare-ground non-crop areas (*e.g*., levee roads) and open grass sites (Cummings et al. 2002*a*). However, estimating avian mortality caused by DRC-1339 can be difficult. The compound DRC-1339 is a slow acting avicide that causes death 24 to 72 hours following ingestion; therefore, blackbirds ingesting a lethal dose of DRC-1339 are not likely to die at the bait site or areas adjacent to the bait sites. Estimating mortality based on the number of carcasses located is not practical given the mode of action of DRC-1339.

Pre- and post-baiting blackbird roost counts have been used to estimate blackbird mortality during the use of DRC-1339 treated rice bait, but this method can be inaccurate because it does not account for blackbird migration (*i.e*., turnover in roosts) during the baiting period. Consequently, the NWRC has developed mathematical models for the estimation of blackbird mortality from DRC-1339 baiting, which are continually being refined to improve accuracy. For example, Johnston et al. (2006) developed a probabilistic model for estimating field mortality of blackbirds baited with DRC-1339. Later, research biologists with the NWRC developed a linear model for estimating blackbird take from DRC-1339 (J. Cummings, NWRC unpublished data). More recently, research scientists with the NWRC have developed a semi-mechanistic model using bioenergetics inputs for estimating blackbird mortality from DRC-1339 baiting (Homan et al. 2013). The model Homan et al. (2013) developed also includes inputs for meteorological and environmental conditions, such as ambient temperature, cloud cover, and wind, which influence bird feeding rates and DRC-1339 mortality (Homan et al. 2005, Homan et al. 2011, Homan et al. 2013). Bioenergetics models do not require a numerical estimate of size of the targeted population, which avoids the bias, high variance, and chance events that decrease precision and accuracy of counting blackbirds at roosts or at bait sites (Faanes and Bystrak 1981).

Previously, the WS program in Louisiana estimated blackbird mortality from baiting with DRC-1339 using the linear model that research biologists with the NWRC developed (J. Cummings, NWRC unpublished data). However, WS would now use the newer (and potentially more accurate) semi-mechanistic model that Homan et al. (2013) developed to estimate blackbird mortality if the WS program used DRC-1339 treated bait to alleviate damage to newly seeded rice. The model developed by Homan et al. (2013) factors in the temperature and other weather parameters at the time of baiting and their effects on blackbird feeding behavior. In general, the semi-mechanistic model (Homan et al. 2013) using bioenergetics inputs appears to produce a blackbird mortality rate that is approximately 29% lower than the linear model (J. Cummings, NWRC unpublished data) when using the same inputs into the model (Homan et al. 2013). For additional information on the bioenergetics model that WS would use to estimate blackbird mortality, see Homan et al. (2005), Homan et al. (2011), and Homan et al. (2013).

The removal of blackbirds near roost sites in southwestern Louisiana could result in the lethal removal of blackbirds that breed in other states and Canadian provinces. As discussed previously, those migratory blackbirds that occur in the rice growing areas of southwestern Louisiana would primarily be blackbirds from the Mississippi Flyway and those states that are a part of the Flyway. Therefore, the evaluations will include discussions on population impacts that could occur within the Mississippi Flyway.

The analysis of potential impacts on each of the species populations includes the anticipated annual lethal removal by WS, which WS based on previous requests for assistance and in anticipation of additional efforts to manage damage or threats of damage in the future. To evaluate the potential cumulative effects of lethally removing blackbirds to alleviate damage, the analyses will evaluate magnitude by comparing the number of each species of blackbirds that WS could remove to alleviate damage with that species' overall populations, annual mortality of the species, and/or population trend(s). The following subsections analyze the potential population impacts for each blackbird species that could occur from the implementation of the proposed action.

EUROPEAN STARLING POPULATION IMPACT ANALYSIS

As their name suggests, European starlings are native to parts of Europe and Asia (Cabe 1993). Their colonization of North America began in 1890 and 1891 with the release of approximately 100 starlings in New York City (Cabe 1993). By 1918, the distribution range of migrant juveniles extended from Ohio to Alabama and by 1926, the distribution of starlings in the United States had moved westward and encompassed an area from Illinois to Texas. By 1941, starlings had expanded further westward from Idaho to New Mexico. By 1946, the range of starlings had expanded to California and western Canadian coasts (Miller 1975). In just 50 years, the starling had colonized the United States and expanded into Canada and Mexico and 80 years after the initial introduction had become one of the most common birds in North America (Feare 1984).

European starlings are highly adaptable and they occur in a wide range of habitats; however, they are most often associated with disturbed areas created by people (Cabe 1993). European starlings prefer to forage in open country on mown or grazed fields (Cabe 1993). Their diet consists of insects, fruits, berries, seeds, and spilled grain (Cabe 1993). European starlings are highly social birds that feed, roost, and migrate in flocks at all times of the year (Cabe 1993). European starlings are aggressive cavity nesters that can evict native cavity nesting species (Cabe 1993). In the absence of natural cavities, European starlings will nest in manmade structures, such as streetlights, mailboxes, and attics (Cabe 1993). Although few conclusive studies are available, evidence suggests European starlings can have a detrimental effect on native species, primarily by competing with cavity nesters, such as bluebirds and woodpeckers, for nesting locations (Cabe 1993).

In Louisiana, starlings occur statewide throughout the year and flocks consisting of several thousand starlings can occur during the winter when birds that breed further north augment local populations. In areas of Louisiana surveyed during the BBS, the number of starlings observed has shown a declining trend since 1966 estimated at -1.0% annually, with a -0.2% annual decline occurring from 2003 through 2013 (Sauer et al. 2014). In the United States, the number of starlings observed in surveyed areas has also shown a declining trend estimated at -0.9% annually since 1966, with a -0.9% annual decline occurring from 2003 through 2013 (Sauer et al. 2014). The Partners in Flight Science Committee (2013) estimated the breeding population of European starlings in the State at 400,000 starlings, with the breeding population estimated at 57 million starlings in the United States and Canada. In areas surveyed in Louisiana during the CBC, the number of starlings observed has shown a variable trend since 1966 (National Audubon Society 2010).

The ratio of migratory to non-migratory starlings present in blackbird flocks that occur in the rice growing areas of southwestern Louisiana likely fluctuates from year to year and likely changes regularly throughout the winter roosting period. Kessel (1953) found that over 67% of the leg bands recovered from starlings in Louisiana, Arkansas, Kansas, Missouri, and western Tennessee were from starlings that people had banded in other states. Band recoveries for starlings banded during the winter at Avery Island, Louisiana showed a north to northeasterly migration pattern with recoveries occurring in Tennessee, Illinois, Ohio, Michigan, and Wisconsin (Kessel 1953). Natal philopatry does not appear strong in starlings (Kessel 1953, Kessel 1957, Cabe 1993); however, adult starlings do show a high fidelity for breeding sites but not for wintering areas (Cabe 1993).

Using data from the Partners in Flight Science Committee (2013), the estimated breeding population of starlings in each of the states and Canadian provinces in the Mississippi Flyway is nearly 23.9 million starlings. The populations of bird species likely peak in late summer and early fall after the breeding season when hatch year birds (*i.e*. birds born that breeding season) join with adults before the fall migration.

If there were one female for every male in the Flyway population of 23.9 million starlings, every female laid eggs, and the entire breeding population only built one nest per year, then starlings build approximately 12 million nests in the Flyway. The mean clutch size (*i.e*., the number of eggs a bird lays in a nest) of starlings in the Midwestern United States has been estimated at 4.28 eggs (Cabe 1993). With a clutch size of 4.28 eggs per nest and 12 million starling nests, starlings lay approximately 51.4 million eggs in the Flyway. The fledging success (*i.e*., proportion of total eggs laid that produce young that leave the nest) of starlings ranges from 52.3% to 78.6% of the total eggs laid (Cabe 1993). Based on those parameters, approximately 26.9 million to 40.4 million fledglings could successfully leave starling nests each year in the Flyway. The proportion of starling nests fledging at least one young (*i.e*., nesting success) ranges from 47.8% to 78.6% of nests (Cabe 1993). Therefore, approximately 5.7 million to 9.4 million starling nests would produce at least one young each year. The current fall population of starlings in the Mississippi Flyway is currently unknown; however, a fall population in the Flyway could range from 29.6 million to 64.3 million starlings using reproductive parameters that Cabe (1993) summarizes for breeding starlings and all starling nests producing only one fledgling. Therefore, the starling population is likely highest right after fledging occurs.

Conversely, bird populations are likely at their lowest in the winter and early spring, as the spring migration begins, and birds arrive back at their breeding areas. For starlings, the highest mortality rates occur in the fall and winter (Cabe 1993). Approximately 50% of the adult starling population dies each year (Kessel 1957); however, the annual mortality of adult starlings can range from 33% to 77% (Flux and Flux 1981). The annual mortality rate for juvenile starlings ranges from 55% to 65% each year (Kessel 1957, Cabe 1993). Mortality can occur from many sources, including predation, disease, parasites, weather, availability of food sources, and activities to alleviate the damage that starlings cause.

Although predation likely has a negligible effect on the starling population, several avian and mammalian predators can feed on starlings, including raptors, weasels, rats, dogs, and cats. Occasionally, squirrels access nests and destroy entire clutches (Collins and De Vos 1966, Flux and Flux 1981, Feare 1984, Cabe 1993). The risk of predation appears to be higher for juvenile starlings (Cabe 1993). Diseases also appear to have a negligible effect on population regulation in starlings (Cabe 1993). Boyd (1951) found that 99% of starlings have internal parasites (*e.g.*, flatworms, round worms) and 95% carry ectoparasites (*e.g.*, lice, mites, ticks), which can affect mortality rates. Cold, wet weather and high temperatures in the nest cavity can contribute to the mortality of nestlings (Cabe 1993), and those same weather factors can affect the availability of food sources, such as invertebrates (Dunnet 1956, Gromadzki 1980, Tinbergen 1981, Cabe 1993). In some cases, the availability of nesting sites may limit local populations (Cabe 1993). In addition, people kill a high number of starlings each year to alleviate damage to agricultural resources, property, and to reduce risks to human health and safety.

European starlings are not a common species amongst flocks of blackbirds that feed in and around areas of rice production (A. Wilson, WS pers. comm. 2014). The average annual species composition of blackbirds recorded during the CBC conducted annually in Evangeline Parish from 1975 through 2013 consisted of 3.8% European starlings (National Audubon Society 2010). In major roosts surveyed from 1960 to 1965 in Louisiana, starlings comprised 8% of the relative abundance of species in those roosts (Meanley 1971). At one blackbird roost in Evangeline Parish, starlings were no longer present in the roost by late February (Brugger et al. 1992), which coincides with the general period recommended for rice planting (Slaton et al. 2003, Linscombe et al. 2004, Louisiana State University Agricultural Center 2011). Therefore, it is likely that most starlings are no longer present in major roosts near rice producing areas when rice seeds are most vulnerable. However, starlings do feed on rice during the winter (Meanly 1971) and could feed on newly planted rice if present in foraging flocks of blackbirds.

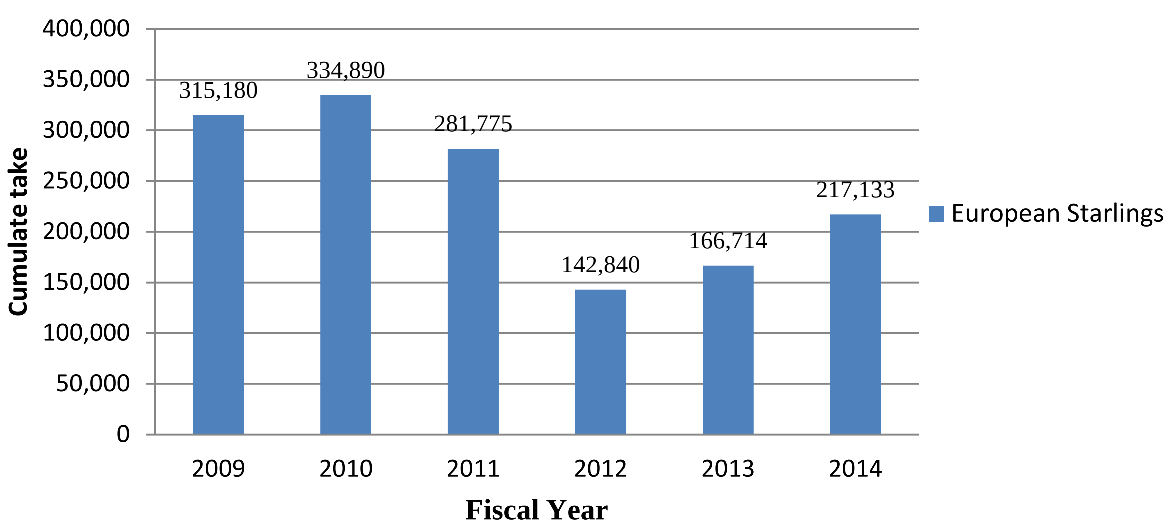
Based on the species composition of sites that the WS program in Louisiana has observed previously during damage management activities targeting blackbirds, no lethal take of starlings by WS has occurred between FY 2009 and FY 2015 to alleviate blackbird damage to sprouting rice. As described in Section 1.4, the WS program in Louisiana also receives requests for assistance associated with damage that starlings cause to other agricultural resources, property, and threats to human safety. As part of those other requests for assistance, WS lethally removed 322 starlings using firearms in the State from FY 2009 through FY 2014 to alleviate damage, with the highest annual take occurring in FY 2013 when WS removed 146 starlings. In addition, WS dispersed 4,020 starlings as part of those damage management activities.

WS anticipates that during activities to prevent flocks of blackbirds from foraging on newly seeded or sprouting rice and during other damage management activities targeting starlings that the WS program in Louisiana could cumulatively kill up to 50,000 European starlings annually under the proposed action alternative. Starlings are a gregarious species that often roost and forage in large flocks, especially during the winter; therefore, the potential exists for WS to address a large number of starlings associated with a request for assistance. The annual take of up to 50,000 starlings by WS would represent 12.5% of a statewide breeding population estimated at 400,000 starlings, if all the starlings that WS lethally removed were from the breeding population in the State. The migratory behavior of starlings varies regionally, individually, and in some cases, by year (Kessel 1953, Dolbeer 1982, Cabe 1993). Johnson and Glahn (1994) stated, "*Although starlings are not always migratory, some will migrate up to several hundred* *miles, while others may remain in the same general area throughout the year. Hatching-year starlings are more likely to migrate than adults, and they tend to migrate farther*." Kessel (1953) found that some individual starlings migrate in some years but did not migrate in other years. Dolbeer (1982) found starlings showed more migratory tendencies in the Midwest and Great Lakes regions of the United States than the North Atlantic region with breeding starling populations occurring south of 40° latitude rarely migrating. Therefore, those starlings that could be present in blackbird flocks associated with rice depredation could be local starlings that breed within Louisiana or they could be starlings that have migrated to the region from other areas. Nothing visual would distinguish starlings that were from the local breeding population and those starlings that migrate into the rice growing area from other areas.

Figure 4.1 shows the cumulative number of starlings that the WS program has lethally removed in the Mississippi Flyway from FY 2009 through FY 2014. The highest annual take by the WS program in the Flyway occurred during FY 2010 when WS' employees lethally removed 334,890 starlings. On average, the WS program in the Flyway has lethally removed 243,089 starlings per year from FY 2009 through FY 2014. The number of starlings lethally removed by other entities in the Mississippi Flyway is unknown. European starlings are not a species afforded protection from take under the MBTA. Activities that result in the take of starlings do not require a depredation permit from the USFWS and there are no reporting requirements for the take of starlings. Therefore, the number of starlings that other entities lethally remove to alleviate damage is unknown.

With a fall population that ranges from 29.6 million to 64.3 million starlings and a 33% to 77% mortality rate for starlings, approximately 9.8 million to 49.5 million starlings would die each year. In the Flyway, the WS program has lethally removed an average of 243,089 starlings per year from FY 2009 through FY 2014, which represents 0.5% to 2.5% of the annual mortality of starlings. The highest annual cumulative take by WS in the Flyway occurred during FY 2010 when WS removed 334,890 starlings, which would represent 0.7% to 3.4% of the annual mortality of starlings.

Figure 4.1 - WS' annual cumulative take of European Starlings in the Mississippi Flyway, FY 2009 - FY 2014



Johnson and Glahn (1994) raised the question of whether removing starlings to alleviate the damage they cause was a substitute for natural mortality (*i.e.*, compensatory) or additive. From 1974 through 1992, Dolbeer et al. (1997) estimated that applications of a wetting agent killed 11.4 million starlings during the winter in the eastern United States, which equates to approximately 600,000 starlings removed per year. Despite that level of annual lethal removal over the 19-year period, Dolbeer et al. (1997) found no correlations between the numbers of starlings killed each winter and subsequent changes in the breeding population of starlings. Therefore, the findings by Dolbeer et al. (1997) indicate that lethal removal in the winter is likely a substitute for natural mortality and does not add to the mortality that occurs annually. In addition, other density dependent factors[20] may regulate starling populations (Risser 1975, Nephew and Romero 2003), which also provides an indication that limited lethal removal is not likely additive to natural mortality but is a substitute for mortality that would have occurred otherwise.

As discussed previously, starlings are not native to Louisiana and the United States. Pursuant to Executive Order 13112, the National Invasive Species Council has designated the European starling as meeting the definition of an invasive species. Lowe et al. (2000) ranked the European starling as one of the 100 worst invasive species in the world. The MBTA does not afford starlings protection from take and a depredation permit is not required to take starlings. No state laws in Louisiana afford protection to starlings. Activities associated with starlings would occur pursuant to Executive Order 13112, which states that each federal agency whose actions may affect the status of invasive species shall reduce invasions of exotic species and the associated damages.

RED-WINGED BLACKBIRD POPULATION IMPACT ANALYSIS

The red-winged blackbird is one of the most abundant bird species in North America, easily recognized by its distinctive red and yellow shoulder patches (Yasukawa and Searcy 1995). The breeding habitat of red-winged blackbirds includes marshes and upland habitats from southern Alaska and Canada southward to Costa Rica extending from the Pacific to the Atlantic Coast along with the Caribbean Islands (Yasukawa and Searcy 1995). Red-winged blackbirds nest in emergent vegetation of wetlands and upland habitats, including roadside ditches, saltwater marshes, rice paddies, hay fields, pastureland, fallow fields, suburban habitats, and urban parks (Yasukawa and Searcy 1995).

The red-winged blackbird is one of the most abundant breeding birds in the rice growing area of southwestern Louisiana (Kalmbach 1937). During the breeding season, the number of red-winged blackbirds observed along routes surveyed in the State during the BBS have shown a decreasing trend estimated at -2.2% annually since 1966, with a similar -2.4% annual decline occurring between 2003 and 2013 (Sauer et al. 2014). Across all BBS routes surveyed in North America, the number of red-winged blackbirds observed have declined at an estimated rate of -1.0% per year since 1966, with a -0.7% annual decline occurring from 2003 through 2013 (Sauer et al. 2014). Using data from the BBS, the Partners in Flight Science Committee (2013) estimated the statewide breeding population of red-winged blackbirds to be 2.2 million birds. The Partners in Flight Science Committee (2013) estimated the breeding population of red-winged blackbirds at 120 million birds in North America, with an estimated 99 million red-winged blackbirds occurring in the United States. In those states comprising the Mississippi Flyway, the Partners in Flight Science Committee (2013) estimated the breeding population to be 50.1 million red-winged blackbirds.

Northern breeding populations of red-winged blackbirds migrate southward during the migration periods but red-winged blackbirds are common throughout the year in states along the Gulf Coast and parts of the western United States, including Louisiana (Yasukawa and Searcy 1995). The fall migration period for red-winged blackbirds generally occurs from early October through mid-December, with the peak occurring from mid-October through early December (Yasukawa and Searcy 1995). Migratory red-winged blackbirds are present in their wintering areas until departing on their spring migration from mid-February through mid-May with the peak occurring from late February through late April (Yasukawa and Searcy 1995). Therefore, the number of blackbirds, including red-winged blackbirds, increases

[20] Generally, a density dependent factor affects the size or growth of a population that varies with the density of the population. For example, reducing a starling population may increase the survival and reproductive output of the remaining starlings by reducing competition for food and nesting locations. The increased survival and reproductive output of the remaining starlings compensates for the reduction in the population.

substantially in the State as northern breeding populations migrate southward during the fall to winter in the southern United States, which augments local breeding populations (Meanley et al. 1966). Like other blackbirds, nothing visual would distinguish red-winged blackbirds that were from the local breeding population and those red-winged blackbirds that migrate into the rice growing area from other areas.

Of the 7.2 million red-winged blackbirds marked using Day-Glo pigment in January and February 1995 at four roosts in southern Louisiana, Cummings and Avery (2003) reported marked blackbirds were later collected from 13 states and three Canadian provinces. The highest recovery rates of marked blackbirds occurred from Iowa, with some blackbirds collected as far north as central Manitoba (Cummings and Avery 2003). However, some evidence suggests that blackbirds feeding in rice fields during the spring are primarily local resident birds, especially red-winged blackbirds that breed locally (Wilson 1985, Brugger and Dolbeer 1990).

From 1960 to 1965, major roosts in the rice growing areas of Louisiana consisted of 48% red-winged blackbirds (Meanley 1971). Between 1975 and 2013, the average annual composition of blackbirds observed in the Pine Prairie count survey area occurring in Evangeline Parish, Louisiana during the CBC consisted of 53.4% red-winged blackbirds (National Audubon Society 2010). Between 2004 and 2013, surveyors counted an average of nearly 3.2 million red-winged blackbirds per year in those areas of the State surveyed during the CBC (National Audubon Society 2010). The number of red-winged blackbirds surveyors observed in the State during the CBC conducted between 2004 and 2013 has ranged from a low of nearly 1.4 million blackbirds, which occurred in 2012, to a high of over 5.8 million blackbirds, which occurred in 2013 (National Audubon Society 2010)[21]. Overall, the number of red-winged blackbirds observed in areas surveyed in the State during the CBC has shown a general decreasing trend since 1966 (National Audubon Society 2010).

A precise count of the red-winged blackbird population in Louisiana during the wintering and breeding seasons or across the United States is not currently available. Large-scale winter roost surveys for blackbirds are no longer conducted (A. Wilson, WS pers. comm. 2014). Flocks of blackbirds found in the rice-growing region of southwestern Louisiana from December through April likely consist of locally breeding blackbirds and blackbirds that have migrated to the area from northern breeding areas. As discussed previously, Cummings and Avery (2003) collected red-winged blackbirds during the spring in 13 states and 3 Canadian provinces that were marked at winter roosts in Louisiana, with the majority of red-winged blackbirds collected in Iowa. In addition, Meanley (1971) estimated that 84% of the blackbirds present in the rice growing states were from breeding populations further north. Therefore, birds killed by WS in southwestern Louisiana could originate from breeding population outside of the State. Thus, removing red-winged blackbirds at a single roost or cluster of roosts during the winter probably would spread the effects amongst populations of red-winged blackbirds that are indigenous to a wide area (Dolbeer 1978). Based on banding data and marking studies, the majority of red-winged blackbirds present in the rice growing areas of southwestern Louisiana originate from breeding populations in the Mississippi Flyway. The Partners in Flight Science Committee (2013) estimated the breeding population in the Flyway at 50.1 million red-winged blackbirds.

Peer et al. (2003) calculated the fall blackbird population in the northern Great Plains of North America by multiplying the breeding population in the region by 1.45 based on work Stehn (1989) conducted. Using this technique, the fall population in the Flyway could be 72.7 million red-winged blackbirds based on a breeding population estimated at 50.1 million blackbirds. Yasukawa and Searcy (1995) reported the number of fledglings per nesting attempt for red-winged blackbirds ranged from 0.55 to 1.96 fledglings,

[21]Data from the CBC provides a minimum population estimate given the survey parameters of the CBC and the survey only covering a small portion of the State. CBC data provides an indication of long-term trends in the number of birds observed wintering in the State and is not intended to represent population estimates of wintering bird populations.

which is an average of 1.3 fledglings per nesting attempt. Dolbeer (1976) also found a 1.3 fledgling average per nesting attempt during a study conducted in upland habitat. If an even sex ratio existed in the blackbird population and every female attempted to nest, approximately 13.8 million to 49.2 million blackbirds fledge each year per nesting attempt based on a breeding population estimated at 50.1 million red-winged blackbirds in the Flyway, with the average being 32.6 million fledglings. Therefore, a fall population of red-winged blackbirds could range from 63.9 million to 99.3 million blackbirds in the Flyway, with an average of 82.7 million blackbirds.

Yasukawa and Searcy (1995) summarize the annual and lifetime reproductive success of red-winged blackbirds. Using those reproductive parameters that Yasukawa and Searcy (1995) summarize, additional estimations of the fall population are possible with some assumptions[22]. If the sex ratio of red-winged blackbirds in the Flyway was one female for every male[23], every female laid eggs[24], and females only produced one successful nest per year[25], then red-winged blackbirds attempt to build approximately 25.1 million nests in the Flyway during the breeding season. The clutch size of red-winged blackbirds ranges from 2.43 to 3.70 eggs, with a mean of 3.28 eggs (Yasukawa and Searcy 1995). With a mean clutch size of 3.28 eggs per nest and 25.1 million nests, female red-winged blackbirds lay approximately 82.2 million eggs in the Flyway, with a range of 61.0 million to 92.9 million eggs each year. However, only 40.1% to 88.0% of the eggs laid each year hatch successfully (Yasukawa and Searcy 1995)[26]. Therefore, 24.5 million to 81.8 million eggs successfully hatch each year in the Flyway. The fledging success of red-winged blackbirds ranges from 40.0% to 88.0% (Yasukawa and Searcy 1995). Based on those parameters, approximately 9.8 million to 72.0 million fledglings successfully leave nests each year.

If the entire breeding population of 50.1 million red-winged blackbirds survived until all the fledglings were recruited into the population and all the fledglings were recruited at the same time, a peak post-breeding fall population in the Flyway could range from 59.9 million to 122.1 million red-winged blackbirds each year using reproductive parameters that Yasukawa and Searcy (1995) summarizes. The populations derived using other methods of estimating fall populations (*e.g*., see Dolbeer et al. 1976, Peer et al. 2003) would fall within the population range of 59.9 million to 122.1 million red-winged blackbirds. However, the current fall population of red-winged blackbirds in the Mississippi Flyway is currently unknown and likely varies between years.

Like other bird species, the population of red-winged blackbirds is likely highest following the recruitment of hatch year birds into the population in late summer and early fall (Dolbeer et al. 1976). Conversely, bird populations are likely at their lowest in the winter and early spring as birds begin arriving at their breeding areas (Dolbeer et al. 1976). The annual survival rate of red-winged blackbirds likely ranges from 50% to 60% of the population (Fankhauser 1967, Fankhauser 1971, Dolbeer 1994). Yasukawa and Searcy (1995) reported the annual survival rate of adult red-winged blackbirds ranged from 42.1% to 62.0%, with a mean life expectancy of 2.14 years. Mortality can occur from many sources, including predation, disease, parasites, weather, availability of food sources, and activities to

[22]One assumption would be the actual breeding population in the Mississippi Flyway is 50.1 million blackbirds (Partners in Flight Science Committee 2013) with no mortality occurring during the breeding season (*i.e*., the breeding population remains constant throughout the breeding season). Adult mortality rates during the breeding season are unknown but likely occur from predation, weather, accidents, competition, illegal take, and other from other factors. Dolbeer et al. (1976) suggests adult survival in red-winged blackbirds is highest in late summer-early fall and does not vary between the sexes.

[23]The exact sex ratio of red-winged blackbirds is unknown and likely varies yearly; however, in general, a one female to one male sex ratio has been suggested (Holcomb and Twiest 1970, Holcomb 1974, Fiala 1981).

[24]Female red-winged blackbirds appear to begin breeding their first year (Holcomb 1974).

[25]Although re-nesting is common after a nest failure early in the breeding season, female red-winged blackbirds do not successfully produce a second brood (Yasukawa and Searcy 1995). During a 16-year study in Washington, only 3.8% of breeding females successfully produced two broods in a season (Yasukawa and Searcy 1995).

[26]Searcy and Yasukawa (1995) attributed variations in nesting success on many factors, such as weather, habitat type, food supply, characteristics of nest site, types/densities of predators, competition, and age/experience of the parents.

alleviate damage. Damage management activities are now one of the major sources of adult mortality in red-winged blackbirds (Yasukawa and Searcy 1995). However, a reproductive rate of two to four fledglings per female red-winged blackbird per year can offset their high mortality rate (Dolbeer 1994).

In addition, red-winged blackbirds are strongly polygynous (*i.e*., males mate with several females). Therefore, from one to 15 females may occupy a male's territory during the breeding season with some means reaching 5.0 females per male (Yasukawa and Searcy 1995). The polygynous mating system of red-winged blackbirds results in a large group of males that are capable of breeding but that do not have territories during the breeding season and are often referred to as "*floaters*" (Yasukawa and Searcy 1995, Sawin et al. 2003). This group consists mainly of after-second year males that were unable to secure a territory and second year males that are often smaller and have duller plumage than after-second year males (Yasukawa and Searcy 1995). This floater group travels around during the breeding season looking for vacant territories. This group of males can be difficult to locate during the breeding season, which can make traditional survey methods that rely on sight or sound (*e.g*., the BBS) incomplete (Sawin et al. 2003).

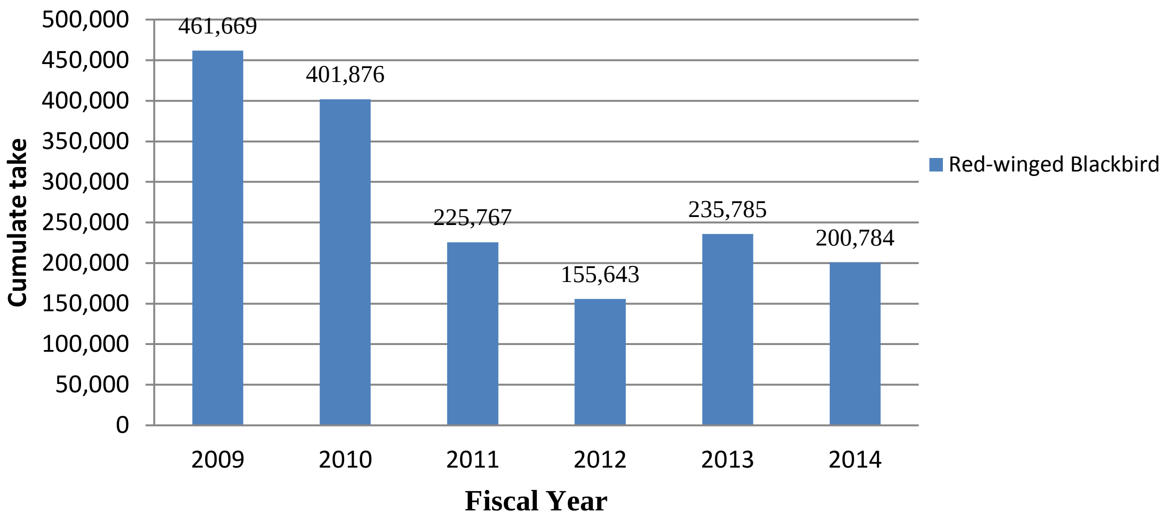
Although flocks comprised of several species of blackbirds and starlings can cause damage to seeded and sprouting rice, red-winged blackbirds appear to be responsible for most of the damage (Meanley 1971, Cummings et al. 2005). As mentioned previously, red-winged blackbirds often dominate the species composition of many blackbird flocks and roosts in the rice-growing region of Louisiana. Therefore, WS has addressed a high number of red-winged blackbirds during prior activities conducted to alleviate blackbird damage to sprouting rice.

Between FY 2009 and FY 2015, the WS program has lethally removed approximately 2.2 million red-winged blackbirds using the avicide DRC-1339 to alleviate damage to sprouting rice in Louisiana with an average annual lethal take of 313,200 red-winged blackbirds. In addition, the WS program in Louisiana has lethally removed 10 red-winged blackbirds using firearms between FY 2009 and FY 2014 to alleviate damage or threats of damage. Data from WS' removal of blackbirds to alleviate rice damage for FY 2015 is preliminary and subject to change. In addition, FY 2015 data only includes take using DRC-1339 and does not include blackbirds that WS' personnel could lethally remove using other methods or during activities to manage damage or threats of damage to resources other than sprouting rice. Figure 4.2 shows the cumulative take of red-winged blackbirds by WS in Louisiana during all activities to alleviate damage or threats of damage from FY 2009 through FY 2014.

During FY 2015, preliminary information indicates the WS program in Louisiana killed approximately 510,987 red-winged blackbirds using the avicide DRC-1339, which would represent the highest annual take of red-winged blackbirds by WS from FY 2009 through FY 2015. WS used those take models described previously to calculate the annual lethal removal of red-winged blackbirds from the use of DRC-1339. The models estimate annual take using site-specific parameters for each baiting location. Based on those activities conducted previously by WS and in anticipation of additional efforts to alleviate damage to sprouting rice, WS could lethally remove up to 1 million red-winged blackbirds annually in the rice-growing region of Louisiana to alleviate damage.

The lethal removal of up to 1 million red-winged blackbirds annually by WS in southwestern Louisiana to alleviate damage would represent 0.8% to 1.7% of a fall Flyway population estimated to range from 59.9 million to 122.1 million red-winged blackbirds. The WS program also conducts damage management activities involving red-winged blackbirds in other states throughout the Mississippi Flyway. Figure 4.3 shows the cumulative take of red-winged blackbirds between FY 2009 and FY 2014 by the WS program in those states that comprise the Flyway. Cumulatively, the entire WS program has lethally removed approximately 1.7 million red-winged blackbirds in the Mississippi Flyway between FY 2009 and FY 2014 with an average annual removal of nearly 282,000 red-winged blackbirds. The annual lethal removal of 282,000 red-winged blackbirds by the entire WS program in the Flyway represents 0.6% of a breeding population estimated at 50.1 million blackbirds in the Flyway and 0.2% to 0.5% of a fall Flyway population estimated to range from 59.9 million to 122.1 million red-winged blackbirds.

Figure 4.2 - WS' annual cumulative take of red-winged blackbirds in Louisiana, FY 2009 - FY 2014



With a post-breeding population that ranges from 59.9 million to 122.1 million red-winged blackbirds and a 42.1% to 62.0% survival rate, approximately 22.8 million to 70.7 million red-winged blackbirds die each year. In the Flyway, the WS program has lethally removed an average of 281,943 red-winged blackbirds per year from FY 2009 through FY 2014, which represents 0.4% to 1.2% of the annual mortality of red-winged blackbirds. The highest annual cumulative take by the WS program in the Flyway occurred during FY 2009 when the entire WS program in the Flyway removed 463,250 red-winged blackbirds, which would represent 0.7% to 2.0% of the annual mortality of red-winged blackbirds.

WS uses information from previous requests for assistance and the anticipation of additional efforts to project the annual take that could occur by WS in each state[27]. Based on those projections, the WS program could remove up to 1.9 million red-winged blackbirds annually in the Flyway to alleviate damage[28]. However, between FY 2009 and FY 2014, the cumulative annual take by the WS program across the Flyway has never approached 1.9 million red-winged blackbirds, with the highest annual take of 463,250 blackbirds occurring in FY 2009 (see Figure 4.3). Although unlikely, if WS lethally removed 1.9 million red-winged blackbirds annually in the Flyway, the cumulative take would represent 1.6% to 3.2% of the post-breeding population and 2.7% to 8.3% of the annual mortality of red-winged blackbirds in the Flyway. WS anticipates the cumulative annual take of red-winged blackbirds in the Flyway to be similar to the actual take levels that have occurred from FY 2009 through FY 2014.

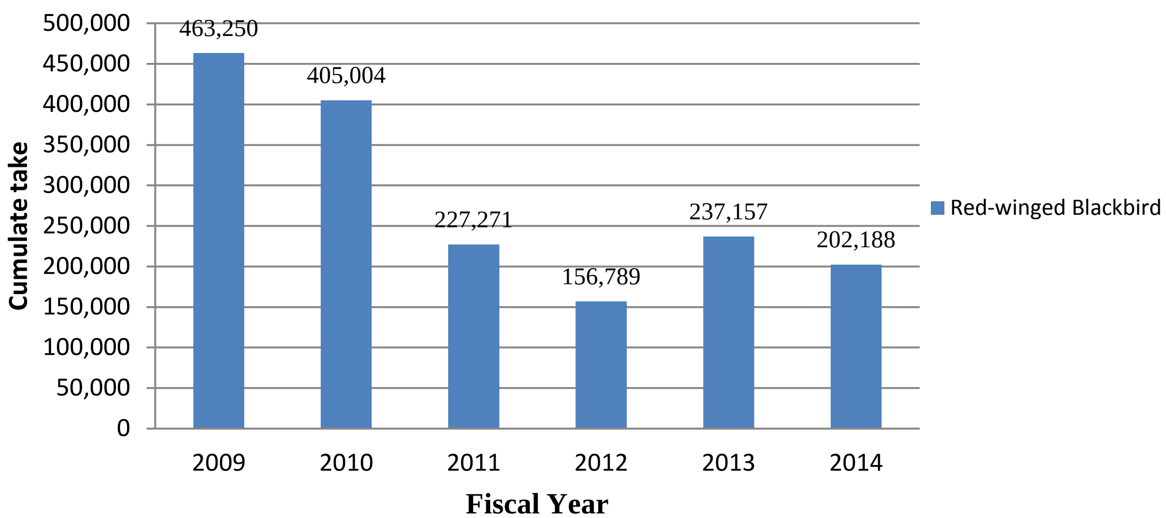
Activities to alleviate damage associated with blackbirds, including red-winged blackbirds, also likely occur by entities other than WS. As discussed previously, under 50 CFR 21.43, a depredation permit is not required to lethally take red-winged blackbirds when found committing or about to commit damage to resources or when concentrated in such numbers and in a manner as to constitute a health hazard or other

[27]WS only conducts activities upon receiving a request for such assistance; therefore, the number of requests for assistance that WS receives, the number of individual blackbirds involved with the associated damage or threat, and the efficacy of the methods that WS employs would determine the actual annual take in each state.

[28]Across all program activities conducted by the WS program in the Mississippi Flyway, a cumulative take could reach a maximum of 1.9 million red-winged blackbirds annually based on evaluations in EAs available during the development of this EA.

nuisance. Prior to January 3, 2011, there were no reporting requirements for take under 50 CFR 21.43 (see 75 FR 75153-75156). Therefore, the number of red-winged blackbirds that entities other than WS lethally removes to alleviate damage or the threat of damage pursuant to 50 CFR 21.43 is unknown prior to January 3, 2011. Although private individuals are required to report the number and species of blackbirds lethally removed to the USFWS, it is unknown whether the reported take accurately reflects the actual take since it is likely that some take of blackbirds goes unreported. However, some annual take is likely to occur by private individuals. It is reasonable to predict that the number of blackbirds lethally removed by private individuals is minimal because the primary method that people use to alleviate damage would be shooting, which has limitations for killing blackbirds. Private individuals use firearms primarily as a form of harassment rather than to remove blackbirds, despite some limited take likely occurring. Under a worst-case scenario, the private take of red-winged blackbirds is likely less than 25,000 blackbirds per year in the Flyway. Although the actual take of red-winged blackbirds by private individuals is unknown, WS will evaluate the lethal take of 25,000 red-winged blackbirds annually by other entities to evaluate the potential effects on the red-winged blackbird population cumulatively.

Figure 4.3 - WS' annual cumulative take of red-winged blackbirds in the Mississippi Flyway, FY 2009 - FY 2014



An important component to understanding population impacts is whether the annual take by WS and other entities would be additive to the 38.0% to 57.9% mortality rate that occurs annually or whether take by WS and other entities would occur within the annual mortality rate of blackbirds (*i.e.*, is part of the 38.0% to 57.9% annual mortality and not additive). Some people would claim that lethal removal of blackbirds is pointless because up to 60% of the population dies each year anyway, which implies that any removal by WS and other entities would be compensatory and not additive to other mortality occurring (see Section 2.3 for further discussion). As with any population, for annual increases to occur, recruitment into the population must exceed mortality.

At what stage in the annual mortality cycle a mortality event occurs could potentially magnify any effect and reduce the potential for the mortality event to be compensatory. For example, a mortality event that occurred at the lowest population point in the mortality cycle could result in additive mortality (*e.g.*, removing blackbirds as they arrive on their breeding grounds in the spring when the population is likely at the lowest). Conversely, a post-breeding mortality event prior to the fall migration when the blackbird population is likely highest could be compensatory since most mortality likely occurs during the migration periods and during the winter. In addition, a mortality event that affects primarily males, primarily females, or both sexes equally could influence whether mortality was compensatory or additive. As discussed earlier, red-winged blackbirds are a polygynous species, which means males often have more than one female per breeding territory. A large "*floater*" population of males also exists within the red-winged blackbird population that consists of non-breeding males that are capable of reproduction. A mortality event that removed primarily males would likely have little effect on reproduction since other reproductive males could replace those males removed[29]. Nearly all female red-winged blackbirds breed; therefore, a mortality event that removed primarily females would prevent the production of future offspring by those females removed.

Red-winged blackbirds generally exhibit an asynchronous migration pattern (*i.e*., males and females do not migrate at the same time). In the spring, males begin leaving wintering areas earlier than females; therefore, males tend to arrive in breeding areas to begin establishing territories before females arrive. In the fall, females begin leaving the breeding areas earlier than males (Yasukawa and Searcy 1995). From 1974 through 1992, Dolbeer et al. (1997) estimated that applications of a wetting agent killed over 5.1 million red-winged blackbirds during the winter in the eastern United States, which equates to approximately 270,000 red-winged blackbirds removed per year. Despite that level of annual lethal removal over the 19-year period, Dolbeer et al. (1997) found no correlations between the numbers of red-winged blackbirds killed each winter and subsequent changes in the breeding population of red-winged blackbirds. Therefore, the findings by Dolbeer et al. (1997) indicate that lethal removal during the winter could be a substitute for natural mortality and does not add to the mortality that occurs annually. Density-dependent factors as regulatory mechanisms often influences bird populations (*e.g*., see Newton 1998), and is a likely factor in the regulation of red-winged blackbird populations (Dolbeer et al. 1976, Blackwell et al. 2003).

As indicated by banding data (Meanley 1971, Dolbeer 1978, Dolbeer 1982, Cummings and Avery 2003), the potential effects associated with a high mortality rate at a single winter roost or cluster of winter roosts in winter would be spread amongst populations of red-winged blackbirds that originate across a wide geographical area (Dolbeer 1978). Therefore, the removal of red-winged blackbirds at winter roosts would not result in large-scale reductions of specific local breeding populations in North America the following summer. In addition, if blackbirds from a local winter roost or cluster of roosts were removed during one winter, red-winged blackbirds from other areas would likely readily repopulate those roosts in subsequent winters if suitable roosting habitat and a food supply continued to exist (Dolbeer 1978).

Despite the high levels of mortality associated with red-winged blackbirds, Yasukawa and Searcy (1995) stated, the "[a]*mount of breeding habitat is key to overall population regulation*." As people have converted woodlands and wetland habitats to agricultural uses, the red-winged blackbird has adapted to nesting in upland pastures, hay fields, and grain fields, which has resulted in substantial population increases in some agricultural areas (Graber and Graber 1963, Weatherhead and Bider 1979, Yasukawa and Searcy 1995). Dolbeer (1976) found the average number of fledglings that red-winged blackbirds nesting in upland habitats produced were similar to the average number of fledglings produced in wetland habitats. The conversion of wetland and upland habitat to agricultural production that requires annual tillage has been associated with long-term declines in the number of breeding blackbirds (Besser et al. 1984). Blackwell and Dolbeer (2001) correlated changes in agricultural practices in Ohio with a decline in the statewide breeding red-winged blackbird population, primarily because of the conversion of alfalfa fields and upland areas used for hay to row crops. The timing of hay harvest can also influence the

[29]In theory, the quality of parental investment provided by males with less breeding experience would likely contribute to a lower reproductive success. Reproductive success could be lower if the amount and quality of parental investment provided by replacement males was lower than would have occurred by those males removed. The parental investment provided by male red-winged blackbirds is generally limited to nest defense and some provisioning of young (Beletsky 1996). However, the amount and quality of parental investment by males could contribute directly to reproductive success (Linz et al. 2014). Studies investigating the effects of increased male contributions to the raising of young have shown mixed outcomes (*e.g*., see Linz et al. 2014). Linz et al. (2014) found no evidence that the breeding experience of male red-winged blackbirds lead to an increase in the number of fledglings per nest or increased nest survival in a North Dakota population of red-winged blackbirds. The quality of habitat in the breeding territory of a male red-winged blackbird may contribute more to reproductive success than the quality of parental investment by males (Linz et al. 2014).

reproductive success of red-winged blackbirds nesting in upland habitats (Blackwell and Dolbeer 2001). On an intermediate level, drought conditions can severely reduce reproductive success over large areas (Brenner 1966). On a smaller scale, local breeding population size and reproductive success has been correlated with insect biomass (Brenner 1968), locally abundant insect foods, such as periodical cicadas (*Magicicada* spp.) (Strehl and White 1986), and habitat quality (Yasukawa and Searcy 1995, Linz et al. 2014). However, the most important factor regulating local reproductive success is probably predation (Searcy and Yasukawa 1995).

As was discussed previously, approximately 38.0% to 57.9% of the adult red-winged blackbirds die each year (Yasukawa and Searcy 1995), which equates to approximately 22.8 million to 70.7 million red-winged blackbirds dying each year in just the Mississippi Flyway. Under a worst-case scenario, the cumulative lethal removal of red-winged blackbirds by the WS program and other entities in the Mississippi Flyway could represent 1.6% to 3.2% of the post-breeding population and 2.7% to 8.4% of the annual mortality of red-winged blackbirds in the Flyway. However, based on the average annual removal by the WS program from FY 2009 through FY 2014, the cumulative removal of red-winged blackbirds ranged from 0.4% to 1.4% of the annual mortality of red-winged blackbirds in the Flyway, including removal that could occur by private individuals. As discussed previously, there appears to be sufficient evidence based on modeling to suggest that the cumulative annual take of red-winged blackbirds by WS and other entities is likely compensatory and not additive to the normal annual loss of red-winged blackbirds. Therefore, the annual mortality of red-winged blackbirds does not increase because of WS' activities.

The key to the overall population regulation in red-winged blackbirds is the amount of breeding habitat (Besser et al. 1984, Yasukawa and Searcy 1995, Blackwell and Dolbeer 2001). Despite recent surveys showing declines in the red-winged blackbird population, the International Union for Conservation of Nature and Natural Resources (IUCN) has ranked the red-winged blackbird has a species of "*least concern*" based on the "*species…extremely large range*…", "…*the population size is extremely large*…", and "*the decline is not believed to be sufficiently rapid*" (BirdLife International 2012*a*). WS would evaluate the potential effects of enacting this alternative on the red-winged blackbird population by monitoring yearly activities as part of the SOPs; therefore, WS could identify and evaluate any changes occurring within the population of red-winged blackbirds.

BREWER'S BLACKBIRD POPULATION IMPACT ANALYSIS

Historically, Brewer's blackbirds were a common social species in the open habitats, farmsteads, and urbanized areas of western North America (Martin 2002). Nesting records of the Brewer's blackbird in eastern North America did not exist prior to 1914. Beginning in 1914 and continuing for the next 40 years, nesting populations of Brewer's blackbirds expanded eastward across the northern United States and southern Canada into the Great Lakes region, which represented a range expansion of nearly 750 miles (Martin 2002). The clearing of forest and the conversion of areas to agricultural production aided the range expansion. Today, breeding populations of Brewer's blackbirds occur across much of the western United States and the southern half of western Canada with breeding populations extending across northern Minnesota and the southern edge of Canada into the Great Lakes region (Martin 2002).

As the breeding range of the Brewer's blackbird extended eastward, the wintering areas associated with this blackbird species also expanded eastward. With breeding populations historically occurring in western North America, the movements and migration patterns were restricted to the western United States. However, since the breeding range of this blackbird species now occurs in northern portions of the eastern United States and southern Canada, Brewer's blackbirds now occur in the southeastern United States during the winter migration periods (Martin 2002), including the rice growing areas of southwestern Louisiana. Martin (2002) described the winter and fall migration patterns of Brewer's blackbird, especially those from the northern portion of their range, as "*nomadic*" due to their shifting patterns and the timing of migratory movements. In general, large numbers of Brewer's blackbirds begin arriving in wintering areas around the middle of October through mid-November. In the spring, Brewer's blackbirds begin leaving wintering areas in March, with some individuals lingering into April (Martin 2002).

Brewer's blackbirds often associate with other blackbird species during migration periods (Martin 2002). Meanley (1971) reported "*trace*" numbers of Brewer's blackbirds in major blackbird roosts in Louisiana from 1960 through 1965. Between 1975 and 2013, the average annual composition of blackbirds observed in Evangeline Parish, Louisiana during the CBC consisted of 0.3% Brewer's blackbirds, with the highest composition consisting of 6.0% Brewer's blackbirds (National Audubon Society 2010). Since 1966, the number of Brewer's blackbirds observed in areas of the State surveyed during the CBC has shown a general increasing trend (National Audubon Society 2010).

Across all survey routes, the number of Brewer's blackbirds observed in areas surveyed during the BBS has shown a declining trend estimated at -2.4% per year between 1966 and 2013, with a -1.8% annual decline occurring from 2003 through 2013 (Sauer et al. 2014). In the central region of the BBS, the number of Brewer's blackbirds observed along routes surveyed have shown a declining trend estimated at -0.8% between 1966 and 2013, with an -1.0% annual decline occurring from 2003 through 2013 (Sauer et al. 2014). The Partners in Flight Science Committee (2013) estimated the breeding population of Brewer's blackbird to be 20 million blackbirds in North America. In the Mississippi Flyway, breeding populations of Brewer's blackbirds occur in Michigan, Minnesota, and Wisconsin in the United States and Saskatchewan, Manitoba, and Ontario in Canada (Martin 2002). No breeding populations of Brewer's blackbirds occur in Louisiana or the southern United States (Martin 2002). In those states and Canadian provinces that comprise the Mississippi Flyway, the Partners in Flight Science Committee (2013) estimated the breeding population of Brewer's blackbirds at nearly 2.8 million birds. As with the other blackbird species addressed by WS, the population likely peaks during the late summer after the breeding season when hatch year birds (*i.e*. birds born that breeding season) join with adults before the fall migration.

If there were one female for every male in the Flyway population of 2.8 million Brewer's blackbirds, every female laid eggs, and the entire breeding population only built one nest per year, then Brewer's blackbirds build approximately 1.4 million nests in the Flyway. Martin (2002) reported the mean clutch size of Brewer's blackbirds is approximately five eggs per nest (Martin 2002). With a clutch size of five eggs per nest and 1.4 million nests, Brewer's blackbirds lay approximately 7.0 million eggs in the Flyway. Martin (2002) reported that 62.7% of eggs laid hatched; therefore, of the 7.0 million eggs laid in the Flyway, approximately 4.4 million hatch. Of the eggs that hatch, 62.7% also fledge successfully (Martin 2002). If 62.7% of the nestlings that hatch leave the nest, then approximately 2.8 million nestlings would fledge successfully. La Rivers (1944) estimated that approximately 50% of fledglings die or are killed within one month of leaving the nest. The current fall population of Brewer's blackbirds in the Mississippi Flyway is currently unknown; however, a fall population in the Flyway could be approximately 4.2 million Brewer's blackbirds using reproductive parameters that Martin (2002) summarizes and a 50% mortality rate for fledglings within a month of leaving the nest.

The annual survival rate of adult Brewer's blackbirds can range from 30% to 54% (Martin 2002). Mortality can occur from many sources, including predation, disease, parasites, weather, and availability of food sources. Like other blackbird populations, the Brewer's blackbird population is likely lowest as birds begin arriving in breeding areas following the spring migration and prior to nestlings fledging. Therefore, the breeding population estimate provided by the Partners in Flight Science Committee (2012) of 2.8 million Brewer's blackbirds likely represents the population low.

Although present in the rice growing regions of Louisiana, Brewer's blackbirds are not a common species amongst flocks of blackbirds that feed in and around areas of rice production (Meanley 1971, A. Wilson, WS pers. comm. 2014). As mentioned previously, the average annual species composition of blackbirds recorded during the CBC conducted annually in Evangeline Parish (Pine Prairie count) from 1975 through 2013 consisted of 0.3% Brewer's blackbirds, with a composition as high as 6.0% (National Audubon Society 2010). Although uncommon in mixed blackbird species flocks, Brewer's blackbirds do feed on rice during the winter (Meanly 1971) and could feed on newly planted rice if present in foraging flocks of blackbirds.

Based on the species composition of sites that the WS program in Louisiana has observed previously during damage management activities targeting blackbirds, no lethal take of Brewer's blackbirds by WS has occurred between FY 2009 and FY 2015 to alleviate blackbird damage to sprouting rice. WS anticipates that during activities to prevent flocks of blackbirds from foraging on newly seeded or sprouting rice that the WS program in Louisiana could kill up to 5,000 Brewer's blackbirds annually under the proposed action alternative.

With a post-breeding population estimated at 4.2 million Brewer's blackbirds and a 46% to 70% mortality rate, approximately 1.9 million to 2.9 million Brewer's blackbirds die each year. In the Flyway, the entire WS program has not employed lethal methods to address damage or threats of damage associated with Brewer's blackbirds from FY 2009 through FY 2014. As discussed previously, WS uses information from previous requests for assistance and the anticipation of additional efforts to project the annual take that could occur by WS in each state. Based on those projections, the WS program could remove up to 5,060 Brewer's blackbirds annually in the Flyway to alleviate damage. Although unlikely, if WS lethally removed 5,060 Brewer's blackbirds annually in the Flyway, the cumulative take would represent 0.1% of the post-breeding population and 0.2% to 0.3% of the annual mortality of Brewer's blackbirds. WS anticipates the cumulative annual take of Brewer's blackbirds in the Flyway to be similar to the take levels that have occurred from FY 2009 through FY 2014.

Activities to alleviate damage associated with blackbirds, including Brewer's blackbirds, could also occur by entities other than WS. As discussed previously, under 50 CFR 21.43, a depredation permit is not required to lethally take Brewer's blackbirds when found committing or about to commit damage to resources or when concentrated in such numbers and in a manner as to constitute a health hazard or other nuisance. Similar to the discussion for red-winged blackbirds, the number of Brewer's blackbirds that other entities removed to alleviate damage or the threat of damage pursuant to 50 CFR 21.43 is unknown prior to January 3, 2011. Although private individuals are now required to report the number and species of blackbirds lethally removed to the USFWS, it is unknown whether the reported take accurately reflects the actual take since it is likely that some take of blackbirds goes unreported. However, the annual take of Brewer's blackbirds could occur by private individuals. It is reasonable to predict that the number of blackbirds lethally removed by private individuals is minimal because the primary method that people use to alleviate damage would be shooting, which has limitations for killing blackbirds. Private individuals use firearms primarily as a form of harassment rather than to remove blackbirds, despite some limited take likely occurring. Under a worst-case scenario, the private take of Brewer's blackbirds is likely less than 1,000 blackbirds per year in the Flyway. Although the actual take of Brewer's blackbirds by private individuals is unknown, WS will evaluate the lethal take of 1,000 Brewer's blackbirds annually by other entities to evaluate the potential effects on the Brewer's blackbird population cumulatively.

Under a worst-case scenario, the cumulative lethal removal of Brewer's blackbirds by the WS program and other entities in the Mississippi Flyway could represent 0.1% of the post-breeding population and 0.2% to 0.3% of the annual mortality of Brewer's blackbirds in the Flyway. However, no lethal take has occurred by the WS program in Louisiana or across the Mississippi Fly from FY 2009 through FY 2014.

Although the lethal take of Brewer's blackbirds could occur, the WS program anticipates the lethal take of Brewer's blackbirds to occur infrequently across the Flyway.

Despite recent surveys showing declines in the Brewer's blackbird population, the IUCN has ranked the Brewer's blackbird has a species of "*least concern*" based on the "*species…extremely large range…*", "*…the population size is extremely large…*", and "*the decline is not believed to be sufficiently rapid*" (BirdLife International 2012*b*). As part of the SOPs, the WS program in Louisiana would monitor activities conducted pursuant to this alternative to evaluate the potential effects on the populations of blackbirds; therefore, WS could identify and monitor any changes in the population of Brewer's blackbirds over time.

COMMON GRACKLE POPULATION IMPACT ANALYSIS

The common grackle is a large, conspicuous blackbird found across North America east of the Rocky Mountains (Peer and Bollinger 1997). Common grackles use a wide range of open or partially open habitat, including open woodlands, forest edges, and suburban areas (Peer and Bollinger 1997). The clearing of forests in the 1700 and 1800s and the associated increase in agricultural activities likely provided some benefit to grackles. Subsequently, the range of the common grackle has expanded westward (Peer and Bollinger 1997). Today, breeding populations occur across southern portions of Canada and across the United States (east of the Rocky Mountains) (Peer and Bollinger 1997). Common grackles are migratory, especially the northern breeding populations, and can be found throughout the year in Louisiana. Like red-winged blackbirds, migrants during the fall and winter supplement the local breeding populations in Louisiana. Their diet includes insects and other invertebrates, eggs, young birds, spilled grain, seeds, and fruits (Peer and Bollinger 1997). Common grackles are social birds, nesting in colonies of up to 200 pairs and forming flocks with other blackbirds, which may exceed 1 million birds (Peer and Bollinger 1997).

In Louisiana, the number of common grackles observed in the State along routes surveyed during the BBS have shown an annual declining trend estimated at -3.3% annually since 1966, with a -3.5% annual decline occurring from 2003 through 2013 (Sauer et al. 2014). Across all routes surveyed the United States, data from the BBS shows a declining trend estimated at -1.9% since 1966, with a -2.2% annual decline from 2003 through 2013 (Sauer et al. 2014). Using data from the BBS, the Partners in Flight Science Committee (2013) estimated the statewide breeding population of common grackles to be 1.2 million birds. The Partners in Flight Science Committee (2013) estimated the breeding population of common grackles at 61 million birds in North America, with an estimated 55 million grackles occurring in the United States. In the Mississippi Flyway, the Partners in Flight Science Committee (2013) estimated the breeding grackle population at 30.5 million grackles.

The fall migration period for common grackles generally occurs from late August through early December, with the peak occurring from mid-October through mid-November (Peer and Bollinger 1997). Migratory common grackles are present in their wintering areas until departing on their spring migration, which generally occurs from mid-February through the end of April with the peak occurring from late February through the end of March (Peer and Bollinger 1997). Therefore, the number of common grackles increases substantially in the State as northern breeding populations migrate southward during the fall to winter in the southern United States, which augments local breeding populations (Meanley et al. 1966). Like other blackbirds, nothing visual would distinguish common grackles that were from the local breeding population and those grackles that migrate into the rice growing area from other areas.

The number of common grackles observed in the State during the CBC has shown a highly variable trend since 1966 (National Audubon Society 2010). For example, observers counted nearly 128,000 grackles in areas surveyed during the CBC conducted during 1985. In 1986, observers counted nearly 114 million grackles in areas surveyed during the CBC, which compared to 280 million grackles counted during the 1987 count (National Audubon Society 2010).

From 1960 to 1965, major roosts in the rice growing areas of Louisiana consisted of 26% common grackles (Meanley 1971). Between 1975 and 2013, the average annual composition of blackbirds observed in the Pine Prairie count survey area occurring in Evangeline Parish, Louisiana during the CBC consisted of 7.5% common grackles (National Audubon Society 2010). A precise count of the common grackle population in Louisiana during the wintering and breeding seasons or across the United States is not currently available. As mentioned previously, large-scale winter roost surveys for blackbirds are no longer conducted (A. Wilson, WS pers. comm. 2014).

As with the other blackbird species addressed by WS, the population likely peaks during the late summer after the breeding season when hatch year birds (*i.e*. birds born that breeding season) join with adults before the fall migration. Peer et al. (2003) calculated the fall blackbird population in the northern Great Plains of North America by multiplying the breeding population in the region by 1.45 based on work Stehn (1989) conducted. Using this technique, the fall population in the Flyway could be 44.2 million common grackles based on a breeding population estimated at 30.5 million grackles.

Using those reproductive parameters that Peer and Bollinger (1997) summarize and based on several assumptions, additional estimations of the fall population are possible. Those assumptions would be similar to those discussed for red-winged blackbirds. If there were one female for every male in the Flyway population of 30.5 million breeding grackles[30], every female laid eggs[31], and females only produced one successful nest per year[32], then common grackles build approximately 15.3 million nests in the Flyway. Peer and Bollinger (1997) reported the mean clutch size of common grackles is approximately five eggs per nest, with a range of one to seven eggs. With a mean clutch size of five eggs per nest and 15.3 million nests, grackles lay approximately 76.5 million eggs in the Flyway with a range of 15.3 to 107.1 million eggs. Peer and Bollinger (1997) estimated the number of eggs that produced fledglings at 33.0 to 65.0%. Based on those parameters, approximately 5.1 million to 69.6 million fledglings successfully leave nests each year, with an average of 25.3 to 49.7 million fledglings. The current fall population of common grackles in the Mississippi Flyway is currently unknown. However, a peak post-breeding fall population in the Flyway could range from 55.8 million to 80.2 million grackles using the average number of fledglings that successfully leave nests that Peer and Bollinger (1997) summarize. The estimate range could occur if the entire breeding population of 30.5 million grackles survived until all the fledglings were recruited into the population and all the fledglings were recruited at the same time.

Common grackles have a 51.6% adult annual survivorship (Peer and Bollinger 1997). Like other blackbird species, mortality can occur from many sources, including predation, disease, parasites, weather, and availability of food sources. The common grackle population is likely lowest as birds begin arriving in breeding areas following the spring migration and prior to the fledging of nestlings. Therefore, the breeding population estimate provided by the Partners in Flight Science Committee (2013) of 30.5 million breeding common grackles likely represents the population low.

Common grackles are a common blackbird species found in flocks of blackbirds in the rice growing areas of southwestern Louisiana (Meanley 1971). Therefore, WS has addressed common grackles during prior activities conducted to alleviate blackbird damage to sprouting rice.

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[30]The exact sex ratio of common grackles is unknown and likely varies yearly; however, in general, a one female to one male sex ratio is likely.

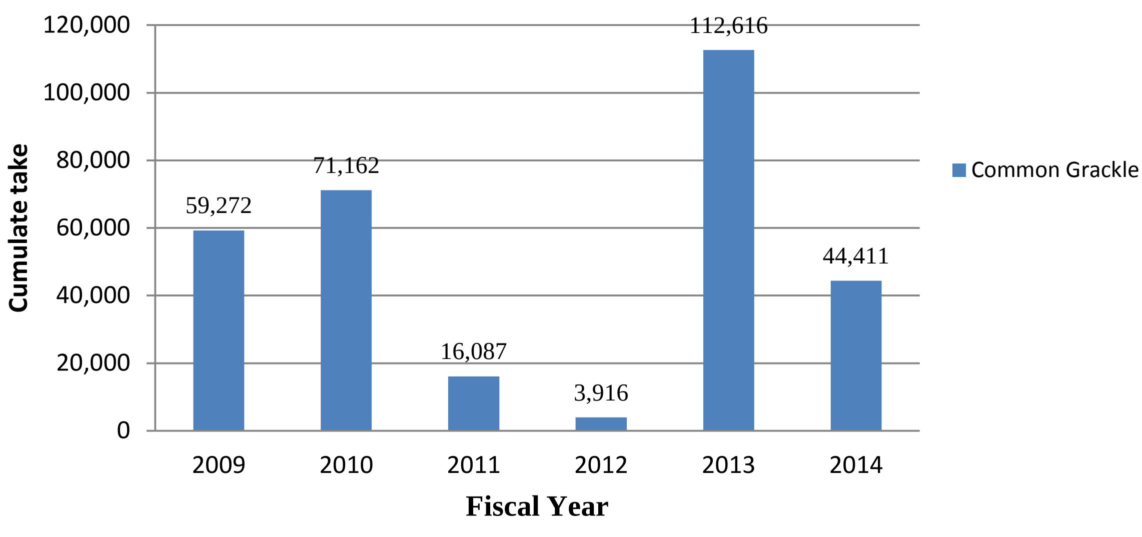
[31]The age at first breeding in common grackles is unknown (Peer and Bollinger 1997).

[32]Although re-nesting can occur after a nest failure early in the breeding season, female grackles do not generally attempt a second brood (Peer and Bollinger 1997).

Between FY 2009 and FY 2015, the WS program has lethally removed approximately 423,278 common grackles using the avicide DRC-1339 to alleviate damage to sprouting rice in Louisiana, which is an average lethal take of 60,468 grackles. In addition, the WS program in Louisiana lethally removed five common grackles between FY 2009 and FY 2014 using firearms. Figure 4.4 shows the cumulative annual take of common grackles by the WS program in Louisiana between FY 2009 and FY 2014. WS' preliminary take estimate of 115,819 common grackles during FY 2015 represented the highest annual take level from FY 2009 through FY 2015. WS used those take models described previously to calculate the annual lethal removal of common grackles from the use of DRC-1339. The models estimate annual take using site-specific parameters for each baiting location. Based on those activities conducted previously by WS and in anticipation of additional efforts to alleviate damage to sprouting rice, WS could lethally remove up to 300,000 common grackles annually in the rice-growing region of Louisiana to alleviate damage.

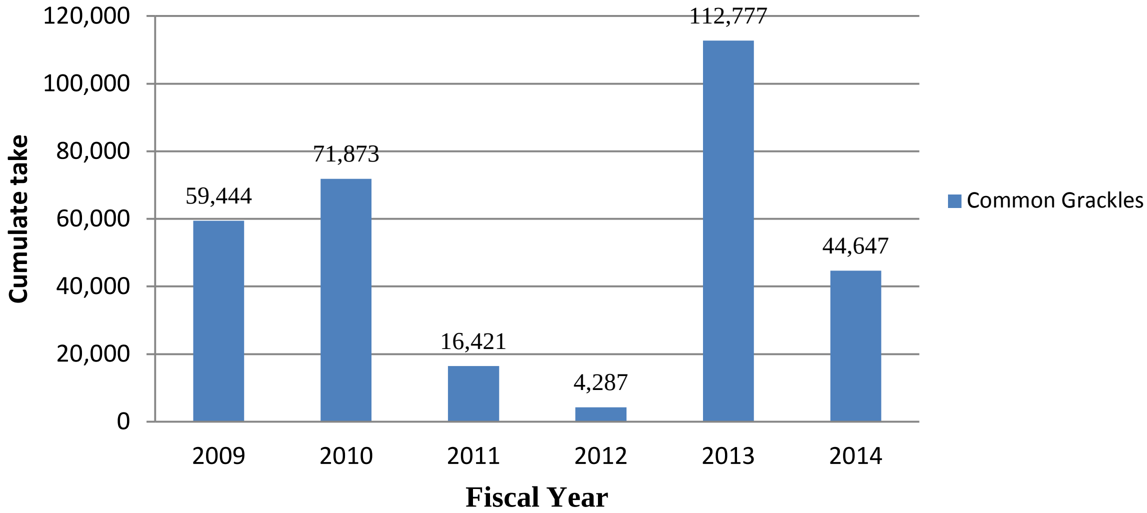
The lethal removal of up to 300,000 common grackles annually by WS to alleviate damage would represent 0.4% to 0.5% of a fall Flyway population estimated to range from 55.8 million to 80.2 million grackles. The WS program also conducts damage management activities involving common grackles in other states throughout the Mississippi Flyway. Figure 4.5 shows the cumulative take of common grackles between FY 2009 and FY 2014 by the WS program in those states that comprise the Flyway. Cumulatively, the WS program has lethally removed approximately 309,449 common grackles in the Mississippi Flyway between FY 2009 and FY 2014, which is an average annual removal of 51,575 grackles. The annual cumulative lethal removal of 51,575 common grackles by the WS program represents 0.2% of a breeding population estimated at 30.5 million grackles in the Flyway and 0.1% of a fall Flyway population estimated to range from 55.8 million to 80.2 million grackles.

Figure 4.4 - WS' annual cumulative take of common grackles in Louisiana, FY 2009 - FY 2014



With a post-breeding population that ranges from 55.8 million to 80.2 million grackles and a 48.4% mortality rate, approximately 27.0 million to 38.8 million grackles die each year. In the Flyway, the WS program has lethally removed an average of 51,575 grackles per year from FY 2009 through FY 2014, which represents 0.1% to 0.2% of the annual mortality of common grackles. The highest annual cumulative take by the WS program in the Flyway occurred during FY 2013 when the WS program removed 112,777 grackles, which would represent 0.3% to 0.4% of the annual mortality of grackles.

Figure 4.5 - WS' annual cumulative take of common grackles in the Mississippi Flyway, FY 2009 - FY 2014



As was discussed previously, the WS program uses information from previous requests for assistance and the anticipation of additional efforts to project the annual take that could occur by WS in each state. Across all program activities conducted by the WS program in the Mississippi Flyway, a cumulative take could reach a maximum of 945,450 common grackles annually based on evaluations in EAs available during the development of this EA. However, between FY 2009 and FY 2014, the cumulative annual take by the WS program across the Flyway has never approached 945,450 grackles, with the highest annual take of 112,777 grackles occurring in FY 2013 (see Figure 4.5). Although unlikely, if WS lethally removed 945,450 common grackles annually in the Flyway, the cumulative take would represent 1.2% to 1.7% of the post-breeding population and 2.4% to 3.5% of the annual mortality of common grackles. WS anticipates the cumulative annual take of common grackles in the Flyway to be similar to the take levels that have occurred from FY 2009 through FY 2014.

Activities to alleviate damage associated with blackbirds, including common grackles, also likely occur by entities other than WS. Under 50 CFR 21.43, a depredation permit is not required to lethally take common grackles when found committing or about to commit damage to resources or when concentrated in such numbers and in a manner as to constitute a health hazard or other nuisance. Prior to January 3, 2011, there were no reporting requirements for take under 50 CFR 21.43 (see 75 FR 75153-75156). Therefore, the number of common grackles that entities other than WS lethally removes to alleviate damage or the threat of damage pursuant to 50 CFR 21.43 is unknown prior to January 3, 2011. Although private individuals are required to report the number and species of blackbirds lethally removed to the USFWS, it is unknown whether the reported take accurately reflects the actual take since it is likely that some take of blackbirds goes unreported. However, some annual take is likely to occur by private individuals. It is reasonable to predict that the number of blackbirds lethally removed by private individuals is minimal because the primary method that people use to alleviate damage would be shooting, which has limitations for killing blackbirds. Private individuals use firearms primarily as a form of harassment rather than to remove blackbirds, despite some limited take likely occurring. Under a worst-case scenario, the private take of common grackles is likely less than 25,000 grackles per year in the Flyway. Although the actual take of common grackles by private individuals is unknown, WS will evaluate the lethal take of 25,000 grackles annually to evaluate the potential effects on the common grackle population cumulatively.

Similar to red-winged blackbirds, an important component to understanding population impacts is whether the annual take by WS and other entities would be additive to the 48.4% annual mortality that occurs annually or whether take by WS and other entities would occur within the annual mortality rate of grackles. Some people would claim that lethal removal of blackbirds is pointless because nearly 52% of the population dies each year anyway, which implies that any removal by WS and other entities would be compensatory and not additive to other mortality occurring. At what stage in the annual mortality cycle a mortality event occurs could potentially magnify any effect and reduce the potential for the mortality event to be compensatory. As with any population, for annual increases to occur, recruitment into the population must exceed mortality.

From 1974 through 1992, Dolbeer et al. (1997) estimated that applications of a wetting agent killed over 18.3 million common grackles during the winter in the eastern United States, which equates to approximately 963,200 common grackles removed per year. Despite that level of annual lethal removal over the 19-year period, Dolbeer et al. (1997) found no correlations between the numbers of grackles killed each winter and subsequent changes in the breeding population of common grackles. Therefore, the findings by Dolbeer et al. (1997) indicate that lethal removal in the winter could be a substitute for natural mortality and does not add to the mortality that occurs annually.

In addition, a high mortality rate at a single winter roost or cluster of winter roosts would spread the potential effects across populations of common grackles that originated across a wide geographical area. Therefore, the removal of grackles at winter roosts would not result in large-scale reductions of specific local breeding populations in North America the following summer.

Land clearing and the associated expansion of agricultural production since European settlement began in North America that created additional breeding habitat is likely responsible for a "*dramatic*" increase in the number of common grackles (Peer and Bollinger 1997). In addition, Robbins et al. (1986) attributed increases in the number of grackles observed during the BBS from 1965 to 1979, in part, on the trend toward mechanical harvesting of crops, which leaves more waste grain. The increased availability of waste grains from mechanical harvest, in part, resulted in increased winter survival of grackles and other blackbirds (Robbins et al. 1986).

Despite more recent surveys showing declines in the grackle population, the IUCN has ranked the common grackle as a species of "*least concern*" based on the "*species…extremely large range…*", "*…the population size is extremely large…*", and "*the decline is not believed to be sufficiently rapid*" (BirdLife International 2012*c*). As part of the SOPs that WS would implement under this alternative, WS would monitor activities to evaluate the potential effects on the populations of common grackles associated with activities conducted by WS; therefore, WS could identify and monitor any changes in the population of common grackles.

BOAT-TAILED GRACKLES POPULATION IMPACT ANALYSIS

The boat-tailed grackle is a large, conspicuous blackbird with a long tail and iridescent blue-green plumage (Post et al. 2014). The boat-tailed grackle is a coastal species, residing from the Gulf coast of Texas to the coasts of the eastern United States, as far north as Long Island. It seldom resides far inland, except in Florida, where it is widespread across the peninsula. In Louisiana, boat-tailed grackles are primarily residents of the coastal marshes (Post et al. 2014). They build their nests in colonies between stalks of marsh vegetation, in bushes, such as mangrove, or in the top branches of trees that grow on the cheniers (Lowery 1981).

Based on banding data, boat-tailed grackle populations are relatively sedentary, with little movement during the traditional fall and spring migration periods, except for breeding populations along the northern Atlantic coast that tend to move southward along the coast during the fall migration period (Post et al. 2014). Overall, winter movements are "*poorly understood*", but may be related to the availability of food during the winter (Post et al. 2014). Meanley (1971) identified boat-tailed grackles as one of the four blackbird species that cause major damage to rice in Louisiana. Meanley (1971) reported boat-tailed grackles comprised 9% of the species composition of major blackbird roosts in Louisiana from 1960 through 1965. Since 1966, the number of boat-tailed grackles observed in areas of the State surveyed during the CBC showed a general increasing trend until the late 1990s and early 2000s with a general declining trend observed occurring since the early 2000s. However, trend data from 2007 through 2012 have shown general increases (National Audubon Society 2010).

Across all survey routes, the number of boat-tailed grackles observed in areas surveyed during the BBS has shown a declining trend estimated at -0.4% per year between 1966 and 2013, with a -0.3% annual decline occurring from 2003 through 2013 (Sauer et al. 2014). In the central region of the BBS, the number of boat-tailed grackles observed along routes surveyed have shown a declining trend estimated at -0.1% between 1966 and 2013, with a -1.3% annual decline occurring from 2003 through 2013 (Sauer et al. 2014). The Partners in Flight Science Committee (2013) estimated the breeding population of boat-tailed grackles to be 400,000 grackles in Louisiana with 2 million breeding boat-tailed grackles occurring in North America. In the Mississippi Flyway, breeding populations of boat-tailed grackles occur in Alabama, Louisiana, and Mississippi (Post et al. 2014). As with the other blackbird species addressed by WS, the population likely peaks during the late summer after the breeding season when hatch year birds (*i.e*. birds born that breeding season) join with adults before the fall migration.

Therefore, the breeding population estimate provided by the Partners in Flight Science Committee (2013) of 400,000 boat-tailed grackles likely represents the population low. If there were one female for every male in the Louisiana population of 400,000 boat-tailed grackles, every female laid eggs, and the entire breeding population only built one nest per year, then boat-tailed grackles build approximately 200,000 nests in Louisiana. Post et al. (1995) found that boat-tailed grackles produced a mean of 1.32 fledglings from all nests. If boat-tailed grackles in Louisiana produced 1.32 fledglings per nest, the 200,000 nests in Louisiana produce 264,000 fledglings. If all of the fledglings were recruited into the breeding population and no adult mortality occurred during the breeding season, the post-breeding population in Louisiana would be approximately 664,000 boat-tailed grackles.

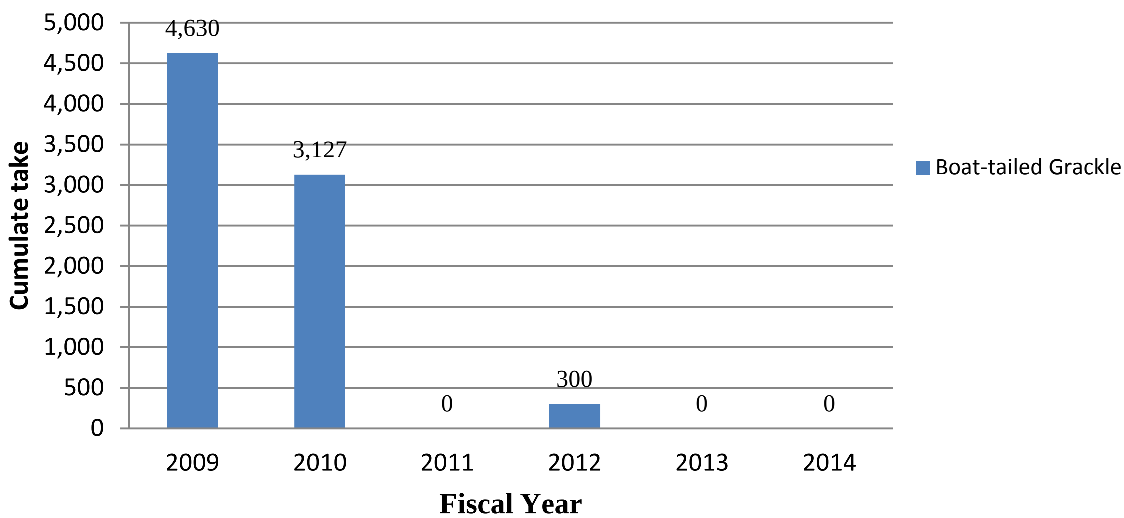
The annual survival of adult boat-tailed grackles can range from 69.2% to 86.0% (Post et al. 2014). Like other blackbirds, mortality can occur from many sources, including predation, disease, parasites, weather, and availability of food sources. Based on the annual mortality rate and the estimated post-breeding population, approximately 93,000 to 204,500 boat-tailed grackles likely die each year.

Although present in the rice growing regions of Louisiana, boat-tailed grackles are not as common amongst flocks of blackbirds as red-winged blackbirds, common grackles, and brown-headed cowbirds in the spring (Meanley 1971, A. Wilson, WS pers. comm. 2014). However, boat-tailed grackles do feed on germinating rice seed (Meanley 1971, Post et al. 2014). Pair formation may begin as early as late February with the first eggs laid beginning in late March (Post et al. 2014); therefore, boat-tailed grackles likely begin to disperse to breeding areas and are less common in blackbird flocks when sprouting rice is most vulnerable in the spring.

Based on the species composition of sites that the WS program in Louisiana has observed previously during damage management activities targeting blackbirds, WS has lethally removed 8,057 boat-tailed grackles between FY 2009 and FY 2014 to alleviate blackbird damage to sprouting rice (see Figure 4.6). On average, WS has lethally removed 1,343 boat-tailed grackles per year from FY 2009 through FY 2014, with the highest annual take occurring in FY 2009 when WS removed 4,630 boat-tailed grackles. WS anticipates that during activities to prevent flocks of blackbirds from foraging on newly seeded or sprouting rice that the WS program in Louisiana could kill up to 5,000 boat-tailed grackles annually under the proposed action alternative.

In the Flyway, the WS program has not employed lethal methods to address damage or threats of damage associated with boat-tailed grackles from FY 2009 through FY 2014, except in Louisiana. WS anticipates the cumulative annual take of boat-tailed grackles in the Flyway to be similar to the take levels that have occurred from FY 2009 through FY 2014. As discussed previously, local breeding populations do not migrate long distances during the winter. Therefore, those boat-tailed grackles found in mixed species flocks in the southeastern Louisiana rice growing area are likely locally breeding grackles within the State. Since boat-tailed grackles are generally non-migratory, the lethal take of boat-tailed grackles by the WS program in other states within the Flyway is unlikely. Lethal take could occur in Mississippi and/or Alabama since boat-tailed grackles are present in those states throughout the year; however, those grackles are not likely to be present in Louisiana given the sedentary patterns of grackles. Post et al. (2014) did report the possibility that boat-tailed grackles from Mississippi move into Louisiana during the winter. However, given the early onset of breeding in boat-tailed grackles (late February to early March), if grackles from Mississippi were present in the State, those birds likely would have moved back to breeding areas in Mississippi prior to planting of rice. None of the other WS' state programs in the Mississippi Flyway anticipates the annual take of boat-tailed grackles to alleviate damage.

Figure 4.6 - WS' annual cumulative take of boat-tailed grackles in Louisiana, FY 2009 - FY 2014



Although unlikely, if the WS program lethally removed 5,000 boat-tailed grackles annually in Louisiana, the take would represent 0.8% of the post-breeding population and 2.5% to 5.4% of the annual mortality of grackles. Activities to alleviate damage associated with blackbirds, including boat-tailed grackles, could also occur by entities other than WS. As discussed previously, under 50 CFR 21.43, a depredation permit is not required to lethally take boat-tailed grackles when found committing or about to commit damage to resources or when concentrated in such numbers and in a manner as to constitute a health hazard or other nuisance.

Similar to the discussion for many of the other blackbird species, the number of boat-tailed grackles that other entities removed to alleviate damage or the threat of damage pursuant to 50 CFR 21.43 is unknown prior to January 3, 2011. Although private individuals are now required to report the number and species of blackbirds lethally removed to the USFWS, it is unknown whether the reported take accurately reflects the actual take since it is likely that some take of blackbirds goes unreported. However, the annual take of boat-tailed grackles could occur by private individuals. It is reasonable to predict that the number of blackbirds lethally removed by private individuals is minimal because the primary method that people use to alleviate damage would be shooting, which has limitations for killing blackbirds. Private individuals use firearms primarily as a form of harassment rather than to remove blackbirds, despite some limited take likely occurring. Under a worst-case scenario, the private take of boat-tailed grackles is likely less than 500 grackles per year. Although the actual take of boat-tailed grackles by private individuals is unknown, WS will evaluate the lethal take of 500 grackles annually to evaluate the potential effects on the population cumulatively. Under a worst-case scenario, the cumulative lethal removal of boat-tailed grackles by the WS program and other entities could represent 0.8% of the post-breeding population and 2.7% to 5.9% of the annual mortality of boat-tailed grackles in the State.

Despite recent surveys showing declines in the boat-tailed grackle population, the IUCN has ranked the boat-tailed grackle as a species of "*least concern*" based on the "*species…extremely large range…*", "*…the population size is extremely large…*", and "*the population trend appears to be increasing*"[33] (BirdLife International 2012*d*). The WS program in Louisiana would monitor activities conducted pursuant to this alternative to evaluate the potential effects on the populations of blackbirds associated as part of the SOPs; therefore, WS could identify and monitor any changes in the population of boat-tailed grackles over time.

GREAT-TAILED GRACKLES POPULATION IMPACT ANALYSIS

The great-tailed grackle is a large blackbird that is similar in appearance to the boat-tailed grackle, but with a much wider range. Prior to 1900, the range of the great-tailed grackle barely extended into Texas from Central America and the northern edge of South America (Johnson and Peer 2001). During the twentieth century, the range of the great-tailed grackle expanded rapidly into the south central and southwestern United States. By the end of the twentieth century, the great-tailed grackle nested in at least 14 states with people reporting occurrences in 21 states. Most of the range expansions occurred after 1960 and coincided with changes in habitat from human expansion, such as irrigation and urbanization (Johnson and Peer 2001). In the United States today, great-tailed grackles occur in many parts of the southwestern and south central United States from southern California to central Missouri.

As late as 1957, the boat-tailed and great-tailed grackles were considered to be conspecific (*i.e.*, belonging to the same species); however, today, the two are believed be reproductively isolated (Johnson and Peer 2001). Boat-tailed grackles breed along the coastal marshes while the great-tailed grackle prefers drier coastal habitat and typically occurs in areas with scattered trees near standing water (Johnson and Peer 2001). However, unlike the boat-tailed grackle, great-tailed grackles are often far removed from coastal situations (Lowery 1981). Great-tailed grackles nest in trees associated with prairies, agricultural areas, and towns while boat-tailed grackles more frequently occur in marshy areas (Johnson and Peer 2001). The ranges of the two species overlap along the coasts of Texas and Louisiana. The great-tailed grackle is a short-distance, partial migrant that winters throughout most of its breeding range (Johnson and Peer 2001). Only those grackles along the northern edge of their range in the United States appear to show migratory movements with most great-tailed grackles being sedentary or only moving short distances (Johnson and Peer 2001).

The number of great-tailed grackles observed in the State along routes surveyed during the BBS have shown an annual increasing trend estimated at 5.4% annually since 1966; however, from 2003 through 2013, the number of great-tailed grackles observed has shown a declining trend estimated at -6.1%

[33]The IUCN assessment for the boat-tailed grackle occurred in 2012 (BirdLife International 2012*d*). Although breeding populations of boat-tailed grackles are showing declining trends in Louisiana based on the Breeding Bird Survey, population trends in other areas are showing increasing trends (Sauer et al 2014).

annually (Sauer et al. 2014). Across all routes surveyed in the United States, data from the BBS shows an increasing trend estimated at 1.8% annually since 1966, with a 3.6% annual increase occurring from 2003 through 2013 (Sauer et al. 2014). Using data from the BBS, the Partners in Flight Science Committee (2013) estimated the statewide breeding population of great-tailed grackles to be 30,000 birds. The Partners in Flight Science Committee (2013) estimated the breeding population of great-tailed grackles at 5 million birds in United States. In the Mississippi Flyway, breeding populations of great-tailed grackles occur in Iowa, Missouri, Arkansas, and Louisiana (Johnson and Peer 2001). As with the other blackbird species addressed by WS, the population likely peaks during the late summer after the breeding season when hatch year birds (*i.e*. birds born that breeding season) join with adults before the fall migration.

Using those reproductive parameters that Johnson and Peer (2001) summarize and based on several assumptions, additional estimations of the fall population are possible. Those assumptions would be similar to those discussed for the other blackbird species. If there were one female for every male in the statewide population of 30,000 breeding grackles[34], every female laid eggs[35], and females only produced one successful nest per year[36], then great-tailed grackles build approximately 15,000 nests in the State. Johnson and Peer (2001) reported the mean clutch size of great-tailed grackles is approximately three eggs per nest, with a range of one to five eggs. With a mean clutch size of 3 eggs per nest and 15,000 nests, great-tailed grackles lay approximately 45,000 eggs in the State. In Louisiana, Guillory et al. (1981) found that 43.9% to 62.1% of the eggs laid by great-tailed grackles hatched. If 43.9% to 62.1% of the 45,000 eggs hatched, approximately 19,800 to 27,900 nestlings occur in the State annually. Johnson and Peer (2001) reported that nests with three eggs had a 98% fledging success. Based on those parameters, approximately 19,400 to 27,300 fledglings successfully leave nests each year. The current fall population of great-tailed grackles in the State is currently unknown. However, if the entire breeding population of 30,000 grackles survived until all the fledglings were recruited into the population and all the fledglings were recruited at the same time, a peak post-breeding fall population in the State could be 49,400 to 57,300 grackles using reproductive parameters that Johnson and Peer (2001) summarizes.

The number of great-tailed grackles observed in the State during the CBC has shown a general increasing trend since 1966 (National Audubon Society 2010). Between 1975 and 2013, the average annual composition of blackbirds observed in Evangeline Parish, Louisiana during the CBC consisted of 0.3% great-tailed grackles, with the highest composition consisting of 3.4% great-tailed grackles (National Audubon Society 2010). A precise count of the great-tailed grackle population in Louisiana during the wintering and breeding seasons or across the United States is not currently available. As mentioned previously, large-scale winter roost surveys for blackbirds are no longer conducted (A. Wilson, WS pers. comm. 2014).

There is currently no information on annual adult survivorship for great-tailed grackles (Johnson and Peer 2001). If the annual mortality of adult great-tailed grackles were similar to boat-tailed grackles, the annual adult mortality would range from 14.0% to 30.8%. Based on an annual mortality rate of 14.0% to 30.8% and the estimated post-breeding population, approximately 6,916 to 17,700 great-tailed grackles likely die each year.

Between FY 2009 and FY 2015, the WS program has lethally removed approximately 1,408 great-tailed grackles using the avicide DRC-1339 to alleviate damage to sprouting rice in Louisiana. The highest level of annual take by WS occurred in FY 2009 when WS estimates that DRC-1339 killed 1,338 great-tailed grackles. During FY 2010, the WS program in Louisiana killed an estimated 70 great-tailed

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[34]The exact sex ratio of common grackles is unknown and likely varies yearly; however, in general, a one female to one male sex ratio is likely.

[35]The age at first breeding in common grackles is unknown.

[36]Although re-nesting can after a nest failure early in the breeding season, female grackles do not generally attempt a second brood (Johnson and Peer 2001).

grackles in the State using DRC-1339. No take of great-tailed grackles occurred by WS in Louisiana from FY 2011 through FY 2015. WS used those take models described previously to calculate the annual lethal removal of great-tailed grackles from the use of DRC-1339. The models estimate annual take using site-specific parameters for each baiting location. Based on those activities conducted previously by WS and in anticipation of additional efforts to alleviate damage to sprouting rice, WS could lethally remove up to 5,000 great-tailed grackles annually in the rice-growing region of Louisiana to alleviate damage. The lethal removal of up to 5,000 great-tailed grackles annually by WS to alleviate damage would represent 8.7% to 10.1% of a fall statewide population estimated to be between 49,500 and 57,300 grackles.

In the Mississippi Flyway, the WS program has not employed lethal methods to address damage or threats of damage associated with great-tailed grackles from FY 2009 through FY 2014, except in Louisiana. WS anticipates the cumulative annual take of great-tailed grackles in the Flyway to be similar to the take levels that have occurred from FY 2009 through FY 2014. As discussed previously, local breeding populations do not migrate long distances during the winter. Therefore, those great-tailed grackles found in mixed species flocks in the southwestern Louisiana rice growing area are likely locally breeding grackles within the State. Given the early onset of breeding in great-tailed grackles (late February to early March), if grackles from other states were present in southwestern Louisiana, those birds likely would have moved back to breeding areas prior to planting of rice. None of the other WS state programs in the Mississippi Flyway anticipates the annual take of great-tailed grackles to alleviate damage.

Activities to alleviate damage associated with blackbirds, including great-tailed grackles, also likely occur by entities other than WS. Under 50 CFR 21.43, a depredation permit is not required to lethally take great-tailed grackles when found committing or about to commit damage to resources or when concentrated in such numbers and in a manner as to constitute a health hazard or other nuisance. Prior to January 3, 2011, there were no reporting requirements for take under 50 CFR 21.43 (see 75 FR 75153-75156). Therefore, the number of great-tailed grackles that entities other than WS lethally removes to alleviate damage or the threat of damage pursuant to 50 CFR 21.43 is unknown prior to January 3, 2011. Although private individuals are required to report the number and species of blackbirds lethally removed to the USFWS, it is unknown whether the reported take accurately reflects the actual take since it is likely that some take of blackbirds goes unreported. However, some annual take is likely to occur by private individuals. It is reasonable to predict that the number of blackbirds lethally removed by private individuals is minimal because the primary method that people use to alleviate damage would be shooting, which has limitations for killing blackbirds. Private individuals use firearms primarily as a form of harassment rather than to remove blackbirds, despite some limited take likely occurring. Under a worst-case scenario, the private take of great-tailed grackles is likely less than 500 grackles per year in the State. Although the actual take of great-tailed grackles by private individuals is unknown, WS will evaluate the lethal take of 500 grackles annually to evaluate the potential effects on the great-tailed grackle population cumulatively. Under a worst-case scenario, the cumulative lethal removal of great-tailed grackles by the WS program and other entities could represent 9.6% to 11.1% of the post-breeding population.

The IUCN has ranked the great-tailed grackle as a species of "*least concern*" based on the "*species…extremely large range…*", "*…the population size is extremely large…*", and "*the population trend appears to be stable*" (BirdLife International 2012*e*). As part of the SOPs that WS would implement under this alternative, WS would monitor activities to evaluate the potential effects on the populations of great-tailed grackles associated with activities conducted by WS; therefore, WS could identify and monitor any changes in the population of great-tailed grackles.

BROWN-HEADED COWBIRD POPULATION IMPACT ANALYSIS

Brown-headed cowbirds are another species of the blackbird family commonly found in mixed species flocks during migration periods. Cowbirds are a common summer resident across the United States and southern Canada (Lowther 1993). As people have converted woodlands to agricultural uses, the cowbird has expanded its range in the United States (Lowther 1993). Breeding populations in the northern range of the cowbird are migratory with cowbirds present throughout the year in much of the eastern United States and along the west Coast (Lowther 1993). Likely restricted to the range of bison (*Bison bison*) prior to the presence of European settlers, cowbirds were probably a common occurrence on the short-grass plains where they fed on insects distributed by foraging bison (Lowther 1993). As people began clearing forests for agriculture, cowbirds expanded their breeding range (Lowther 1993). Cowbirds still commonly occur in open grassland habitats but also inhabit urban and residential areas. Unique in their breeding habits, cowbirds are brood parasites, meaning they lay their eggs in the nests of other bird species (Lowther 1993). Female cowbirds can lay up to 40 eggs per season with eggs reportedly being laid in the nests of over 220 species of birds (Lowther 1993). Cowbirds provide no parental care, with the raising of cowbird young occurring by the host species (Lowther 1993).

Brown-headed cowbirds are highly social and are a common component of mixed-species blackbird flocks that may exceed 1 million birds (Lowther 1993, Peer and Bollinger 1997). In Louisiana, brown-headed cowbirds occur statewide and are present in the State throughout the year (Lowther 1993).

During the breeding season, the number of cowbirds observed in areas of the State surveyed during the BBS has shown a declining trend estimated at -1.1% annually between 1966 and 2013 (Sauer et al. 2014). From 2003 through 2013, the number of cowbirds observed in the State has shown a declining trend estimated at -0.1% annually (Sauer et al 2014). Across all routes surveyed in the United States, data from the BBS shows a declining trend estimated at -0.5% since 1966, with a -0.1% annual decline from 2003 through 2013 (Sauer et al. 2014). The Partners in Flight Science Committee (2013) estimated the statewide breeding population of cowbirds at 1 million cowbirds based on data from the BBS. The Partners in Flight Science Committee (2013) estimated the breeding population of cowbirds at 110 million birds in North America, with an estimated 91 million cowbirds occurring in the United States. In the Mississippi Flyway, the Partners in Flight Science Committee (2013) estimated the breeding cowbird population at nearly 32.3 million cowbirds. Like other blackbird populations, the brown-headed cowbird population is likely lowest as birds begin arriving in breeding areas following the spring migration and prior to nestlings fledging. Therefore, the breeding population estimate provided by the Partners in Flight Science Committee (2013) of 32.3 million cowbirds in the Flyway likely represents the population near its lowest.

Northern breeding populations of cowbirds migrate southward during the migration periods but cowbirds are common throughout the year in states along the Gulf Coast and parts of the eastern United States, including Louisiana (Lowther 1993). The fall migration period for cowbirds generally occurs from mid-August through mid-October, with the peak occurring from September through early October (Lowther 1993). Migratory cowbirds are present in their wintering areas until departing on their spring migration from late-February through mid-May with the peak occurring from mid-March through April (Lowther 1993). Therefore, the number of cowbirds increases substantially in the State as northern breeding populations migrate southward during the fall to winter in the southern United States, which augments local breeding populations (Meanley et al. 1966). Like other blackbirds, nothing visual would distinguish cowbirds that were from the local breeding population and those cowbirds that migrate into the rice growing area from other areas.

From 1960 to 1965, major roosts in the rice growing areas of Louisiana consisted of 14% cowbirds (Meanley 1971). Between 1975 and 2013, the average annual composition of blackbirds observed in the Pine Prairie count survey area occurring in Evangeline Parish, Louisiana during the CBC consisted of 34.6% brown-headed cowbirds (National Audubon Society 2010). Between 2004 and 2013, surveyors counted an average of 1.9 million cowbirds per year in those areas of the State surveyed during the CBC (National Audubon Society 2010). The number of cowbirds surveyors observed in the State during the CBC conducted between 2004 and 2013 has ranged from a low of 61,307 cowbirds, which occurred in 2009, to a high of nearly 8.1 million cowbirds, which occurred in 2004 (National Audubon Society 2010)[37]. Overall, the number of cowbirds observed in areas surveyed in the State during the CBC has shown a general decreasing trend since 1966 (National Audubon Society 2010).

A precise count of the cowbird population in Louisiana during the wintering and breeding seasons or across the United States is not currently available. Large-scale winter roost surveys for blackbirds are no longer conducted (A. Wilson, WS pers. comm. 2014). Flocks of blackbirds found in the rice-growing region of southwestern Louisiana from December through April likely consist of locally breeding cowbirds and cowbirds that have migrated to the area from northern breeding areas. Meanley (1971) estimated that 84% of the blackbirds, including cowbirds, present in the rice growing states were from breeding populations further north. Therefore, birds killed by WS in southwestern Louisiana could originate from breeding population outside of the State. Thus, removing cowbirds at a single roost or cluster of roosts during the winter probably would spread the effects amongst populations of cowbirds that are indigenous to a wide area. Based on available data, the majority of cowbirds present in the rice growing areas of southwestern Louisiana originate from breeding populations in the Mississippi Flyway.

As discussed previously, female cowbirds lay their eggs in the nests of other bird species and do not provide parental care to offspring; therefore, information on the reproductive success of cowbirds is limited. Lowther (1993) summarizes the available information on annual and lifetime reproductive success of cowbirds. Using those reproductive parameters that Lowther (1993) summarize, additional estimations of the fall population in the Flyway are possible with some assumptions[38]. If the sex ratio of cowbirds in the Flyway was one female for every male[39], then there are approximately 16.2 million female cowbirds in the Flyway. Female cowbirds breed and produce eggs at one year of age; therefore, 16.2 million cowbirds are capable of laying eggs in the Flyway. Lowther (1993) reports that female cowbirds produce approximately 40 eggs per breeding season; therefore, female cowbirds in the Flyway produce approximately 648 million eggs per season. However, not all of the eggs laid by female cowbirds hatch and reach adulthood. Only 3% of the eggs laid by female cowbirds produce adult cowbirds (Lowther 1993). Based on a survival rate of 3%, approximately 19.4 million eggs produce adult cowbirds.

If the entire Flyway breeding population of 32.3 million cowbirds survived until all the fledglings were recruited into the population and all the fledglings were recruited at the same time, a peak post-breeding fall population in the Flyway could be estimated at 51.7 million cowbirds each year using reproductive parameters that Lowther (1993) summarizes. However, the current fall population of cowbirds in the Mississippi Flyway is currently unknown and likely varies between years.

Like other bird species, the population of cowbirds is likely highest following the recruitment of hatch year birds into the population in late summer and early fall. Conversely, bird populations are likely at their lowest in the winter and early spring as birds begin arriving at their breeding areas (Dolbeer et al. 1976). The annual survival rate of cowbirds likely ranges from 48.5% to 63.0% of the population

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[37]Data from the CBC provides a minimum population estimate given the survey parameters of the CBC and the survey only covering a small portion of the State. CBC data provides an indication of long-term trends in the number of birds observed wintering in the State and is not intended to represent population estimates of wintering bird populations.

[38]One assumption would be the actual breeding population in the Mississippi Flyway is nearly 32.3 million cowbirds (Partners in Flight Science Committee 2013) with no mortality occurring during the breeding season (*i.e*., the breeding population remains constant throughout the breeding season). Adult mortality rates during the breeding season are unknown but likely occur from predation, weather, accidents, competition, illegal take, and other from other factors.

[39]The exact sex ratio of cowbirds is unknown and likely varies yearly; however, in general, a one female to one male sex ratio is likely.

(Fankhauser 1971, Lowther 1993). With a post-breeding population estimated at 51.7 million cowbirds and a 37.0% to 51.5% mortality rate, approximately 19.1 million to 26.6 million cowbirds die each year.

Although flocks comprised of several species of blackbirds and starlings can cause damage to seeded and sprouting rice, brown-headed cowbirds are one of the blackbird species responsible for most of the damage (Meanley 1971, Cummings et al. 2005). Cowbirds are often the second most common blackbird species found in major blackbird roosts in the rice-growing region of Louisiana (Meanley 1971). In addition, cowbirds appear to be the last blackbird species to leave their wintering grounds and return to their breeding grounds each year (Dolbeer 1982), which likely accounts for the high number of cowbirds addressed by WS during activities to reduce damage to sprouting rice.

Between FY 2009 and FY 2015, the WS program has lethally removed approximately 3.4 million cowbirds using the avicide DRC-1339 to alleviate damage to sprouting rice in Louisiana. On average, the WS program in Louisiana has used DRC-1339 to remove 481,016 cowbirds per year between FY 2009 and FY 2015. In addition to the use of DRC-1339, the WS program in Louisiana has employed firearms and decoy traps to remove 1,340 cowbirds between FY 2009 and FY 2014. Figure 4.7 shows the cumulative take of cowbirds by the WS program in Louisiana from FY 2009 through FY 2014.

WS' estimated cumulative take of 595,444 cowbirds in Louisiana during FY 2013 represented the highest annual take level from FY 2009 through FY 2014. WS used those take models described previously to calculate the annual lethal removal of cowbirds from the use of DRC-1339. The models estimate annual take using site-specific parameters for each baiting location. Based on those activities conducted previously by WS and in anticipation of additional efforts to alleviate damage to sprouting rice, WS could lethally remove up to 1 million cowbirds annually in the rice-growing region of Louisiana to alleviate damage.

The lethal removal of up to 1 million cowbirds annually by WS to alleviate damage would represent 1.9% of a fall Flyway population estimated to be 51.7 million cowbirds. The WS program also conducts damage management activities involving cowbirds in other states throughout the Mississippi Flyway. Figure 4.8 shows the cumulative take of cowbirds between FY 2009 and FY 2014 by the WS program in those states that comprise the Flyway. Cumulatively, the WS program has lethally removed approximately 3 million cowbirds in the Mississippi Flyway between FY 2009 and FY 2014, with an average annual removal of 504,331 cowbirds. The annual lethal removal of 504,331cowbirds by the WS program represents 1.6% of a breeding population estimated at 32.3 million cowbirds in the Flyway and 1.0% of a fall Flyway population estimated to be 51.7 million cowbirds.

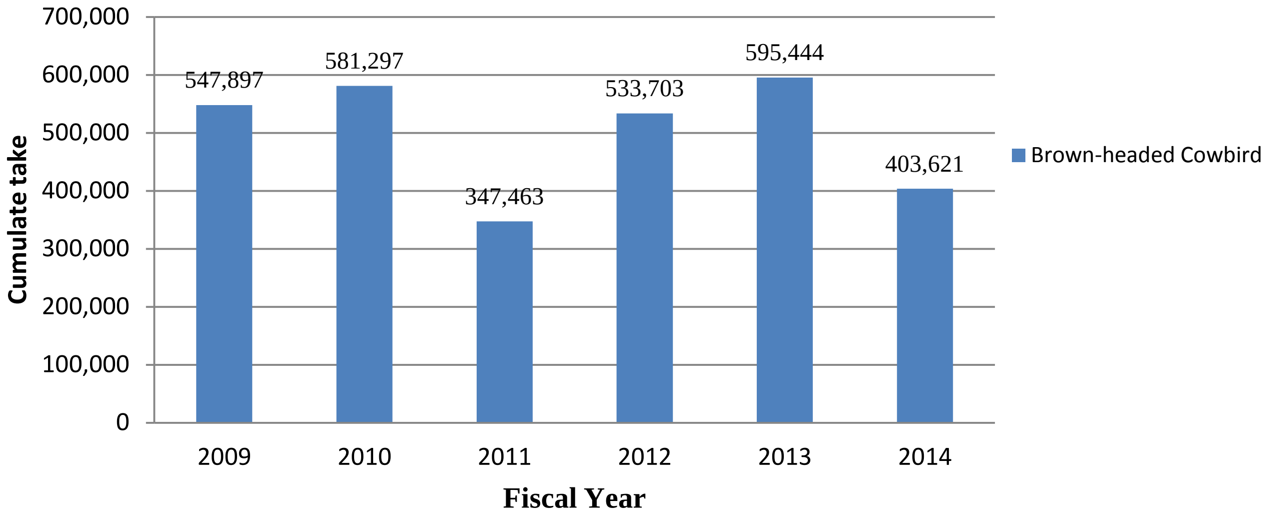
In the Flyway, the WS program has lethally removed an average of 504,331 cowbirds per year from FY 2009 through FY 2014, which represents 1.9% to 2.6% of the annual mortality of cowbirds. The highest annual cumulative take by the WS program in the Flyway occurred during FY 2013 when the WS program removed 596,079 cowbirds, which would represent 2.2% to 3.1% of the annual mortality of cowbirds.

WS uses information from previous requests for assistance and the anticipation of additional efforts to project the annual take that could occur by WS in each state. Based on those projections, the WS program could remove up to 1.9 million cowbirds annually in the Flyway to alleviate damage[40]. However, between FY 2009 and FY 2014, the cumulative annual take by the WS program across the Flyway has never approached 1.9 million cowbirds, with the highest annual take of 596,079 cowbirds occurring in FY 2013 (see Figure 4.8). Although unlikely, if WS lethally removed 1.9 million cowbirds

[40]Across all program activities conducted by the WS program in the Mississippi Flyway, a cumulative take could reach a maximum of 1.7 million cowbirds annually based on evaluations in EAs available during the development of this EA.

annually in the Flyway, the cumulative take would represent 3.7% of the post-breeding population and 7.1% to 10.0% of the annual mortality of cowbirds. However, WS anticipates the cumulative annual take of brown-headed cowbirds in the Flyway to be similar to the take levels that have occurred from FY 2009 through FY 2014.

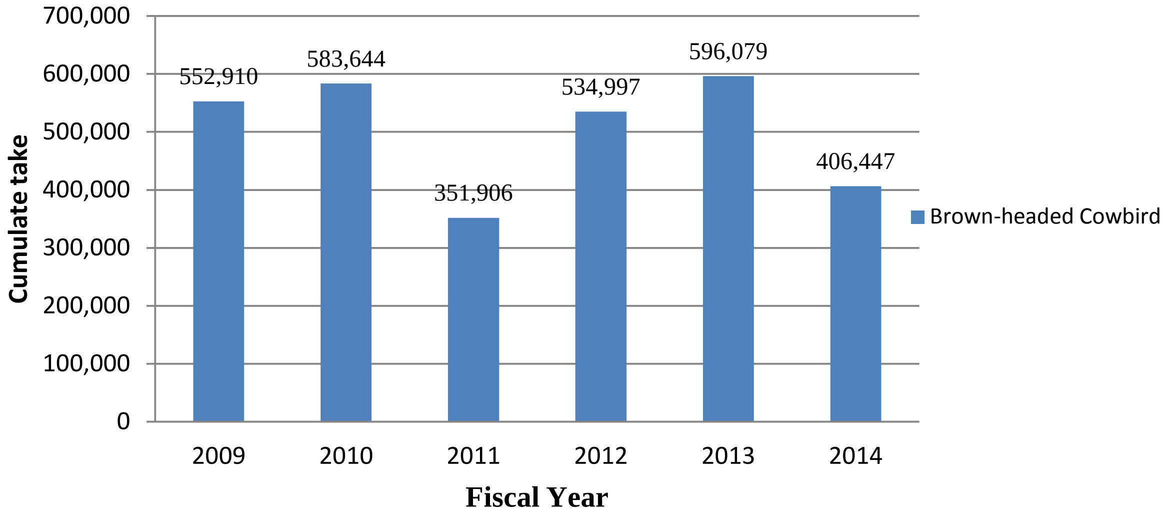
Figure 4.7 - WS' annual cumulative take of brown-headed cowbirds in Louisiana, FY 2009 - FY 2014



Activities to alleviate damage associated with blackbirds, including cowbirds, also likely occur by entities other than WS. For example, entities actively trap cowbirds in Michigan to reduce nest parasitism of Kirtland's warbler, which the USFWS has listed as an endangered species (Elbert and Mensing 2010). As discussed previously, under 50 CFR 21.43, a depredation permit is not required to lethally take cowbirds when found committing or about to commit damage to resources or when concentrated in such numbers and in a manner as to constitute a health hazard or other nuisance. Prior to January 3, 2011, there were no reporting requirements for take under 50 CFR 21.43 (see 75 FR 75153-75156). Therefore, the exact number of brown-headed cowbirds that entities other than WS lethally removes to alleviate damage or the threat of damage pursuant to 50 CFR 21.43 is unknown prior to January 3, 2011. Although private individuals are required to report the number and species of blackbirds lethally removed to the USFWS, it is unknown whether the reported take accurately reflects the actual take since it is likely that some take of blackbirds goes unreported.

However, some annual take is likely to occur by private individuals and other entities. Elbert and Mensing (2010) reported that entities in Michigan captured 4,160 cowbirds during 2009 and 3,540 cowbirds during 2010 to reduce nest parasitism of Kirtland's warblers. Since cowbird trapping began in 1972, Elbert and Mensing (2010) reports capturing 151,740 cowbirds in the Kirtland's warbler nesting areas of Michigan, which is an average of 3,964 cowbirds per year. For private individuals (e.g., agricultural producers), it is reasonable to predict that the number of blackbirds lethally removed is minimal because the primary method that people use to alleviate damage would be shooting, which has limitations for killing blackbirds. Private individuals use firearms primarily as a form of harassment rather than to remove blackbirds, despite some limited take likely occurring. Under a worst-case scenario, the cumulative take of brown-headed cowbirds by entities other than WS is likely less than 10,000 cowbirds per year in the Flyway. Although the actual take of brown-headed cowbirds by other entities is unknown, WS will evaluate the lethal take of 10,000 cowbirds annual to evaluate the potential effects on the brown-headed cowbirds population cumulatively.

Figure 4.8 - WS' annual cumulative take of brown-headed cowbirds in the Mississippi Flyway, FY 2009 - FY 2014



An important component to understanding population impacts is whether the annual take by WS and other entities would be additive to the 37% to 51.5% mortality rate that occurs annually or whether take by WS and other entities would occur within the annual mortality rate of cowbirds. Some people would claim that lethal removal of blackbirds is pointless because up to 50% of the population dies each year anyway, which implies that any removal by WS and other entities would be compensatory and not additive to other mortality occurring (see Section 2.3 for further discussion). As with any population, for annual increases to occur, recruitment into the population must exceed mortality. Density-dependent factors as regulatory mechanisms often influences bird populations (*e.g.*, see Newton 1998), and is a likely factor in the regulation of blackbird populations, including cowbirds.

As indicated by migration patterns, the potential effects associated with a high mortality rate at a single winter roost or cluster of winter roosts in winter would be spread amongst populations of cowbirds that originate across a wide geographical area. Therefore, the removal of cowbirds at winter roosts would not result in large-scale reductions of specific local breeding populations in North America the following summer. In addition, if cowbirds from a local winter roost or cluster of roosts were removed during one winter, cowbirds from other areas would likely readily repopulate those roosts in subsequent winters if suitable roosting habitat and a food supply continued to exist.

As was discussed previously, approximately 37% to 51.5% of the adult cowbirds die each year (Lowther 1993), which equates to approximately 19.1 million to 26.6 million cowbirds dying each year in just the Mississippi Flyway. Under a worst-case scenario, the cumulative lethal removal of cowbirds by the WS program and other entities in the Mississippi Flyway could represent 3.7% of the post-breeding population and 7.2% to 10.0% of the annual mortality of cowbirds in the Flyway. However, based on the average annual removal that actually occurred by the WS program from FY 2009 through FY 2014, the cumulative removal of cowbirds represented 1.9% to 2.7% of the annual mortality of cowbirds in the Flyway, including the removal that could occur by other entities.

Despite recent surveys showing declines in the cowbird population, the IUCN has ranked the brown-headed cowbird as a species of "*least concern*" based on the "*species*…*extremely large range*…", "…*the population size is extremely large*…", and "*the decline is not believed to be sufficiently rapid*" (BirdLife International 2012*f*). WS would evaluate the potential effects of enacting this alternative on the brown-headed cowbird population by monitoring yearly activities as part of the SOPs; therefore, WS could identify and evaluate any changes occurring within the population of brown-headed cowbirds.

Alternative 2 - WS Would Address Blackbird Damage through an Adaptive Integrated Approach Using Only Non-lethal Methods

The lethal take of blackbirds to alleviate damage to sprouting rice would not occur by WS under this alternative. To resolve requests for assistance, WS would employ only non-lethal methods. Therefore, WS' activities would have no effect on blackbird populations. Although some harassment and dispersal of blackbirds would occur under this alternative by WS, those actions would not adversely affect populations since those activities would only disperse blackbirds to other areas.

If WS employed live-capture methods to alleviate damage under this alternative, WS would translocate those blackbirds to release sites. If translocation occurred, WS could place appropriately sized leg bands[41] on captured blackbirds for identification purposes. The effects associated with translocation and the use of leg bands would be similar to those discussed under Alternative 1. As discussed previously, non-lethal methods generally have minimal impacts on overall populations of wildlife since those species would be unharmed. The use of non-lethal methods would have no adverse effects on target blackbird populations in the State or in the Flyway.

Since the WS program would be limited to the use of non-lethal methods under this alternative, the avicide DRC-1339 would not be available for use by WS. However, in the absence of WS' use of the avicide, other entities could potentially pursue the registration of DRC-1339 within the State for use. If other entities registered DRC-1339 with the LDAF to manage damage to sprouting rice, the potential effects on the blackbird populations from the use of DRC-1339 could be similar to the proposed action alternative.

Similar to the other alternatives, the lethal take of blackbirds by other entities could continue to occur under this alternative. The methods that rice producers and other entities are likely to employ to manage damage to rice associated with blackbirds would be propane cannons supplemented with shooting (Glahn and Wilson 1992). Therefore, some take of blackbirds would likely occur by other entities under this alternative. However, the number of blackbirds that other entities in the State remove lethally each year is not available and is unknown. It is reasonable to predict that the number of blackbirds lethally removed by private individuals is minimal because the primary method available for use to alleviate damage would be shooting, which has limitations for killing blackbirds. Private individuals use firearms primarily as a form of harassment rather than to remove blackbirds, despite some limited take likely occurring. However, depending on the persistence of the user, the use of propane cannons and shooting often produce variable results and demonstrate limited effectiveness at reducing blackbird damage to rice (Wilson 1985). If rice producers and other entities determine the available methods are not adequate to reduce damage to appropriate levels, they could use chemicals illegally to lethally remove blackbirds. In the past, people have resorted to the illegal use of chemicals and methods to alleviate blackbird damage issues (*e.g.*, see Mitchell et al. 1984, Stone et al. 1984, White et al. 1989, Food and Drug Administration 2003).

[41]If banding occurred, WS would use the North American Bird Banding Manual to determine the appropriate band sizes for the blackbird species being banded (Gustafson et al. 1997). At the time of development, the Manual could be found at http://www.pwrc.usgs.gov/BBL/MANUAL/index.cfm.

Alternative 3 – WS Would Address Blackbird Damage Using Technical Assistance Only

Under a technical assistance only alternative, WS would recommend an integrated methods approach similar to the proposed action alternative (Alternative 1); however, WS would not provide direct operational assistance under this alternative. Using information that a requester provides or from a site visit by an employee, WS would recommend methods and techniques based on 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 blackbird 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 no direct involvement by WS in resolving damage and threats associated with blackbirds, those people experiencing damage caused by blackbirds could continue to alleviate damage by employing those methods legally available. Appendix B discusses the methods available for use in managing damage and threats associated with blackbirds. With the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative. DRC-1339 is only available for use by WS and therefore would be unavailable for use under this alternative unless another entity pursued registering DRC-1339 with the LDAF. If other entities registered DRC-1339 with the LDAF to manage damage to sprouting rice associated with blackbirds, the effects on the blackbird population from the use of DRC-1339 could be similar to the proposed action alternative. Management actions taken by non-federal entities would represent the *environmental status quo* (see Section 2.1).

Under this alternative, those persons experiencing threats or damage associated with blackbirds could lethally remove birds. The MBTA does not afford protection to the European starling; therefore, anyone can remove starlings at any time using legally available methods. The MBTA does protect red-winged blackbirds, brown-headed cowbirds, common grackles, boat-tailed grackles, great-tailed grackles, and Brewer's blackbirds from take; however, when those species are causing damage or about to commit damage, those blackbird species can be lethally removed pursuant to the blackbird depredation order (50 CFR 21.43; see Section 1.6).

This alternative would place the immediate burden of resolving damage on the people requesting assistance. Those persons experiencing damage or were concerned with threats posed by blackbirds 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 alleviate or prevent blackbird damage as permitted by federal, state, and local laws and regulations or those persons could take no action. Therefore, the WS program in Louisiana would have no direct effect on blackbird populations from a program implementing technical assistance only.

With the oversight of the USFWS and the LDWF, it is unlikely that damage management activities conducted by other entities would adversely affect blackbird 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, the USFWS, 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 take, which could lead to real but unknown effects on the population of blackbirds and other wildlife. People have resorted to the illegal use of chemicals and methods to alleviate the damage that blackbirds cause (*e.g*., see Mitchell et al. 1984, Stone et al. 1984, White et al. 1989, Food and Drug Administration 2003).

Alternative 4 – WS Would Not Address Blackbird Damage to Sprouting Rice

Under this alternative, WS would not conduct technical or direct operational assistance to reduce damage or threats to sprouting rice. WS would not provide assistance with any aspect of managing damage to sprouting rice. WS would refer all requests for assistance associated with sprouting rice and blackbirds to the USFWS, the LDWF, the LDAF, and/or private entities.

Despite no involvement by WS in resolving damage and threats associated with blackbirds in southwestern Louisiana, those people experiencing damage caused by blackbirds could continue to alleviate damage by employing both non-lethal and lethal methods. The lethal take of blackbirds to alleviate damage to sprouting rice could continue to occur without the need for a depredation permit from the USFWS pursuant to the blackbird depredation order. Other entities could continue to employ lethal methods, such as shooting and live trapping (followed by euthanasia). The number of blackbirds that other entities would lethally remove annually under this alternative would be unknown but could be similar to the other alternatives. Similar to Alternative 2 and Alternative 3, with the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative. The avicide DRC-1339 would not be available for use under this alternative unless another entity pursued registering the avicide for use in the State. If other entities registered DRC-1339 for use in the State to manage damage to sprouting rice, the potential effects on the blackbird population could be similar to the proposed action alternative.

If WS or other entities were not available to provide direct operational assistance or technical assistance, it is possible that frustration caused by the lack of help could lead to the use of illegal methods. Illegal, unsafe, and environmentally unfriendly actions could lead to real but unknown effects on blackbird populations. In the past, people have resorted to the illegal use of chemicals and methods to alleviate the damage that blackbirds cause (*e.g*., see Mitchell et al. 1984, Stone et al. 1984, White et al. 1989, Food and Drug Administration 2003).

This alternative would place the immediate burden of operational damage management work on the resource owner, other governmental agencies, and/or private businesses. Those people experiencing damage or threats could take action using those methods legally available to resolve or prevent bird damage as permitted by federal, State, and local laws and regulations, or those persons could take no action.

Issue 2 - Effects of Damage Management Activities on Non-target Wildlife Species, Including Threatened or Endangered Species

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on non-target species, including threatened or endangered species. Potential adverse effects to non-target wildlife could occur from the employment of methods to address bird damage or threats of damage. Non-lethal methods have the potential to disperse non-target wildlife inadvertently, while lethal methods have the potential to inadvertently capture or kill non-target wildlife. To reduce the risk to non-target wildlife, including threatened or endangered species, persons employing damage management activities should select methods or implement methods in a specific way that targets the specific species causing the damage. For example, persons should implement methods in locations that are extensively, and if possible exclusively, used by the target species. Additionally, if captured, persons should release non-target species.

The ESA makes it illegal for any person to '*take*' any listed endangered or threatened species or their critical habitat. The ESA defines take as, "*to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct*" (16 USC 1531-1544). Critical habitat is a specific geographic area or areas that are essential for the conservation of a threatened or endangered species. Section 7 of the Act requires that federal agencies conduct their activities in a way to conserve species. It also requires that federal agencies consult with the appropriate implementing agency (either the USFWS or the National Marine Fisheries Service) prior to undertaking any action that may take listed endangered or threatened species or their critical habitat.

Appendix C contains a list of species the Louisiana Natural Heritage Program within the LDWF considers as rare, threatened, or endangered in the State. The potential for damage management activities to have effects on populations of non-target wildlife, including threatened or endangered species under the four alternatives occurs below.

Alternative 1 – WS Would Continue to Address Blackbird Damage through an Adaptive Integrated Approach Using Lethal and Non-lethal Methods (Proposed Action/No Action Alternative)

The proposed action/no action alternative would continue the current implementation of an adaptive integrated approach utilizing non-lethal and lethal techniques, as deemed appropriate using the WS Decision Model. WS' personnel use a thought process for evaluating and responding to requests for assistance detailed in the WS Decision Model (see WS Directive 2.201) and described by Slate et al. (1992). As part of that thought process, WS' employees would consider the methods available and their potential to disperse, capture, or kill non-targets based on the use pattern of the method.

WS' personnel would use their training and experience to identify wildlife and wildlife damage or threats of damage. In addition, WS' employees would be knowledgeable in the use patterns of methods to select the most appropriate methods to address target animals and exclude non-target species. To reduce the likelihood that methods would affect non-target wildlife, WS would employ the most selective methods for the target species, would employ the use of attractants that were as specific to target species as possible, and/or determine placement of methods to avoid exposure to non-targets. Section 3.3 and Section 3.4 of this EA discuss the SOPs to prevent and reduce any potential adverse effects on non-targets. Despite the best efforts to minimize non-target take during program activities, the potential for adverse effects to non-targets exists when applying both non-lethal and lethal methods to manage damage to sprouting rice.

Non-lethal methods have the potential to cause adverse effects to non-targets primarily through exclusion, harassment, dispersal, and could include inadvertently live capturing non-target animals. Any exclusionary device erected to prevent access of target species also potentially excludes species that are not the primary reason for erecting the exclusion; therefore, adverse effects could occur to non-target species excluded from areas if the area excluded were large enough. The use of auditory and visual dispersal methods used to reduce damage or threats caused by blackbirds would also likely disperse non-targets in the immediate area the methods were employed. Therefore, employing non-lethal harassment and dispersal techniques could disperse non-targets from an area. 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. WS would not employ non-lethal dispersal and harassment 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 would cause long-term adverse effects to occur to a species' population. Non-lethal harassment and dispersal methods generally have minimal impacts on overall populations of wildlife since those methods would not harm individuals of those species. The use of non-lethal harassment and dispersal methods would not have adverse impacts on non-target populations under any of the alternatives.

Other non-lethal methods available for use under this alternative include live traps, nets, translocation, and repellents (if registered). Live traps (*e.g.*, decoy traps) and nets (*e.g.*, mist nets, cannon nets) would capture and restrain blackbirds, but those methods would have the potential to capture non-target wildlife. Nets would virtually be selective for target individuals since application would occur by attending personnel, with handling of birds occurring after deployment of the net or nets. Therefore, attending personnel could immediately release any non-targets captured using nets. Trap and net placement in areas where target species were active and the use of target-specific attractants would likely minimize the capture of non-targets. Attending to live traps appropriately (*e.g.*, frequent checking, personnel present on site) would allow the release of any non-targets captured unharmed. Even though live-capture does occur from those methods, the potential for death of a target or non-target while restraining or releasing the animal does exist, primarily from being struck by the cannon/rocket assemblies during deployment. The likelihood of cannon/rocket assemblies striking non-targets is extremely low. To occur, non-target animals must be present when the net is activated and in a position to be struck. Attending personnel would position nets to envelop wildlife upon deployment and to minimize striking hazards. Baiting of the areas to attract target species often occurs when using nets. Therefore, if non-target use of the area were high, personnel could abandon those sites.

WS would only recommend repellents the EPA approves for use pursuant to the FIFRA and the LDAF approves for application in the State. WS would recommend the use of repellents available to reduce damage occurring to sprouting rice to an agricultural producer. Therefore, the actual application of the repellent would be the responsibility of the producer. Since blackbirds feed on the rice seed, research on repellents has focused on seed treatments where application of the repellent occurs directly to the seed by the seed manufacturer or by the agricultural producer at the time of seeding. Despite extensive research on possible taste repellents for newly seeded rice, a safe, effective repellent remains elusive (Avery et al. 2005). One active ingredient that has shown promise as a taste repellent and that agricultural producers have used in the State to prevent blackbird damage to sprouting rice is anthraquinone (Avery et al. 1998, Cummings et al. 2002*b*, Cummings et al. 2002*c*).

Anthraquinone is a naturally occurring chemical compound found in many plants and some invertebrates that was first registered as a bird repellent in 1944 (Cummings et al. 2011). When birds ingest food treated with anthraquinone, they appear to become slightly sick, which prompts them to avoid feeding on treated foods (Avery and Cummings 2003, Cummings et al. 2011). Birds that ingest foods treated with anthraquinone recover from being sick. The EPA considers anthraquinone to be a biopesticide since the chemical is a naturally occurring compound. When evaluating anthraquinone, the EPA concluded, "[r]*isks to nontarget species is minimal due to the lack of toxicity, use pattern, and application methods*" (EPA 1998).

Under the pesticide emergency exemption in Section 18 of the FIFRA, a commercial product with the active ingredient anthraquinone received approval by the EPA and the LDAF for limited use in the State to prevent damage to newly seeded rice. However, the emergency exemption has expired and the commercial product is no longer available for use in the State. The future availability of products containing the active ingredient anthraquinone or other taste repellents is unknown. Caffeine has been the focus of the most recent research on possible taste repellents (Avery et al. 2005).

If a repellent were available to reduce damage to newly seeded rice, the EPA would have to approve the use of the repellent pursuant to the FIFRA and the LDAF would have to allow its application in the State. Therefore, if WS recommended the use of a commercial product through technical assistance that the

EPA and the LDAF approved for use and the person requesting assistance applied the product pursuant to the label[42], the effects on non-target wildlife would be minimal.

Impacts on 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 take would occur. Non-lethal methods would be available under all the alternatives analyzed. WS' involvement in the use of or recommendation of non-lethal methods would ensure non-target impacts were considered under WS' Decision Model. 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 would also employ and/or recommend lethal methods under the proposed action alternative to alleviate damage. Lethal methods available for use to manage damage caused by blackbirds under this alternative would include shooting and the avicide DRC-1339. In addition, WS could euthanize blackbirds captured alive using traps or nets. Appendix B further discusses the available methods and the application of those methods to alleviate blackbird damage.

The use of firearms would essentially be selective for target species since WS' employees would identify the bird species prior to application; therefore, no adverse effects to non-targets would be anticipated from use of this method. When WS captured target blackbirds alive and subsequently euthanized those blackbirds, WS' personnel would apply euthanasia methods according to WS Directive 2.505. Since live-capture of blackbirds using other methods would occur prior to the administering euthanasia methods, identification of the bird species would occur prior to application. Therefore, no adverse effects would occur to the populations of any non-target species from the use of euthanasia methods.

As mentioned previously, the avicide DRC-1339 is currently only available for use by WS and would only be available under the proposed action alternative. A common concern with the use of the avicide DRC-1339 is the potential non-target risks. Based on increased concerns of non-target risks associated with the use of DRC-1339, a more detailed discussion occurs below.

DRC-1339 Use Patterns

When using DRC-1339, WS' employees would follow all label requirements of DRC-1339 to minimize non-target hazards. As required by the label, WS' employees would pre-bait and monitor for non-target use as outlined in the pre-treatment observations section of the label. If WS' employees observed non-targets feeding on the pre-bait, WS' employees would abandon those plots and no baiting would occur at those locations. When baiting occurred, WS' employees would mix treated bait with untreated bait per label requirements to minimize the likelihood of non-targets finding and consuming treated bait.

Locations where WS may place the diluted mixture of DRC-1339-treated bait and untreated rice would be determined based on several factors. Those factors include product label requirements (*e.g.*, distance from water, specific location restrictions), the target bird species use of the site (determined through prebaiting and an acclimation period), and non-target use of the area (areas with non-target activity would not be used or would be abandoned). In addition, WS' personnel would select sites based on human safety factors. Once appropriate locations were determined after the pre-baiting acclimation period, the diluted mixture (treated bait and untreated bait) would be broadcast using mechanical methods (ground-

[42] The intent of the registration process for pesticides is to assure minimal adverse effects to people, animals, and the environment when using chemicals in accordance with label directions. Under the FIFRA and its implementing guidelines, using any pesticide in a manner that is inconsistent with the label of the pesticide is a violation of federal law.

based equipment or hand spreaders) or by manual broadcast (distributed by hand) per label requirements[43].

Per the staging area label requirements of DRC-1339 (EPA Reg. No. 56228-30), application rates cannot exceed 0.1 pounds of active ingredient per treated acre per treatment or a maximum yearly application rate of 0.5 pounds of active ingredient per acre. This application rate is consistent with the use of brown rice bait that is 1.9% active ingredient (DRC-1339), diluted 1:25 with untreated brown rice, and applied at a rate of 137 pounds of diluted mixture per treated acre. WS' personnel would apply the diluted mixture in swaths 20 to 50 feet wide that are spaced at least one swath width (20 to 50 feet) apart. WS' personnel would re-treat the same swaths or treat previously untreated swaths (continuing to alternate swaths) if 75% or more of the originally bait mixture placed was consumed by target birds, if 0.4 inches or more of precipitation has fallen, or after seven days of exposure. WS' personnel would not replenish the bait mixture if target species were no longer present or were no longer feeding on the diluted mixture. Regardless of the application method selected, WS' personnel would not make treatments that exceed rates of 137 pounds per treated acre of diluted brown rice mixture and personnel would not make more than five treatments per year to any one treated area.

To limit the exposure of non-targets to DRC-1339 treated baits, the DRC-1339 label available to target blackbirds causing damage to newly seeded rice requires the dilution of treated rice with untreated rice at a ratio of one treated rice particle to 25 or more untreated rice particles. Cummings et al. (1992) found the median consumption of rice was 28 grains per blackbird from blackbirds collected from and around bait sites. Therefore, a dilution rate of at least one treated particle to 25 untreated particles ensures that blackbirds would generally consume one treated particle per feeding bout. One benefit of DRC-1339 is the differential toxicity exhibited by the compound when ingested by wildlife. The differential toxicity of DRC-1339 reduces the risk of non-targets consuming a lethal dose (DeCino et al. 1966). The ingestion of one treated rice particle is likely to cause mortality in target blackbird species, which are highly sensitive to the effects of DRC-1339; however, some wildlife species are less sensitive to DRC-1339 and must ingest multiple treated particles to achieve a lethal dose.

For example, Pipas et al. (2003) estimated that a 30-gram horned lark would need to eat 7.6 treated rice grains to ingest a dose equivalent to the lowest observed effect level (*i.e*., the lowest observed level that caused mortality) that Eisemann et al. (2003) reported for larks. To eat 7.6 treated rice grains, Pipas et al. (2003) calculated a horned lark would have to consume 197.6 grains of rice from a bait plot with a dilution rate of one treated rice particle to 25 untreated particles. In comparison, female red-winged blackbirds collected from a bait site consumed a maximum of 104 whole rice grains in a single feeding bout, with the mean being 30.3 grains per feeding (Pipas et al. 2003).

Despite non-target birds potentially occurring on sites baited with DRC-1339 treated rice, there have been no or few reported mortalities because of the mode of action associated with DRC-1339 (Knittle et al. 1980, Glahn et al. 1990, Cummings et al. 1992). Cummings et al. (2002*a*) speculated the low numbers of species observed around baiting sites could have been due to the location of bait sites, the feeding activity of blackbirds, or the bait availability. Glahn et al. (1990) found that blackbirds could overwhelm bait sites and exclude non-target bird use, and that target birds consumed most of the DRC-1339 baits each day. Blackbirds often eat all of the rice placed at bait sites within a few hours of application. At those sites where blackbirds may not eat all of the rice following application, the DRC-1339 treated baits are likely to degrade rapidly because of the moist climate of the rice growing regions in Louisiana (Pipas et al. 2003). Therefore, non-target birds that ingest treated bait may receive a sub-lethal dose caused by the degradation of the DRC-1339 from environmental factors (see discussion further below). In addition, WS would recover unconsumed bait material to the extent possible at the end of a baiting period.

[43]The broadcast of the diluted mixture would not occur by aircraft

However, despite differential toxicity some bird species that could be present in areas baited with DRC-1339 could be sensitive to the effects if they ingested a treated rice grain. Estimating avian mortality caused by DRC-1339 can be difficult, and failure to find affected or dead target and/or non-target birds does not mean there is no risk to non-targets. Previous studies have shown the success of locating small bird carcasses on bait sites or in adjacent habitat can range from 30% to 88% (Linz et al. 1991, Tobin and Dolbeer 1990). Cummings et al. (2002*a*) found the predominant non-target birds using DRC-1339 bait sites and the surrounding habitat in southwestern Louisiana were savannah sparrows, mourning doves, killdeer, and unidentified species of sparrows, which was similar to the findings of Pipas et al (2003). In total, Cummings et al. (2002*a*) conducted 94 searches of DRC-1339 bait sites and surrounding habitat and found one dead northern male cardinal that showed pathological signs of DRC-1339 poisoning.

As stated previously, potential sites would be pre-baited to monitor for non-target activity. If WS observes non-target activity at potential sites, WS would not place treated bait at those locations. If WS broadcast treated baits at a site, WS would continue to monitor those sites for non-target feeding activity. If WS observed non-targets feeding on bait, WS' personnel would abandon those sites. By acclimating target bird species to a feeding schedule (accomplished during the pre-baiting acclimation phase), baiting could occur at specific times to ensure target bird species quickly consumed the bait, especially when large flocks of target species were present. For example, blackbirds often feed in the late afternoon or evenings prior to entering nighttime roosting sites. Therefore, once blackbirds were accustomed to feeding at a particular location near nighttime roosts, which can be accomplished by WS' personnel applying pre-bait, the diluted mixture (treated and untreated rice mixture) can be placed during the late afternoon or early evening just prior to the birds beginning to return to nightly roost locations. In those situations, the diluted mixture would only be available for a few hours from the time WS' personnel broadcast the diluted mixture to the time when blackbirds consumed the treated rice. Glahn et al. (1990) found that blackbirds can overwhelm DRC-1339 bait sites and exclude non-target bird use, and that target blackbirds consumed most of the bait each day, which limits the availability of treated rice to non-target animals.

The acclimation period would allow treated bait to be present only when WS' personnel had conditioned target bird species to be present at the site. An acclimation period would also increase the likelihood that target species would consume the treated bait shortly after applying the diluted mixture, which would make it unavailable to non-targets. In addition, when present in large numbers, many bird species tend to exclude non-targets from a feeding area due to their aggressive behavior and by the large number of conspecifics present at the location. Therefore, risks to non-target species from consuming treated bait would only occur when treated bait was present at a bait location. WS would retrieve all dead birds, to the extent possible, following treatment with DRC-1339 to minimize secondary hazards associated with scavengers feeding on bird carcasses.

DRC-1339 Primary Hazard Profile

DRC-1339 was selected for reducing bird damage because of its very high toxicity to blackbirds (DeCino et al. 1966, West et al. 1967, Schafer, Jr. 1972) and low toxicity to many mammals, sparrows, and finches (Schafer and Cunningham 1967, Apostolou 1969, Schafer, Jr. 1972, Schafer, Jr. et al. 1977, Matteson 1978, Cunningham et al. 1979, Cummings et al. 1992, Sterner et al. 1992, Pipas et al. 2003). The differential toxicity of DRC-1339 can reduce the risk of non-targets consuming a lethal dose (DeCino et al. 1966).

For example, the median acute lethal dose (LD_{50})[44] values for starlings, blackbirds, and magpies (Corvidae) range from one to five mg/kg (Eisemann et al. 2003). For American crows, the median acute lethal dose occurs at 1.33 mg/kg (DeCino et al. 1966). DRC-1339 can be toxic to mourning doves (*Zenaida macroura*), pigeons, quail (*Coturnix coturnix*), chickens, and ducks (*Anas* spp.) at ≥5.6 mg/kg (DeCino et al. 1966). In cage trials, Cummings et al. (1992) found that 2% DRC-1339-treated rice did not kill savannah sparrows (*Passerculus sandwichensis*). Gallinaceous birds and waterfowl may be more resistant to DRC-1339 than blackbirds, and their large size may reduce the chances of ingesting a lethal dose (DeCino et al. 1966).

Eisemann et al. (2003) summarizes the data available on the acute oral toxicity (LD_{50}) of DRC-1339 for over 55 species of birds. In addition, Eisemann et al. (2003) proposed defining the inherent toxicity of DRC-1339 to birds using the EPA classification of "*very highly toxic*" (LD_{50}<10 mg/kg), "*highly toxic*" (LD_{50}=10 to 50 mg/kg), "*moderately toxic*" (LD_{50}=51 to 500 mg/kg), "*slightly toxic*" (LD_{50}=501 to 2000 mg/kg), and "*practically nontoxic*" (LD_{50}>2000 mg/kg) (Bascietto 1985).

Using the EPA classification (Bascietto 1985) proposed by Eisemann et al. (2003), DRC-1339 is highly toxic (LD_{50}=10 to 50 mg/kg) to moderately toxic (LD_{50}=51 to 500 mg/kg) to American kestrels (*Falco sparverius*), chachalacas (*Ortalis vetula*), budgerigars (*Melopsittacus undulatus*), horned larks (*Eremophila alpestris*), and birds in the Anatidae, Accipitridae, Fringillidae, and Ploceidae families. DRC-1339 is very highly toxic (LD_{50} <10 mg/kg) to barn owls (*Tyto alba*), northern cardinals (*Cardinalis cardinalis*), African bulbuls (*Pycnonotus capensis*), American robins (*Turdus migratorius*), and birds in the Phasianidae, Odontophoridae, Columbidae, and Mimidae families (Eisemann et al. 2003, Pipas et al. 2003). In addition, the ingestion of DRC-1339 treated baits does not appear to affect avian reproduction until the bird ingests levels where toxicity occurs (USDA 2001). Cunningham et al. (1979) reported that DRC-1339 was moderately toxic (LD_{50}=51 to 500 mg/kg) to only slightly toxic (LD_{50}=501 to 2000 mg/kg) to most mammals, except cats (*Felis* spp.).

The risks associated with non-target animal exposure to DRC-1339 baits have been evaluated in rice fields in Louisiana (Glahn et al. 1990, Cummings et al. 1992, Glahn and Wilson 1992), poultry and cattle feedlots in several western states (Besser 1964, Ford 1967, Royall et al. 1967), ripening sunflower fields in North Dakota (Linz et al. 2000, Schaaf 2003, Custer et al. 2003), and around blackbird staging areas in east-central South Dakota (Knutsen 1998, Smith 1999, Custer et al. 2003). Smith (1999) used field personnel and dogs to search for dead non-target animals around sites baited with DRC-1339. Smith (1999) did not find carcasses of non-targets that exhibited histological signs consistent with DRC-1339 poisoning. Other studies also failed to detect any non-target birds that had succumbed to DRC-1339. However, DRC-1339 is a slow-acting avicide and thus, some birds could move to areas not searched by the study participants before dying.

Cummings et al. (2002*a*) and Pipas et al. (2003) evaluated the non-target bird use and the potential hazards of DRC-1339 treated bait to non-targets when used at blackbird staging areas near roosts in Louisiana. In total, Pipas et al. (2003) observed 10 non-target bird species using bait sites in Louisiana, including savannah sparrows, killdeer, mourning dove, meadowlarks, American pipit, northern cardinals, snow geese, white-fronted geese, horned larks, and herring gulls. The predominant non-target birds observed on sites and surrounding habitat were savannah sparrows, mourning doves, killdeer (*Charadrius vociferus*), unidentified sparrow species (Fringillidae family), meadowlarks (*Sturnella* spp.), and American pipits (*Anthus rubescens*), with the savannah sparrow having the highest exposure rate of any of the non-target bird species observed (Cummings et al. 2002*a*, Pipas et al. 2003). As stated previously, during 94 searches of areas surrounding sites baited with DRC-1339 for sick or dead non-targets,

[44]An LD_{50} is the dosage in milligrams of material per kilogram of body weight required to cause death in 50% of a test population of a species.

Cummings et al. (2002*a*) found one northern cardinal, which showed pathological signs of dying from DRC-1339.

To assess the sensitivity of the savannah sparrow and other sparrows, Cummings et al. (2002*a*) conducted feeding trials that offered 2% DRC-1339-treated brown rice to wild-caught sparrows for either 1 or 12 hours daily for 5 days. In those trials, none of savannah sparrows, white-crowned sparrows (*Zonotrichia leucophrys*), field sparrows (*Spizella pusilla*), song sparrows (*Melospiza melodia*), or chipping sparrows (*S. passerina*) in the trials died (Cummings et al 2002*a*). In another feeding test involving savannah sparrows, Cummings et al. (2003) offered the sparrows brown rice treated with 2% DRC-1339 that was mixed 1:25 with untreated rice for a 12-hr period each day for 5 days. During the feeding trial, one of the 10 savannah sparrows in the test died; however, a necropsy of the sparrow could not conclusively link the cause of death with any pathological signs associated with ingesting DRC-1339 (Pipas et al. 2003). Based on the data gathered, Cummings et al. (2002*a*) and Pipas et al. (2003) concluded the risks to savannah sparrows were low at sites associated with the use of DRC-1339 treated baits in Louisiana.

There is currently no published data on the sensitivity of killdeer and American pipits to the effects of DRC-1339. Killdeer diets typically consist of 98% animal matter and <2% plant matter, with some question as to whether ingestion of seeds is actually deliberate (Jackson and Jackson 2000). Arthropods (predominantly insects) are the primary food source of American pipits during most of the year but pipits also consume plant seeds in autumn and winter (Hendricks and Verbeek 2012). Based on the dietary habits of killdeer and American pipits, Pipas et al. (2003) concluded that those two species were not at high risk at bait sites where the DRC-1339 bait is brown rice.

There have been concerns expressed about the study designs used to derive acute lethal doses of DRC-1339 for some bird species (Gamble et al. 2003). The appropriateness of study designs used to determine acute toxicity to pesticides has many views (Lipnick et al. 1995). The use of small sample sizes was the preferred method of screening for toxicity beginning as early as 1948 to minimize the number of animals involved (Dixon and Mood 1948). In 1982, the EPA established standardized methods for testing for acute toxicity that favored larger sample sizes (EPA 1982). More recently, regulatory agencies have again begun to debate the appropriate level of sample sizes in determining acute toxicity based on a growing public concern for the number of animals used for scientific purposes.

Based on those concerns, the EPA established the Ecological Committee on FIFRA Risk Assessment to provide guidance on ecological risk assessment methods (EPA 1999). The committee report recommended to the EPA that only one definitive LD_{50} be used in toxicity screening either on the mallard or northern bobwhite and recommended further testing be conducted using the up-and-down method (EPA 1999). Many of the screening methods used for DRC-1339 prior to the establishment of EPA guidelines in 1982 used the up-and-down method of screening (Eisemann et al. 2003).

A review of the literature shows that LD_{50} research using smaller sample sizes conducted prior to EPA established guidelines are good indicators of acute lethal doses derived from research with more rigorous designs (Bruce 1985, Bruce 1987, Lipnick et al. 1995). Therefore, acute and chronic toxicity data gathered prior to EPA guidance remain valid and to ignore the data would be inappropriate and wasteful of animal life (Eisemann et al. 2003).

Birds that ingest a lethal dose of DRC-1339 probably die because of irreversible necrosis of the kidney and subsequent inability to excrete uric acid (*i.e.*, uremic poisoning) (DeCino et al. 1966, Felsenstein et al. 1974, Knittle et al. 1990). Birds ingesting a lethal dose of DRC-1339 usually die in one to three days. Consequently, target birds that become sick or die from ingesting DRC-1339 treated bait are not typically found at baiting sites but rather considerable distance away from the bait site or at roosting areas (Knittle et al. 1990). Because target birds are difficult to locate after feeding on treated bait, it is reasonable that some non-target bird carcasses would also be difficult to locate (Pipas et al. 2003).

Estimating risks to non-target wildlife associated with the use of DRC-1339 is a function not only of the susceptibility of the animal to the chemical (*i.e.*, toxicity), but also the potential exposure of the animal to the chemical (Pipas et al. 2003). The likelihood of a non-target animal obtaining a lethal dose is dependent on: (1) frequency of encountering the bait, (2) length of feeding bout, (3) the bait dilution rate, (4) the propensity of the animal to select against the treated bait, and (5) the susceptibility of the non-target species to the toxicant. To reduce risks to non-targets from the use of DRC-1339 treated bait, WS' employees would limit the exposure of non-target wildlife to bait by diluting treated rice with untreated rice, positioning bait lanes away from field edges, and observing pre-baited fields to avoid those with non-targets (Glahn and Wilson 1992).

During the development and scoping process for this EA, WS and others identified a concern regarding the potential effects of damage management activities on the declining populations of rusty blackbirds. The rusty blackbird is one of the most rapidly declining bird species in North America (Greenberg et al. 2011, Avery 2013). Avery (2013) summarizes the potential factors that may be influencing the current decline in the rusty blackbird population, which may include loss of wintering habitat, contaminants on the breeding grounds, damage management activities targeting other blackbird species, and increasing disturbance to breeding habitats in the boreal forest. Disease factors may also be contributing to the population decline (Barnard et al. 2010, Greenberg and Matsuoka 2010).

The rusty blackbird is one of the most ecologically specialized of the blackbird species in North America, both in its feeding habits and habitat uses (Avery 2013). During the nesting season, rusty blackbirds occur across the wet forests of Alaska and Canada, with breeding populations also occurring in some of the wet forested regions of the northeastern United States (Avery 2013). Trend data from the BBS shows an annual decline of -5.1% across all survey routes between 1966 and 2013, with a -3.0% annual decline occurring from 2003 through 2013 (Sauer et al. 2014)[45]. The Partners in Flight Science Committee (2013) estimated the breeding population of rusty blackbirds in North America at 5 million blackbirds, with a United States breeding population estimated at 700,000 blackbirds.

The fall migration period for rusty blackbirds begins in early September and ends in early December (Avery 2013). Rusty blackbirds winter in the southern and east-central portions of the United States, including Louisiana; however, their distribution across their wintering range is spotty (Avery 2013). Over the last 20 years, the number of rusty blackbirds observed in the United States in areas surveyed during the CBC has shown a cyclical pattern but an overall general increasing trend (National Audubon Society 2010). Since 1966, the number of rusty blackbirds observed in areas surveyed during the CBC has shown a general declining trend, with a cyclical but general increasing trend over the last 20 years (National Audubon Society 2010). No winter population estimates are available (Avery 2013). The spring migration back to nesting areas for rusty blackbirds begins in late February and ends in mid-May (Avery 2013).

The habitat of the rusty blackbird through its winter range typically consists of swamps, wet woodlands, and pond edges (Rosenberg et al. 1991, Luscier et al. 2010, Greenberg et al. 2011, Avery 2013). Small flocks may feed in open fields, often near marshland (Burleigh 1958). On their wintering grounds, rusty blackbirds typically forage in areas with shallow water (Luscier et al. 2010, Greenberg et al. 2011, DeLeon 2012, Avery 2013). DeLeon (2012) suggested rusty blackbirds selected wintering habitat based on the availability of shallow water and speculated the presence of shallow water and prey availability

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[45]Avery (2013) stated, "*Estimating abundance of this species has been difficult and inexact, given inaccessible breeding habitat (much of it north of* [Breeding Bird Survey] *routes) and mixing with other blackbirds on wintering grounds*."

could have a greater impact on rusty blackbird populations than changes in forested wetlands alone. The ephemeral nature of some shallow water and moist soil habitats may provide some explanation for the annual variability in the presence or absence of rusty blackbirds in wintering areas (Luscier et al. 2010, DeLeon 2012, Avery 2013). Greenberg et al. (2011) stated "*Rusty blackbirds appeared to depend on two distinct dietary items: (1) small acorns and pecans, which are often eaten while associating with common grackles, whose large, strong bills are able to crack nutshells; and (2) invertebrates picked from water or soil, or captured after flipping leaf litter and floating vegetation*." Luscier et al. (2010) found rusty blackbirds in agricultural fields adjacent to wetlands and bottomland forest near national wildlife refuges and wildlife management areas but wintering rusty blackbirds were not typically associated with large open agricultural fields that lacked nearby forests or wetlands.

Rusty blackbirds may associate with other blackbird species during the migration periods and during the winter season, but tend to prefer more woodland roosts and forage areas than the other blackbird species (Avery 2013). Greenberg et al. (2011) stated, '*Most rusty blackbirds are found either in single-species roosts or mixed with some red-winged blackbirds*." Rusty blackbirds usually comprise less than 1% of large mixed-species blackbird roosts (Neff and Meanley 1952, Meanly 1971, White et al. 1985, Stickley 1987, Dolbeer et al. 1997, Avery 2013). Meanley (1971) considered the rusty blackbird to be of "*minor importance*" when considering damage to rice, with the species doing little to no damage to growing rice.

Although rusty blackbirds are likely present in southwestern Louisiana, rusty blackbirds have not been associated with foraging flocks of blackbirds that cause damage to sprouting rice (A. Wilson, WS pers. obs. 2014). Similar observations have occurred in areas of southeastern Missouri where blackbirds cause damage to ripening rice. To determine blackbird movement patterns, research scientists with the NWRC used aerial mass marking to mark 1.3 million and 3.2 million blackbirds in communal roosts in Missouri during October in 2004 and 2005, respectively. Biologists recovered blackbirds lethally removed during damage management activities in Missouri and surrounding states during the subsequent January and February. Of the 11,671 blackbirds recovered, biologist did not identify any rusty blackbirds (USDA 2008). In addition, the species composition of major blackbird roosts surveyed in Missouri and Arkansas between 2002 and 2006 did not show the presence of rusty blackbirds, including one roost containing approximately 7 million blackbirds (USDA 2008).

As discussed previously, the use of DRC-1339 treated brown rice in Louisiana would generally be restricted to a period between December and April, with most baiting occurring from February 15 through March 15. DeLeon (2012) indicated surveys for rusty blackbirds present in Louisiana should occur from early November through late March and that peak populations of rusty blackbirds in Louisiana occurred from early January through late February. Survey seasons conducted by DeLeon (2012) "*…started with low numbers of* [rusty blackbirds] *until early January, then ended abruptly in late February or early March with departure of all birds*." Therefore, the use of DRC-1339 from February 15 through March 15 may miss part of the peak presence of rusty blackbirds in Louisiana.

During surveys in the Mississippi Alluvial Valley conducted by Luscier et al. (2010), surveyors detected an average of 26 ± 8 (range 1-160) rusty blackbirds at sites surveyed during 2006, 19 ± 5 rusty blackbirds (range 1-100) during 2007, and an average of 27± 8 (range 1-1,000) rusty blackbirds at survey sites during 2008. DeLeon (2012) found the average flock size of rusty blackbirds in areas of Louisiana surveyed was 20.6 ± 3.4 rusty blackbirds in 2010 and 19.7 ± 3.5 rusty blackbirds during 2011. Over the last 20-years, observers have only noted rusty blackbirds during seven of the surveys conducted in the Prairie Pine circle of the CBC, ranging from a low of one rusty blackbird to a high of 165 rusty blackbirds (National Audubon Society 2010). Across the State, the numbers of rusty blackbirds observed in areas surveyed during the CBC have shown a cyclical pattern but a general increasing trend from 1966 until the late 1980s and early 1990s. From the late 1980s through the early 1990s, the number of rusty blackbirds observed declined but began showing a more stable trend into the late 1990s and early 2000s with a general increasing trend beginning around 2008 (National Audubon Society 2010). Between 2004 and 2013, observers have counted an annual average of 760 rusty blackbirds across all areas surveyed in the State during the CBC (National Audubon Society 2010). No lethal take of rusty blackbirds have occurred by the WS program in Louisiana or by the WS program in the various states that comprise the Mississippi Flyway between FY 2009 and FY 2014.

However, the potential exists for rusty blackbirds to be present in mixed-species flocks of blackbirds in the rice-growing region of southwestern Louisiana. Therefore, WS would consider rusty blackbirds as non-target animals when conducting activities to alleviate damage to newly seeded rice. As with all other potential non-targets, the WS program would employ those SOPs discussed in Chapter 3 to ensure the dispersal, capture, or lethal removal of non-targets was minimal to non-existent. As per label requirements, WS would monitor for the presence of non-targets feeding on pre-bait prior to baiting areas, including the presence of rusty blackbirds. Like other non-targets, if WS' employees observed rusty blackbirds feeding on pre-bait, WS would abandon those sites or continue to pre-bait those locations until WS' employees no longer observed rusty blackbirds per the label requirements of the avicide DRC-1339. If WS' employees observed rusty blackbirds in flocks feeding at baited sites, WS would abandon those sites or WS could substitute untreated pre-bait until employees no longer observed rusty blackbirds feeding at the site.

As stated previously, no lethal take of rusty blackbirds have occurred by the WS program in the various states that comprise the Mississippi Flyway between FY 2009 and FY 2014. The effects associated with damage management activities targeting other blackbird species on the overall population of rusty blackbirds are unknown (Avery 2013). However, Greenberg and Droege (1999) speculated that damage management activities associated with other blackbird species were not an important cause of the species' decline. Based on the use patterns of methods, including the label requirements of the avicide DRC-1339, and the absence of rusty blackbirds from mixed-species flocks of blackbirds observed foraging on sprouting rice in southwestern Louisiana, activities under this alternative are not likely to have effects on the rusty blackbird population. Under this alternative, WS would implement those SOPs discussed in Chapter 3, which includes the continued monitoring of activities to evaluate the potential effects on the populations of non-target wildlife, including rusty blackbirds. The monitoring process would allow WS to adapt and modify activities to avoid any potential effects on the rusty blackbird population.

DRC-1339 Secondary Hazards

Secondary poisoning has not been observed with DRC-1339 treated baits. During research studies, carcasses of birds that died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1979). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds, which leaves little residue to be ingested by scavengers.

DRC-1339 is rapidly metabolized and excreted and does not bioaccumulate, which probably accounts for its low secondary hazard profile (Schafer, Jr. 1991). For example, cats, owls, and magpies would be at risk only after exclusively eating DRC-1339-poisoned starlings for 30 continuous days (Cunningham et al. 1979). According to the EPA (1995), laboratory studies with raptors indicated no adverse effects when certain raptor species were fed starlings poisoned with 1% DRC-1339 treated baits. Two American kestrels survived eating 11 and 60 poisoned starlings over 24 and 141 days, respectively. Two Cooper's hawks ate 191 and 222 starlings with no observable adverse effects. Three Northern harriers ate 100, 191, and 222 starlings over 75 to 104 days and survived with no apparent detrimental effects. The LD_{50} values established for other avian predators and scavengers, such as crows, ravens, and owls, indicate those species are acutely more sensitive to DRC-1339 than hawks and kestrels (EPA 1995). The risk to mammalian predators from feeding on birds killed with DRC-1339 appears to be low (Johnston et al. 1999).

DRC-1339 Environmental Degradation

DRC-1339 is unstable in the environment; therefore, DRC-1339 degrades rapidly when exposed to sunlight, heat, or ultra violet radiation and has a short half-life (EPA 1995). The half-life of DRC-1339 in biologically active soil is approximately 25 hours with the identified metabolites having a low toxicity (EPA 1995). DRC-1339 is also highly soluble in water, does not hydrolyze, and photodegrades quickly in water with a half-life estimated at 6.3 hours in summer, 9.2 hours in spring sunlight, and 41 hours during winter (EPA 1995). DRC-1339 binds tightly with soil; thus, the EPA (1995) considered DRC-1339 to have low mobility.

While WS' employees would take every precaution to safeguard against taking non-targets during operational use of methods and techniques for resolving damage and reducing threats to newly seed rice, the use of such methods could result in the incidental take of unintended species. Those occurrences would be rare and should not affect the overall populations of any species under the proposed action. WS' take of non-target species during activities to reduce damage associated with blackbirds in southwestern Louisiana would be expected to be extremely low to non-existent.

Effects on Non-target Wildlife from WS' Previous Activities to Manage Blackbird Damage

No non-target bird mortality was observed and no non-target wildlife species were known to have been killed from WS' activities conducted from FY 2009 through FY 2015. WS would monitor the take of non-target species to ensure program activities or methodologies used in blackbird damage management do not adversely affect non-targets. Methods available to alleviate and prevent blackbird damage or threats when employed by trained, knowledgeable personnel are selective for target species. WS would annually report to the USFWS and/or the LDWF any non-target take to ensure those agencies have the opportunity to consider any take by WS as part of management objectives.

Potential Benefits of Brown-headed Cowbird Reduction

Additionally, activities that remove brown-headed cowbirds may benefit songbird populations by reducing nest parasitism. Somewhat unique in their breeding habits, brown-headed cowbirds are known as brood parasites, meaning they lay their eggs in the nests of other bird species (Lowther 1993). As discussed previously, female cowbirds can lay up to 40 eggs per season with eggs reportedly being laid in the nests of over 220 species of birds (Lowther 1993). Cowbirds provide no parental care with the raising of cowbird young occurring by the host species. Young cowbirds often out-compete the young of the host species (Lowther 1993). Due to this, brown-headed cowbirds can have adverse effects on the reproductive success of other species (Lowther 1993) and can threaten the viability of a population or even the survival of a host species (Trail and Baptista 1993). In FY 2013, WS lethally removed an estimated 594,755 cowbirds to alleviate damage to sprouting rice in southwestern Louisiana. Based on models provided by The Nature Conservancy (K. Ouchley, Nature Conservancy pers. comm. 2001), WS estimates that 5.9 to 11.9 million songbird nests may have been protected from parasitism as a result of WS' removal of brown-headed cowbirds in FY 2013.

Threatened and Endangered Species Effects

The WS program makes special efforts to avoid jeopardizing threatened or endangered species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. Chapter 3 of this EA describes SOPs to avoid effects on threatened or endangered.

Federally Listed Species – WS reviewed the current list of species designated as threatened and endangered in Louisiana as determined by the USFWS and the National Marine Fisheries Services during the development of this EA. Table 4.1 contains the list of species currently listed in Acadia, Allen, Calcasieu, Cameron, Evangeline, Jefferson Davis, St. Landry, and Vermilion Parishes along with the common and scientific names of those species.

Based on a review of those threatened or endangered species listed in the State during the development of the EA, WS determined that activities conducted pursuant to the proposed action would have no effect on those species listed by the USFWS and the National Marine Fisheries Services nor their critical habitats. The rationale for the no effect determination for each species was based on several considerations, which are further discussed below.

Table 4.1 - Threatened or endangered species occurring in the proposed project area

Common Name	Scientific Name	Status†	Determination‡
Animals			
Reptiles			
Green Sea Turtle	*Chelonia mydas*	T	NE
Hawksbill Sea Turtle	*Eretmochelys imbricata*	E	NE
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	NE
Leatherback Sea Turtle	*Dermochelys coriacea*	E	NE
Loggerhead Sea Turtle	*Caretta caretta*	T	NE
Fish			
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*	T	NE
Pallid Sturgeon	*Scaphirhynchus albus*	E	NE
Mammals			
Louisiana Black Bear	*Ursus americanus luteolus*	T	NE
Louisiana Black Bear Critical Habitat		H	NE
West Indian Manatee	*Trichechus manatus*	E	NE
Birds			
Piping Plover	*Charadrius melodus*	T	NE
Piping Plover Critical Habitat		H	NE
Red-cockaded Woodpecker	*Picoides borealis*	E	NE
Sprague's Pipit	*Anthus spragueii*	C	NE
Red Knot	*Calidris canutus rufa*	T	NE
Plants			
American Chaffseed	*Schwalbea americana*	E	NE

†T=Threatened; E=Endangered; C=Candidate; H=Critical Habitat Designated

‡NE=No effect

Kemp's Ridley sea turtle (Nesting) – This sea turtle is a marine species that can be found along the coastal waters of Louisiana. Nesting has not recently been documented in the State; however, nesting has been documented to occur along beaches in States adjacent to or near Louisiana (National Marine Fisheries Service, USFWS, and SEMARNAT 2010). Based on the use patterns of methods available to alleviate blackbird damage, the proposed activities would have no direct effect on sea turtles.

Green sea turtle (Nesting) – Like the other sea turtles, the green sea turtle is a marine species that could be found along the coastal waters of the State. Based on the use patterns of methods, the proposed activities would have no direct effect on the status of the green sea turtle. Nesting is not known to occur on coastal beaches of the continental United States; therefore, WS concludes that the proposed activities would have no effect on the green sea turtle.

Hawksbill sea turtle (Nesting) – The hawksbill sea turtle is another marine species that could be found along the coastal waters of the State. However, nesting is not known to occur along the coastal beaches of the State. Since methods and activities conducted under the proposed activities would not involve marine environments and since nesting is not known to occur within the State, WS has concluded the proposed activities would have no effect on the status of the hawksbill sea turtle.

Leatherback sea turtle (Nesting) - This marine species has been observed nesting along the gulf coast states from Texas to Georgia; however, the sea turtle currently only consistently nests along the Florida coast. Similar to the other sea turtles, the proposed activities would not directly affect the leatherback sea turtle; therefore, WS has determined the proposed action alternative would have no effect on the status of the leatherback sea turtle in the State.

Loggerhead sea turtle (Nesting) - The loggerhead sea turtle is a marine species that could be found along the coastal areas of the State. The proposed activities would not result in any detrimental impacts to the status of the loggerhead sea turtle; therefore, WS has concluded the proposed action alternative would have no effect on the status of the loggerhead sea turtle.

Gulf sturgeon – Gulf sturgeons are found in the Pearl River and the tributaries of Lake Pontchartrain. The proposed activities would not be conducted in riverine systems or result in modifications to riverine habitats. Therefore, WS has concluded that the proposed activities would have no effect on the status of the gulf sturgeon in the State. In addition, WS has determined the proposed activities would have no effect on designated critical habitat for the gulf sturgeon based on the use pattern of the methods and the locations where activities could occur. Use pattern of methods would not result in major habitat modifications.

Pallid sturgeon - Pallid sturgeons require large, turbid, free-flowing riverine habitat and are usually found near the bottom of those rivers. This species has been found in the Mississippi River and tributaries of the Mississippi River. The proposed activities would not be conducted within riverine habitat or result in habitat changes of riverine systems; therefore, WS has concluded the proposed activities would have no effect on the status of the pallid sturgeon within the State.

Louisiana black bear - The Louisiana black bear once occupied forestlands in Louisiana, Mississippi, and eastern Texas, with hardwood forests being the preferred habitat of bears. However, bears can also occur in other forested habitats where sufficient food, water, cover, and denning locations are available in large remote forested areas (USFWS 2009). Current threats to the black bear in Louisiana continue to be habitat reduction and fragmentation and human-induced mortality (USFWS 2009). The loss of habitat and the continued fragmentation of existing habitat prevents the current subpopulations of black bears from expanding their current breeding range by restricting movements and forcing bears to forage in areas where bears may be more susceptible to mortality events (*e.g.*, crossing roads). Fragmentation can also affect the demographics of the population and genetic integrity by restricting movements of bears between subpopulations. In addition, fragmentation can also increase mortality associated with human activities, such as mortality from vehicular collisions, poaching, and damage management purposes (USFWS 2009). Louisiana black bears are known to feed on agricultural crops, such as corn, oats, wheat, and sugar cane (USFWS 1995). During a food habits study, Benson and Chamberlain (2006) found that of the 48 different food items found in Louisiana bear scat examined, corn comprised the highest percentage by volume in summer, fall, and in overall volume. Of the methods available to alleviate blackbird damage, of primary concern would be the use of DRC-1339. Of concern would be black bears consuming treated rice baits and bears foraging on dead blackbirds that were killed after ingesting DRC-

1339. However, no black bears have been observed in plots to date, no evidence of black bears in baited areas have been observed to date, and no effects have been observed or brought to the attention of WS from the use of DRC-1339 treated rice to date. DRC-1339 toxicity data for black bears is currently not available.

During research studies, carcasses of birds that died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1979). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds, which leaves little residue to be ingested by scavengers. In addition, WS' personnel would dilute treated rice particles with untreated rice before broadcasting the mixture onto bait lanes; therefore, diluting the treated rice with untreated rice reduces the risk of a non-target consuming a treated particle. Based on the lack of evidence of bears being present in plots where treated rice has been placed, the low toxicity of DRC-133 to many mammal species, and the chemical being nearly metabolized from the bodies of target bird species that consume treated particles, WS has determined the proposed action alternative, including the use of DRC-1339, would have no effect on the status of the black bear, including any designated critical habitat.

West Indian manatee - Manatees are an aquatic species occasionally found in larger drainages that empty into large saltwater bays and lakes or the Gulf of Mexico. Areas within the State where manatees could be found include Lake Pontchartrain and associated tributaries on the north shore and rarely along the Gulf coast. Based on the use patterns of methods available, the distribution of manatees within the State, and the habitat associated with manatees, WS has determined that activities conducted pursuant to the proposed action alternative would have no effect on the status of the manatee in the State. The proposed activities would not result in destruction or modification of those habitats; therefore, WS concludes the proposed activities would have no effect on the status of the manatee.

Piping plover - Piping plovers winter along the coastal areas of the State and prefers tidal flats for feeding and sandy beaches for roosting. Critical habitat for this plover includes the coastal areas of Cameron and Vermillion Parishes. The proposed activities do not result in habitat destruction or modifications of habitat. Based on the feeding habits of piping plovers and their preference for tidal flats to feed and sandy beaches for roosting, WS has determined the proposed action alternative would have no effect on the status of the piping plover. In addition, WS has determined the proposed activities would have no effect on designated critical habitat for the piping plover based on the use pattern of the methods. Use pattern of methods do not result in major ground disturbance or major habitat modifications.

Red-cockaded woodpecker – This woodpecker species requires open stands of mature pine trees, primarily longleaf pine (*Pinus palustris*), for nest cavity construction. Based on the habitat requirements of the woodpecker and the use patterns of those methods available to address blackbird damage, WS has concluded that the proposed activities would have no effect on the status of the red-cockaded woodpecker. Those methods and activities proposed would not result in habitat destruction or result in habitat modification.

Sprague's pipit - The Sprague's pipit is considered a candidate species for listing across their range. Their breeding range includes the native prairie regions of the Upper Great Plains with their wintering range along the southern edge of the United States from southern Arizona across to southern Louisiana and northern Mexico (USFWS 2014*a*). The pipit uses a wider range of grassland habitats on their winter ranges but appear to be strongly associated with native prairie habitats. The preferred grass height varies but has been estimated to be between 4 and 12 inches on both their breeding grounds and wintering grounds (USFWS 2014*a*). Pipits are rarely observed on cropland (USFWS 2014*a*). Most of the Sprague's pipit population winters in Mexico with some sightings along the coastal prairies of Texas and Louisiana (USFWS 2014*a*). Sprague's pipit feed primarily on arthropods during the migration and wintering periods; however, they may feed on seeds during the latter wintering periods (Davis et al. 2014). Of the methods available to alleviate blackbird damage, of primary concern would be the use of DRC-1339. Of concern would be pipits consuming treated rice baits. However, no Sprague's pipits have been observed in plots to date in Louisiana.

The primary threats to the Sprague's pipit are habitat conversion (*e.g*., land conversion, grazing, fire suppression, mowing, fragmentation) and energy development (*e.g*., oil, gas, wind, roads). The proposed activities would not result in destruction or modification of native prairie habitats. Based on the habitat preferences of the Sprague's pipit and their feeding habits, WS concludes the proposed activities would have no effect on the status of the Sprague's pipit.

Red knot - The USFWS has listed the red knot as a threatened species. During the breeding season, red knots occur in the extreme northern artic region of Alaska, central Canada, and the northern edges of Greenland. Red knots winter primarily in intertidal marine habitats, especially near coastal inlets, estuaries, and bays along the coasts of the United States, Central America, and South America. During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks and they roost on high sand flats, reefs, and other sites protected from high tides (USFWS 2014*b*). Their primary food sources during the migration periods and on their wintering habitats include invertebrates, especially bivalves, gastropods, and crustaceans. Coquina clams (*Donax variabilis*), a frequent and often important food resource for red knots, are common along many beaches in the Gulf of Mexico (USFWS 2014*b*). Major threats to the red knot along the Gulf of Mexico include the loss and degradation of habitat due to erosion, shoreline stabilization, and development; disturbance by humans and pets; and predation (USFWS 2014*b*).

In Louisiana, red knots occur primarily in marine habitats along the coast during the spring and fall migration periods and during the winter months (Baker et al. 2013). Generally, red knots could be present in the State from September through March with knots present during the fall migration (July 2 through Nov 15), spring migration (February 16 through June 1), and during the winter months (November 16 through February 15) (USFWS 2014*b*, D. Fuller, USFWS pers. comm. 2015). Red knots may also occur within mixed flocks of shorebirds in seasonally flooded agricultural fields (*e.g*., rice, crawfish) during spring and fall migrations. Although rare, people have observed red knots along the coastal areas of the State during the summer months (June 2 through July 1) (USFWS 2014*b*, D. Fuller, USFWS pers. comm. 2015).

When evaluating the risks of methods to the red knot, of primary concern would be the potential use of DRC-1339 by WS to manage damage to sprouting rice. WS' use of DRC-1339 would follow all label requirements of the product. Prior to using bait treated with DRC-1339, WS' personnel would pre-bait potential sites with untreated rice during an acclimation period. The acclimation period conditions blackbirds to feed at the location and allows WS' personnel to observe the site for non-target animal activity. Potential baits sites would be abandoned if WS' personnel observe non-target animals feeding on the pre-bait. During previous activities associated with WS' use of DRC-1339 to manage blackbird damage to sprouting rice, WS has not previously observed red knots using potential bait plots. In addition, during the migration periods and during the winter months, red knots feed primarily on invertebrates, especially bivalves, gastropods, and crustaceans (Baker et al. 2013, USFWS 2014*b*). Therefore, it is unlikely that red knots, if found in potential bait sites, would feed on the brown rice that WS' personnel would use as pre-bait or treated bait. In addition, applicators cannot place treated baits within 50 feet of water bodies per requirements of the DRC-1339 staging area label (EPA Reg. No. 56228-30). The use of DRC-1339 treated brown rice would be limited to blackbird staging areas that include stubble fields, bare-ground non-crop areas (*e.g*., levee roads) and open grass sites (Cummings et al. 2002*a*), which are not areas where red knots are likely to occur. Based on the use patterns of the methods available to alleviate damage and the areas where damage management activities could occur in relationship to areas where red knots are likely to occur, WS has concluded the proposed action would have no effect on the status of the red knot.

State Listed Species – The current list of State listed species designated as endangered or threatened by the LDWF was reviewed during the development of the EA (see Appendix C). Based on the review of species listed in the State, WS has determined that the proposed activities would have no effect on those species currently listed by the LDWF.

Alternative 2 - WS Would Address Blackbird Damage through an Adaptive Integrated Approach Using Only Non-lethal Methods

A non-lethal management alternative would require WS to only recommend and use non-lethal methods to manage and prevent blackbird damage to newly seeded rice. WS would provide technical assistance and direct operational assistance under this alternative recommending and using only non-lethal methods. Non-lethal methods would have the potential to cause adverse effects to non-targets primarily through live-capture, exclusion, harassment, and dispersal. Any exclusionary device erected to prevent access of target species also potentially excludes species that are not the primary reason for erecting the exclusion; therefore, if the exclusion area was large enough, adverse effects could occur to individual non-target species by potentially restricting access to food or shelter. The use of auditory and visual dispersal methods would also likely disperse non-targets in the immediate area the methods were employed. Therefore, non-lethal dispersal techniques could permanently disperse non-targets from an area. 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.

Live traps would restrain blackbirds once captured; therefore, those types of traps are live-capture methods. Live traps have the potential to capture non-target species. Trap placement in areas where target species were active and the use of target-specific attractants could minimize the capture of non-targets. If WS' personnel attended to traps appropriately, those employees could release any non-targets unharmed on site.

WS would only recommend those repellents that the EPA registers pursuant to the FIFRA and the LDAF allows people to apply within the State. As discussed previously, those repellents that could be available are most applicable for use by the agricultural producer or the manufacturer of the seed. Risks to non-targets from the use of repellents would be similar to those discussed under the proposed action alternative.

WS' involvement in the use of or recommendation of non-lethal methods would ensure that the potential effects on non-target wildlife were considered under WS' Decision Model. Based on the use patterns of the non-lethal methods that would be available under this alternative, the WS program in Louisiana has determined this alternative would have no effect on any threatened or endangered species listed within the project area, including any designated critical habitat.

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 take would occur from their use. However, other entities could continue to use lethal methods to alleviate damage under this alternative. Other entities could still lethally remove blackbirds to alleviate damage under this alternative using the same methods addressed under the proposed action alternative, except for DRC-1339. However, other entities could register DRC-1339 for use in the State under this alternative. Therefore, non-target take under this alternative by other entities that employ lethal methods could be similar to the take of non-targets that could occur under the proposed action alternative.

If other entities registered DRC-1339 with the LDAF for use in the State to minimize blackbird damage to sprouting rice and people used DRC-1339 in accordance with label requirements and in consideration of non-target risks, the risks to non-targets from the use of DRC-1339 would be similar to those risks discussed under Alternative 1. If people used DRC-1339 inappropriately and/or without regard to non-target risks, risks to non-targets under this alternative could be higher than the proposed action alternative.

If lethal methods were not available to address damage adequately, it is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal take, which could lead to real but unknown effects on the population of non-target wildlife. People have resorted to the illegal use of chemicals and methods to alleviate the damage that blackbirds cause (*e.g*., see Mitchell et al. 1984, Stone et al. 1984, White et al. 1989, Food and Drug Administration 2003).

Alternative 3 – WS Would Address Blackbird Damage Using Technical Assistance Only

Under this alternative, WS would provide those persons requesting assistance with managing damage and threats associated with blackbirds with technical assistance only. WS would provide technical assistance as similar to Alternative 1 and Alternative 2. WS' personnel would use the WS Decision Model to make recommendations based on information provided by the person requesting assistance or through site visits to the area where damage was occurring. The potential effects on non-target animals would be a consideration when WS' personnel use the Decision Model. Recommendations would include methods or techniques to minimize non-target impacts associated with the methods that personnel were recommending or the methods that personnel loan, Technical assistance may also include providing supplies or materials not readily available (*e.g*., loaning propane cannons).

Appendix B contains a discussion of the methods available for use in managing damage and threats associated with blackbirds. Methods recommended could include non-lethal and lethal methods as deemed appropriate using WS' Decision Model and as permitted by laws and regulations. With the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative. The avicide DRC-1339 would only be available for use by WS and therefore would be unavailable for use under this alternative. However, similar to Alternative 2, other entities could register DRC-1339 for use in the State under this alternative. If other entities registered DRC-1339 with the LDAF for use in the State to minimize blackbird damage to sprouting rice and people used DRC-1339 in accordance with label requirements and in consideration of non-target risks, the risks to non-targets from the use of DRC-1339 would be similar to those risks discussed under Alternative 1. If people used DRC-1339 inappropriately and/or without regard to non-target risks, risks to non-targets under this alternative could be higher than the proposed action alternative.

The potential impacts to non-targets from a technical assistance only alternative would be variable and based on several factors. If other entities employ methods pursuant to recommendations made by WS' personnel, the potential impacts to non-targets would likely be similar to Alternative 1 and in the case of non-lethal methods, similar to Alternative 2. If those entities receiving technical assistance did not follow recommendations made by WS' personnel or if those entities employed methods that WS' personnel did not recommend, the potential impacts on non-target species, including threatened or endangered species, would likely be higher than the proposed action. Potential impacts from providing only technical assistance could be greater if those people experiencing damage did not implement methods or techniques correctly. Methods or techniques recommended by WS that other entities implement incorrectly could lead to an increase in non-target take. If persons did not follow recommendations made by WS' personnel or did not seek assistance from WS, the potential risks would be similar to Alternative 4.

If people receiving technical assistance use harassment and exclusion methods correctly and as WS' personnel recommend, the potential impacts of harassment and exclusion methods on non-target species could be similar to those described under Alternative 1 and Alternative 2. Harassment and exclusion methods are easily obtainable and simple to employ. Since identification of targets could occur when employing shooting as a method and if people were familiar with the identifying characteristics of the target bird species, the potential impacts to non-target species associated with those methods would likely be low under this alternative. However, the knowledge and skill of those persons implementing recommended methods would also influence the potential impacts to non-target animals.

Under this alternative, those persons receiving technical assistance could 1) take no further action, 2) choose to implement methods recommended by WS on their own, 3) choose to implement methods not recommended by WS, or 4) seek further assistance from other entities. Direct operational assistance provided by WS as described under Alternative 1 and Alternative 2 would not be available. Therefore, the WS program would have no direct effect on non-target species under this alternative, including any threatened or endangered species. If other entities provided direct operational assistance, WS could refer persons seeking assistance to those entities under this alternative.

It is possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal killing of blackbirds, which could lead to unknown effects on local non-target species populations, including some threatened or endangered species. When those people 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, including blackbirds. 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 take of wildlife species (*e.g.*, see Mitchell et al. 1984, Stone et al. 1984, White et al. 1989, Food and Drug Administration 2003).

Alternative 4 – WS Would Not Address Blackbird Damage to Sprouting Rice

Under this alternative, WS would not provide any assistance with managing damage to sprouting rice associated with blackbirds. WS would refer all requests for assistance to the USFWS, the LDWF, the LDAF, and/or private entities. Therefore, WS would have no direct impact to non-targets under this alternative, including threatened or endangered species.

Despite no direct involvement by WS in resolving damage and threats associated with blackbirds in the rice growing areas of southwestern Louisiana, those persons experiencing damage caused by blackbirds could continue to alleviate damage by employing both non-lethal and lethal methods. Under this alternative, people experiencing damage associated with blackbirds could continue to lethally take blackbirds pursuant to the blackbird depredation order or seek the assistance of other entities. Non-lethal methods would continue to have the potential to disperse non-target wildlife inadvertently while lethal methods would continue to have the potential to capture or kill non-target wildlife inadvertently. Therefore, risks to non-targets and threatened or endangered species would continue to occur from those people who implement damage management activities on their own and through recommendations or assistance that other federal, state, and private entities provide. Management actions taken by non-federal entities would be the *environmental status quo*.

Despite no involvement by WS in resolving damage and threats associated with blackbirds in the rice growing areas of southwestern Louisiana, those persons experiencing damage caused by blackbirds could continue to alleviate damage by employing both non-lethal and lethal methods. Similar to Alternative 2 and Alternative 3, with the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative. The avicide DRC-1339 would only be available for use by WS and therefore would be unavailable for use under this alternative. However, similar to Alternative 2 and Alternative 3, other entities could register DRC-1339 for use in the State under this alternative. If other entities registered DRC-1339 with the LDAF for use in the State to minimize blackbird damage to sprouting rice and people used DRC-1339 in accordance with label requirements and in consideration of non-target risks, the risks to non-targets from the use of DRC-1339 would be similar to those risks discussed under Alternative 1. If people used DRC-1339 inappropriately and/or without regard to non-target risks, risks to non-targets under this alternative could be higher than the proposed action alternative.

Similar to Alternative 3, the potential impacts to non-targets from this alternative would be variable and based on several factors. If people use methods correctly, the potential impacts of methods on non-target species could be similar to those described under Alternative 1 and Alternative 2. However, the knowledge and skill of those persons implementing methods would also influence the potential impacts to non-target animals. If entities employ methods incorrectly or without consideration of non-target risks, the potential impacts on non-target species, including threatened or endangered species, would likely be higher than the proposed action. Methods or techniques implemented incorrectly could lead to an increase in non-target take. If another entity began providing direct operational assistance, then the risks to non-targets would likely be similar to Alternative 1 and Alternative 2.

As previously stated, WS would not be involved with any aspect of addressing damage or threats of damage caused by blackbirds under this alternative. If assistance were not provided by WS or other entitles, it is hypothetically possible that frustration caused by the inability to reduce damage and threats could lead to illegal take, which could lead to real but unknown effects on other wildlife populations. In the past, people have resorted to the illegal use of chemicals and methods to alleviate blackbird damage issues (*e.g.*, see Mitchell et al. 1984, Stone et al. 1984, White et al. 1989, Food and Drug Administration 2003). However, if other entities knowledgeable and experienced in managing blackbird damage provided appropriate direct operational assistance and/or technical assistance, the risks would be similar to the other alternatives.

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

An additional issue often raised is the potential risks to human health and safety associated with the methods employed to manage damage caused by blackbirds. Both chemical and non-chemical methods have the potential to have adverse effects on human health and safety. Risks can occur both to persons employing methods and to persons encountering methods. Risks can be inherent to the method itself or related to the misuse of the method. Potential effects of damage management activities on human health and safety under each of the four alternatives occurs below.

Alternative 1 – WS Would Continue to Address Blackbird Damage through an Adaptive Integrated Approach Using Lethal and Non-lethal Methods (Proposed Action/No Action Alternative)

The proposed action/no action alternative would continue the current implementation of an adaptive integrated approach utilizing non-lethal and lethal techniques, as deemed appropriate using the WS Decision Model, to reduce damage and threats associated with blackbirds in rice growing areas of southwestern Louisiana. As described and discussed previously, WS' personnel would use a thought process for evaluating and responding to requests for assistance detailed in the WS Decision Model (see WS Directive 2.201) and described by Slate et al. (1992). WS' personnel would evaluate the appropriateness of strategies and methods based on their availability and suitability, including threats of those methods to human health and safety. Therefore, WS' personnel could integrate those methods discussed in Appendix B into a damage management strategy using the Decision Model after consideration of human safety risks.

The cooperator requesting assistance would be aware of the methods that WS could potentially use on their properties by signing a MOU, work initiation document, or a similar document that would list the methods the cooperator had agreed to allow WS to use. Therefore, the cooperator would be aware of and would approve of the use of those methods on property they own or manage prior to the initiation of any project, which would assist with identifying any risks to human safety associated with the use of those methods. WS could also minimize potential harmful effect by continually monitoring, evaluating, and making modifications, as necessary, to methods or strategies when providing direct operational assistance to not only reduce damage but also to minimize potentially harmful effects to human health and safety. In addition, WS would identify hazards in advance of work assignments and would provide employees with Personal Protective Equipment (PPE), when necessary. WS' employees must adhere to safety requirements and use appropriate PPE when employing methods. WS' employees are required to work cooperatively to minimize hazards and immediately report unsafe working conditions (see WS Directive 2.601).

WS would continue to provide technical assistance and/or direct operational assistance to those persons seeking assistance with managing damage or threats from blackbirds. Section 3.3 and Section 3.4 of this EA lists many SOPs that WS' personnel would incorporate into management strategies using the Decision Model. Those SOPs would ensure that implementation of management strategies would reduce or prevent risks to human health and safety under the proposed action alternative. WS' personnel would incorporate those SOPs into activities when providing direct operational assistance and when providing technical assistance (if applicable). Risks to human safety from technical assistance conducted by WS would be similar to those risks addressed under Alternative 3.

Under direct operational assistance, WS' employees who conduct activities would be knowledgeable in the use of methods, wildlife species responsible for causing damage or threats, and WS' directives. Personnel would incorporate that knowledge into the decision-making process inherent with the WS' Decision Model. Prior to and during the utilization of methods, WS' employees would consider risks to human safety based on location and method. When providing direct operational assistance, WS' personnel would generally conduct damage management activities away from areas of high human activity (*e.g*., in remote areas). If that were not possible, then personnel would conduct activities during periods when human activity was low (*e.g*., early mornings), when possible.

All of the methods listed in Appendix B could be available for use by WS' employees under this alternative when providing direct operational assistance; however, repellents are currently not available for use in the State. The discussion of the methods available while providing technical assistance occurs under Alternative 3 below. Although hazards to human health and safety from both non-lethal and lethal methods exist, those methods would generally be safe when used by individuals trained and experienced in their use and with regard and consideration of possible risks to human health and safety.

Although some risk of bodily harm would exist from the use of non-lethal non-chemical methods, when used appropriately and with consideration of possible risks, those WS' personnel can use those methods with a high degree of safety. If used incorrectly, physical exclusion devices (*e.g*., overhead wires) and frightening devices/deterrents (*e.g.,* propane exploders, pyrotechnics, lasers) could all pose safety hazards. Other non-lethal methods available for use under any of the alternatives are live capture traps (see Appendix B). Risks of most live capture methods (*e.g*., decoy traps, mist nets) to human health and safety are extremely low to non-existent. Risks to human health and safety from the use of cannon/rocket nets could be higher than other live capture methods. However, proper application of cannon/rocket nets requires trained and experienced personnel to be present at all times. Cannon/rocket nets only trigger through direct activation of the device by attending personnel. Therefore, if left undisturbed, cannon/rocket nets would pose no risk to the public. Of concern would be risks to WS' employees while setting up a rocket net that uses small explosive charges to launch the net. Serious injuries could occur to employees if the small explosive charge detonated unintentional while handling or setting up the rocket net. If personnel handle the charges appropriately and in consideration of the risks, personnel can use rocket nets with a high degree of safety. In addition, personnel infrequently use rocket nets. Cannon nets that utilize compressed air to launch the net have generally replaced rocket nets in most situations. Under the proposed action, all WS' personnel who use those devices would have experience with and/or receive training in their use with personnel required to wear the appropriate PPE during their use (see WS Directive 2.601). WS would not implement those methods in locations or in such a manner in which they would pose hazards to WS staff or the public. When recommending those methods, WS would caution those person's against their misuse.

Under the proposed action, WS' personnel could use or recommend non-lethal chemical methods, such as repellents, that the EPA had approved for use pursuant to the FIFRA and the LDAF approved for use in Louisiana (see Appendix B). Currently, no repellents are available to alleviate blackbird damage to sprouting rice. For sprouting rice, repellents require ingestion of the chemical to achieve the desired effects on target species; therefore, past and present repellent research focused on a seed treatment that applicators apply to the rice kernel before planting. Application of the repellent would occur by the seed manufacturer directly to seed kernels as a seed treatment or the rice producer would apply the repellent to rice seed before planting. Repellents, when used according to label directions, would generally be safe especially when the ingredients are naturally occurring substances. When recommending those methods, WS would also caution those person's against their misuse.

All of the lethal methods listed in Appendix B would be available for use when WS' employees provide direct operational assistance under this alternative, including the avicide DRC-1339. However, as discussed below under Alternative 3, WS' personnel would not recommend the use of DRC-1339 when providing just technical assistance since the avicide is currently only available for use by WS' personnel. WS' personnel that use restricted-use chemical methods, such as DRC-1339, would be certified as pesticide applicators by the LDAF and would adhere to all certification requirements set forth in the FIFRA, the Louisiana pesticide control laws and regulations, and WS Directive 2.401.

Risks to human safety from the use of rice treated with DRC-1339 could occur through direct exposure of the chemical on treated rice. WS' employees would mix rice treated with DRC-1339 with untreated rice per label requirements. The mixing and storage of DRC-1339 treated bait would occur in controlled areas that were not accessible by the public. Therefore, risks to public safety from the preparation of DRC-1339 would be minimal. Some risks do occur to the handlers during the mixing process from inhalation and direct exposure on the skin and eyes. Adherence to label requirements during the mixing and handling of DRC-1339 treated bait for use of PPE ensures the safety of WS' personnel handling and mixing treated bait. Therefore, risks to handlers and mixers that adhere to the PPE requirements of the label would be low. Before application at bait locations, WS' employees would mix treated bait with untreated bait at ratios required by the product label to minimize non-target hazards and to avoid bait aversion by target species.

After mixing treated rice with untreated rice, WS' employees would broadcast the mixture onto the ground in areas where blackbirds were previously routinely feeding on untreated rice during the prebaiting acclimation period. Therefore, if people left the rice broadcast on the ground undisturbed, treated rice would pose no risk to human safety from direct exposure. Locations where WS may place treated bait would be determined based on several factors[46], including selecting sites based on human safety (*e.g.*, in areas restricted or inaccessible by the public or where WS' personnel have placed warning

[46]Selecting factors are discussed further under Issue 2

signs). Once baited using the diluted mixture, WS' employees would continue to monitor locations for non-target activity and to ensure the safety of the public.

After each baiting period, WS' employees would recover as much unconsumed bait material as possible and dispose of it in accordance with the label. Through prebaiting, target birds can be acclimated to feed at certain locations at certain times. By acclimating birds to a feeding schedule, baiting could occur at specific times to ensure target blackbirds quickly consume bait, especially when large flocks of target species were present. The acclimation period would allow personnel to place treated bait at a location only when target birds were conditioned to be present at the site, which provides a higher likelihood that treated bait would be consumed by the target species making it unavailable for potential exposure to people. Someone would have to approach a bait site and handle treated bait for exposure to occur. If the target species had consumed the bait or if WS' personnel had removed the bait, then treated bait would no longer be available and human exposure to the bait could not occur. Therefore, direct exposure to treated bait during the baiting process would only occur if someone approached a bait site that contained bait and if treated bait was present, would have to handle treated bait.

Several factors would minimize any risk to public health from the use of DRC-1339. For example, the use of DRC-1339 is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops (contrary to some misconceptions, DRC-1339 is not applied to feed materials that livestock can feed upon). Per the staging area label requirements of DRC-1339 (EPA Reg. No. 56228-30), application rates cannot exceed 0.1 pounds of active ingredient per treated acre per treatment or a maximum yearly application rate of 0.5 pounds of active ingredient per acre. In addition, the application of treated baits can only occurring in non-crop staging areas associated with nighttime blackbird roosting sites with applications restricted to agricultural stubble fields, harvested dormant hay fields, open grassy or bare-ground non-crop areas, roads, and roadsides.

DRC-1339 is also highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation and the half-life of DRC-1339 is about 25 hours. In general, DRC-1339 on treated bait material would almost completely be broken down within a week if target birds did not consume the bait or if WS did not retrieve uneaten bait. The avicide DRC-1339 is more than 90% metabolized in target birds within the first few hours after they consume the bait; therefore, little material is left in bird carcasses that may be found or retrieved by people. The mode of action of DRC-1339 requires ingestion by target blackbird species, so handling a blackbird found dead from ingesting treated rice would not pose any primary risks to human safety. For exposure to occur in people from a carcass, a person would need to ingest the internal organs of birds that died from ingesting DRC-1339 bait. To further limit the possibility that the public is exposed to blackbirds that have died from DRC-1339, WS would retrieve all dead birds to the extent possible and dispose of them in accordance with WS Directive 2.515. Application rates of bait treated with DRC-1339 are extremely low (EPA 1995). Furthermore, the EPA has concluded that, based on mutagenicity (*i.e*., the tendency to cause gene mutations in cells) studies, the avicide DRC-1339 is not a mutagen or a carcinogen (*i.e.*, cancer-causing agent) (EPA 1995).

The WS program would notify property owners of the rotational crop (plantback) restrictions associated with the use of the staging area label of DRC-1339 and a property owner would be required to agree to adhere to those restrictions before WS would use DRC-1339 treated bait on their property. The boundaries of baited areas are typically marked with flagging to identify areas. After last application of bait, the plantback intervals are 15 days for rice, wheat, corn, and barley; 30 days for sunflower and soybeans; and 365 days for other crops. Under the proposed action, WS' personnel that use DRC-1339 would be certified as pesticide applicators by the LDAF and be required to adhere to all certification requirements set forth in FIFRA and Louisiana pesticide control laws and regulations.

Certain safety issues can arise related to misusing firearms and the potential human hazards associated with firearm use when employed to reduce damage and threats. WS' employees who use shooting as a method must comply with WS Directive 2.615 and all standards described in the WS Firearms Safety Training Manual. Directive 2.615 requires that personnel undergo regular training, adhere to a set of safety standards, and submit to drug testing. As a condition of employment, WS' employees who carry and use firearms are subject to the Lautenberg Domestic Confiscation Law, which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence (18 USC § 922(g)(9)). 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 personnel considered all safety issues before deeming firearms appropriate for use. The security of firearms would also occur pursuant to WS Directive 2.615. When used appropriately and with consideration of human safety, risks associated with firearms are minimal.

No adverse effects to human safety have occurred from WS' use of methods to alleviate blackbird damage to sprouting rice from FY 2009 through FY 2015. The risks to human safety from the use of non-lethal and lethal methods, when used appropriately and by trained personnel, would be low. Based on the use patterns of methods available to address damage caused by blackbirds, this alternative would comply with Executive Order 12898 and Executive Order 13045.

Alternative 2 - WS Would Address Blackbird Damage through an Adaptive Integrated Approach Using Only Non-lethal Methods

Under a non-lethal only alternative, WS would be restricted to the use and recommendation of non-lethal methods only to resolve requests for assistance. WS would continue to provide technical assistance and direct operational assistance to those persons requesting assistance. WS' personnel would continue to use the WS Decision Model to formulate management strategies. Risks to human safety associated with the use of methods would be a consideration when formulating management strategies using the WS Decision Model. WS' personnel would incorporate appropriate SOPs discussed in Section 3.3 and Section 3.4 when conducting activities and when making recommendations through technical assistance.

Under direct operational assistance, WS' employees who conduct activities would be knowledgeable in the use of non-lethal methods, the wildlife species responsible for causing damage or threats, and WS' directives. Personnel would incorporate that knowledge into the decision-making process inherent with the WS' Decision Model. Prior to and during the utilization of methods, WS' employees would consider risks to human safety based on location and method. When providing direct operational assistance, WS' personnel would generally conduct damage management activities away from areas of high human activity (*e.g.*, in remote areas). If that were not possible, then personnel would conduct activities during periods when human activity was low (*e.g.*, early mornings), when possible.

Risks to human safety associated with non-chemical methods such as cultural practices (*e.g.*, drill seeding, block planting), resource management methods (*e.g.*, habitat modification), exclusion devices (*e.g.*, netting, wire grids), frightening devices (*e.g.*, pyrotechnics, propane cannons), nets, and live traps would be low considering their use profile for alleviating damage. Although some risk of fire and bodily harm exists from the use of pyrotechnics, propane cannons, and rocket nets, when used appropriately and in consideration of those risks, personnel can use those methods with a high degree of safety. Risks to human safety associated with WS' use of non-lethal non-chemical methods would be similar to those discussed previously under Alternative 1.

As was discussed under Alternative 1, application of a repellent would occur by the seed manufacturer directly to seed kernels as a seed treatment or the rice producer would apply the repellent to rice seed before planting. Repellents, when used according to label directions, would generally be safe especially when the ingredients were naturally occurring substances. The primary risks would occur to the person(s) applying the repellent to the rice seed. Following the label requirements of the repellent should minimize risks to the safety of people applying the repellent to the rice seed. When recommending those methods, WS would also caution those person's against their misuse. Therefore, risks associated with the use or recommendation of repellents would be similar to Alternative 1.

People experiencing damage or threats of damage associated with blackbirds could continue to employ lethal methods and/or seek assistance with the use of lethal methods from other entities. When other entities used lethal methods appropriately and in consideration of human safety, risks to human safety associated with the use of lethal methods would be similar to those risks addressed under Alternative 1. If other entities used methods incorrectly or without regard to human safety, risks to human safety under this alternative could be higher

As mentioned previously, the only lethal methods that would not currently be available for use under this alternative would be the avicide DRC-1339, which is restricted to use by WS' personnel only. However, in the absence of WS' use of DRC-1339, other entities could seek to register DCR-1339 for use in the State. If other entities registered DRC-1339 with the LDAF for use in the State to minimize blackbird damage to sprouting rice and people used DRC-1339 in accordance with label requirements and in consideration of human safety, the risks to human safety from the use of DRC-1339 would be similar to those risks discussed under Alternative 1. If people used DRC-1339 inappropriately and/or without regard to human safety, risks to people under this alternative could be higher than the proposed action alternative.

It is possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal killing of blackbirds, which could lead to unknown risks to human safety. When those people 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, including blackbirds.

Although hazards to human safety from non-lethal methods exist, those methods would generally be safe when used by personnel trained and experienced in their use. Those non-lethal methods available under this alternative would also be available under the other alternatives. The risks to human safety from the use of those methods would be similar across the alternatives. No adverse effects to human safety have occurred from WS' use of methods to alleviate blackbird damage to sprouting rice from FY 2009 through FY 2015. The risks to human safety from the use of non-lethal methods, when used appropriately and by trained personnel, would be low. Based on the use patterns of methods available to address damage caused by blackbirds, this alternative would comply with Executive Order 12898 and Executive Order 13045.

Alternative 3 – WS Would Address Blackbird Damage Using Technical Assistance Only

Under this alternative, WS would be restricted to making method recommendations and the demonstration of methods only to alleviate damage. WS would only provide technical assistance to those people requesting assistance. Technical assistance would include recommendation and demonstration of both non-lethal and lethal methods. Direct operational assistance would not be available from WS under Alternative 3. However, other entities could provide direct operational assistance under this alternative, such as the USFWS, the LDWF, the LDAF, and/or private entities.

All of those methods identified in Appendix B of this EA would be available for WS' personnel to recommend as part of technical assistance, except for the avicide DRC-1339 and chemical repellents. Currently, no chemical repellents are available for use to manage blackbird damage to sprouting rice; however, if a chemical repellent were available, WS' personnel could recommend the repellent under Alternative 3. WS' personnel would continue to use the WS Decision Model to formulate management strategies. Risks to human safety associated with the use of methods would be a consideration when formulating management strategies using the WS Decision Model. WS' personnel would incorporate appropriate SOPs discussed in Section 3.3 and Section 3.4 when conducting activities and when making recommendations through technical assistance.

The potential risks to human safety from a technical assistance only alternative would be variable and based on several factors. If other entities employ methods pursuant to recommendations made by WS' personnel, the potential risks to human safety would likely be similar to Alternative 1 and in the case of non-lethal methods, similar to Alternative 2. If those entities receiving technical assistance did not follow recommendations made by WS' personnel or if those entities employed methods that WS' personnel did not recommend, the potential risks to human safety would likely be higher than Alternative 1. Potential risks from providing only technical assistance could be greater if those people experiencing damage did not implement methods or techniques correctly. Methods or techniques recommended by WS that other entities implement incorrectly could lead to an increase in risks to human safety. If persons did not follow recommendations made by WS' personnel or did not seek assistance from WS, the potential risks would be similar to Alternative 4.

If people receiving technical assistance use harassment and exclusion methods correctly and as WS' personnel recommend, the potential risks of those methods could be similar to those described under Alternative 1 and Alternative 2. The knowledge and skill of those persons implementing recommended methods would also influence the potential risks to human safety.

As mentioned previously, the only lethal methods that would not currently be available for use under this alternative would be the avicide DRC-1339, which is restricted to use by WS' personnel only. However, in the absence of WS' use of DRC-1339, other entities could seek to register DCR-1339 for use in the State. If other entities registered DRC-1339 with the LDAF for use in the State to minimize blackbird damage to sprouting rice and people used DRC-1339 in accordance with label requirements and in consideration of non-target risks, the risks to human safety from the use of DRC-1339 would be similar to those risks discussed under Alternative 1. If people used DRC-1339 inappropriately and/or without regard to human safety, risks to people under this alternative could be higher than the proposed action alternative.

As was discussed under Alternative 1 and Alternative 2, application of a repellent would occur by the seed manufacturer directly to seed kernels as a seed treatment or the rice producer would apply the repellent to rice seed before planting. Repellents, when used according to label directions, would generally be safe especially when the ingredients were naturally occurring substances. The primary risks would occur to the person(s) applying the repellent to the rice seed. Following the label requirements of the repellent should minimize risks to the safety of people applying the repellent to the rice seed. When recommending those methods, WS would also caution those person's against their misuse. Therefore, risks associated with the use or recommendation of repellents would be similar to Alternative 1 and Alternative 2.

The recommendation of shooting with firearms as a method of harassment and direct lethal take could occur under this alternative. Safety issues can 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 people employed firearms inappropriately or without regard to human safety, serious injuries or loss of life 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 blackbird damage would be available under any of the alternatives and the use of firearms by those persons experiencing blackbird damage could occur whether the person experiencing damage consulted or contacted WS, the risks to human safety from the use of firearms would be similar among all the alternatives.

If people employed non-chemical methods according to recommendations and as demonstrated by WS, the potential risks to human safety would be similar to the proposed action. If people employed methods without guidance from WS or applied those methods 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.

If direct operational assistance was not provided by WS or other entities, it is possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal killing of blackbirds, which could lead to unknown risks to human safety. When those people experiencing damage caused by blackbirds 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 blackbirds (*e.g*., see Mitchell et al. 1984, Stone et al. 1984, White et al. 1989, Food and Drug Administration 2003).

WS' employees would make the cooperator requesting assistance aware of threats to human safety associated with the use of those methods. 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 people misuse or apply methods inappropriately, any of the methods available to alleviate blackbird damage could threaten human safety. However, when used appropriately, methods available to alleviate damage would not threaten human safety.

Alternative 4 – WS Would Not Address Blackbird Damage to Sprouting Rice

Under this alternative, WS would not conduct technical or direct operational assistance to reduce damage to newly seeded rice. WS would not provide assistance with any aspect of managing damage caused by blackbirds. Therefore, WS would have no direct impact on human health and safety under this alternative. WS would refer all requests for assistance to resolve damage to the USFWS, the LDWF, the LDAF, and/or private entities.

Despite no direct involvement by WS in resolving damage and threats associated with blackbirds in the rice growing areas of southwestern Louisiana, those persons experiencing damage caused by blackbirds could continue to alleviate damage by employing both non-lethal and lethal methods. Under this alternative, people experiencing damage associated with blackbirds could continue to lethally take blackbirds pursuant to the blackbird depredation order or seek the assistance of other entities. Non-lethal and lethal methods would continue to pose risks to human safety similar to those described in the other alternatives. Therefore, risks to human safety would continue to occur from those people who implement damage management activities on their own and through recommendations or assistance that other federal, state, and private entities provide. Management actions taken by non-federal entities would be the *environmental status quo*.

Despite no involvement by WS in resolving damage and threats associated with blackbirds in the rice growing areas of southwestern Louisiana, those persons experiencing damage caused by blackbirds could continue to alleviate damage by employing both non-lethal and lethal methods. Similar to Alternative 2 and Alternative 3, with the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative. The avicide DRC-1339 would only be available for use by WS and therefore would be unavailable for use under this alternative. However, similar to Alternative 2 and Alternative 3, other entities could register DRC-1339 for use in the State under this alternative. If other entities registered DRC-1339 with the LDAF for use in the State to minimize blackbird damage to sprouting rice and people used DRC-1339 in accordance with label requirements and in consideration of human risks, the risks to people from the use of DRC-1339 would be similar to those risks discussed under Alternative 1. If people used DRC-1339 inappropriately and/or without regard to human risks, risks to people under this alternative could be higher than the proposed action alternative.

Although no repellents are currently available, if repellents became available for use, those products would be available for use under this alternative. Risks to human safety associated with repellents would be similar to those discussed previously under the other alternatives.

Similar to Alternative 3, the potential risks to human safety from this alternative would be variable and based on several factors. If people use methods correctly, the potential risks of methods to human safety could be similar to those described under Alternative 1 and Alternative 2. However, the knowledge and skill of those persons implementing methods would also influence the potential risks to human safety. If entities employ methods incorrectly or without consideration of safety risks, the potential risks to people would likely be higher than the proposed action. If another entity began providing direct operational assistance, then the risks to human safety would likely be similar to Alternative 1 and Alternative 2.

As previously stated, WS would not be involved with any aspect of addressing damage or threats of damage caused by blackbirds under this alternative. If assistance were not provided by WS or other entities, it is hypothetically possible that frustration caused by the inability to reduce damage and threats could lead to illegal take, which could lead to real but unknown risks to human safety. In the past, people have resorted to the illegal use of chemicals and methods to alleviate blackbird damage issues (*e.g.*, see Mitchell et al. 1984, Stone et al. 1984, White et al. 1989, Food and Drug Administration 2003). However, if other entities knowledgeable and experienced in managing blackbird damage provided appropriate direct operational assistance and/or technical assistance, the risks would be similar to the other alternatives.

Issue 4 – Humaneness and Animal Welfare Concerns

WS identified the issue of method humaneness and animal welfare concerns associated with methods available to reduce blackbird damage during the scoping process for the EA. As previously stated, with the exception of DRC-1339, all methods listed in Appendix B would be available under all alternatives. A discussion of the humaneness and animal welfare concerns of the methods, as they relate to the alternatives, occurs below.

Alternative 1 – WS Would Continue to Address Blackbird Damage through an Adaptive Integrated Approach Using Lethal and Non-lethal Methods (Proposed Action/No Action Alternative)

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. As described and discussed previously, WS' personnel would use a thought process for evaluating and responding to requests for assistance detailed in the WS Decision Model (see WS Directive 2.201) and described by Slate et al. (1992). WS' personnel would evaluate the appropriateness of strategies and methods based on their availability and suitability, including method humaneness and animal welfare concerns. Therefore, WS' personnel could integrate those methods discussed in Appendix B into a damage management strategy using the Decision Model after consideration of humaneness and animal welfare concerns.

Methods available under the proposed action could include non-lethal and lethal methods. Some people believe any use of lethal methods to alleviate damage associated with wildlife is inhumane and an animal welfare concern because the resulting fate is the death of the animal. Other people believe that certain lethal methods can lead to a humane death. Others believe most non-lethal methods to be humane because the animal is generally unharmed and alive. Still others believe that any disruption in the behavior of wildlife is inhumane and a welfare concern. 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 address 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 animals addressed when attempting to alleviate 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, many members of the public would consider a cage trap to be a "*humane*" method. Yet, without proper care, live-captured wildlife in a cage trap can be treated inhumanely if not attended to appropriately. Some concern arises from the use of live-capture methods causing stress on the animal, but if used appropriately, the stress is minimal and only temporary. Overall, many people consider the use of non-lethal management methods as humane when used appropriately.

Overall, most people would consider the management of resources, physical exclusion, and frightening devices as humane when used appropriately. Although some issues of humaneness and animal welfare concerns could occur from the use of live-capture methods and repellents, 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 occur 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 action is not taken to alleviate conditions that cause pain or distress in animals. Under the proposed action, when live-capture devices are deemed appropriate, WS' personnel would be present on-site during capture events or devices would be checked at least once every 24 hours to ensure birds captured were addressed timely to prevent injury. Although stress could occur from being restrained, timely attention to live-captured wildlife would alleviate suffering. Stress would likely be temporary.

Also under the proposed action, WS' employees could employ lethal methods to alleviate or prevent blackbird damage and threats, when requested. Lethal methods would include shooting, the avicide DRC-1339, and euthanasia after birds were live-captured. WS' use of euthanasia methods under the proposed action would adhere to WS' directives (see WS Directive 2.430, WS Directive 2.505). The euthanasia methods available for use under the proposed action for live-captured birds would be cervical dislocation and carbon dioxide. The AVMA guidelines on euthanasia list cervical dislocation and carbon dioxide as acceptable methods of euthanasia for free-ranging birds, which can lead to a humane death (AVMA 2013). The use of cervical dislocation or carbon dioxide for euthanasia would occur after blackbirds were live-captured and away from public view. WS' personnel that employ methods to euthanize live-captured birds would receive training in the proper use of those methods to ensure a timely and quick death.

With the exception of DRC-1339, all lethal methods listed in the Appendix would be available under all alternatives. Although the mode of action of DRC-1339 is not well understood, when ingested, it appears to cause death primarily by nephrotoxicity in susceptible species and by central nervous system depression in non-susceptible species (DeCino et al. 1966, Westberg 1969, Schafer, Jr. 1984). DRC-1339 causes irreversible necrosis of the kidney and the affected bird is subsequently unable to excrete uric acid, with death occurring from uremic poisoning and congestion of major organs (DeCino et al. 1966, Knittle et al. 1990). The external appearances and behavior of starlings that ingested DRC-1339 slightly above the LD_{50} for starlings appeared normal for 20 to 30 hours, but water consumption doubled after 4 to 8 hours and decreased thereafter. Food consumption remained fairly constant until about 4 hours before death, at which time starlings refused food and water and became listless and inactive. The birds perched with feathers fluffed as in cold weather and appeared to doze, but were responsive to external stimuli. As death nears, breathing increased slightly in rate and became more difficult while the birds no longer responded to external stimuli and became comatose. Death followed shortly thereafter without convulsions or spasms (DeCino et al. 1966). Birds ingesting a lethal dose of DRC-1339 become listless and lethargic, and a quiet death normally occurs 24 to 72 hours following ingestion. This method appears to result in a less stressful death than which probably occurs by most natural causes, which are primarily disease, starvation, and predation. In non-sensitive birds and mammals, central nervous system depression and the attendant cardiac or pulmonary arrest is the cause of death (Felsenstein et al. 1974).

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 are found practical, a certain amount of animal suffering could occur when some methods are used in situations where non-lethal damage management methods are not practical or effective. Personnel from WS are experienced and professional in their use and recommendation of management methods. Consequently, management methods are implemented in the most humane manner possible under the constraints of current technology. With the exception of DRC-1339, all the methods listed in Appendix B would be available for use under all the alternatives. Therefore, the issue of humaneness associated with methods would be similar across any of the alternatives since other entities could employ those methods under any of the alternatives. 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 ensure WS use methods as humanely as possible under the proposed action alternative are listed in Chapter 3. Therefore, the goal would be to address requests for assistance using methods in the most humane way possible that minimizes the stress and pain to the animal.

Alternative 2 - WS Would Address Blackbird Damage through an Adaptive Integrated Approach Using Only Non-lethal Methods

Under this alternative, WS' personnel would only use non-lethal methods. Similar to Alternative 1, the goal would be to address request for assistance using non-lethal methods in the most humane way possible. Non-lethal methods would include resource management methods (*e.g.*, minor habitat modification, modification of human behavior), translocation, exclusion devices, frightening devices, nets, and live traps.

Although some issues of humaneness could occur from the use of cage traps and nets, 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 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 action is not taken to alleviate conditions that cause pain or distress in animals. When using live-capture devices, WS' personnel would be present on-site during capture events (*e.g.*, when using mist nets or cannon nets) or devices (*e.g.*, decoy traps) would be checked at least once every 24 hours to ensure birds captured were addressed timely to prevent injury.

Although stress could occur from being restrained, timely attention to live-captured wildlife would alleviate suffering. Stress would likely be temporary.

The applicability of cage traps, translocation, nets, minor habitat modifications, and exclusion for resolving damage would be limited under this alternative. Overall, the use of resource management methods, harassment methods, live-capture 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 would likely be temporary and would cease once the animal was released.

Alternative 3 – WS Would Address Blackbird Damage Using Technical Assistance Only

Under this alternative, WS would provide those persons requesting assistance with managing damage and threats associated with blackbirds with technical assistance only. Technical assistance would occur similar to Alternative 1. This includes the recommendation and demonstration of both non-lethal and lethal methods. Therefore, the issue of humaneness of methods under this alternative is likely to be similar to humaneness issues discussed under the proposed action. This perceived similarity occurs from WS' recommendation of methods that some people may consider inhumane. WS' personnel would not provide direct operational assistance under this alternative; therefore, the entities receiving technical assistance would be responsible for using methods humanely and in consideration of animal welfare. If the entity requesting assistance applied methods as described by WS' personnel when providing technical assistance, the issue of humaneness would be similar to the proposed action. Under the WS Decision Model, WS personnel would consider the issue of method humaneness and animal welfare when providing technical assistance.

WS would instruct and demonstrate the proper use and placement of methodologies to increase effectiveness in capturing target bird species and to ensure methods are 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 person using the methods to resolve the threat to safety or damage situation despite WS' demonstration. Therefore, a lack of understanding of the behavior of blackbirds or improperly identifying the damage caused by blackbirds along with inadequate knowledge and skill in using methodologies to alleviate the damage or threat could lead to incidents with a greater probability of being perceived as inhumane. In those situations, people are likely to regard the pain and suffering as greater than the pain and suffering that could occur under Alternative 1. In addition, entities may employ other methods not recommended by WS to alleviate damage, which could lead to more situations where pain and suffering of animals occurred. With the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative. DRC-1339 would only be available for use by WS and therefore, would be unavailable for use under this alternative. However, if WS was not able to use DRC-1339, other entities could seek to register DRC-1339 for use in the State. If the LDAF approved the use of DRC-1339 for use by other entities, the issue of humaneness would be similar to the use of DRC-1339 under the proposed action alternative.

Those people requesting assistance would be directly responsible for the use and placement of methods. If monitoring or checking of those methods does not occur in a timely manner, captured wildlife could experience suffering, and if not addressed timely, could experience distress. The amount of time an animal is restrained under the proposed action would be shorter compared to a technical assistance alternative if those requesters implementing methods are not as diligent or timely in checking methods. Similar to Alternative 3, it can be difficult to evaluate the behavior of individual people and determine what may occur under given circumstances. Therefore, only the availability of WS' assistance can be evaluated under this alternative since determining human behavior can be difficult. If those persons seeking assistance from WS apply methods recommended by WS through technical assistance as intended and as described by WS, then those methods would be applied as humanely as possible to minimize pain and distress. If those persons provided technical assistance by WS apply methods not recommended by WS or do not employ methods as intended or without regard for humaneness, then the issue of method humaneness would be of greater concern since pain and distress of birds would likely be higher.

Alternative 4 – WS Would Not Address Blackbird Damage to Sprouting Rice

Under this alternative, WS would not conduct technical assistance or direct operational assistance to manage damage to sprouting rice in southwestern Louisiana. WS' personnel would refer all requests for assistance associated with blackbird damage to sprouting rice to the USFWS, the LDWF, the LDAF, and/or private entities.

Despite no involvement by WS in resolving damage and threats associated with blackbirds, those persons experiencing damage caused by blackbirds could continue to alleviate damage by employing both non-lethal and lethal methods. Similar to the other alternatives, with the exception of DRC-1339, all methods listed in Appendix B would be available under this alternative. DRC-1339 would only be available for use by WS and therefore would be unavailable for use under this alternative. However, like other alternatives, other entities could pursue the registration of DRC-1339 for use in the State. Therefore, the humaneness and animal welfare concerns associated with the use of DRC-1339 would be similar to the proposed action alternative.

Those methods that people considered inhumane would continue to be available under this alternative and a segment of society is likely to continue to consider those methods as inhumane no matter the entity employing those methods. A method considered inhumane would still be perceived as inhumane regardless of the person or entity applying the method. However, people could employ methods generally regarded as being humane in inhumane ways. Those people inexperienced in the use of those methods could employ methods inhumanely or if those people were not as diligent in attending to those methods.

The skill and knowledge of the person employing those methods would determine the efficacy of the methods used and therefore the humaneness. A lack of understanding of the target species 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 alleviate damage and threats caused by birds. Therefore, those methods considered inhumane would continue to be available for use under this alternative. If those people experiencing blackbird damage apply those methods considered humane methods as intended and in consideration of the humane use of those methods, then the issue of method humaneness would be similar across the alternatives. If those persons experiencing blackbird damage were not provided with information and demonstration on the proper use of those methods and employed humane methods in ways that were inhumane, the issue of method humaneness could be greater under this alternative. However, the level at which people would apply humane methods inhumanely under this alternative based on a lack of assistance is difficult to determine and could just as likely be similar across the alternatives.

Issue 5 – Effects of Damage Management Activities on the Aesthetic Values of Blackbirds

An additional issue raised is that blackbird damage management activities would result in the loss of the aesthetic benefits of target blackbirds to persons in the area where damage management activities occur. People often enjoy viewing, watching, and knowing blackbirds exist as part of the natural environment and gain aesthetic enjoyment in such activities. Those methods available to alleviate damage can disperse and/or remove blackbirds. Non-lethal methods can exclude or make an area less attractive, which disperses birds to other areas. Similarly, lethal methods can remove those birds identified as causing damage or posing a threat of damage. A discussion of the effects on the aesthetic value of blackbirds as it relates to the alternatives occurs below.

Alternative 1 – WS Would Continue to Address Blackbird Damage through an Adaptive Integrated Approach Using Lethal and Non-lethal Methods (Proposed Action/No Action Alternative)

The proposed action/no action alternative would continue the current implementation of an adaptive integrated approach utilizing non-lethal and lethal techniques, as deemed appropriate using the WS Decision Model, to reduce damage and threats associated with blackbirds. The implementation or recommendation of methods by WS under this alternative could result in the dispersal, exclusion, or removal of blackbirds to alleviate damage and threats. In some instances where WS or other entities disperse or remove blackbirds, the ability of interested persons to observe and enjoy those blackbirds would likely temporarily decline.

Even the use of exclusionary devices could lead to the dispersal of blackbirds if the resource the blackbirds were damaging was acting as an attractant. Thus, once WS or another entity removed or made the attractant unavailable, the birds would likely disperse to other areas. The use of lethal methods could result in temporary declines in local populations resulting from the removal of birds 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 blackbirds responsible for the resulting damage. Therefore, the ability to view and enjoy blackbirds would remain if people made a reasonable effort to locate blackbirds outside the area in which damage management activities occurred. Those birds removed by WS would be those birds that the person experiencing damage or their designated agents could remove in the absence of assistance by WS. In addition, the large flocks of blackbirds present in the State when damage is occurring to sprouting rice will disperse to breeding areas during the spring; therefore, those birds would no longer be in the area despite any activities conducted by WS or other entities.

WS would only conduct activities on properties after receiving a request for such assistance by the property owner or manager. In addition, WS' personnel would only conduct activities after WS and the entity requesting assistance signed a MOU, work initiation document, or another similar document. Since those blackbirds dispersed or removed by WS under this alternative could be dispersed or removed by other entities, WS' involvement in dispersing or removing those blackbirds would not likely be additive to the number of birds that could be dispersed or removed in the absence of WS' involvement. WS has no authority to regulate take or harassment of blackbirds in the State. That authority rests with the USFWS and the LDWF.

In addition, WS' take of blackbirds over the last five years has been of low magnitude when compared to population estimates, annual mortality, and other available information (see Issue 1, Alternative 1 for additional information on impacts to target bird populations). Given the limited take proposed by WS under this alternative, when compared to the known sources of mortality of birds and their population information, damage management activities conducted by WS pursuant to the proposed action would not adversely affect the aesthetic value of blackbirds.

The ability to view and enjoy birds would remain if people made a reasonable effort to locate blackbirds outside the area in which damage management activities occurred. The impact on the aesthetic value of blackbirds and the ability of the public to view and enjoy blackbirds under the proposed action would be similar to the other alternatives and would likely be low.

Alternative 2 - WS Would Address Blackbird Damage 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 blackbirds from areas where damage to newly seeded rice was occurring in southwestern Louisiana. The use of non-lethal methods would result in the translocation, dispersal, or exclusion of blackbirds from areas where damage was occurring or could occur. Therefore, a reduction in the number of blackbirds present in those locations would occur and those individual blackbirds 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, take could still occur under the depredation order for blackbirds. Therefore, the take of blackbirds could continue despite WS' use of only non-lethal methods. If lethal methods were to continue by using trained, non-WS individuals, the number of blackbirds taken 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 blackbirds under this alternative, those species could still be viewed and enjoyed under this alternative if people made a reasonable effort to find those species outside the area where damage was occurring or could occur. The impacts to the aesthetic value of blackbirds from the use of non-lethal methods by WS under this alternative would be low.

Alternative 3 – WS Would Address Blackbird Damage Using Technical Assistance Only

Under this alternative, WS would provide technical assistance to those persons requesting assistance similar to Alternative 1 but WS would not provide direct operational assistance. Therefore, WS would have no direct effect on the aesthetic value of blackbirds under this alternative. WS' personnel could recommend and demonstrate both non-lethal and lethal methods under this alternative and could loan equipment (*e.g.*, propone cannons) to people seeking assistance with managing blackbird damage to sprouting rice. Similar to Alternative 1 and Alternative 2, the methods that WS could recommend or loan could disperse, exclude, or remove blackbirds causing damage to sprouting rice; therefore, the potential effects on the aesthetics value of blackbirds would be similar to Alternative 1 and Alternative 2.

When people seek assistance with managing damage from WS or another entity, the damage level has often reached an unacceptable threshold for that particular person. Therefore, in the case of blackbird damage, the social acceptance level of those blackbirds has reached a level where the person seeks assistance 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. If those people experiencing damage were not as diligent in employing methods as WS would be, if WS provided direct operational assistance, the effects on aesthetics from a technical assistance program could be lower than Alternative 1 and Alternative 2. If those people experiencing damage abandoned the use of those methods, then blackbirds would likely remain in the area and available for viewing and enjoyment by those people interested in doing so. Similar to the other alternatives, the geographical area in which damage management activities occurs would not be such that birds would be dispersed or removed from such large areas that opportunities to view and enjoy birds would be severely limited. In addition, as discussed previously, those large flocks of blackbirds that cause damage to sprouting rice will begin to disperse to breeding grounds. Therefore, the large flocks of blackbirds would no longer be available for viewing due to natural dispersal.

Alternative 4 – WS Would Not Address Blackbird Damage to Sprouting Rice

Under this alternative, WS would not provide technical assistance or direct operational assistance with any aspect of managing damage to newly seeded rice. Therefore, WS would have no direct effect on the aesthetic values of blackbirds under this alternative. WS' personnel would refer all requests for assistance received to resolve damage caused by blackbirds to the USFWS, the LDWF, the LDAF, and/or private entities. Despite no involvement by WS in resolving damage and threats associated with blackbirds, those persons experiencing damage caused by blackbirds could continue to alleviate damage by employing both non-lethal and lethal methods.

Since people could continue to disperse, exclude, and remove blackbirds under this alternative, despite WS' lack of involvement, the ability to view and enjoy birds would likely be similar to the other alternatives. The lack of WS' involvement would not lead to a reduction in the number of blackbirds dispersed or taken since WS has no authority to regulate take or the harassment of blackbirds. Under this alternative, those people experiencing damage could and likely would continue to employ both lethal and non-lethal methods, despite WS' lack of involvement. Therefore, the impacts to the aesthetic value of blackbirds could be similar to the other alternatives. Impacts would only be lower than the proposed action alternative if those people experiencing damage were not as diligent in employing methods as WS would be if conducting direct operational assistance. If those people experiencing damage abandoned the use of those methods, then blackbirds would likely remain in the area and available for viewing and enjoying for those people interested in doing so.

4.2 CUMULATIVE EFFECTS 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 results from the incremental impacts 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 the proposed action/no action alternative (Alternative 1), WS would respond to requests for assistance by: 1) taking no action, if warranted, 2) providing technical assistance to property owners or managers on actions they could take to reduce damage or threats of damage, or 3) provide technical assistance and direct operational assistance to a property owner or manager experiencing damage or threats of damage. Under this alternative, WS would be the primary agency conducting direct operational assistance in the rice growing area of southwestern Louisiana. However, other federal, state, and private entities could also be conducting damage management activities associated with blackbirds. As stated previously, lethal take of blackbirds can occur pursuant to the blackbird depredation order. Therefore, take can occur not only by WS but also by federal, state, and private entities.

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. However, WS may conduct direct damage management activities concurrently in the same area that private entities, such as agricultural producers, are conducting similar activities. The potential cumulative impacts analyzed below could occur because of WS' damage management program activities over time or because of the aggregate effects of those activities combined with the activities of other agencies and private entities. Through ongoing coordination and collaboration between WS, the USFWS, and the LDWF, the activities of each agency and the take of blackbirds under the depredation order for blackbirds would be available. In addition, the WS program would monitor damage management activities conducted by WS' personnel to ensure those activities occur within the scope of analysis of this EA.

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

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on the populations of target species. WS' actions would happen over short or extended periods simultaneously with other natural processes and other human impacts. These processes and impacts include but are not limited to

- Natural mortality of blackbirds
- Human-induced mortality through vehicle strikes, aircraft strikes, tower strikes, and illegal take
- Human-induced mortality of blackbirds through private damage management activities
- Human and naturally induced alterations of habitat
- Annual and perennial cycles in blackbird population densities

All those factors play a role in the dynamics of blackbird populations. In many circumstances, requests for WS' assistance arise when some or all of those elements have contrived to elevate target species populations or place target species at a juncture to cause damage to resources. The actions taken or recommended by WS under the proposed action alternative to minimize or eliminate damage would be constrained in scope, duration, and intensity for the purpose of minimizing or avoiding impacts to the species and the environment. WS' personnel use a thought process for evaluating and responding to requests for assistance detailed in the WS Decision Model and described by Slate et al. (1992). The Model allows WS to take into consideration environmental processes and impacts, such as those listed above, in order to avoid cumulative adverse impacts on target species.

As discussed previously in Chapter 3, both lethal and non-lethal methods would be available under all of the alternatives. Non-lethal methods would generally have minimal effects on populations of target blackbird species since those blackbirds would be unharmed. The use of non-lethal methods would not have adverse effects on target blackbird populations under any of the alternatives. The number of blackbirds removed from the population using lethal methods would be dependent on the number of requests for assistance received, the number of blackbirds involved with the associated damage or threat, and the efficacy of methods employed.

WS has no authority to regulate take or the harassment of blackbirds. That authority rests with the USFWS and the LDWF. Under the proposed action, those agencies would continue to adjust take levels based on population objectives for target blackbird species. Therefore, the USFWS would continue to regulate and adjust the number of blackbirds lethally taken annually pursuant to the depredation order for blackbirds. The USFWS considers all known take when determining population objectives for blackbirds and could adjust the number of blackbirds that could be taken for damage management purposes to achieve population objectives. Consultation and reporting of take by WS under the proposed action would ensure the USFWS considers any activities conducted by WS. Any target blackbird population declines or increases induced through the regulation of take would be the collective objective for blackbird populations established by the USFWS. Therefore, the cumulative take of blackbirds annually or over time by WS would occur at the discretion of the USFWS as part of their management objectives for blackbirds. No cumulative effects on target blackbird populations would be expected from WS' damage management activities based on the following considerations:

Historical outcomes of WS' damage management activities on blackbirds

WS would only conduct activities to manage blackbird damage at the request of a cooperator to reduce damage that was occurring or to prevent damage from occurring and only after methods that WS could use were agreed upon by all parties involved. WS would monitor activities conducted under the selected alternative to ensure the WS program could identify and address any potential impacts. WS would work closely with the USFWS and the LDWF to ensure the activities conducted by WS would not adversely affect blackbird populations, which ensures those agencies have the opportunity to consider WS' activities as part of management goals established by those agencies. Historically, WS' activities to managing damage caused by blackbirds in rice growing areas of southwestern Louisiana have been a small component of the annual mortality of blackbirds. Section 4.1 of this EA discusses the cumulative effects of known mortality on the populations of blackbirds, including cumulative mortality occurring across the Mississippi Flyway. Based on current information, the mortality associated with the lethal removal of blackbirds by WS to alleviate damage is likely compensatory and not additive to annual mortality. Therefore, the number of blackbirds lethally removed by WS would likely die annually from predation, starvation, disease, weather, or other mortality events in the absence of WS' removal.

Dolbeer et al. (1997) indicated that lethal removal of blackbirds in the winter is likely a substitute for natural mortality and does not add to the mortality that occurs annually. In addition, other density dependent factors may regulate populations (Risser 1975, Nephew and Romero 2003), which also provides an indication that limited lethal removal is not likely additive to natural mortality but is a substitute for mortality that would have occurred otherwise. Density-dependent factors as regulatory mechanisms often influences bird populations (*e.g.*, see Newton 1998), and is a likely factor in the regulation of blackbird populations.

Standard Operating Procedures

SOPs incorporated in the proposed action/no action alternative would be designed to reduce the potential effects of WS' actions on blackbirds and would be tailored to respond to changes in populations, which could result from unforeseen environmental changes. This would include those changes occurring from sources other than WS. Alterations in programs are defined through SOPs and implementation is insured through monitoring, in accordance with the WS' Decision Model (Slate et al. 1992).

Issue 2 - Effects of Damage Management Activities on Non-target Wildlife Populations, Including Threatened or Endangered Species

The proposed action/no action alternative would continue the current implementation of an adaptive integrated approach utilizing non-lethal and lethal techniques, as deemed appropriate using the WS Decision Model, to reduce damage. As mentioned previously, WS uses an adaptive integrated approach when providing both technical assistance and direct operational assistance. The philosophy behind this approach 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. Potential harmful effects are also minimized because WS continually monitors, evaluates, and makes modifications as necessary to methods or strategy when providing direct operational assistance, to not only reduce damage but also to minimize potentially harmful effects to non-target species, including threatened or endangered species. WS' personnel receiving training and have experience in animal identification; therefore, employees can distinguish between target and non-target animals.

Potential effects on non-target species from conducting the proposed action/no action alternative arise from the use of non-lethal and lethal methods to alleviate or prevent damage to sprouting rice associated with blackbirds. The use of non-lethal methods during activities to reduce or prevent damage caused by blackbirds 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 lethal take of non-target animals. When people use exclusion devices and/or repellents, those methods can prevent both target and non-target animals from accessing the resource being damaged. Since exclusion does not involve lethal take, cumulative impacts on non-target species from the use of exclusionary methods would not occur, but would likely just disperse those individuals to other areas. Exclusionary methods often require constant maintenance or application 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 are excluded from large areas that would cumulatively impact populations from the inability to access a resource (*e.g.*, food sources or nesting sites). The use of visual and auditory harassment and dispersal methods would generally be temporary with non-target species returning after the cessation of those activities. Dispersal and harassment do not involve the lethal take of non-target species and, similar to exclusionary methods, people do not use those methods to the extent or at a constant level that would prevent non-targets from accessing critical resources that would threaten survival of a population.

Capture methods used are methods that are set to confine or restrain target blackbird species. WS' personnel would employ capture methods in such a manner as to minimize the threat to non-target species by placement in those areas frequently used by target blackbirds, using baits or lures that are as species specific as possible, and modification of individual methods to exclude non-targets from capture. With all live-capture devices, WS' personnel could release non-target wildlife captured on site if determined to be able to survive following release. WS' personnel would also incorporate SOPs into damage management strategies to ensure capture of non-target animals is minimal during the use of methods to capture target blackbirds. Under the proposed action, when WS' personnel deem live-capture devices to be appropriate using the Decision Model, personnel would be present on-site during capture events (*e.g.*, mist nets, cannon nets) or personnel would check devices (*e.g.*, decoy trap) at least once every 24 hours.

As discussed throughout the EA, no repellents are currently available for use in the State to alleviate blackbird to sprouting rice. WS' personnel would only use or recommend those repellents registered for use in the State by the EPA and the LDAF as part of an integrated approach to managing damage and threats associated with blackbirds. The recommendation and/or use of repellents would also follow all label instructions approved by the EPA and the LDAF. The EPA would register repellents in accordance with the FIFRA through a review process. The FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. Repellents available for use to discourage blackbirds from feeding on planted rice seed must receive approval and registration from the EPA according to the FIFRA. As discussed previously, repellents to prevent blackbirds from feeding on rice seed are seed treatments that the seed manufacturer applies to the seed or the rice producer would apply to rice seed before planting. Although some hazards exist from the use of repellents, hazards occur primarily to the handler and the applicator. When people apply repellents according to label requirements, no expected adverse effects to non-targets would occur. In addition, many of the repellents available previously or being considered for use are naturally occurring substances.

The use of lethal methods (or those methods used to live-capture target species followed by euthanasia) also has the potential to affect non-target animals through the lethal take of non-target species. Those lethal methods discussed in Appendix B include firearms and the avicide DRC-1339. In addition, WS' personnel could live-capture target blackbird species and then euthanize those blackbirds using those euthanasia methods approved for use by the AVMA (2013). The use of firearms and euthanasia methods are essentially selective for target species since WS' personnel would identify the animal prior to the application of the method. Personnel would apply euthanasia methods through direct application to a target blackbird. Therefore, the use of those methods would not affect non-target species.

WS' employees would follow all label requirements of DRC-1339 to minimize non-target risks. As required by the label, WS' employees would pre-bait and monitor all potential bait sites for non-target use as outlined in the pre-treatment observations section of the label. If personnel observe non-targets feeding on the pre-bait, they would abandon those plots and no baiting would occur at those locations. If WS' personnel baited sites after observing for non-target animals, they would continue to monitor the sites daily to observe for non-target feeding activity. If personnel observed non-targets feeding on bait, personnel would abandon those sites. WS would retrieve all dead birds to the extent possible following treatment with DRC-1339 to minimize secondary hazards associated with scavengers feeding on bird carcasses.

WS would track and record all chemical methods 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. The amount of chemicals used or stored by WS would be minimal to ensure human safety. Based on this information, WS' use of chemical methods, as part of the proposed action, would not have cumulative effects on non-targets.

The methods described in Appendix B have a high level of selectivity and WS' personnel can employ methods using SOPs to ensure minimal effects to non-target species. Between FY 2009 and FY 2015, no non-target bird mortality was observed and no non-target wildlife species were known to have been killed from WS' activities. Based on the methods available to alleviate bird damage and/or threats, WS does not anticipate the number of non-targets taken to reach a magnitude where declines in those species' populations would occur. Therefore, take of non-targets under the proposed action would not cumulatively affect non-target species. WS would continue to monitor the take of non-target species to ensure program activities or methodologies used in blackbird damage management do not adversely affect non-targets. WS has reviewed the list of federally listed T&E species in Louisiana and those state listed species developed by the Louisiana Natural Heritage Program. After review of the use patterns of methods available and the life histories of threatened or endangered species, WS has determined that the proposed action would have no effect on those species federally or state listed or their critical habitats.

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

An additional issue often raised is the potential risks to human health and safety associated with the methods employed to manage damage caused by blackbirds. Both chemical and non-chemical methods have the potential to have adverse effects on human health and safety. Risks could occur to persons employing methods and persons encountering methods. Risks can be inherent to the method itself or related to the misuse of the method.

WS' personnel would use a thought process for evaluating and responding to requests for assistance detailed in the WS Decision Model (see WS Directive 2.201) and described by Slate et al. (1992). This would include considering risks to human safety. WS would use an adaptive integrated methods approach under the proposed action alternative. The philosophy behind this approach would be to implement methods in the most effective manner while minimizing the potentially harmful effects to people, target and non-target species, and the environment. Potential harmful effects would also be minimized because WS would continually monitor, evaluate, and make modifications as necessary to methods or strategies when providing direct operational assistance, to not only reduce damage but also to minimize potentially harmful effects to human health and safety.

Additionally, WS' employees would incorporate those SOPs discussed in Chapter 3 into activities conducted under the proposed action alternative to reduce risks to human health and safety. WS would identify hazards in advance of work assignments and would provide employees with PPE appropriate to the activities. WS' employees would adhere to safety requirements and use the appropriate PPE. WS' employees are required to work cooperatively to minimize hazards and immediately report unsafe working conditions (see WS Directive 2.601). Whenever possible, WS' employees would conduct damage management activities away from areas of high human activity (*e.g.*, rural areas) and during periods when human activity is low (*e.g.*, early mornings).

All of the methods listed in Appendix B would be available under the proposed action. Although hazards to human health and safety from both non-lethal and lethal methods exist, those methods would generally be safe when used by individuals trained and experienced in their use and with regard and consideration of possible risks to human health and safety.

Although some risk of bodily harm exists from the use of non-lethal non-chemical methods, when used appropriately and with consideration of possible risks, WS' employees can use those methods with a high degree of safety. Under the proposed action, WS' personnel would receive training and have experience with the use of non-lethal non-chemical methods. WS Directive 2.601 requires employees wear appropriate PPE the program provides to them. WS would not implement those methods in locations or in such a manner in which they would pose hazards to WS staff or the public. When recommending those methods, WS would caution those person's against their misuse.

When used appropriately and with consideration of human safety, risks associated with firearms would be minimal. Questions have arisen about the deposition of lead into the environment from ammunition used in firearms. Lead is a metal that can be poisonous to people. Risk of lead exposure to humans occurs primarily when people ingest lead. To minimize risk to people, WS would use non-toxic ammunition as required by the depredation order for blackbirds; thereby, eliminating any cumulative impacts of lead on human health and safety.

A common concern regarding the use of chemicals is the risk to human health and safety. WS would follow all label requirements when using DRC-1339; therefore, following label requirements of DRC-1339 would reduce risks to the safety of people, including WS' employees. Under the proposed action, WS' personnel that use DRC-1339 would be certified as pesticide applicators by the LDAF and be required to adhere to all certification requirements set forth in FIFRA and Louisiana pesticide control laws and regulations.

DRC-1339 is unstable in the environment; therefore, DRC-1339 degrades rapidly when exposed to sunlight, heat, or ultra violet radiation and has a short half-life (EPA 1995). DRC-1339 is highly soluble in water but does not hydrolyze and degradation occurs rapidly in water. The chemical tightly binds to soil and has low mobility. The half-life is about 25 hours, which means it is nearly 100% broken down within a week, and identified metabolites (*i.e.*, degradation chemicals) have low toxicity. WS would recover and dispose of as much unconsumed bait as possible in accordance with the label. The WS program would notify property owners of the rotational crop (plantback) restrictions associated with the use of the staging area label of DRC-1339 and a property owner would be required to agree to adhere to those restrictions before WS would use DRC-1339 treated bait on their property. The boundaries of baited areas are typically marked with flagging to identify areas. After last application of bait, the plantback intervals are 15 days for rice, wheat, corn, and barley; 30 days for sunflower and soybeans; and 365 days for other crops. To limit the possibility that the public is exposed to birds that have died from DRC-1339, WS would retrieve all dead birds to the extent possible and dispose of them in accordance with WS Directive 2.515. Given the strict application requirements for DRC-1339, WS does not anticipate any negative impacts on human health and safety.

As mentioned previously, WS' personnel would only conduct direct operational assistance after a MOU, work initiation document, or another comparable document listing all the methods the property owner or manager would allow WS' personnel to use on property they own and/or manage was signed by WS and those people requesting assistance. Therefore, people requesting assistance would be aware of the methods that WS' personnel would use on property they own or manage, which would assist in identifying any risks to human health and safety associated with those methods.

Issue 4 – Humaneness and Animal Welfare Concerns

Humaneness and animal welfare concerns associated with methods available to reduce blackbird damage have been identified as an issue. As previously discussed, 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.

Research and development by WS has improved the selectivity and humaneness of methods and WS continues to seek new methods and ways to improve current technology to improve the selectivity and 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. Until new findings and products are found practical, a certain amount of animal suffering could occur when some methods are used in situations where non-lethal damage management methods are not practical or effective. Personnel from WS are experienced and professional in their use of and recommendation of management methods. Consequently, WS' personnel would implement management methods in the most humane manner possible under the constraints of current technology. As previously stated, all methods listed in Appendix B would be available under the proposed action alternative. Chapter 3 discusses the SOPs that ensure WS' personnel use methods as humanely as possible under the proposed action alternative.

Issue 5 – Effects of Damage Management Activities on the Aesthetic Values of Blackbirds

An additional issue raised is that damage management activities associated with blackbirds would result in the loss of the aesthetic benefits of target birds to persons in the area where damage management activities occur. The implementation or recommendation of methods by WS under this alternative would result in the dispersal, exclusion, or removal of individuals or small groups of birds to alleviate damage and threats. In some instances when WS' employees disperse or remove blackbirds, the ability of interested persons to observe and enjoy those birds at that location would likely temporarily decline.

WS has no authority to regulate take or harassment of birds. That authority rests with the USFWS and the LDWF. Therefore, WS' involvement in activities to manage blackbird damage to sprouting rice would not increase the number of birds that other entities could take or disperse. Those birds removed or dispersed by WS under this alternative would likely be those same birds that other entities could and likely would remove or disperse in the absence of assistance from WS. Since other entities could remove or disperse those birds that WS could disperse or remove under this alternative, WS' involvement in removing those birds would not likely be additive to the number of birds that could be taken in the absence of WS' involvement.

WS' take of blackbirds between FY 2009 and FY 2015 has been of low magnitude when compared to population estimates, annual mortality, and other available information. Given the limited take proposed by WS under the proposed action alternative when compared to the known sources of mortality of birds and their population information, damage management activities conducted by WS pursuant to the proposed action would not have cumulative adverse impacts on the aesthetic value of birds.

CHAPTER 5 - LIST OF PREPARERS, REVIEWERS, AND PERSONS CONSULTED

5.1 LIST OF PREPARERS

Dwight LeBlanc	USDA, APHIS, WS – State Director
Allen Wilson	USDA, APHIS, WS – Wildlife Biologist
Ryan Wimberly	USDA, APHIS, WS – Environmental Management Coordinator

5.2 LIST OF PERSONS CONSULTED AND REVIEWERS

Jimmy Anthony, Assistant Secretary	LDWF
Deborah Fuller, Biologist	USFWS
Jeffery Sylvester - President	Louisiana Rice Growers Association
Jerry Leonards – President	Acadia Rice Growers Association
Eric Savant - President	Allen Rice Growers Association
Adam Habetz - President	Calcaseau/Cameron Rice Growers Assoc.
Paul Johnson – President	Jefferson Davis Rice Growers Association
Jason Waller - President	North Louisiana Rice Growers Association
Christian Richard - President	Vermillion Rice Growers Association
Richard Fontenot - Chairman	Farm Bureau Rice Committee
Jeff Durand - Member	Louisiana Rice Promotion Board
Kevin Berken - Chairman	Louisiana Rice Promotion Board
Jackie Loewer - Chairman	Louisiana Rice Research Board
Philip Lamartiniere - President	Central Louisiana Rice Growers Assoc.

APPENDIX A
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APPENDIX B
METHODS TO ALLEVIATE BLACKBIRD DAMAGE TO SPROUTING RICE

The most effective approach to resolving any wildlife damage problem is to use an adaptive integrated approach, which may call for the use of several methods simultaneously or sequentially. This approach, used by WS for providing both technical assistance and direct operational assistance, is commonly known as integrated management (see WS Directive 2.105). The philosophy behind integrated management is to implement methods in the most effective manner while minimizing the potentially harmful effects to humans, target and non-target species, and the environment[47]. Integrated damage management may incorporate both non-lethal and lethal methods depending upon the circumstances of the specific damage problem. Non-lethal methods disperse or otherwise make an area where the damage is occurring unattractive to the species causing the damage, thereby reducing the presence of those species in the area. Lethal methods remove individuals of the species causing the damage, thereby reducing the presence of those species in the area and the local population.

WS' personnel use a thought process for evaluating and responding to requests for assistance detailed in the WS Decision Model (see WS Directive 2.201) and described by Slate et al. (1992). After receiving a request for assistance, a WS' employee would determine whether the problem was within the authority of WS. If the request for assistance was within the authority of WS, information about the damage would be gathered and analyzed (*e.g*., what species is responsible for the damage, the type of damage occurring, the magnitude of the damage occurring, previous actions taken to address the problem). WS would then evaluate the appropriateness of strategies and methods based on their availability (*i.e*., legal and administrative) and suitability based on biological, environmental, social, and economic factors (see WS Directive 2.101). Specific examples of factors used to determine suitability may include but are not limited to the status of target 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 overriding environmental, legal, human health and safety, animal welfare, or other concerns. Methods deemed practical for the situation are then developed into a management strategy. This information is then provided to the requestor in the form of technical assistance. As mentioned previously, those persons receiving technical assistance can then 1) take no action, 2) choose to implement WS' recommendations on their own, 3) use the services of a private nuisance wildlife control agent, 4) use volunteer services of private individuals or organizations, or 5) use the services of WS (direct operational assistance) when available. If they choose to use the services of WS, WS would continue to monitor and evaluate the situation as assistance was provided, modifying the strategy and methods used to reduce the damage to an acceptable level.

A variety of methods would potentially be available to the WS program in Louisiana. Various federal, state, and local statutes and regulations, as well as the directives of WS would govern WS' use of methods. The WS program in Louisiana could recommend or use the following methods and materials during technical assistance and direct damage management efforts of the WS program in Louisiana.

NON-LETHAL METHODS (NON-CHEMICAL)

RESOURCE MANAGEMENT

Resource management includes a variety of practices that may be used by resource owners or managers to reduce the potential for damage. Implementation of these practices would be appropriate when the potential for damage the property owner or manage could reduce damage without substantially increasing

[47]The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns.

a resource owner's costs or diminishing their ability to manage resources pursuant to goals. WS would make resource management recommendations through technical assistance efforts.

Cultural Practices: WS could recommend a rice producer change or modify the activities associated with planting rice to reduce the damage that blackbirds may cause to newly seeded rice fields. However, the implementation of those practices that WS recommends would be the responsibility of the rice producer, since the agricultural producer would control the activities conducted on their properties and the planting of rice seed. The cultural practices that would be available would vary in accordance with such things as land topography, economics, experience, and legalities. Abandonment of rice fields in areas of historically high bird damage or cultivation of crops not susceptible to bird damage are also viable cultural practices. In some cases, rice producers may avoid damage by moving rice fields away from sites where severe depredation was expected or finding another use for their property.

Changes in cultural practices that could reduce the risk of blackbirds causing damage to newly seeded rice could include only water-seeding rice when the producer can keep two to six inches of water uniformly flooded over the rice seed. Another recommendation could be to delay the planting of rice until after April 1 or arranging planting programs so a producer plants fields near known blackbird roost areas (such as coastal marshes) last. WS could also recommend implementing a block planting schedule with neighbors where rice producers in a given area plant all or most of their rice on, or near, the same date, which can be effective at spreading damage over several individuals instead of one or two producers experiencing most of the damage. Further description of the cultural practices that a rice producer could implement and that WS could recommend occurs below.

Drill seeding reduces the susceptibility of rice to bird damage by covering seed with a layer of soil. However, not all fields lend themselves to drill seeding and it is more costly and labor intensive than water seeding rice. Drill seeding can be relatively beneficial to terrestrial wildlife in comparison to water seeding, because the rice producer would no longer need to flood some fields. Conversely, drill-seeded fields would not provide preferred habitat to migratory shorebirds, waterfowl, and other water-dependent species. Although drill seeding prevents birds from feeding on the rice seed because the seed is underneath soil, blackbirds can still pull sprouting rice seeds out of the ground to feed on the rice kernel.

Pinpoint flooding, whereby a rice producer gradually raises water levels as rice germinates and grows, can greatly reduce the period during which rice is vulnerable to bird damage. Likewise, rice seeded into a field that is continuously flooded with two to six inches of water is not susceptible to bird-caused damage; however, this water management scheme sometimes results in poor stands of rice by promoting seed/seedling drift or "*stretching*" of seedlings. Both pinpoint and continuous flooding practices require extensive land leveling prior to seeding, to insure uniform water levels. Both flooding regimes can provide additional habitat for aquatic wildlife.

Delaying seeding until April greatly reduces the likelihood of severe blackbird damage occurring to sprouting rice by allowing migrant blackbirds to leave and resident flocks to disperse to breeding territories (Wilson et al. 1989). Additionally, delayed seeding promotes seedling vigor and stand establishment, reduces that chance of damage from freezes, reduces the likelihood water mold development, and increases the efficacy of herbicides. Quick emergence associated with delayed seeding reduces the period of susceptibility to blackbird damage. Delayed seeding can also increase damage associated with insects and weeds, reduce the ratoon-crop potential (*i.e.*, second cropping) of some rice varieties, invite wind damage from summer storms, and make headed rice more vulnerable to bird attacks (Wilson et al. 1989). Rice producers can partially offset the negative aspects of delayed seeding by using very early maturing rice varieties.

Block planting, whereby rice producers plant most of the rice in a given area on or near the same date, can reduce bird damage to rice on individual farms by dispersing blackbird populations (Louisiana State University Agricultural Center 1998). Delayed seeding, use of early maturing varieties, and block planting may affect the timing of availability of food and habitat associated with rice culture, thus benefitting some non-target wildlife species.

Lure crops can be a cost effective way of protecting crops (Cummings et al. 1987). If an agricultural producer cannot avoid blackbird damage by careful crop selection or a modified planting schedule, those rice producers can sometimes mitigate the potential loss of rice by planting lure crops (Cummings et al. 1987). Lure crops are crops planted or left for consumption by wildlife as an alternate food source. To improve the efficacy of this technique, an agricultural producer should use frightening devices in nearby non-lure crop fields and the producer should not disturb blackbirds in the lure crop fields. This approach provides relief for critical crops by sacrificing less important or specifically planted fields. Establishing lure crops is sometimes expensive, requires considerable time and planning to implement, and may attract other unwanted species to the area. Agriculture producers have used lure crops successfully to reduce damage by cranes and geese in the Middle Rio Grande Valley of New Mexico for many years (USDA 2009). Hagy et al. (2008) found that lure crops could reduce blackbird damage to nearby commercial sunflower fields. The implementation of this method would be limited to property owners or property managers who can manage what occurs on their own properties.

Habitat Management: Localized habitat management is often an integral part of wildlife damage management. Minor modification to habitat at a field can help reduce the attractiveness of the field to blackbirds, such as eliminating weeds. Removing brush and trees from ditch banks, levees, fencerows, and keeping fields free of weeds can make those fields less attractive to blackbirds (Louisiana State University Agricultural Center 1998). Legal constraints may also exist that preclude altering particular habitats. In most cases, the owner or manager of the resource or property is responsible for implementing habitat modifications and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect.

PHYSICAL EXCLUSION

Physical exclusion methods would restrict the access of blackbirds to resources. Those methods could provide effective prevention of blackbird damage in some situations. Bird proof barriers can be effective but are often cost-prohibitive, particularly because of the aerial mobility of birds, which requires overhead barriers, as well as peripheral fencing or netting. Exclusion adequate to stop blackbird movements can also restrict movements of other wildlife (Fuller-Perrine and Tobin 1993). Exclusionary devices can be costly to implement, especially for large areas, and therefore are uneconomical and not used often. In addition, some exclusionary devices are labor intensive, which can further reduce their cost-effectiveness.

Surface Coverings: Surface coverings, such as netting and wire grids, are the exclusion devices that people most often use to prevent birds from accessing susceptible resources. Selection of a barrier system depends on the bird species involved, expected duration of the damage, size of the area to be excluded, compatibility of the barrier with other operations (*e.g.*, harvesting), resilience to weather, and aesthetics. For example, the use of overhead wire grids can exclude birds from ponds or other areas (Fairaizl 1992, Lowney 1993). Birds apparently fear colliding with the wires and thus, avoid flying into areas where people have used overhead wire grids. Overhead wire grids are likely most applicable for use on areas of two acres or less. Netting can also exclude birds from a specific area by placing the net over and around the specific resource that people want to protect. Although bird exclusion netting can be used cost effectively in some commercial crops (Fuller- Perrine and Tobin 1993), the use of netting is often not cost effective when addressing damage in commercial rice fields, which can be hundreds of acres in size. However, netting can protect small areas of high value crops. For example, the WS program in Louisiana has provided assistance with erecting bird proof netting around high value research crops of less than two acres in size to prevent blackbird damage. Therefore, exclusion with wire grids or netting may be impractical for large areas (*e.g.*, commercial agriculture) but can be practical in small areas (*e.g.*, less than 2 acres) or for high-value crops (*e.g.*, research crops). Exclusion could also displace a large variety and number of shorebirds, wading birds, and waterfowl that feed, nest, and loaf in rice fields. Netting and overhead wire grids can also cause mortality or injury to target and non-target wildlife from entanglement (Mott and Boyd 1995) or collision.

FRIGHTENING DEVICES OR DETERRENTS

Frightening devices can repel blackbirds from areas where they are causing damage or posing threats of damage. The success of frightening methods depends on an animal's fear of, and subsequent aversion to, offensive stimuli (*e.g.*, see Shivik and Martin 2001). A persistent effort is usually required to apply frightening techniques effectively and the techniques must be sufficiently varied to prolong effectiveness (Booth 1994). Over time, animals often habituate to commonly used scare tactics and ignore them (*e.g.*, see Rossbach 1975, Pfeifer and Goos 1982, Conover 1982, Shirota et al. 1983, Mott 1985, Dolbeer et al. 1986, Tobin et al. 1988). In addition, in many cases birds frightened from one location become a problem at another.

Devices used to frighten or deter birds are probably the oldest methods of addressing wildlife damage. Devices may be either auditory or visual and generally only provide short-term relief from damage. However, a number of sophisticated techniques could be available to scare or harass birds from an area. Methods include but are not limited to reflective tape, flags, scarecrows, effigies, eye spot balloons, alarm or distress calls, propane exploders, pyrotechnics, people, vehicles, lights, and lasers. These methods can frighten birds from the area where damage is occurring. As with other methods, these techniques tend to be more effective when used collectively in a varied regime rather than individually. However, the continued success of these methods frequently requires reinforcement by limited shooting (see Shooting). Those techniques are generally only practical for small areas. Frightening devices that use loud noise can also scare people and domestic or wild animals when people use those methods in their vicinity.

Reflective Tape and Flags: Visual deterrents such as reflective tape (Mylar® tape), flags, and windsocks are sometimes effective in reducing bird damage. Both reflective tape, which has a mirror like surface that can produce flashes of light when exposed to the sun, and flags that are made of lightweight materials that can move in the wind, can produce visual effects that may startle birds. Some studies have shown reflective tape can successfully repel some birds from crops (Bruggers et al. 1986, Dolbeer et al. 1986, Heinrich and Craven 1990). Other studies have shown that reflective tape is ineffective (Bruggers et al. 1986, Dolbeer et al. 1986, Tobin et al. 1988, Conover and Dolbeer 1989). Both reflective tape and flagging is impractical in many locations and can be aesthetically unappealing to some people. Those devices can be effective, but reduced effectiveness can occur after a short time as birds become accustomed and learn to ignore them.

Scarecrows or Effigies: The use of scarecrows or effigies has had mixed results and rice producers do not often use scarecrows or effigies. Scarecrows or effigies, which mimic people or predatory raptors, as well as air-filled balls with '*eye spots*', could be available for use or recommendation. For example, Conover and Chasko (1985) found that an integrated approach, which used scarecrows or effigies in combination with other methods (distress calls and non-lethal chemical repellents), was ineffective at scaring or repelling nuisance waterfowl. In contrast, Heinrich and Craven (1990) reported that using scarecrows reduced the use of agricultural fields by migrant Canada geese in rural areas. In general, scarecrows or effigies are most effective for blackbirds when they are moved frequently, used as part of an integrated approach, and are well maintained. However, the effectiveness of scarecrows and effigies can be reduced after a short time as birds become accustomed and learn to ignore them and as the number of birds at a location increases (*e.g.*, see Smith et al. 1999).

Alarm or Distress Calls: Birds often give alarm calls when they detect predators, while birds often give distress calls when a predator captures them (Conover 2002). When other birds hear those calls, they know a predator is present or that a bird is in distress (Conover 2002). To disperse birds, people can broadcast recordings of both calls in an attempt to scare birds from areas where they cause damage. Recordings have been effective in scaring starlings from airports and vineyards, gulls from airports and landfills, finches from grain fields, herons from aquaculture facilities, and American crows from roosts (Conover 2002). However, the effectiveness of alarm or distress calls is reduced as birds become accustomed and learn to ignore them. Because alarm or distress calls are given when a bird is being held by a predator or when a predator is present, birds should expect to see a predator when they hear those calls. If they do not, they may become accustomed to alarm or distress calls more quickly. For this reason, scarecrows or effigies should be paired with alarm or distress calls (Conover 2002), pyrotechnics (Mott and Timbrook 1988), or other methods to realize maximum effectiveness. In some situations, the level of volume required for this method to be effective may disturb nearby residents.

Propane Exploders: Propane exploders or cannons operate on propane gas and produce loud explosions at controllable intervals, similar to the sound of a firearm makes when fired. They can be strategically located to frighten birds from the area where damage or threats are occurring or at roost locations to disperse roosts. Propane exploders with timers that automatically turn them on and off each day can be effective at dispersing blackbirds from rice fields. The Louisiana State University Agricultural Center (1998) recommended at least one exploder for every 25 acres of rice crop that a producer is trying to protect. Propane exploders should be elevated using a barrel, stand, or a truck bed so the sound "*shoots*" out over the crop. In addition, rice producers should move propane cannons around the field to new locations every few days and vary the intervals that exploders fire to reduce the likelihood of habituation. Rice producers should also reinforce the use of propane exploders with pyrotechnics or live ammunition from a firearm (Louisiana State University Agricultural Center 1998). Williams (1983) reported an approximate 50% reduction in blackbirds at two south Texas feedlots because of pyrotechnics and propane cannon use. Propane exploders are generally inappropriate in areas near where people live or work due to the repeated loud explosions, which many people would consider a serious and unacceptable nuisance. In some situations, the level of volume required for this method to be effective may disturb nearby livestock and could disperse non-target wildlife from an area.

Pyrotechnics: Pyrotechnics, scare cartridges or bombs and shell-crackers, can repel many species of birds (Booth 1994). Shell-crackers are 12-gauge shotgun shells containing firecrackers that are projected up to 75 yards in the air before exploding. They can frighten birds and are most often used to prevent crop depredation by birds or to discourage birds from undesirable roost locations. The shells should be fired so they explode in front of or underneath flocks of birds attempting to enter fields or roosts. The purpose is to produce an explosion between the birds and their objective. Birds already in a field can be frightened from the field; however, it is extremely difficult to disperse birds that have already settled in a roost. Noise, whistle, racket, and rocket bombs can be fired from 15-millimeter flare pistols. They are used similarly to shell-crackers but are projected for shorter distances. Noise bombs (also called bird bombs) are firecrackers that travel about 25 yards before exploding. Whistle bombs are similar to noise bombs, but whistle in flight rather than exploding. They produce a noticeable response because of the trail of smoke and fire, as well as the whistling sound. Racket bombs make a screaming noise in flight and do not explode. Rocket bombs are similar to noise bombs, but may travel up to 150 yards before exploding. A variety of other pyrotechnic devices, including firecrackers, rockets, and Roman candles, can disperse birds. Firecrackers can be inserted in slow-burning fuse ropes to control the timing of each explosion. The interval between explosions is determined by the rate at which the rope burns and the spacing between firecrackers.

Although one of the more effective methods of dispersing birds, more often than not, pyrotechnics simply move birds to other areas. There are also safety and legal implications regarding their use. Pyrotechnic projectiles can start fires, ricochet off buildings, and trigger dogs to bark incessantly. Additionally, the discharge of pyrotechnics is inappropriate or prohibited in some areas by firearm discharge and noise ordinances. As with other methods, pyrotechnics tend to be more effective when used collectively in a varied regime, rather than individually.

Human Presence: Physical human harassment or hazing involves people pursuing birds on foot, clapping their hands, or shouting. Vehicle harassment involves people pursuing birds with remote control vehicles, non-motorized or motorized boats, or motor vehicles. These techniques have been successfully used to keep a variety of bird species from areas where they cause damage or threats. However, like other methods of harassment, birds hazed from one area where they are causing damage may move to another area where they cause damage (Brough 1969, Conover 1984, Summers 1985). Additionally, birds tend to habituate to hazing techniques (Zucchi and Bergman 1975, Summers 1985, Aubin 1990), but this can mitigated by using an integrated management approach.

CAPTURE WITH LIVE CAPTURE TRAPS

Blackbirds could be live captured using live-traps, mist nets, or cannon nets. Upon capture, WS could band/collar and release blackbirds on site, translocate blackbirds to other areas for release, or euthanize those blackbirds. Translocation may be appropriate in limited situations; however, translocation would not necessarily be feasible to alleviate damage in most situations. Although WS would not necessarily preclude translocation in all cases, it would be logistically impractical to translocate a large number of blackbirds in most cases. Translocation to other areas following live capture would not generally be effective because blackbirds are highly mobile and can easily return to damage sites from long distances, blackbirds generally already occupy habitats in other areas, and translocation would most likely result in blackbird damage near the new location. In most cases, WS' policy discourages translocation because of the stress to relocated animals, poor survival rates, and the difficulties of adapting to new locations or habitats (see WS Directive 2.501). Additionally, blackbird species that often cause damage are abundant and translocation is not necessary for the maintenance of viable populations. When WS deems the translocation of blackbirds to be an appropriate method to alleviate damage or for research purposes, WS would consult with the USFWS and/or the LDWF, as appropriate. When translocating blackbirds, WS would hold and transport blackbirds in appropriate containers. WS would transport blackbirds to suitable habitat away from the site where damage and threats were occurring for release, with permission of the landowner or manager.

Cage Traps: Cage traps come in a variety of styles to target different species. The most commonly known cage traps used are box traps. Box traps are usually rectangular and made of heavy gauge wire mesh. WS could use cage traps to capture target blackbird species alive. Cage traps usually work best when baited with foods attractive to the target blackbird species. Cage traps must be checked frequently to ensure that captured animals are not subjected to extreme environmental conditions. For example, a blackbird may die quickly if the cage trap were placed in direct summertime sunlight. Other potential problems with the use of cage traps are that some birds fight to escape and injure themselves in the process or a predator enters the trap and injures or kills the birds. WS SOPs require that active traps be checked regularly to replenish bait, food, and water and to remove captured birds. Non-target species are released during these checks unless it is determined that the animal would not survive or that the animal cannot be released safely. The most common type of cage trap for blackbirds is the decoy trap.

Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds of the same species that are being targeted are usually placed in the trap with sufficient food and water to assure their survival. Perches are configured in the trap to allow birds to roost above the ground and in a more natural position. The feeding behavior and calls of the decoy birds attract other birds, which enter the trap through an opening in the top of the trap. The openings allow target bird species to enter the trap but prevent them from exiting. Active decoy traps are monitored daily, every other day, or as appropriate, to remove excess birds and to replenish bait and water.

Cannon/Rocket Nets: Cannon or rocket nets use nylon or cloth nets to capture wildlife that have been conditioned to feed in a given area through baiting. When using cannon nets, the net is fully deployed to determine the capture area when fired. Once the capture zone has been established, the net is rolled up upon itself and bait is placed inside the zone to ensure feeding wildlife are captured. When target animals are feeding at the site and within the capture zone of the net, the launcher is activated by personnel near the site, which launches the net over the target wildlife. The net is launched using small explosive charges and weights or compressed air. The launching of the net occurs too quickly for the birds to escape. Only personnel trained in the safe handling of explosive charges would be allowed to employ rocket nets when explosive charges were used. Pneumatic cannon nets could also be used, which propels the net using compressed air instead of small explosive charges. Cannon nets require personnel to be present at the site continually to monitor for feeding. Cannon nets can be used to capture multiple animals during a single application. Non-targets incidentally captured can be released on site unharmed.

Mist Nets: Mist nets, made of a very fine mesh, are hung vertically in a drape like fashion. Birds cannot see the netting and become entangled when they fly into it. The size of the mesh determines the species of birds that can be caught (Day et al. 1980). Mist nets are monitored closely to ensure that any captured birds (target or non-target) can be promptly removed.

NON-LETHAL METHODS (CHEMICAL)

Non-lethal chemical methods could include repellents. The use of chemical methods is strictly regulated by the EPA and the LDAF. All pesticides have to be registered with the EPA and must have labels approved by the agency detailing the product’s ingredients, the type of pesticide, the formulation, classification, approved uses and formulations, potential hazards to humans, animals, and the environment, as well as directions for use. The registration process for pesticides is intended to assure minimal adverse effects to humans, animals, and the environment when chemicals are used in accordance with label directions. Under the FIFRA and its implementing guidelines, it is a violation of federal law to use any pesticide in a manner that is inconsistent with its label.

All chemicals used by WS would be registered as required by the FIFRA (administered by the EPA and the LDAF). WS’ personnel that use restricted-use chemical methods would be certified as pesticide applicators by the LDAF and would be required to adhere to all certification requirements set forth in FIFRA and Louisiana pesticide control laws and regulations. Chemicals would only be used on private, public, or tribal property sites with authorization from the property owner or manager.

Chemical Repellents: Chemical repellents are non-lethal chemicals used to discourage or disrupt particular behaviors of wildlife. Research scientists with the NWRC have been involved with conducting research on taste repellents to discourage blackbirds from feeding on rice (*e.g*., see Besser 1973, Mott et al. 1976, Ruelle and Bruggers 1979, Holler et al. 1985, Decker et al. 1990, Avery et al. 1995, Avery et al. 2005). Research scientist with the NWRC have evaluated a non-toxic clay-based seed coating (Decker et al. 1990), methiocarb (Besser 1973, Mott et al. 1976, Ruelle and Bruggers 1979, Holler et al. 1985), methyl anthranilate (Avery et al. 1995), anthraquinone (Avery et al. 1998), and caffeine (Avery et al. 2005). Despite extensive research efforts, the commercial development and regulatory approval of an effective repellent for sprouting rice remains elusive (Avery et al. 2005). During the development of this EA, no repellents were commercially available to alleviate blackbird damage to sprouting rice.

Since blackbirds feed on the rice seed, research on repellents has focused on seed treatments where application of the repellent occurs directly to the seed. Based on previous research, repellents that could be available for use in the future to prevent blackbirds from feeding on newly planted rice are likely to be seed treatments that the seed manufacturer or the farmer mixes directly onto the seed prior to planting. Since the WS program in Louisiana would not be responsible for planting rice, no direct use of taste repellents would occur by WS. However, WS could recommend the use of repellents, if registered for use in the State to prevent damage to newly seeded rice. WS would only recommend repellents the EPA approves for use pursuant to the FIFRA and the LDAF approves for application in the State. Although not registered for use on sprouting rice, repellents containing methyl anthranilate, anthraquinone, or caffeine are the most common taste repellents and research related to those chemical repellents and sprouting rice exists. Further discussion on those potential repellents occurs below.

Methyl Anthranilate is naturally occurring in concord grapes and in the blossoms of several species of flowers, which manufacturers have used as a food additive and perfume ingredient for many years (Dolbeer et al. 1992). Methyl anthranilate is also an artificial grape flavoring used in foods and soft drinks for human consumption. It has been listed as "*Generally Recognized as Safe*" by the FDA (Dolbeer et al. 1992).

Methyl anthranilate is a promising repellent for many bird species (Dolbeer et al. 1993). Avery et al. (1995) investigated methyl anthranilate as a seed treatment for rice to deter blackbirds from foraging on rice seed. Although methyl anthranilate showed repellent properties when mixed with rice seed, blackbirds would continue to feed on treated seed rice if no other food sources were available or if alternative food sources were less preferred. In addition, the formulation of methyl anthranilate used by Avery et al. (1995) did not persist on treated rice seed and to be effective the seed treatment would need to be extended to persist to cover a two to three week period. Methyl anthranilate has been shown to be nontoxic to bees (LD_{50} > 25 micrograms/bee1)[48], nontoxic to rats in an inhalation study (LC_{50} > 2.8 mg/L2)[49], and of relatively low toxicity to fish and other invertebrates.

Anthraquinone (sold under the trades name Flight Control® and Avipel®) is a naturally occurring chemical found in many plant species and in some invertebrates as a natural predator defense mechanism. Anthraquinone has been effective in protecting rice seed from red-winged blackbirds and boat-tailed grackles (Avery et al. 1997). It has also been effective as a foraging repellent when used to limit Canada goose grazing on turf and brown-headed cowbirds feeding on seed (Dolbeer et al. 1998). Anthraquinone has low toxicity to birds and mammals.

Caffeine has been identified as a potential avian repellent with relatively low toxicity (Schafer et al. 1983, Werner et al. 2006). At 2,500 parts per million, Avery and Cummings (2003) found caffeine reduced rice consumption by 76% among male red-winged blackbirds held in captivity. Under field conditions in southwestern Louisiana, Avery et al. (2005) found that blackbirds consumed <10% of rice seeds treated with 10,000 parts per million caffeine while blackbirds consumed >80% of untreated rice seeds. Avery et al. (2005) viewed caffeine as an effective, economical, and environmentally safe avian repellent if improvements in the formulation occurred to make caffeine practical for agricultural applications. For example, caffeine has low water solubility, which can impede mixing during field applications (Avery et

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[48] An LD_{50} is the dosage in milligrams of material per kilogram of body weight, or in this case in micrograms per individual bee, required to cause death in 50% of a test population of a species.

[49] An LC_{50} is the dosage in milligrams of material per liter of air required to cause death in 50% of a test population of a species through inhalation.

al. 2005). Werner et al. (2006) recommended a caffeine and sodium benzoate formulation to increase the solubility of caffeine in water along with a "*sticker*" to maintain the formulation on the rice seed. The EPA has designated caffeine as "*Generally Recognized as Safe*".

LETHAL METHODS (MECHANICAL)

Shooting: Shooting is the practice of selectively removing target birds using firearms. Shooting, when deemed appropriate using the WS Decision Model, can be highly effective in removing those individual birds responsible for causing damage and posing threats. In addition, shooting can be highly selective since identification of the target would occur prior to application. Normally, shooting occurs using a shotgun or small caliber rifle (*e.g.*, .22 caliber). WS would kill birds as quickly and humanely as possible in accordance with WS Directive 2.505. The use of firearms would be available for use by entities other than WS under the all of the alternatives.

When using firearms to address the damage that blackbirds cause to sprouting rice, WS and other entities primarily use shooting as a dispersal technique. Although some lethal take of target blackbird species likely occurs, shooting is primary a method to reinforce other non-lethal methods, such pyrotechnics, propane cannons, and other non-lethal harassment methods. Shooting a few individual target birds from a larger flock can reinforce a birds' fear of harassment techniques.

WS employees who use shooting as a method must comply with WS Directive 2.615 and all standards described in the WS Firearms Safety Training Manual. WS Directive 2.615 requires that personnel undergo regular training, adhere to a set of safety standards, submit to drug testing, and are subject to the Lautenberg Amendment, which prohibits those convicted of a misdemeanor crime of domestic violence from possessing a firearm.

Cervical Dislocation: WS could use this euthanasia method when WS captures target blackbird species. The neck is hyper-extended and dorsally twisted to separate the first cervical vertebrae from the skull. The AVMA has stated this technique as a humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of poultry and other small birds (Beaver et al. 2001, AVMA 2013). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Beaver et al. 2001, AVMA 2013).

LETHAL METHODS (CHEMICAL)

The EPA and the LDAF strictly regulate the use of chemical methods. The EPA must register all pesticides and all pesticides must have labels that the EPA approves, which details the product's ingredients, the type of pesticide, the formulation, classification, approved uses, potential hazards to people, animals, and the environment, and directions for use. The EPA has designed the registration process for pesticides to assure minimal adverse effects to people, animals, and the environment occurs when people use pesticides in accordance with label directions. Under the implementing guidelines of the FIFRA, it is a violation of federal law to use any pesticide inconsistent with the label of the pesticide. When EPA registers a pesticide as restricted-use, only those people trained and certified by the LDAF can purchase and apply the product.

WS' personnel that use restricted-use chemical methods would be certified as pesticide applicators by the LDAF and would adhere to all certification requirements set forth in the FIFRA and state pesticide control laws and regulations. WS would only use chemical methods on sites with authorization from the property owner or manager. The only lethal chemical methods that WS could use to address the damage that blackbirds cause would be the avicide DRC-1339 and carbon dioxide. DRC-1339 is a restricted-use pesticide that is currently only available for use by the WS program in Louisiana. WS could use carbon dioxide to euthanize target birds after live-capture. Further discussion of those methods occurs below.

DRC-1339: DRC-1339 is a slow acting avicide that the EPA has registered for reducing damage from several species of birds, including blackbirds, starlings, pigeons, crows, ravens, magpies, and gulls. Glahn and Wilson (1992) noted that baiting with DRC-1339 is a cost-effective method of reducing damage by blackbirds to sprouting rice. The WS program developed DRC-1339 as an avicide due to the differential toxicity exhibited by the compound when ingested by wildlife. The differential toxicity of DRC-1339 reduces the risk of non-targets consuming a lethal dose (DeCino et al. 1966). Most bird species that are responsible for damage, including starlings, blackbirds, and pigeons, are highly sensitive to DRC-1339 (Johnston et al. 1999). Many other bird species, such as raptors, are less sensitive (EPA 1995, DeCino et al. 1966, Schafer 1984).

Although DRC-1339 is highly toxic to sensitive species, it is only slightly toxic to some non-sensitive bird and mammal species (EPA 1995, Schafer 1981, Schafer 1991). For example, European starlings, a highly sensitive species, require a dose of only 0.3 mg/bird to cause death (Royall et al. 1967). Secondary poisoning has not been observed with DRC-1339, except in crows eating gut contents of pigeons (Krebs 1974). During research studies, carcasses of birds that died from DRC-1339 were fed to raptors, including northern harriers, for up to 141 days, with no symptoms of secondary poisoning observed (DeCino et al. 1966). This can be attributed the chemical's relatively low toxicity to many raptor species and the tendency of DRC-1339 to be almost completely metabolized by the target birds, leaving little residue to be ingested by scavengers (Cunningham et al. 1979).

Following the label requirements of DRC-1339 would reduce risks to non-target species. Label requirements include a period of pre-baiting and observation to ensure the absence of non-targets and the rapid uptake of treated bait by the target bird species. Additionally, DRC-1339 is typically very unstable in the environment and degrades quickly when exposed to sunlight, heat, and ultraviolet radiation (EPA 1995). DRC-1339 is also highly soluble in water, does not hydrolyze, and photodegrades quickly in water with a half-life estimated at 6.3 hours in summer, 9.2 hours in spring sunlight, and 41 hours during winter (EPA 1995). DRC-1339 binds tightly with soil and is considered to have low mobility (EPA 1995). The half-life of DRC-1339 in biologically active soil was estimated at 25 hours with the identified metabolites having a low toxicity (EPA 1995). Although DRC-1339 is moderately toxic to fish and highly toxic to aquatic invertebrates (EPA 1995), when WS' employees follow the label requirements of DRC-1339, exposure risks to non-target aquatic species would be reduced. The label requirements to reduce risks to fish and aquatic invertebrates include application more than 50 feet from a body of water. Given the strict application requirements for DRC-1339, WS does not anticipate any negative effects on people, non-target animals, or the environment.

Carbon Dioxide: Although not a registered pesticide, WS could use compressed carbon dioxide gas to euthanize target birds captured in live traps. WS would place live birds in a container, such as a plastic five-gallon bucket or chamber, which is then sealed. WS would then release carbon dioxide gas into the bucket or chamber and birds would quickly die after inhaling the gas. The American Veterinary Medical Association considers carbon dioxide gas to be an acceptable form of euthanasia for small birds (AVMA 2013). Carbon dioxide is a byproduct of respiration, is common in the atmosphere, and is required by plants for photosynthesis. It is used to carbonate beverages for human consumption and is also the gas released by dry ice. The use of carbon dioxide by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society. Euthanasia conducted by WS would be done in accordance with WS Directive 2.505.

APPENDIX C
SPECIES LISTED BY THE STATE OF LOUISIANA

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