SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT

STATEWIDE BIRD DAMAGE MANAGEMENT

IN MISSOURI

March 2008

I. INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as the human population expands and more land is used to meet human needs. These human uses often come into conflict with the needs of wildlife and increase the potential for negative human/wildlife interactions. Conflicts with wild and feral birds include but are not limited to negative impacts of increasing bird populations on vegetation and habitat used by other wildlife species, damage to private property from bird feces, crop damage, risks of aircraft collisions with birds at or near airports, and risks of disease transmission to humans and livestock. Wildlife damage management is the science of reducing damage or other problems associated with wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 1992). In response to persistent conflicts and complaints relating to wild and feral birds in Missouri, the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) completed an Environmental Assessment (EA) on bird damage management in 2002 (USDA 2002). The EA analyzed the potential environmental effects of alternatives for managing damage by and conflicts with wild and feral birds at private and public property sites or facilities within Missouri wherever such management is needed and assistance is requested from the WS program. The management alternative selected in the September 17, 2002 Decisions and Finding of No Significant Impact (FONSI) involves the use of an integrated wildlife damage management (IWDM) approach, including non-lethal and lethal methods to manage bird damage.

There have been changes to the regulations pertaining to bird damage management (BDM), the magnitude of WS' bird damage management activities in Missouri, and the methods to be considered for BDM. The supplement has been prepared to evaluate the environmental impacts of these changes and to reconsider WS' decision regarding the selection of a management alternative.

WS is the Federal program authorized by law to reduce damage caused by wildlife (the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c)). WS uses an IWDM approach, commonly known as Integrated Pest Management (WS Directive 2.105) in which a combination of methods may be used or recommended to reduce damage. WS' wildlife damage management program activities are not based on punishing offending animals but are a means of reducing damage and are used as part of the WS Decision Model (Slate et al. 1992, USDA 1997 Revised, WS Directive 2.101). The imminent threat of damage or loss of resources is often deemed sufficient for wildlife damage management actions to be initiated (U.S. District Court of Utah 1993). Missouri WS receives request to assist in managing bird damage to agricultural resources, livestock, property, turf, aquaculture, and crops, in reducing risks to human health and safety, and in conducting surveillance for diseases in wild and feral birds. All Missouri WS wildlife damage management is in compliance with relevant state, federal and local laws including the Endangered Species Act of 1973, the Migratory Bird Treaty Act and the Wildlife Code of Missouri.

The United States Department of the Interior, Fish and Wildlife Service (USFWS) is the federal agency with primary statutory authority for the management of migratory bird populations in the United States. The USFWS has joined WS as a cooperating agency in the preparation of this supplement to the EA.

Individual actions on the types of sites encompassed by this analysis may be categorically excluded under the APHIS Implementing Regulations for compliance with the National Environmental Policy Act (NEPA) (7 CFR 372.5(c)). APHIS Implementing Regulations also provide that all technical assistance

furnished by WS is categorically excluded (7 CFR 372.5(c)) (60 Federal Register 6,000, 6,003 (1995)). WS prepared the original EA and this supplement to assist in planning BDM activities and to clearly communicate with the public the analysis of cumulative impacts for a number of issues of concern in relation to alternative means of reducing bird damage in Missouri. The analysis in the EA relied on existing data contained in published documents, agency (WS, USFWS, Missouri Department of Conservation (MDC)) data and reports, and the Animal Damage Control Final Environmental Impact Statement (USDA 1997 Revised). Comments from the public involvement process were reviewed for substantive issues and alternatives which were considered in developing the alternatives and selecting the final management decision. This supplement adds to the analysis in the 2002 EA and FONSI and all information and analyses in the 2002 EA remain valid unless otherwise noted below.

II. NEED FOR ACTION

The need for action remains as described in the EA section 1.3. Records of WS technical assistance projects are good indicators of the range and nature of damage by and conflicts with birds in Missouri. This information is provided in Table 1. The Missouri Department of Conservation, State and County extension agents, private companies and organizations, and others also provide technical assistance with wildlife damage problems. Table 1 only contains information on requests made to WS and is not an indicator of the total number of problems with birds in Missouri.

When WS conducts an initial site visit to assess damage, the specialist will determine the species responsible for the damage and make an estimate of losses/damage. This information is referred to as verified losses. Verified loss data are usually only the damage observed at the time of the initial site investigation and does not necessarily represent total losses that have occurred at the site or landowner costs for damage prevention or property cleaning. Verified losses also do not include an estimate of the damage that would have occurred had WS not provided assistance with the damage problem. Some types of conflicts or damage risks, like risks to human or livestock health, cannot be readily quantified and are not represented. Nonetheless, like the information on requests for technical assistance with damage problems, this information serves as an indicator of the types of bird damage that can occur in the state. Verified loss data for the period of 2004-2006 is presented in Figure 1.

The EA discusses the need to manage wild and feral birds to reduce the risk of disease transmission to humans and livestock. WS is receiving increasing requests for assistance with surveillance for disease in wild and feral birds. In 2006, WS was one of several agencies and organizations conducting surveillance for Avian Influenza (AI) virus in migrating birds.

Avian Influenza is caused by a virus in the Orthomyxovirus group. Viruses in this group vary in the intensity of illness they may cause (virulence). Wild birds, in particular waterfowl and shorebirds, are considered to be the natural reservoirs for AI (Clark 2003). Most strains of AI rarely cause severe illness or death in birds although the H5 and H7 strains tend to be highly virulent and very contagious (Clark 2003).

Recently, the occurrence of highly pathogenic (HP) H5N1 AI virus has raised concerns regarding the potential impact on wild birds, domestic poultry, and human health should it be introduced into the U.S. It is thought that a change occurred in a low pathogenicity AI virus of wild birds, allowing the virus to infect chickens, followed by further change into the HP H5N1 AI. High Pathogenicity H5N1 AI has been circulating in Asian poultry and fowl resulting in death to these species. High Pathogenicity H5N1 AI likely underwent further changes allowing infection in additional species of birds, mammals and humans. More recently, this virus moved back into wild birds resulting in significant mortality of some species of waterfowl, gulls and cormorants. This is only the second time in history that HP form of AI has been recorded in wild birds. Numerous potential routes for introduction of the virus into the US exist including illegal movement of domestic or wild birds, contaminated products, and the migration of infected wild birds. In 2006, the Missouri WS program was able to obtain 747 cloacal samples from birds and 1,035 environmental (fecal) samples to assist with the national monitoring for HP H5N1 AI in migratory birds.

The nationwide surveillance effort has detected some instances of low pathogenic AI viruses, as was expected given that waterfowl and shorebirds are considered to be the natural reservoirs for AI. Tens of thousands of birds have been tested, but there has been no evidence of the HP H5N1 virus in North America

Table 1. Average annual requests to WS for technical assistance (advice) on the management of damage by and conflicts with wild and feral birds in Missouri for Fiscal Years 2004-2006.

SPECIES	DAMAGE/CONFLICT TYPE			
	Agriculture	**Human Health and Safety***	**Property***	**Natural Resources**
Blackbirds	7.7	8	0.7	0
Cormorants, Double-crested	4	0	0	0.3
Crows, American	0.7	0	1.3	0
Dove, Mourning	0	0.7	0	0
Ducks, Wood	0	0	0.3	0
Eagles, Bald	3	0	0	0
Egrets, Cattle	0	1	0	0
Egrets, Great	0	0.3	0	0
Egrets, Snowy	0	0.3	0	0
Egrets/Herons, mixed	0	0.7	0	0
Egrets/Herons/ Cormorants, mixed	0	0.3	0	0
Finches, Purple	0.3	0	0	0
Falcons, Peregrine	0	0.3	0	0
Flickers, Northern	0	0	3.3	0
Geese, Canada	5	17.3	21.7	0
Geese, Feral/Domestic	0	0.3	0.3	0
Geese, Snow	0.3	0	0	0
Goldfinches, American	0.7	0	0	0
Gulls, Herring	0.7	0	0	0
Gulls, Ring-billed	0.3	0.7	2	0.3
Hawks, Coopers	0.3	0	0.3	0.3
Hawks, Harriers	0	0	0.3	0
Hawks, Red-tailed	2	1	1.7	0.3
Herons, Great Blue	16.7	0	0	0.7
Herons, Green	0.7	0	0	0.3
Herons, Little blue	0	0.3	0	0
Herons, Black-crowned Night	0	0.3	0	0
Kestrels, American	0	0.3	0.7	0
Killdeer	0	0.3	0.3	0
Larks, Horned	0	0.7	0.3	0
Mallards	0.3	1.3	5	0
Osprey	0.3	0	0	0
Owls, barred	1	0	0	0.7
Owls, great-horned	1	0	1.3	0.3
Pigeons, feral	0.3	4.7	607	0

SPECIES	DAMAGE/CONFLICT TYPE			
	Agriculture	Human Health and Safety*	Property*	Natural Resources
Robins, American	1	0	0.3	0
Sparrows, House	0.7	1.3	1.7	0
Starlings, European	1	4.3	5.3	0
Swallows, barn	0	1	1.0	0
Swallows, mixed	0	0	1.0	0
Terns, Black	0	0	0	0.3
Turkey, Wild	0	0	0.3	0
Vultures, black	0	0	1.7	0
Vultures, turkey	0.3	0	2.7	0
Vultures, Mixed	0	0	0.3	0
Waxwings, Cedar	0.3	0	0	0
Woodpeckers	0	0	19.7	0
Passerines, other	0	0	0.7	0

* Includes management of bird hazards at airports

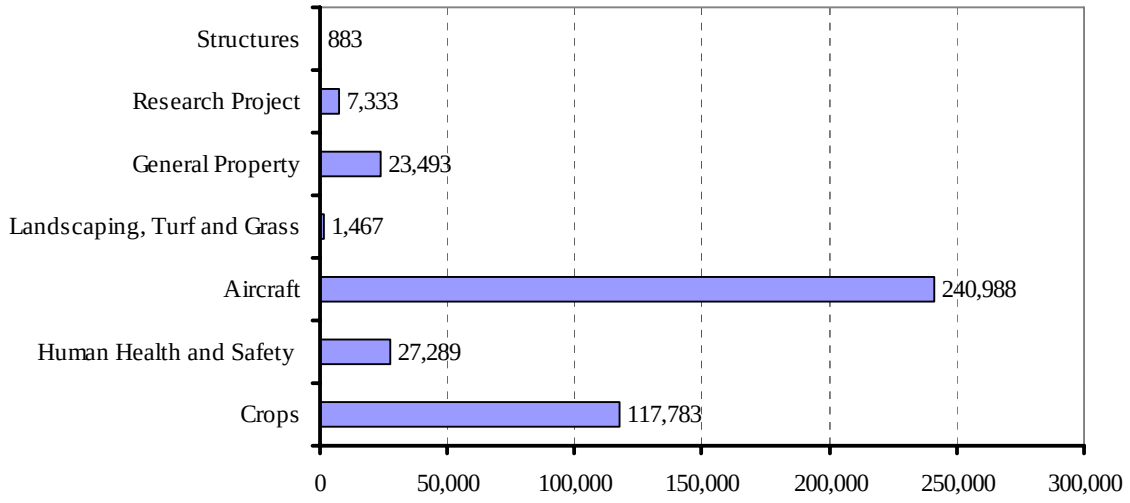

Figure 1. Average annual cost of damage (dollars) verified by WS during site investigation Fiscal Year (FY) 2003-2006. Data do not represent total losses, include cost of damage prevention and clean-up, or damage that would have occurred if action were not taken to reduce damage.

Damage to roofs, metal structures and painted finishes

Members of the public have requested additional information on bird damage to buildings, metal structures and painted finish when commenting on other WS bird damage management EAs. This information is provided here because many of the same issues are applicable to bird damage problems in Missouri. Bird feces are highly acidic and can be corrosive to paint and metal surfaces. Potential for damage is greatest in situations where large numbers of birds congregate in one area to roost or loaf. Bird feces can also have corrosive effects on monuments and decorative stonework on buildings. Gómez-Heras et al. (2004) evaluated the impact of extracts from pigeon feces on limestone. Results from the study indicated that accumulations of pigeon droppings generate solutions with low pH and high salinity when they are leached by water. The derived solutions contain high concentrations of salts which had been identified as possible decay agents on stone monuments and historical buildings in other studies.

Gómez-Heras et al. (2004) concluded that pigeon excrement should be considered as a potentially important factor in the long-term decay of stone.

Microbes within bird excrement also can cause damage to materials for buildings and monuments. Channon (2004) studied the impact of pigeon excrement on marble, Portland stone, Bath stone and concrete which is used as building material for monuments and heritage stonework on buildings. They treated the stones with pigeon excrement and at the end of one year of exposure to environmental conditions, cleaned the stones by scraping with a flat scraper then brushing with a stiff-bristled nylon brush and finally rinsing with a low-pressure water spray until all visible evidence of fouling had been removed and all that remained were a few persistent stains on the surface of the stonework. Condition of the stones was recorded at the end of the cleaning process and then the stones were left exposed to the elements and monitored for an additional 4 years. Despite the cleaning process, nutrients from the excrement has penetrated the surface of the material and provided sufficient resources for moss to grow at the damage sites. Extent of initial damage and moss development varied between materials. In areas with acidic rainfall, the moss may serve as a pad which retains water and exacerbate problems with corrosion due to acid rainfall. Bassi and Chiatante (1976) determined that pigeon excrement constituted a highly favorable substrate for fungal growth and that the fungal growth may contribute to the damage of marble surfaces mechanically and through the secretion of acidic products.

Although most examples are from pigeons, similar impacts are likely for other bird species. Washing/scraping feces from surfaces can reduce the problem but require time and effort which, for some businesses/managers may result in loss of staff time as personnel are assigned to cleaning chores or the cost of hiring an individual/company to do the cleaning.

Bird Damage to Power Lines and Electric Utility Facilities

As with bird damage to structures, this information is provided in response to requests for additional information on the difficulties that birds may cause for electric utility companies. Electric utility companies in Washington State have requested WS assistance with problems caused by large concentrations of starlings roosting at substations and on utility poles. Fecal accumulations on electrical equipment compromise insulators, resulting in fires, shorts in electrical systems, risks to employee safety, and loss of power to customers. One incident in Eastern Washington resulted in loss of power for 11 hours in December when temperatures were below freezing. Cost to replace equipment was $10,000 but there also was lost service revenue, employee overtime and other expenses. The loss of revenue due to outages can cost over 1 million dollars a day on major transmission lines in a power system

There are methods available to wash equipment, but they often require shutting down power at the affected site and rerouting power to customers which can also cost over a million dollars in costs to route/acquire power from other sources.

One rural electrical administration reports that approximately 10% of its outage hours are attributable to birds, primarily starlings. Problems are caused when large numbers of starlings perch on 2-3 spans of power lines. If the birds suddenly flush from the lines at one time it can cause the lines to swing close to one another and short the system. Some equipment can be reset but lines using fuses generally have loss of power until a team can replace the shorted fuse. Power utility problems with starlings generally occur in locations near food sources including fruit orchards, dairies, cattle feedlots, and landfills.

In these situations WS endeavors to work with the utility company and the individuals owning/managing the food source to resolve the problem. Solutions to these problems include the range of non-lethal and lethal methods to reduce bird access to crops, livestock facilities, and landfills as well as visual frightening devices (reflectors) installed at the utility structures, noisemakers and similar frightening devices to discourage birds from loafing and roosting on utility structures, systems to clean utility equipment, and reduction of local starling numbers with lethal methods.

III. SCOPE

Actions Analyzed The EA and supplement evaluate bird damage management by WS to protect property, agriculture, aquaculture, livestock, natural resources, and human health and safety throughout Missouri wherever such management is requested from the WS program.

Period for Which this Supplemented EA is Valid Unless it is determined that an Environmental Impact Statement (EIS) is needed, the supplemented EA will remain valid until WS determines that new needs for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis will be revised as necessary. Review of the EA will be conducted each year to ensure that it is complete and still appropriate to the scope of BDM activities within Missouri.

Site Specificity The EA and supplement analyze the potential impacts of bird damage management on all public and private lands in Missouri under MOU, Cooperative Agreement, and in cooperation with the appropriate public land management agencies.

Planning for the management of bird damage is conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, insurance companies, etc. The EA emphasizes significant issues as they relate to specific areas whenever possible. However, the issues that pertain to the various types of wildlife damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 is the routine thought process that is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS throughout Missouri. (See USDA 1997 Revised, Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application). Decisions made using this thought process will be in accordance with any mitigations and/or Standard Operating Procedures (SOPs) described herein and adopted or established as part of the decision.

The analyses in the EA are intended to apply to any action that may occur in *any locale* and at *any time* within the State of Missouri. In this way, WS and the USFWS believe they meet the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS and the USFWS to comply with NEPA and still be able to meet needs for assistance with WDM in a timely fashion.

The program's goals and directives are to provide services and reduce bird damage and conflicts when requested, within the constraints of available funding and workforce. Therefore, it is conceivable that additional wildlife damage management efforts could occur. The EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in Missouri (EA Chapter 3).

Summary of Public Involvement WS released a pre-decisional EA (PDEA) on June 10, 2002 and a Notice of the proposed action and invitation for public involvement was placed in the *Kansas City Star*, *St. Louis Dispatch*, and the *Springfield News Leader* with circulation throughout Missouri. A letter noticing the availability of the PDEA was also sent to those persons that have a known interest in the Missouri Bird Damage Management program. After a 31-day comment period, WS received three comment letters on the EA. WS responses to specific comments are included in Appendix A of the Decision and FONSI for the EA. All letters and comments are maintained at the Wildlife Services State Office in Columbia, Missouri.

This supplement has been made available to the public for a comment period beginning on March 25, 2008 and ending on April 28, 2008. A notice of availability has been published in *The Jefferson City News Tribune* and has also been mailed directly to agencies, organizations, and individuals with probable

interest in the supplement, including those agencies and individuals who commented on the original EA. A copy of the pre-decisional EA and a notice regarding the opportunity for public comment on the EA has also been made available at (http://www.aphis.usda.gov/regulations/ws/ws_nepa_environmental_documents.shtml). Public notification procedures are in compliance with new WS NEPA implementation procedures published in the Federal Register March 21, 2007 (Vol. 72, No. 54: 13237-13238).

IV. RELATIONSHIP OF THIS ENVIRONMENTAL ASSESSMENT TO OTHER ENVIRONMENTAL DOCUMENTS

4.1 Animal Damage Control Programmatic Environmental Impact Statement (EIS)

WS issued a Final EIS (FEIS) on the national APHIS/WS program (USDA 1997 Revised). Pertinent and current information available in the EIS has been incorporated by reference into the EA. The FEIS may be obtained by contacting the USDA, APHIS, WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

4.2 USFWS FEIS: Managing Resident Canada Goose Populations (USFWS 2005)

On August 10, 2006, the USFWS issued Final Regulations for Managing Resident Canada Goose Populations (FR 17:154 pages 45963-45993). The new regulations were created in response to conflicts associated with high populations of resident Canada geese in the US. The rule gives State wildlife management agencies, private and public landowners, and airports additional flexibility to deal with problems, conflicts, and damages caused by resident Canada geese. The rule includes four specific control and depredation orders (Airports, Nests and Eggs, Agricultural, and Public Health) which directly relate to WS resident Canada Goose damage management activities conducted under this EA. Under these orders, the appropriate State wildlife agency, USFWS or other official agent (e.g., WS), or, in some cases, landowners and airport managers are authorized to conduct certain RCGDM activities without needing to apply for USFWS Migratory Bird Permits. The control and depredation orders may only be implemented between April 1 and August 31, except for the take of nests and eggs which could be implemented in March. However, under the rule, individual states may continue to require permits for these types of activities. At this time the MDC still requires State permits for these types of activities.

4.3 USFWS FEIS: Double-crested Cormorant (DCCO) Management in the United States

In response to persistent conflicts and complaints relating to DCCOs, in 2003 the United States Department of Interior, Fish and Wildlife Service (USFWS), in cooperation with WS, completed an EIS on the management of DCCOs in the United States (USFWS 2003). Included in the selected management alternative was the establishment of a depredation order to reduce the actual occurrence, and/or minimize the risk, of adverse impacts of DCCOs to public resources. Public resources include fish (both free-swimming fish and stock at Federal, State, and Tribal hatcheries that are intended for release in public waters), wildlife, plants, and their habitats. It authorizes WS, State fish and wildlife agencies, and Federally-recognized Tribes to control DCCOs, without a Federal permit, in 24 States including Missouri. The USFWS issued a FEIS and Record of Decision (ROD) (68 Federal Register 58022) on the management of DCCOs (USFWS 2003). WS was a formal cooperating agency in the preparation of the FEIS and has adopted the EIS to support WS' program decisions for its involvement in the management of DCCO damage throughout the United States. WS completed a ROD on November 18, 2003 (68 Federal Register 68020).

V. AUTHORITY AND COMPLIANCE

5.1 Authority of Federal and State Agencies in Wildlife Damage Management Within The State of Missouri

5.1.1 Wildlife Services Legislative Authority

WS is the Federal program authorized by law to reduce damage caused by wildlife (the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c)). The mission of the USDA/APHIS/WS program is to provide federal leadership in managing conflicts with wildlife. Wildlife Services' mission, developed through its strategic planning process (USDA 1999), is: 1) *"to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and 2) to safeguard public health and safety."* WS recognizes that wildlife is an important public resource greatly valued by the American people. By its very nature, however, wildlife is a highly dynamic and mobile resource that can cause damage to agriculture and property, pose risks to human health and safety, and affect industrial and natural resources. WS conducts programs of research, technical assistance and applied management to resolve problems that occur when human activity and wildlife conflict.

Additionally, Memoranda of Understanding among WS and other governmental agencies also define WS responsibilities in wildlife damage management. For example, a Memorandum of Understanding between the Federal Aviation Administration (FAA) and WS recognizes WS role and expertise in providing wildlife hazard management assistance to the aviation community. It states, that the "FAA or the certificated airport may request technical and operational assistance from WS to reduce wildlife hazards."

5.1.2 United States Department of the Interior, Fish and Wildlife Service.

The primary responsibility of the USFWS is conserving fish, wildlife, plants and their habitats. While some of the USFWS's responsibilities are shared with other Federal, State, tribal, and local entities, the USFWS has special authorities in managing the National Wildlife Refuge System; conserving migratory birds, endangered species, certain marine mammals, and nationally significant fisheries; and enforcing Federal wildlife laws. The Migratory Bird Treaty Act (MBTA) gives the USFWS primary statutory authority to manage migratory bird populations in the United States. The USFWS is also charged with implementation and enforcement of the Endangered Species Act of 1973, as amended and with developing recovery plans for listed species.

5.1.3 Missouri Department of Conservation Legislative Authority

The MDC, under the direction of the Conservation Commission, operates under a constitutional mandate to manage the state's wildlife resources. Although many legal mandates of the Conservation Commission and the Department are expressed throughout the Wildlife Code of Missouri, the primary statutory authorities include wildlife management responsibilities, public education charges, law enforcement authorities, and regulatory powers. Also, MDC has the statutory authority to manage damage to agriculture and property, and to protect human health and safety from damage involving mammals.

5.1.4 Missouri Department of Agriculture (MDA)

The MDA is authorized by RSMo 261.090 to cooperate with "other agencies of the state government dealing with the production, handling and marketing of farm products in the

interest of economy, harmony and efficient service and may also cooperate with the USDA and its sub-departments and with other state or organizations have common agricultural problem with those of the State of Missouri.

5.1.5 Missouri Department of Health (MDH)

The MDH is authorized under RSMo 192.020 to safeguard the health of the people in the State of Missouri and all its subdivisions. It shall study the causes and prevention of diseases and designate which diseases are infectious, contagious, communicable, or dangerous, and shall enforce adequate orders, findings, rules and regulations to prevent the spread of such diseases within the State of Missouri. Under RSM0 192.110 and the Department of Health regulations, the Public Health Veterinarian shall take cognizance of any contagious diseases which may be prevalent among domestic animals of the state and which may be communicable or transferred to human beings. The State Public Health Veterinarian shall ascertain the nature and cause of such conditions and shall have the power and duty to administer all laws and orders and findings, to quarantine, prevent or to control the spread of such diseases.

5.2 Compliance with Federal and State Laws

Several federal and state laws authorize, regulate, or otherwise affect WS wildlife damage management. Laws with particular relevant to the proposed action are described in EA Section 1.8.2. and 1.8.3. WS complies with these laws, and consults and cooperates with other agencies as appropriate. The section below provides additional information regulations relevant to the EA.

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

The MBTA provides USFWS regulatory authority to protect families of bird species that migrate outside the United States. The law prohibits the "*take*" of these species by any entity, unless permitted by USFWS; people can obtain permits to take migratory birds under this law that are causing damage to resources.

WS provides on-site assessments for persons experiencing migratory bird damage to obtain information on which to base damage management recommendations. Damage management recommendations could be in the form of technical assistance or operational assistance. In severe cases of migratory bird damage, WS provides recommendations to the USFWS for the issuance of depredation permits to private entities or other agencies. The ultimate responsibility for issuing such permits rests with the USFWS.

WS will obtain MBTA permits covering BDM activities that involve the taking of species for which such permits are required in accordance with the MBTA and USFWS regulations, or will operate as a named agent on MBTA permits obtained by cooperators.

A court case involving mute swans held that the MBTA must provide protection to individual non-native species found within the United States that belong to families of birds already protected under the Act. As a result, many other species in addition to the mute swan became eligible for protection under the MBTA that had previously been excluded. Congress passed the Migratory Bird Treaty Reform Act of 2004 to clarify the original intent of the MBTA, the conservation and protection of migratory birds native to North America, and directed USFWS to establish a list of non-native bird species found in the United States. Species on this list, including mute swans, will not be afforded MBTA protection. Certain bird species in North America are not protected under the MBTA because neither the species nor their family was listed in the MBTA (e.g.,

European Starlings and House Sparrows). All actions proposed in the EA and supplement will be in compliance with the regulations of the MBTA, as amended.

5.2.2 Investigational New Animal Drug (INAD)

The drug alpha chloralose (AC) has been used as a sedative for animals and is registered with the Food and Drug Administration (FDA) to capture waterfowl, coots, and pigeons. FDA approval for use under INAD (21 CFR, Part 511) authorized WS to use the drug as a non-lethal method to capture birds.

5.2.3 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, to develop and implement, a Memorandum of Understanding (MOU) with the USFWS that shall promote the conservation of migratory bird populations. WS has developed a draft MOU with the USFWS as required by this EA and is currently waiting for USFWS approval.

5.2.4 Bald and Golden Eagle Protection Act (16 USC 668)

Congress enacted the Eagle Protection Act (16 U.S.C. 668) in 1940, thereby making it a criminal offense for any person to "take" or possess any bald eagle or any part, egg, or nest. The Act contained several exceptions which permitted take under select circumstances. The Secretary of the Interior could take and possess bald eagles for scientific or exhibition purposes of public museums, scientific societies, and zoological parks; possession of any bald eagle (or part, nest, or egg) taken prior to 1940 was not prohibited; and the terms of the Act did not apply to Alaska. Since its original enactment, the Act has been amended several times to increase protections for eagles and/or provide exemptions for specific types of activities. For example, the amendment in 1962 was designed to give greater protection to immature bald eagles, and to include golden eagles. The 1962 amendment also created two exceptions to the Act: first, it allowed the taking and possession of eagles for the religious purposes of Indian tribes and second, it provided that the Secretary of the Interior, on request of the governor of any State, could authorize the taking of golden eagles to seasonally protect domesticated flocks and herds in that State.

While Bald Eagles were federally listed as a threatened species, the Endangered Species Act was the primary regulation governing the management of Bald Eagles in the lower 48 states. Now that Bald Eagles have been removed from the federal list of threatened and endangered species, the Bald and Golden Eagle Protection Act is the primary regulation governing Bald Eagle management. For purposes of this Act, "take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb." If an APHIS action could potentially affect either bald or golden eagles in any of these ways, APHIS must consult with FWS. If these species are found in a location where a proposed action will be carried out, APHIS must ensure that its actions do not impact eagles in a way that fits the definition of “take”. When there is the potential to affect eagles, it is advisable to coordinate with FWS to assure actions avoid “take.”

VI. ISSUES

The EA describes the alternatives considered and evaluated using the identified issues. The following issues were identified as important to the scope of the analysis (40 CFR 1508.25). A detailed description of each of the issues is provided in Chapter 2 of the EA.

- Effects on target wildlife species populations
- Effects on non-target wildlife species populations, including Threatened and Endangered (T&E) species
- Economic losses to property as a result of bird damage
- Effects on human health and safety
- Effects on aesthetics
- Humaneness and animal welfare concerns of lethal methods used by WS

VII. ALTERNATIVES

The following Alternatives were developed by the Missouri WS office to respond to the issues pertaining to BDM in Missouri. Additionally, in Section 3.3 of the EA three additional alternatives were considered but not analyzed in detail. A detailed discussion of the effects of the Alternatives on the issues is described in the EA; below is a summary of the Alternatives.

7.1 Alternative 1 - Continue the Current Federal BDM Program /Integrated Wildlife Damage Management (No Action/Proposed Action).

The proposed action is to continue an integrated bird management program in. An IWDM approach would continue which would allow use of any legal lethal and non lethal technique or method, used singly or in combination, to meet requests or needs for resolving conflicts with birds on public and private property. Individuals requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Lethal methods used and/or recommended by WS would include shooting, trapping, toxicants, DRC-1339, Starlicide, Avitrol, nest and/or egg destruction or euthanasia following live capture and/or use of AC. Non-lethal methods used and recommended by WS may include habitat alteration, chemical repellents (e.g., methyl anthranilate), wire barriers and deterrents, netting, capture and relocation, harassment and scaring devices. The implementation of non-lethal methods such as habitat alteration and exclusion-type barriers would be the responsibility of the landowner to implement. BDM by WS would be allowed in Missouri, when requested, where a need has been documented and only upon completion of an Agreement for Control with the landowner/manager. All management actions would comply with appropriate federal, state, and local laws. Appendix B of the EA provides a more detailed description of the methods that could be used or recommended under the proposed action.

7.2 Alternative 2 - Non-lethal BDM Only By WS

This alternative would require WS to only use and recommend non-lethal methods to resolve bird damage problems. Requests for information regarding lethal management approaches would be referred to MDC, USFWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, or take no action. Persons receiving technical assistance from WS could still resort to lethal methods that were legally available to them. WS would not make recommendations to the FWS and MDC regarding the issuance of permits to resource owners to allow them to take birds by lethal methods. Under this alternative, AC would be used by WS personnel to capture and relocate birds. Currently, DRC-1339 and AC are only available for use by WS employees. Therefore, use of these chemicals by private individuals would be illegal. However, the avian toxicant, Starlicide, is similar to DRC-1339 and would remain available to licensed pesticide applicators. Appendix B of the EA describes a number of non-lethal methods available for use and recommendation by WS under this alternative.

7.3 Alternative 3 - Lethal BDM Only By WS

Under this alternative, WS would provide only lethal direct control services and technical assistance. Technical assistance would include making recommendations to the USFWS and MDC regarding the issuance of permits to resource owners to allow them to take birds by lethal methods. Requests for information regarding non-lethal management approaches would be referred to MDC, USFWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS lethal recommendations, implement non-lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, or take no action. In some cases, control methods employed by others could be contrary to the intended use or in excess of what is necessary.

7.4 Alternative 4 - No Federal WS BDM (No Action)

This alternative would eliminate Federal involvement in BDM within Missouri. WS would not provide direct operational or technical assistance and requesters of WS services would have to conduct their own BDM without WS input. DRC-1339 and AC are only available for use by WS employees. Therefore, use of these chemicals by private individuals would be illegal. However, the avian toxicant, Starlicide, is similar to DRC-1339 and would remain available to licensed pesticide applicators.

VIII. New Methods

A list of methods used and/or recommended by WS for BDM are found in Appendix B of the EA. Changes and additions to this list are provided below.

8.1 Chemical Repellents.

Wildlife Services, with the help of the National Wildlife Research Center (NWRC), researches and reviews the efficacy of nonlethal avian repellents. All products used by WS must meet Environmental Protection Agency (EPA) and state registration requirements before they can be used by WS. Compliance with label instructions ensures that use of the product will not have significant adverse environmental impacts. A number of chemicals have shown bird repellent capabilities. Anthraquinone, a naturally occurring chemical found in many plant species and in some invertebrates as a natural predator defense mechanism, has shown effectiveness in protecting rice seed from red-winged blackbirds and boat-tailed grackles (Avery et al. 1997). It has also shown effectiveness as a foraging repellent against Canada goose grazing on turf and as a seed repellent against brown-headed cowbirds (Dolbeer et al. 1998). Anthraquinone is currently registered and available for use only as a goose repellent.

8.2 Live-Capture Devices

WS is increasingly involved in surveillance for disease in wildlife with the potential for transmission to humans, livestock and other wildlife species. These surveillance efforts often involve the use of non-lethal methods to capture the target species, collection of samples for testing (e.g., blood samples, cloacal swabs), and on-site release of the target species. The following list includes additions to and modifications of the live-capture methods described in Appendix B of the EA.

Air cannon nets, cannon nets and rocket nets are normally used for birds such as pigeons, feral ducks, and waterfowl. The net systems use mortar projectiles or rockets to propel the net(s) up and over birds, which have been baited to and/or regularly use a particular site. This type of net is especially effective for waterfowl and other birds which are wary of other capture techniques.

Hand nets are used to catch birds in confined areas such as homes and businesses. These nets resemble fishing dip nets with long handles. They can also be used during daylight hours or in conjunction with lights at night to capture a variety of different birds in the field.

Noose mats and Bal-chatri traps are used to catch shorebirds and raptors. Both traps use welded wire mats or cages outfitted with monofilament loops that close to ensnare the feet of target birds. Noose mats are generally set on a beaches or gravel bars in conjunction with short fences that funnel shorebirds to gaps in the fence where noose mats lay (Mehl et al. 2003). Bal-chatri traps are cages made of welded wire with monofilament loops attached that hold a live pigeon or rat. When the raptor strikes to catch the bait animal, its talons becomes tangled in the monofilament loops. Both of these traps typically are closely attended and any captured birds are removed quickly.

Pole traps are most often used to catch raptors. These traps typically consist of padded, No. 1 or 1 1/2 foot-hold traps with greatly weakened springs set on poles at airports or other open areas. When the raptor lands on the trap pan, the padded jaws close and firmly hold the bird. Pan tension devices can be used to prevent birds smaller than the target species from activating the trap. The trap is connected to a cable or slide wire that allows the bird to rest on the ground where it can be removed for relocation. These traps are closely attended and checked at least every two hours.

IX. ENVIRONMENTAL IMPACTS

This analysis is intended to update sections of the environmental impact analysis in the EA and only includes information on impacts which have changed since the EA was completed. The Missouri WS program has been receiving increasing requests for assistance with bird damage management. The additional requests for assistance have resulted in increases in the anticipated maximum annual take for several bird species. A summary of WS bird harassment and lethal bird take is provided in Table 2. The changes in the anticipated maximum level of annual lethal take would only apply to Alternative 1 and are addressed as such.

9.1 Bird Population Estimates

Current bird population estimates are unavailable for most species of birds and thus have to be estimated from the best available information. The best information currently available for monitoring most bird population trends is data from the Breeding Bird Survey (BBS). The BBS is a long-term (1966-2006), large-scale inventory of North American birds, coordinated by the U.S. Geological Survey, Patuxent Wildlife Research Center, combines a set of over 3,500 roadside survey routes primarily covering the continental United States and southern Canada (Sauer et al. 2006). BBS routes are surveyed each May and June by experienced birders. The stated primary objective of the BBS has been to generate an estimate of population change for songbirds. Estimates of population trends from BBS data are derived primarily from route-regression analysis (Geissler and Sauer 1990) and are dependent upon a variety of assumptions (Link and Sauer 1998). The statistical significance of a trend for a given species is reflected in the calculated P-value (i.e., the probability of obtaining the observed data or more extreme data given that a hypothesis of no change is true) for a particular geographic area and is best calculated over a number of years.

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. Using methods adopted by Partners in Flight (PIF) (Rich et al. 2004), the relative abundance of a bird population can be used to extrapolate a population estimate. The Partners in Flight system involves

extrapolating the number of birds in the 50 quarter-mile circles (total area/route = 10 mi^2) to the area of interest. Model makes assumptions on the detectability of bird, which *varies* for each species. For example, some species that are large such as Canada Geese and vultures or vocalize frequently such as Mourning Doves and Northern Bobwhites are much more easily detected during bird surveys than species that are small and inconspicuous such as owls and Horned Larks, or do not vocalize that often or loudly during surveys such as Horned Larks and American Bitterns. Additionally, breeding males are often the most visible during surveys while females may be in cover or on a nest and not detected such as Red-winged Blackbirds. 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.

The BBS divides the country into different physiographic strata which have similar habitat/ecosystem components. When using the PIF model to estimate bird population sizes, we first determined the amount of area from each physiographic region that were in the area in question. The physiographic regions provide the best estimates of populations because of the similarity of habitat within each region. Wildlife Services conducts BDM for most all species that are either residents in Missouri or primarily come from the Mississippi Flyway, so these were identified as the areas of interest for the analysis. These areas include all or portions of the BBS physiographic regions: 3-6, 11, 13-24, 28-33, 37, and 40 in the states and Canadian provinces of Quebec, Ontario, Wisconsin, Minnesota, Michigan, Iowa, Illinois, Indiana, Ohio, Missouri, Kentucky, Arkansas, Tennessee, Louisiana, Mississippi, and Alabama (Figure 2). Some overwintering birds may also come from the Central Flyway or, to a lesser extent, the Atlantic Flyway and are not included in the flyway population estimate.

After determining the area each physiographic region for the population in question (Missouri, Mississippi Flyway), the next step was to obtain estimates of birds seen per BBS route for each physiographic region. Wildlife populations are continually fluctuating, so the best way to represent general abundance is to average the abundance data for a period of years. For calculations used in this EA, it was decided that relative abundance from BBS data for different geographic areas would be averaged for the last 5 years (2002 to 2006). The average number of birds counted per BBS route was then extrapolated to the amount of area within each physiographic region that was in the state and/or Mississippi flyway. This number was adjusted using the detectability factor discussed above to yield an population estimate.

It should be noted that one of the assumptions made when using BBS data to estimate population density is that the species in question is equally distributed throughout the survey area. While this assumption may be made for many species, it is especially problematical for waterfowl, shorebirds and colonial-nesting species such as gulls. For this reason, WS did not use BBS data generate population estimates for use in determining impacts on Mallards, Killdeer or Ring-billed Gulls.

In addition to the BBS, the National Audubon Society (NAS) conducts nationwide bird surveys within a few weeks of December 25th, the NAS Christmas Bird Counts (CBC). The CBC reflects the number of birds in Missouri during early winter that would occur after migrations are completed. The Christmas Counts are a volunteer effort conducted by all levels of birders and only provides the number seen in a 15 mile diameter circle (177 mi^2). The Christmas bird count data does not provide a population estimate (numbers can be extrapolated for the area of coverage giving a very rough population estimate over a larger area), but can be used as an indicator of trend in the population or compared with other populations. CBC data often varies much more than BBS data due to variations in winter climate.

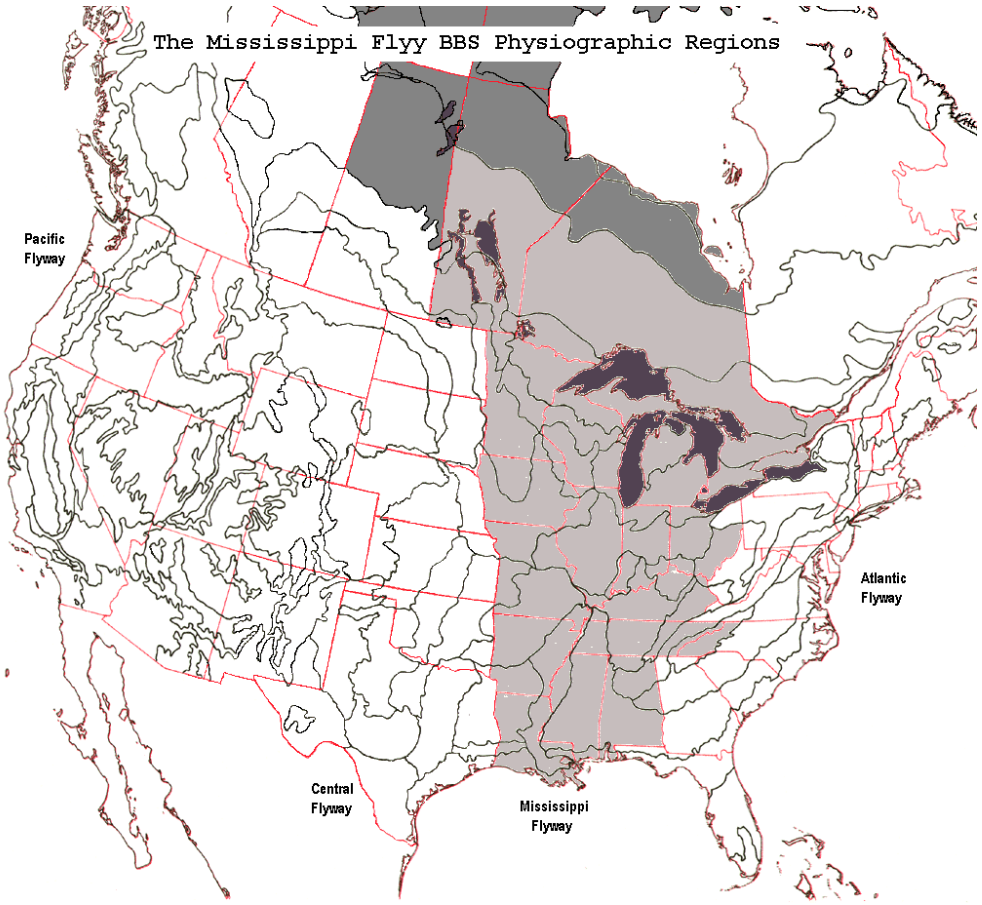

Figure 2. BBS physiographic regions with the Mississippi Flyway (shaded) BBS physiographic regions (shaded light gray) used to estimate migratory bird populations for this EA, excluding areas north of the BBS boundary (dark gray).

9.2 Impacts on Target Species

American Crows

Damage by and conflicts with American Crows in Missouri have included risk of collision with aircraft at airports, and damage at pecan farms. During FY 2003-2006, MO WS dispersed 4,151 - 44,401 crows per year and killed 5-10 crows per year during operational damage management programs (Table 2). Most of the birds killed were taken when using shooting to reinforce noise harassment as part of crow dispersal activities. American Crow populations are still healthy enough and the problems caused by this species sufficient that the USFWS has a depredation order which allows for the take of crows which are "committing or about to commit depredations upon ornamental or shade trees, agriculture crops, livestock, or wildlife, or when concentrated is such numbers and manner as to constitute a health hazard or other nuisance (50 CFR Ch. 1[10-1-98 Edition] 21.43)" without a migratory bird permit. Missouri also has a hunting season for crows and allows take of crows for damage management under the same conditions as the federal depredation order. There are no requirements for individuals to report the number of crows taken to the MDC or USFWS, so there are no records of crow take by non-WS entities.

The EA predicted a maximum annual take of 100 American Crows during bird damage management activities in Missouri. Based on current levels of take, the number of crows harassed in FY 2006 (Table 2), and anticipated increases in requests for assistance with bird damage management, WS has revised the predicted maximum level of crow take per year to 150 birds per year. Using PIF model described in Section 9.1 with a detectability factor of 3.1 yields

a state American Crow population estimate of 837,500 breeding birds. The maximum proposed level of WS take would be 0.02% of the breeding population. This low level of take is within levels that could be sustained by the population. Although there are no records of non-WS crow take, an extremely high number of crows would have to be taken before take exceeded levels that could be sustained by the population. For example, even if non-WS entities were to take up to 8,000 crows per year, total cumulative take would still be less than 1% of the population.

A recent publication by LaDeau, identifies American Crows as one of the species that have declining population trends which appear to correspond with the arrival of West Nile virus in some locations (LaDeau et al. 2007). Despite recent population declines in local areas, long-term population trend data for the period of 1980-2005 indicate that the American Crow population in has increased in Missouri (1.7% per year, $P < 0.01$), the Central BBS Region (1.4% per year, $P < 0.01$) and Nationwide (0.9% per year, $P < 0.01$; Sauer et al. 2005) and current relative abundance figures are still above 1980 levels. Based on relative abundance estimates from the BBS, American Crows are among the ten most commonly seen bird species in the state (Table 3).

WS lethal take of crows is and will continue to be limited to a small number of isolated sites within the state of Missouri. Given the long-term population trends and overall status of the crow population which allows for USFWS and MDC use of depredation orders for crow damage management and the low proportion of the estimated population that could be taken, the proposed action will have minimal effects on the state, regional and national American Crow populations.

Table 2. Impacts of WS direct control activities on target bird species for FY 2003 – 06. To facilitate cumulative impact analysis, the table includes information on instances when a target species for some projects was taken as a nontarget species (NT) in different projects. Nontarget take is included in total take.

	Dispersed/Freed/Relocated				**Killed**			
Avian Species	**FY 03**	**FY 04**	**FY 05**	**FY 06**	**FY 03**	**FY 04**	**FY 05**	**FY 06**
Bittern, American*	0	0	1	0	0	0	0	0
Blackbird, Brewers	0	300	0	0	0	0	0	0
Blackbird, Red-winged	11,066	3,667	3,733	5,396	230	10	26,813	5,170
Blackbird, Mixed	80,025	85	731,560	10,120,719	0	0	0	81
Bluebird, Eastern	0	0	2	0	0	0	0	0
Cormorants, Double-crested	38	20	13	82	0	2	0	0
Cowbird, Brown-headed	1,820	600	7,121	38,473	4,644	5,150	16,177	24,457
Crows, American	44,401	14,459	4,151	38,981	10	5	8	9
Dove, Mourning	1,293	554 1 NT[1]	3,012	50,847	89	43	118	530
Dove, Mourning nests					0	0	2	3
Coot, American	7	0	0	30	0	0	0	0
Duck, American Widgeon	240	0	0	0	1	0	0	0
Duck, Blue-winged Teal	436	0	15	36	6	0	0	0
Duck, Bufflehead	11	0	0	0	0	0	0	0
Duck, Common Golden- eye	0	10	8	22	0	0	0	0

	Dispersed/Freed/Relocated				Killed			
Avian Species	**FY 03**	**FY 04**	**FY 05**	**FY 06**	**FY 03**	**FY 04**	**FY 05**	**FY 06**
Duck, Gadwall	398	0	0	0	6	0	0	0
Duck, Green-winged Teal	80	0	0	9 1 NT[2]	1 NT[2]	0	0	0
Duck, Lesser Scaup	11	0	0	0	0	0	0	0
Duck, Mallard	2,674 1 NT[2]	164	36	2,001	22	28 1 NT[2]	27 1 NT[2]	64
Duck, Mallard eggs					0	0	33	0
Duck, Northern Pintail	85	0	0	0	0	0	0	0
Duck, Northern Shoveler	111	0	0	1	0	0	0	0
Duck, Ring-necked	220	0	0	0	0	0	0	0
Duck, Feral	1	0	0	0	1	1	1	4
Duck, Other	7	0	0	22	0	0	0	5
Egret, Cattle	2	0	0	5	0	0	0	0
Egret, Great	3	0	0	619	1	0	0	0
Egret/Heron, Mixed	0	0	0	300	0	0	0	0
Falcon, Peregrine*	0	1[3]	0		0	0	0	0
Exotic Birds	0	0	0	0	0	0	0	1
Finch, Purple	0	0	0		5	0	0	0
Flicker, Northern	0	0	3	0	0	0	0	0
Flycatcher, Scissor-tailed	0	0	15	0	0	0	3	0
Goldfinch, American	25	0	0	0	0	0	0	0
Goose, Canada	12, 340	14,296 4 NT[2]	1,155	8,710	41	56	350	183
Goose, Canada eggs					1,316	883	1,089	731
Goose, Snow	42,910	10,190	10,400	7,400	1	3	1	0
Goose, Feral	0	0	0	0	0	0	1	0
Goose, Feral Eggs					0	35	9	0
Goose, White-fronted	0	0	0	1,000				0
Grackles, Common	319	359	40,207	7,374	19	44	5,079	2,352
Grackles, Other	3	0	9	0	0	0	0	0
Grebe, Pied-billed	2	0	0	14	0	0	0	0
Grouse	0	00	2	0	0	0	0	0
Gull, Bonaparte's	0	0	1	0	0	2	0	0
Gull, Other	0	0	0	436	0	0	3	0
Gull, Ringed-billed	184	343	70	3,903	20	11	1	15
Harrier, Northern*	32	134	392	123	0	0	0	0
Hawk, Coopers	0	1	1 NT[1]	6	0	0	0	0
Hawk, Ferruginous	0	0	4	0	0	0	0	0

	Dispersed/Freed/Relocated				Killed			
Avian Species	**FY 03**	**FY 04**	**FY 05**	**FY 06**	**FY 03**	**FY 04**	**FY 05**	**FY 06**
Hawk, Red-tailed	263	288	3,752	733	5	11	37	16
Hawk, Rough-legged	0	0	0	0	0	0	0	0
Hawk, Swainson's	35	17	751	245	0	0	0	0
Hawk, Other	40	47	0	0	0	0	0	0
Heron, Great-blue	104	7	9 1 NT[2]	257	10 2 NT[2]	13 2 NT[2]	6 1 NT[2]	13
Heron, Green	2	0	0	35	2	0	1	0
Jay, Blue	0	0	3	0	0	0	0	0
Kestrel, American	160	173	96	354	18	11	11	19
Killdeer	826	1,766	708	507	38	125	27	131
Killdeer, eggs					0	0	0	4
Kingbird, Eastern	0	0	5	0	0	0	1	0
Kingbird, Western	0	0	17	0	0	0	2	0
Kingfisher	0	0	0	2	0	0	0	0
Lark, Horned	2,437	4,680	2,982	3,553	106	207	81	199
Martin, Purple	55	20	0	5	3	0	0	1
Meadowlark, Eastern	3,483	4,785	2,271	8,252	137	158	115	159
Mockingbird, Northern	0	1	3	0	0	0	0	0
Owl, Barn*	0	0	1[3]	0	0	0	0	0
Owl, Barred	0	0	0	2	0	0	0	1
Owl, Common	0	120	0	0	0	0	0	0
Owl, Great-horned	0	1	8	12	0	0	0	0
Owl, Short-eared*	0	1	6	6	0	0	0	0
Owl, Other	0	0	0	0	0	1	0	0
Passerine, Other	105	1,196	0	492	5	6	0	0
Pelican, American White	0	40	220	500	0	0	0	0
Pigeons, feral	130	16	114	1,737	1,634	1,518	1,925	2,462
Pigeon, feral, eggs					0	0	11	6
Robin, American	733	175	1,512	11,287	2	1	2	35
Sandpiper, Buff-breasted	0	0	5	0	0	0	0	0
Sandpiper, Semi-palmated	0	0	22	0	0	0	0	0
Sandpiper, Upland	728	267	106	804	1	0	0	0
Shrikes	0	35	0	0	0	0	0	0
Shorebird, Other	213	92	0	159	9	6	0	0
Snipe, Common	71	0	6	21	1	0	0	4
Sparrow, House	0	0	0	456	137	49	138	234
Sparrow, Field	0	0	39	0	0	0	1	0
Starling, European	41,609	32,088	36,176	592,988	12,060	142	418	3,165

	Dispersed/Freed/Relocated				Killed			
Avian Species	**FY 03**	**FY 04**	**FY 05**	**FY 06**	**FY 03**	**FY 04**	**FY 05**	**FY 06**
Starling, European eggs					0	0	1	0
Swallow, Barn	6,737	3,156	5,334	2,157	72	58	37	80
Swallow, Barn, eggs				0				2
Swallow, Cliff	0	0	0	0	2	0	1	0
Swallow, Tree	11	100	15	188	0	1	0	22
Swallow, Other	903	0	0	2,244	0	1	0	0
Terns	0	0	12	0	2	0	0	0
Turkey, Wild	182	202	35	44	0	0	0	1
Vulture, Black	0	0	1	0	0	0	0	0
Vulture, Turkey	369	232	523	1,157	5	3	11	0
Willet	0	0	1	0	0	0	0	0

* Denotes species classified as Endangered by the MDC (MDC 2007).
[1] Non-target take resulting from bird damage management activities.
[2] Non-target birds taken during work to manage damage caused by aquatic rodents.
[3] Trapped and relocated with authorization from MDC and USFWS.

Table 3. Relative abundance estimates from the U.S. Department of the Interior, Geological Survey, Breeding Bird Survey, for the 10 most abundant bird Species in Missouri (Sauer et al. 2006).

Species	**Relative Abundance**	**Species**	**Relative Abundance**
Red-winged Blackbird	98.6	Mourning Dove	35.9
House Sparrow	59.3	European Starling	35.2
Common Grackle	49.7	Northern Bobwhite	34.9
Eastern Meadowlark	49.0	American Robin	33.6
Dickcissel	42.1	American Crow	31.0

Starling and Blackbird Population Impacts

The Blackbird group in North America includes about 10 species of birds (Dolbeer 1994) including some of the most prolific and abundant birds in North America (Dolbeer and Stehn 1983). Of these 10 species, Red-winged Blackbirds, Brown-headed Cowbirds, and Common Grackles are the species most commonly involved in damage problems in Missouri. European Starlings, an introduced species, are also abundant in Missouri and are often found in mixed flocks with blackbirds. Starlings are involved in many of the same damage problems as blackbirds. Collectively, starlings, Red-winged Blackbirds, Common Grackles and Brown-headed Cowbirds comprised an annual average of approximately 99% of all Missouri blackbird observations during the Audubon Christmas Bird Count for the 2002/2003 to 2006/2007 surveys. Audubon Christmas Bird Counts are conducted in the winter and most like Rusty and Brewer's Blackbirds and Great-tailed Grackles are present in Missouri in winter, but in much lower numbers than the Red-winged Blackbirds, Brown-headed Cowbirds, Common Grackles and starlings. Yellow-headed Blackbirds are fairly uncommon and have only been recorded in the CBC during 6 of the last 20 years (Audubon 2002). Brewer’s Blackbirds, Rusty Blackbirds, Great-tailed Grackles and Yellow-headed Blackbirds are rarely, if ever, seen at damage sites in Missouri and in most circumstances, WS has been able to resolve problems associated with these species (hazards to aircraft) using nonlethal methods (Table 2).

Outside of the nesting season, blackbirds generally feed in flocks and roost at night in congregations varying from a few birds to over a million birds (Dolbeer 1994). These feeding flocks and roosting congregations are sometimes comprised of a single species, but often several species mix together. In Missouri, winter flocks are composed of a mix of resident birds and migrants from Canada and the northern U.S. The tendency of blackbirds and starlings to form

large communal roosts in rice- and wheat-growing areas and to travel and feed in large social flocks often results in locally serious damage to crops, and monetary losses to individual farmers can be substantial (Glahn and Wilson 1992). Large groups of feeding and roosting blackbirds and starlings and the associated fecal material also cause problems at dairies and livestock feedlots (consumption and contamination of feed, fecal damage to facilities), damage to buildings and property (fecal contamination and the weight of thousands of roosting birds), risks to human and animal health and safety from large accumulations of fecal material, and nuisance complaints (noise, fecal contamination).

Although crop damage is often caused by mixed flocks comprised of several species of blackbirds and European Starlings, Red-winged Blackbirds appear to be responsible for most rice depredation (Meanley 1971). In Missouri, Common Grackles and Brown-headed Cowbirds are also commonly involved in damage to rice crops. The NWRC has been conducting research on blackbirds in the rice producing areas of the country including Missouri. One current research area encompasses a portion of Missouri known as the "bootheel" in southeast Missouri that is part of the Mississippi Alluvial Plain. NWRC estimates of blackbird groups observed in Missouri rice fields during September – October 2003-2005, just before harvest ranged from 20,000 to 3,000,000 birds per site (average 1,246,000). NWRC estimates that, each year, just before harvest, there are conservatively over 4 million blackbirds roosting in rice fields in this portion of Missouri. Estimated average species composition in this area was 65% Red-winged Blackbirds, 25% Brown-headed Cowbirds and 10% Common Grackles. NWRC also has data on large blackbird roosts that have been in small towns in the region (Tables 4 and 5). The number of blackbirds in these roosts could go much higher depending on the type of winter, availability of food and migration trends (J. Cummings, NWRC, pers. comm., NWRC unpublished data). In the Missouri rice region, there have been winter roost numbers as high as 6,000,000 blackbirds in one location. Interestingly, although CBC data indicate that other blackbird species are present in the state (Appendix D) there were no observations of other blackbird species in the rice fields or urban roosts studied by NWRC.

Table 4. Urban winter blackbird roosts observed in small towns in the rice growing region of Missouri and Arkansas (J. Cummings, NWRC, pers. comm., NWRC unpublished data).

Year	Month	Location	Number of Birds	Species Composition
2002	January	Sikeston, MO	6,000,000	55% Red-winged Blackbirds, 20% Common Grackles, 20% Brown-headed Cowbirds, 5% Starlings
2003	January	Sikeston, MO	2,000,000	65% Red-winged Blackbirds, 20% Common Grackles, 10% Brown-headed Cowbirds, 5% Starlings
2005	January	Malden, MO	4,000,000	50% Red-winged Blackbirds, 27% Common Grackles, 20% Brown-headed Cowbirds, 3% Starlings
2005	January	Sedgwick north, AR	1,500,000	90% Red-winged Blackbirds, 10% Brown-headed Cowbirds
2005	January	Sedgwick east, AR	4,500,000	95% Red-winged Blackbirds, 5% Brown-headed Cowbirds
2006	February	New Madrid, MO	200,000	60% Red-winged Blackbirds, 10% Common Grackles, 20% Brown-headed Cowbirds, 10% Starlings
2006	January	Kennett, MO	1,000,000	60% Red-winged Blackbirds, 10% Common Grackles, 20% Brown-headed Cowbirds, 10% Starlings
2006	February	Gibson, AR	7,000,000	85% Red-winged Blackbirds, 10% Brown-headed Cowbirds, 5% Common Grackles

Table 5. Urban winter blackbird roosts observed in rice fields in Southeastern

Missouri (J. Cummings, NWRC, pers. comm., NWRC unpublished data).

Year	Month	Number of Birds	Species Composition
2003	October	3,000,000	65% Red-winged Blackbirds, 30% Brown-headed Cowbirds, 5% Common Grackles
2004	October	1,762,000	65% Red-winged Blackbirds, 30% Brown-headed Cowbirds, 5% Common Grackles
2004	October	500,000	70% Red-winged Blackbirds, 25% Brown-headed Cowbirds, 5% Common Grackles
2004	October	20,000	70% Red-winged Blackbirds, 25% Brown-headed Cowbirds, 5% Common Grackles
2005	October	700,000	70% Red-winged Blackbirds, 25% Brown-headed Cowbirds, 5% Common Grackles
2005	October	2,200,000	65% Red-winged Blackbirds, 25% Brown-headed Cowbirds, 10% Common Grackles
2005	September	750,000	80% Red-winged Blackbirds, 15% Brown-headed Cowbirds, 5% Common Grackles
2005	September	1,036,000	80% Red-winged Blackbirds, 20% Brown-headed Cowbirds

Precise counts of blackbird populations do not exist but one estimate placed the United States summer population of the blackbird group at over 1 billion (USDA 1997 Revised) and the winter population at 500 million (Royall 1977). The majority of these birds occur in the eastern U.S.; for example surveys in the southeastern part of the country estimated 350 million blackbirds and starlings in winter roosts (Bookhout and White 1981). The nationwide starling population has been estimated at 140 million (Johnson and Glahn 1994). The most recent information on blackbird populations available for this analysis was made for the northern prairie region by the National Wildlife Research Center field office at Bismark, North Dakota and estimated 40 million Red-winged blackbirds and 19 million common grackles in the late summer population (Homan et al. 2004). The estimates are for the area shown in Figure 3.

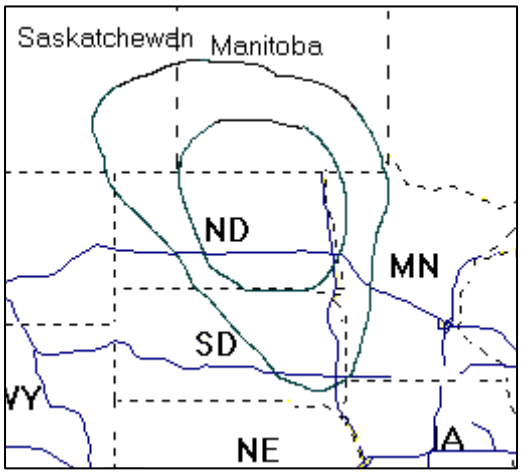

Figure 3. Northern Prairie Region included in blackbird population estimate by Homan et al. (2004). All area within larger circle included in population estimate.

Natural mortality in blackbird populations is between 50 and 65% of the population each year regardless of human-caused control operations (USDA 1997 Revised). Dolbeer (1994) states that this high mortality rate is offset by a reproductive rate of 2 to 4 young fledged per female per year. Given the density-dependent relationships in a blackbird population (i.e. decreased mortality and increased fecundity of surviving birds) a high number of blackbirds would likely have to be killed in order to impact the regional breeding population. Modeling by Dolbeer et al.

(1995) indicated that killing 3.6% of the wintering blackbird population had no effect on breeding populations the following spring. Dolbeer et al. (1976) constructed a population model which indicated that a reduction of 14.8% of the wintering blackbird population would reduce the spring breeding population by 20% and that a 56.2% reduction in the wintering blackbird population would reduce spring breeding populations by only 33%. In an analysis of North American blackbird populations in 1975, FWS concluded that removal of 67.5 million birds would not affect the following years post-breeding population (USDI 1976).

BBS blackbird population trend data for 1980-2006 are mixed, but several species are showing decreasing population trends in some areas (Table 4). There are increasing population trends for the period of 1980-2006 for European Starlings, and Great-tailed Grackles in Missouri. There were no BBS routes in the portion of Missouri where NWRC has been conducting research on blackbirds and where the majority of WS blackbird damage management activities have been and are likely to be conducted. A BBS route (Pawpaw Route) adjacent to the Missouri rice-production area, just across the border in Tennessee has averaged 374 Red-winged Blackbirds per year for 1968 to 2003 and shows an increase in Red-winged Blackbirds. NWRC has established two new BBS routes in the Missouri rice growing area. In 2006, they recorded 512 Red-winged Blackbirds on the southern route and 640 on the northern route. These blackbird counts were greater than have been recorded in surrounding routes which may be attributed to the fact that, unlike Tennessee, blackbirds in Missouri are nesting in wheat fields near rice fields (NWRC, unpublished data). CBC data from Missouri indicate declines in Red-winged Blackbirds, Brown-headed cowbirds, Rusty Blackbirds and Brewers Blackbirds in the early 1980s, but populations appear to have been relatively stable since that time (Appendix D). Missouri CBC data indicate declining trends for European Starlings and a relatively stable trend for Common Grackles. Although observations of Great-tailed Grackles are low in the Missouri CBC data, there is evidence of an increasing trend. Nationally, CBC data indicate degreasing trends for most species except Great-tailed Grackles and Yellow-headed Cowbirds (Table 6, Appendix D). Despite decreasing population trends for Red-Winged Blackbirds and Common Grackles, BBS data indicate that these species are among the 10 most common species observed during the BBS survey in Missouri, the Eastern and Central BBS Regions, and nationwide, and starlings are among the 10 most common species for all areas except the Central BBS Region (Sauer et al. 2006; Table 3). Brown-headed Cowbirds are among the 10 species with the highest relative abundance in the Central BBS Region.

Blackbird populations are healthy enough, and the problems they cause great enough, that the USFWS has established a depredation order (50 CFR 21.43) to facilitate management of blackbird damage. Under this “order”, no Federal permit is required to remove blackbirds (defined as Yellow-headed, Red-winged, Rusty, and Brewer's blackbirds, cowbirds, grackles, crows, and magpies) when 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. WS lethal blackbird damage management actions will be conducted under the authority of this USFWS depredation order. European Starlings are not included in the depredation order because they are not protected under the MBTA. Starlings are a non-native species and no state or federal permits are required to take starlings. No Federal permit or approval is needed to non-lethally harass or haze migratory birds, including blackbirds.

In respect to potential impacts on Rusty Blackbirds, WS is aware that concerns have been expressed about the declines in BBS population trends for Rusty Blackbirds in Canada, the primary breeding area for the species (1980-2006: -14.8% per year, $P = 0.02$). CBC data for the United States also indicate declines in Rusty Blackbird populations over the past three decades. Declines have been linked to wet woodland breeding habitat (Avery 1995). In response, the USFWS is currently considering removing the Rusty Blackbird from the blackbird depredation order. However, for reasons discussed below, the proposed action poses little risk to Rusty Blackbird populations.

Table 6. Breeding Bird Survey and Audubon Christmas Bird Count trend data from 1980-2006 for blackbird species associated with the most damage problems in Missouri (Appendix D, Audubon 2002, Sauer et al. 2006).

Species	BBS Missouri	BBS Central Region	BBS Eastern Region	BBS United States	CBC Missouri	CBC United States
Red-winged Blackbird	-2.1 P < 0.01	-0.3 P = 0.16	-1.1 P < 0.01	-0.7 P < 0.01	decreasing	Variable
Brown-headed Cowbird	-2.1 P < 0.01	-0.8 P < 0.01	-1.4 P < 0.01	-0.8 P < 0.01	decreasing	decreasing
Common Grackle	-5.7 P < 0.01	-1.1 P = 0.01	-1.0 P < 0.01	-1.0 P < 0.01	stable	decreasing
European Starling	1.6 P = 0.03	-0.8 P = 0.06	-0.4% P = 0.01	-0.2 P = 0.13	decreasing	decreasing
Brewer's Blackbird	Not Available	0.1% P = 0.90	-0.8% P = 0.21	-1.6% P < 0.01	decreasing	decreasing
Rusty Blackbird	Not Available	Not Available	-13.0% P = 0.05	11.8% P = 0.36	decreasing	decreasing
Great-tailed Grackle	20.1% P = 0.02	-0.7% P = 0.67	Not Available	0.6% P = 0.67	increasing	Stable/ increasing
Yellow-headed Blackbird	Not Available	0.6% P = 0.51	-4.5% P < 0.01	1.9% P = 0.11	Rarely present	Increasing

During FY 2003-2006, WS harassed/dispersed a total of over 11,600,000 blackbirds. Because harassed birds can return to the depredation site, this figure may include repeated harassment of some individuals. The number of blackbirds killed during the same 4 year period was only 0.4% of the birds harassed (48,089 blackbirds; Table 2). WS is receiving increasing numbers of requests for assistance with blackbird damage, especially from agricultural producers (crop damage, especially rice) and communities (large urban roosts) in the "Bootheel" region. Given the increase in requests for assistance and the number of birds observed in urban roosts and fields in the region where many requests are originating, WS estimates that up to 2,100,000 blackbirds could be taken annually in Missouri. This increase in take is attributable to a combination of factors including a locally high blackbird population as indicated by NWRC data above, increases in Missouri rice Production (Figure 4), increased community and agricultural producer awareness of the assistance available from the WS program, and the development of a new NWRC model used to calculate the number of blackbirds taken through the use of DRC-1339 (Homan et al. 2005, Johnston et al. 2005, J. Cummings, NWRC, Ft. Collins, CO, unpublished data). Based on averages of NWRC observations presented in Table 3, approximately 70% would be Red-winged Blackbirds (1,470,000 birds), 14.4% Brown-headed Cowbirds (302,400 birds), 11.5% Common Grackles (241,500 birds), and 4.1% European Starlings (86,100 birds). The proposed level of total blackbird take by the MO WS program is less than the number of birds in large feeding flocks and urban roosts in the region that have been counted by NWRC (Tables 4 and 5). Although it is possible that Boat-tailed Grackles, Great-tailed Grackles, Brewer's Blackbirds, Yellow-headed blackbirds or Rusty Blackbirds could be among the blackbirds taken by WS, risks to these species appear to be lower than may be expected from their occurrence in CBC data. The NWRC has not encountered any Boat-tailed Grackles, Great-tailed Grackles, Brewer's Blackbirds, Yellow-headed blackbirds or Rusty Blackbirds among the 11,671 blackbirds recovered from blackbird damage management programs in their research in southern Missouri, nor have they recorded any of these species in the blackbird flocks they observed in rice fields and urban roosts discussed above. Consequently, any lethal take of Great-tailed Grackles, Brewer's Blackbirds, Yellow-headed Blackbirds and Rusty Blackbirds is likely to be extremely low and will not adversely impact populations of these species.

Table 7. Blackbird population estimates based on 1974-75 winter population estimates from Meanley and Royall (1976).

Species	Eastern U.S. Winter Population Estimate
Red-winged blackbird	111 million
Brown-headed cowbird	67 million
Common grackle	107 million
Great-tailed grackle	18,000 (includes boat-tailed grackles)
Brewer's blackbird	21,000
Rusty blackbird	713,000
European starling	87 million
Unspecified	25 million
Total	**398 million**

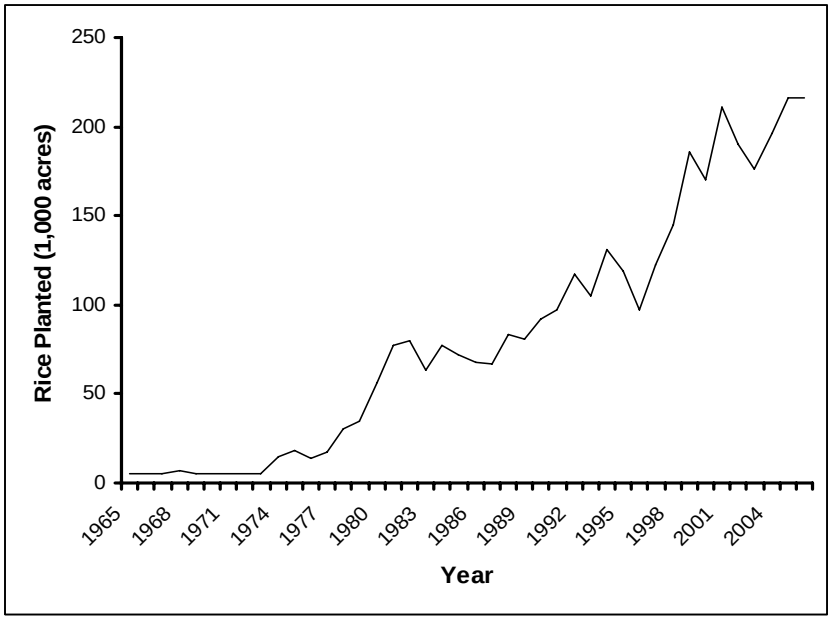

Figure 4. Historical trend in acres of rice planted in Missouri. (NASS 2007).

The proposed level of lethal take by the MO WS program amounts to only 0.6 of the estimated winter blackbird and starling population in the Eastern U.S. (350 - 398 million birds) and 1.2% of the estimated annual natural mortality in the Eastern blackbird and starling population (assumes 50% mortality, Table 7, Bookhout and White 1981). In addition to Missouri, WS also conducted lethal blackbird damage management activities in the Mississippi Flyway states of Wisconsin, Minnesota, Michigan, Iowa, Illinois, Indiana, Ohio, Kentucky, Arkansas, Tennessee, Louisiana, Mississippi, and Alabama. WS blackbird kill data for these other Mississippi Flyway states from Fiscal Year 2004-2006 are presented in Table 8. As noted above, Dolbeer et al. (1995) used models to determine that take of 3.5% of the winter blackbird population would have no effect on breeding populations the following spring. Using the model predictions for a population of 350 million blackbirds, would indicate that a cumulative take of up to 12,250,000 blackbirds would not have an adverse impact on summer breeding population. Even if Missouri WS took the maximum number of blackbirds proposed in this alternative and the other Eastern Flyway states took 2.5 million birds, the cumulative take would be far less than the model by Dolbeer et al. (1995) predicted can be sustained by the population.

Table 8. Estimated number of red-winged blackbirds, brown-headed cowbirds, common grackles, and starlings killed by WS program activities in the Mississippi Flyway States, excluding Missouri, from Fiscal Year 2004-2006.

Fiscal Year	Red-winged Blackbird	Brown-headed Cowbirds	Common Grackles	European Starlings	Blackbirds Mixed Spp	Total
2004	624,200	140,800	7,800	264,100	600	1,037,500
2005	960,500	216,700	12,200	184,400	1,600	1,375,400
2006	801,000	183,200	10,000	164,200	1,600	1,160,000

To determine blackbird movement patterns, NWRC used aerial mass marking to mark 1,300,000 and 3,200,000 blackbirds in Missouri rice fields just prior to harvest (October) in 2004 and 2005 respectively. WS recovered blackbirds taken during damage management activities in Missouri and the surrounding states during the subsequent January and February. In 2005, 71% of the 8,389 recoveries were collected in Missouri during the following winters. In 2006, 90% of the 3,282 recoveries were collected in Missouri. Birds were also collected from Illinois, Tennessee, Arkansas and Louisiana. Arkansas and Louisiana were the only other states where marked birds were collected (Cummings et al 2007). Movement patterns of blackbirds marked in Missouri rice fields just prior to harvest (October) indicate that most of the birds that are causing damage to fall and spring planted rice are remaining in the Missouri area during the winter. This is a strong argument that winter blackbird baiting not only helps the towns with winter roosts, but will also reduce bird damage to rice the following spring (J. Cummings, NWRC, pers. comm., NWRC unpublished data).

Red-winged Blackbird Population Impacts. The U.S. population of Red-winged Blackbirds has been estimated at nearly 111 million for the Eastern U.S., based on winter roost surveys (Meanley and Royall 1976). The model described in Section 9.1 yields a Mississippi Flyway breeding blackbird population estimate of 53,160,000 birds. Assuming maximum annual lethal take of Red-winged Blackbirds in Missouri of 1,470,000 birds and 1,000,000 birds in the other Mississippi Flyway states, maximum annual take would be 1.3% of the U.S. winter red-winged blackbird population and 4.6% of the summer blackbird population in the Mississippi flyway. Comparing mortality in the Mississippi Flyway states to the breeding bird population likely overestimates the impact of the proposed take because most blackbirds are taken during winter when breeding birds are joined by the current year's juvenile birds and migrants from areas outside the Mississippi Flyway. For example, Meanley (1971) analyzed band return data which showed that blackbirds wintering in Arkansas, Mississippi, and Louisiana in the Mississippi Flyway, and Texas in the Central Flyway came from 13, 16, 14, and 15 different states and provinces, respectively, ranging east to west from Alberta to New England and Quebec. Consequently, the proposed level of Red-winged blackbird take is within natural mortality levels that can be sustained by the population.

Brown-headed Cowbird Population Impacts. Brown-headed cowbirds have been estimated at more than 67 million birds in the Eastern U.S. (Meanley and Royall 1976). The model described in Section 9.1 yields a Mississippi Flyway breeding cowbird population estimate of 10,220,000 birds. Assuming maximum annual lethal take of Brown-headed Cowbirds in Missouri of 302,400 birds and 250,000 birds in the other Mississippi Flyway states, maximum annual take would be 0.7% of the Eastern U.S. winter Brown-headed Cowbird population and 5.4% of the summer breeding cowbird population in the Mississippi flyway. Comparing mortality in the Mississippi Flyway states to the breeding bird population likely overestimates the impact of the proposed take because most blackbirds are taken during winter when breeding birds are joined the current year's juvenile birds and migrants from areas outside the Mississippi Flyway. For example, Meanley (1971) analyzed band return data which showed that blackbirds wintering in Arkansas, Mississippi, and Louisiana in the Mississippi Flyway, and Texas in the Central Flyway came from 13, 16, 14, and 15 different states and provinces, respectively, ranging east to west from

Alberta to New England and Quebec. Thus, it is probable that blackbirds wintering in Missouri come from a much broader area than just the northern Mississippi Flyway region. Consequently, the proposed level of Brown-headed Cowbird take is within natural mortality levels that can be sustained by the population.

Common Grackle Population Impacts. The Common Grackle population in the Eastern U.S. has been estimated at 107 million birds for the U.S. (Meanley and Royall 1976). The model described in Section 9.1 yields a Mississippi Flyway breeding common grackle population estimate of 44,195,000 birds. Assuming maximum annual lethal take of Common Grackles in Missouri of 241,500 birds and 15,000 birds in the other Mississippi Flyway states, maximum annual take would be 0.3% of the Eastern U.S. winter Common Grackle population and 0.6% of the summer breeding Common Grackle population in the Mississippi Flyway. This level of impact is within natural mortality levels that can be sustained by the population.

European Starling Population Impacts: In Missouri, 0.9-9.0% of the 2004-2006 WS blackbird take consisted of European Starlings. Under this alternative 86,100 European Starlings could be lethally taken by WS in Missouri per year. European Starlings are not native to the United States and, because of their negative impacts and competition with native birds, are considered by many wildlife biologists and ornithologists to be an undesirable component of North American wild and native ecosystems. Any reduction in starling populations in North America, even to the extent of complete eradication, could be considered a beneficial impact to native bird species. Nonetheless, the European Starling population in the Eastern U.S. has been estimated at 87 million birds (Meanley and Royall 1976). The model described in Section 9.1 yields a Mississippi Flyway breeding European Starling population estimate of 36,660,300 birds. Assuming maximum annual take of Starlings in Missouri of 86,100 birds and 300,000 birds in the other Mississippi Flyway states, maximum annual take would be 0.4% of the Eastern U.S. winter European Starling population and 1.1% of the summer breeding Starling population in the Mississippi Flyway. Consequently, the proposed level of impact is within natural mortality levels that can be sustained by the population.

Rusty Blackbird Impacts: In light of concerns that have been expressed regarding Rusty Blackbird populations, we are providing additional information on Rusty Blackbird biology. Differences in behavior of Rusty Blackbirds indicate that potential impacts on this species from the proposed blackbird damage management actions may be lower than for other blackbird species. The Rusty Blackbird is the most ecologically specialized of the North American blackbirds, both in its feeding habits and habitat uses. Throughout the year this species feeds to a considerable extent on animal prey and is one of the few blackbird species restricted year-round to wooded wetlands (Avery 1995). Rusty Blackbirds breed in Canada and Alaska and winter in the southeastern United States (Avery 1995). Analysis of CBC data suggests that the greatest winter concentrations are found in the Mississippi River Valley (M. Avery, NWRC, Gainesville, FL, 2007, unpub. rep.). The species roosts with other blackbird species, but often is found foraging in single species flocks or together with common grackles in or near wooded wetlands. Only occasionally are Rusty Blackbirds observed foraging in agricultural fields with other blackbirds (M. Avery, NWRC, Gainesville, FL, 2007 unpub. rep.). The preference for animal food and tendency to form single species foraging flocks may explain why WS personnel report rarely seeing Rusty Blackbirds in the large mixed species blackbird foraging flocks at damage sites where WS most commonly uses DRC-1339. Consequently, use of the toxicant DCR-1339 on grain baits likely has lower risk to Rusty Blackbirds than other blackbirds. There have been no reports of WS killing Rusty Blackbirds in any of the Mississippi Flyway states during the last three years (WS Annual Tables 2004-2006 http://www.aphis.usda.gov/wildlife_damage/prog_data_report.shtml). As noted above, NWRC did not encountered any Boat-tailed Grackles, Great-tailed Grackles, Brewer's Blackbirds or Rusty Blackbirds among the 11,671 blackbirds recovered from blackbird damage management programs in their research in southern Missouri (Cummings et al 2007). Consequently, lethal take of Rusty Blackbirds is likely to be low to nonexistent. The national population of Rusty

Blackbirds was estimated at 2.0 million based on BBS data from the 1990s (Rich et al. 2004). The PIF population model yields a population estimate of 493,227 Rusty Blackbirds in the Mississippi Flyway. Based on this analysis, the low level of take that might occur under this alternative will not adversely impact populations of this species.

Great-tailed Grackles, Brewers Blackbirds and Yellow-headed Blackbirds: As noted above, WS rarely specifically targets these blackbird species during damage management activities. While there have been some records of nonlethal harassment/dispersal of Brewer's Blackbirds and Great-tailed Grackles, there has been no known lethal take of these species by the Missouri WS program in the last 4 years (Table 2). It is, theoretically, possible that a limited number of individuals of these species could be mixed in the large blackbird flocks where WS uses DRC-1339 to reduce damage problems. Based on NWRC observations of roosts and foraging flocks in the areas where most blackbird damage management would occur, and the absence of these species in the 11,671 blackbirds recovered from damage management projects during research on bird movements by NWRC, lethal take of these species is likely to be minimal. Consequently, we conclude that Missouri WS blackbird damage management activities will not adversely impact state, regional or national populations of these species

Summary of Impacts on Blackbird Populations. Based on the analysis above, Missouri WS bird damage management actions would not adversely impact state, regional or national native blackbird populations. Removal of European Starlings, although unlikely to be of sufficient magnitude to reduce state, regional or national populations, would likely have beneficial impacts on native species.

Ring-billed Gulls

All Ring-billed Gull damage management in Missouri to date has been conducted to reduce bird-collision hazards to aircraft. Bird strike hazards from Ring-billed Gulls usually occur during the spring and fall migration. Ring-billed Gulls are relatively common and can be observed throughout the U.S. During migration between Coastal wintering areas and breeding BBS data indicate that Ring-billed Gull population has been stable in the USFWS Region 3 (1.0% per year, $P = 0.54$), stable to increasing nationwide (1.1% per year, $P = 0.08$) and increasing in the Central BBS Region (3.8% per year, $P = 0.02$) during the period of 1980-2006 (Sauer et al. 2006). No BBS data were available on Ring-billed Gulls in Missouri. For FY 2003-2006, WS dispersed 70-343 Ring-billed Gulls per year and killed 1-20 per year during damage management activities (Table 2). Non-WS entities killed an additional 39-56 Ring-billed Gulls per year during, 1994-1996 under permits issued by the USFWS (USFWS Region 3, Unpublished Data, Minneapolis, MN). Based upon anticipated increases in future requests for assistance with Ring-billed Gull damage management, WS predicts that no more than 120 Ring-billed Gulls would be killed by WS annually. Given that WS BDM activities are only conducted in a very small portion of the state, that regional Ring-billed Gull populations appear to be stable or increasing, and the relatively low number of birds to be taken, the proposed level of gull damage management will not adversely impact the state, regional or national Ring-billed Gull population.

Mallards

Mallards are migratory game birds with substantial populations throughout much of North America. Damage, conflicts and risks to human health and safety caused by Mallards in Missouri which have resulted in requests for assistance from WS have included damage to boat docks and lawns from droppings, and damage to aircraft and risks to human health and safety at airports. BBS data indicate that, for the period of 1980-2006, the Mallard population has been increasing in the Central BBS Region (2.1% per year, $P < 0.01$) and nationwide (2.0% per year, $P < 0.01$), and has been stable to increasing in Missouri (21.4% per year, $P = 0.07$; Sauer et al. 2006). The number of breeding Mallards in North America has been relatively stable over the last 10 years (Wilkins et al. 2006, USFWS 2006). In 2005, an estimated 242,104 mallards were taken by

licensed hunters in Missouri (USFWS 2006). Mallards have become common inhabitants of urban Missouri, nesting and living on urban ponds.

During FY 2003-2006, WS dispersed 36-2,674 Mallards per year and killed 22-64 Mallards per year during damage management activities (Table 2). Non-WS entities killed an additional 91-153 Mallards per calendar year (CY) during, 1994-1996 under permits issued by the USFWS. Most of the birds taken by WS were killed in association with shooting to reinforce noise harassment as part of bird dispersal activities. In FY 2005, WS also oiled 33 Mallard eggs to reduce the damage caused by Mallards in a residential area. Based upon anticipated increases in future requests for assistance with Mallard damage management, WS predicts that no more than 250 Mallards would be killed by WS annually, an increase of 150 birds/year from the level predicted in the original EA. Additionally, WS anticipates oiling no more than 50 eggs per year during Mallard damage management activities. WS take of Mallards is insignificant relative to the number of Mallards taken by licensed hunters each year and will not adversely impact Mallard populations.

Mourning Doves

Most Mourning Dove damage management in Missouri to date has been conducted to reduce bird-collision hazards to aircraft. The take of Morning Doves has been higher than expected in the EA (predicted maximum - 100 doves/year), in part because of increases in the number of airports in Missouri which receive direct operational assistance from WS. Non-airport Mourning Dove take has been associated with efforts to relocate high numbers of birds at an industrial site where the presence of birds and their fecal material resulted in health and safety issues for employees. BBS data indicate a stable or decreasing trend for the state (-0.9% per year, $P = 0.12$), the Central BBS Region (-0.5% per year, $P < 0.01$) and nationwide (-0.2% per year, $P = 0.22$) for the period of 1980-2006 (Sauer et al. 2006). However, BBS relative abundance estimates indicate that Mourning Doves are among the ten most commonly counted bird species in the state (Table 3). Additionally, the MDC conducts two annual surveys of the Mourning Dove population, the National Mourning Dove Call-Count Survey and a Roadside Dove Survey. Combined, the data from the two population indices indicate a stable to slighting increasing dove population in Missouri (Schulz 2006). WS standardized bird population index for the primary airport where WS has used lethal dove removal indicate a stable or slightly increasing bird population (Fig. 5)

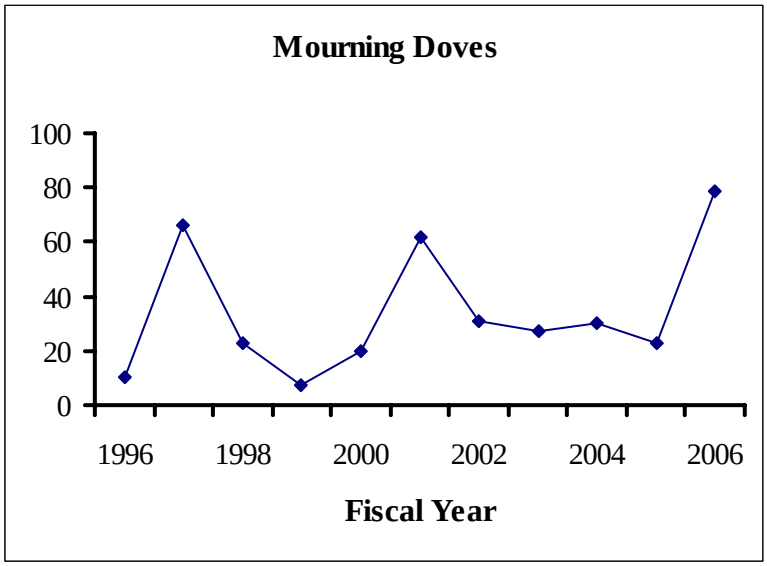

Figure 5. Local population index for Mourning Doves in the vicinity of the primary airport where WS takes Mourning Doves to reduce bird strike hazards to aircraft.

Missouri has a hunting season for Mourning Doves. Preliminary data indicate that Missouri hunters took 641,800 Mourning Doves in 2005 (Schulz 2006). Non-WS entities killed an additional 202, 132 and 0 Mourning Doves per year during, 1994-1996, respectively, under permits issued by the USFWS. Based on current trends in requests for Mourning Dove damage management, WS anticipates a maximum annual take of mourning doves of 1,100 birds per year. This level of take would be insignificant compared to the number of doves taken by licensed

hunters in Missouri (0.2%) and would not contribute substantially to current population trends for Mourning Doves in the state. Using PIF model described above with a detectability factor of 310.48 yields a state Mourning Dove population estimate of 2,745,300 breeding birds. The maximum proposed level of WS take would be 0.04% of the breeding population and within levels that could be sustained by the population. Because WS take impacts only a small amount of the area in the state, the relative abundance of Mounding Doves in the state is high, and WS proposed take is only a small fraction of take by licensed hunters, WS has concluded that the proposed level of Mourning Dove take will not have an adverse cumulative impact the state, regional or national Mourning Dove population.

Red-tailed Hawks

Virtually all (>95%) Red-tailed Hawk take has been and will continue to be conducted at airports to reduce risks of bird strikes to aircraft. Other conflicts with Red-tailed Hawks in Missouri /has included predation on small pets and poultry. Red-tailed hawks are North America's most common and widespread Buteo. For the period of FY 2003-2006, WS dispersed/relocated between 263-3,652 Red-tailed Hawks per year and killed 5-37 hawks per year during damage management activities. Non-WS entities killed an additional 55 - 114 Red-tailed Hawks per year during, 1994-1996, respectively. During the period of 1994-1996, the USFWS authorized the relocation of 84-238 Red-tailed Hawks per year, 32-203 of which were relocated by WS. BBS trend data for Red-tailed Hawks indicates that populations are increasing in Missouri (2.4%/year), the Central BBS Region (1.8% per year) and Nationwide (1.9% per year) during the period of 1980-2006 ($P \leq 0.05$; Sauer et al. 2006). Based on anticipated future need for Red-tailed Hawk damage management, WS anticipates that no more than 165 Red-tailed Hawks would be taken per year during damage management activities, an increase of 115 birds per year from the level predicted in the EA. Using PIF model described above with a detectability factor of 3.22 yields a state Red-tailed hawk population estimate of 44,300 breeding birds. The maximum proposed level of WS take combined with annual take by non-WS entities of 125 birds per year would be 0.65% of the breeding population and within levels that could be sustained by the population. Based on increasing population trends for this species, and that WS BDM activities are only conducted at limited number of sites in the state, the proposed level of take will not adversely impact the state, regional or national Red-tailed Hawk population.

Turkey Vultures

The Turkey Vulture is one of three species of vultures found in North America and is the most common and widespread of the New World vultures. Most WS vulture damage management work has been conducted to reduce bird-collision hazards to aircraft, but vulture damage management activities have also included harassing vultures from towers or smoke stacks where there fecal contamination creates unsightly and slippery working conditions and potential human and safety risks. For the period of FY 2003-2006, WS dispersed/relocated between 232-523 Turkey Vultures per year and killed 3-11 Turkey Vultures per year during damage management activities (Table 2). Non-WS entities killed an additional 13, 36, and 20 Turkey Vultures per year during, 1994-1996, respectively, under permits issued by the USFWS. BBS population trend data for the period of 1980-2006 indicate that the Turkey Vulture population has increased in Missouri (6.1% per year, $P < 0.01$) and nationwide (2.0% per year, $P < 0.01$) and has been relatively stable in the Central BBS Region (0.8% per year, $P = 0.16$; Sauer et al. 2006). Based on current population trend data and requests for assistance with damage by Turkey Vultures, WS anticipates that the annual maximum take of Turkey Vultures should be increased from 50 to 75 vultures per year. Using PIF model described above with a detectability factor of 2.61 yields a state Turkey Vulture population estimate of 128,200 breeding birds. The maximum proposed level of WS take combined with annual take by non-WS entities of 50 birds per year would be 0.10% of the breeding population and within levels that could be sustained by the population. Given current Turkey Vulture population trends the low proportion of the population that would taken under USFWS permits, and the localized nature of WS' activities, the proposed action will

not adversely impact the state, regional or national Turkey Vulture population.

Horned Larks

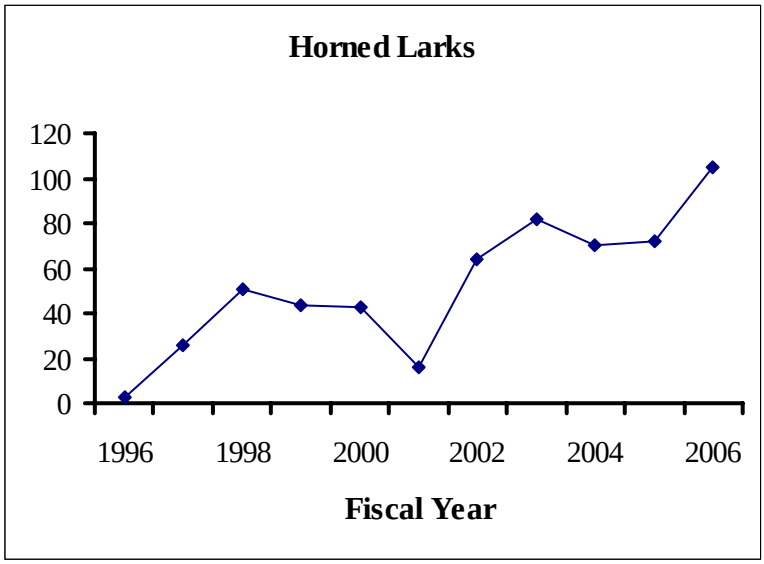

Figure 6. Local population index for Horned Larks in the vicinity of the primary airport where WS takes Horned Larks to reduce bird strike hazards to aircraft.

All of WS' Horned Lark damage management activities have involved and are likely to continue to involve the reduction of risks to aircraft from bird collisions. Although Horned Larks are relatively small birds, weighing 1 – 1.7 ounces (28-48 g), they form large winter flocks which can be hazardous to aircraft. Because of the high speeds attained by military aircraft and the special materials used to build military aircraft, collision with even one small bird can cause substantial damage. For the period of FY 2003-2006, WS dispersed/relocated between 2,437-4,680 Horned Larks per year and killed 81-207 Horned Larks per year during damage management activities (Table 2). Non-WS entities killed an additional 0, 201, and 111 Horned Larks per year during, 1994-1996, respectively, under permits issued by the USFWS. BBS data for Horned Larks show a significant decreasing trend for the state (-3.7% per year), the Central BBS Region (-2.6 % per year) and nationwide (-2.4% per year, $P \leq 0.01$) for the period of 1980-2006 (Sauer et al. 2006).

However, standardized bird surveys conducted at the airport where over 85% of the Horned Lark damage management would occur indicates an increasing trend in Horned Lark numbers in the vicinity of the airport (Fig. 6). Because of the increasing local counts of Horned Larks at the primary local area where WS would work, WS anticipates a maximum annual take of 570 Horned Larks per year under this alternative. Using PIF model described above with a detectability factor of 10.8 yields a state Horned Lark population estimate of 366,400 breeding birds. The maximum proposed level of WS take combined with annual take by non-WS entities of 250 birds per year would be 0.22% of the breeding population and within levels that could be sustained by the population. Given that the take of Horned Larks only occurs at a limited number of sites in the state, Horned Larks have a widespread distribution in North America, the low proportion of the population that would be taken under permits from the USFWS and that WS data indicate the local population appears to be increasing at the site where most take occurs, we conclude that this alternative would have a low level of impact on the state, regional and national Horned Lark population and will not contribute substantially to current population trends.

Swallows

Swallows are a small insectivorous bird from the family *Hirundinidae*. Five species of swallows are relatively common in Missouri, Barn Swallows, Cliff Swallows, Tree Swallows, Bank Swallows, and Northern Rough-winged Swallows. To date, all WS take and harassment of swallow has been conducted for the protection of human safety and property at airports. During the period of FY 2003-2006, WS dispersed/relocated 3,256 – 7,651 swallows per year to reduce damage and risks to human health. Over the same interval WS killed 38-77 swallows per year during damage management activities (Table 2). Eighty eight to 99% percent of the swallows harassed and 91-100% of the swallows killed per year were Barn Swallows (Table 2). Most

lethal take of swallows in Missouri is by WS for the reduction of wildlife hazards to aircraft. Non-WS entities killed an additional 24 Cliff Swallows in 2005 and 25 in 2006, under permits issued by the USFWS. WS also destroyed 2 Barn Swallow eggs in 2006. Based on current and anticipated future requests for assistance with swallow damage management, WS anticipates that annual lethal take of swallows will not exceed 525 birds per year.

BBS data for the period of 1980-2006 indicate the Tree Swallow population in Missouri is increasing (14.4% per year, P = 0.05) while the other 4 swallow populations are relatively stable (-2.5-15.7% per year, $0.13 \leq P < 0.97$; Sauer et al. 2006). Data for the Central BBS region and United States for the same interval indicate the Tree Swallow population is increasing (Central Region 2.5% per year, P = 0.03; United States 0.7% per year, P = 0.03), and there are indications that the Cliff Swallow population may also be increasing (Central Region 1.3% per year, $P = 0.08$; United States 0.9% per year, $P = 0.07$). The Barn Swallow population is decreasing (Central Region -1.4% per year, P < 0.01; United States -1.2% per year, P < 0.01). The remaining 2 swallow species populations are relatively stable (Central Region -3.1 - -1.1% per year, $0.14 \leq P < 0.65$; United States -0.6 – 1.9% per year, $0.36 \leq P \leq 0.45$). Population modeling using detectability factors of 9.52, 11.12, 10.48,8.8 and 9.52 for Barn, Bank, Cliff, Tree and Northern Rough-winged Swallows respectively yield state population estimates of 1,630,100 Barn Swallows, 99,300 Bank Swallows, 3,779,300 Cliff Swallows, 89,500 Tree Swallows and 219,700 Northern Rough-winged Swallows. Data from the primary airport where WS takes barn swallows to reduce damage at airports indicate that the local barn swallow population may be increasing. Given that Tree, Barn, Cliff and Bank Swallow populations have been stable or increasing, that WS take of these species is relatively low compared to that of Barn Swallows and that WS take of swallows is primarily restricted to a limited number of airports within the state, the proposed increase in swallow take will not adversely impact these species. WS take of Barn Swallows is also limited to a small number of sites within the state and the Barn Swallow population index from the airport where WS does most bird damage management work indicates the local Barn Swallow population may be increasing despite current levels of take for damage management (Fig. 7). Based on this information, we conclude the proposed action will not adversely impact the state, regional or national Barn Swallow population (USDA 1997 Revised – Impact Evaluation Procedures).

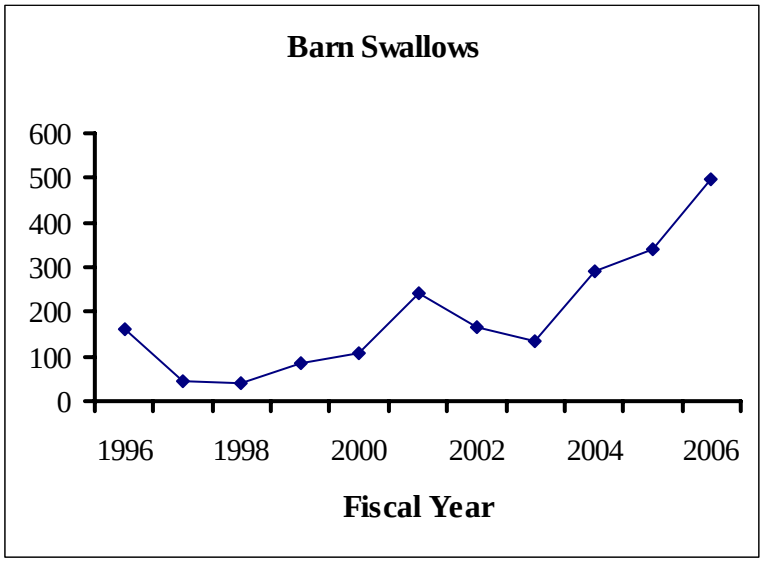

Figure 7. Local population index for Barn Swallows in the vicinity of the primary airport where WS takes Horned Larks to reduce bird strike hazards to aircraft.

Eastern Meadowlarks

Eastern Meadowlarks are relatively common and are often seen in fields and on fences in the Eastern U.S. All WS harassment and take of Eastern Meadowlarks has been conducted for the prevention of bird strikes at airports. During the period of FY 2003-2006, WS dispersed/relocated 2,271 – 8,252 Eastern Meadowlarks per year. Over the same interval WS killed 115-159 meadowlarks per year during damage management activities. Non-WS entities killed an additional 22 - 215 Eastern Meadowlarks per year during, 1994-1996 under permits

issued by the USFWS. BBS data for 1980-2006 indicate a decreasing meadowlark population for the state (-2.3, P < 0.01), the Central BBS Region (3.0, P < 0.01), and nationwide (-3.1, P < 0.01; Sauer et al. 2006). Despite decreasing population trends, BBS relative abundance estimates indicate that Eastern Meadowlarks are among the ten most abundant bird species in the state. Additionally, standardized bird surveys conducted from 1996-2005 at the primary airport where lethal control occurs indicate a slight increase in the local population of Eastern Meadowlarks even with WS lethal removal activities (Fig. 8). Based on current and anticipated future requests for assistance with problems caused by Eastern Meadowlarks, WS anticipates maximum annual take of meadowlarks will not exceed 360 birds. Using PIF model described above with a detectability factor of 2.38 yields a state Eastern Meadowlark population estimate of 415,200 breeding birds. The maximum proposed level of WS take combined with annual take by non-WS entities of 250 birds per year would be 0.15% of the breeding population and within levels that could be sustained by the population. Because WS' take of meadowlarks only occurs in an extremely small portion of the area in Missouri, maximum estimated take is a low portion of the estimated population, and WS data indicate the local population at the primary area where WS appears to be increasing despite current BDM removals, we conclude that this alternative would have a low level of impact on state, regional and national Eastern Meadowlark populations and will not contribute substantially to current population trends.

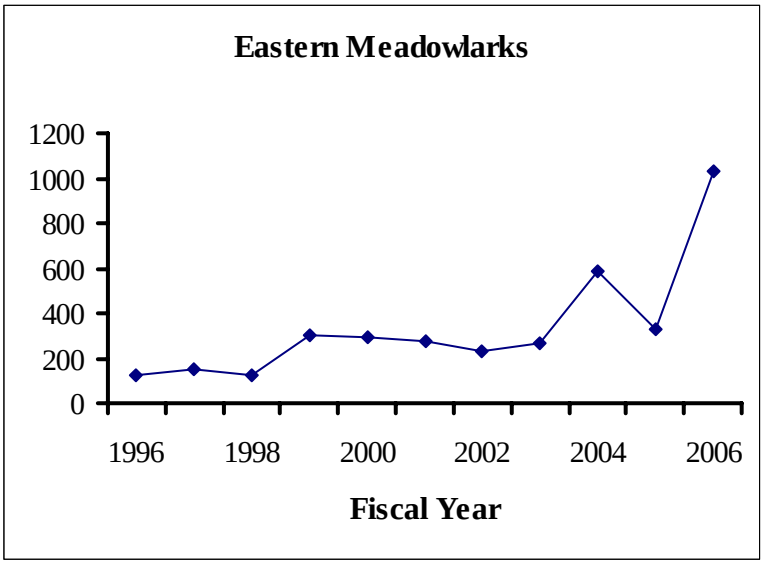

Figure 8. Population indices for Eastern Meadowlarks in the vicinity of the primary airport where WS takes Eastern Meadowlarks to reduce bird strike hazards to aircraft.

Killdeer

Killdeer can be found throughout most of North America except the Northern portions of Canada and most of Alaska (Robbins et al. 2001). All WS Killdeer damage management activities have been conducted for the protection of human safety and property at airports. During the period of FY 2003-2006, WS dispersed/relocated 507-1,766 Killdeer per year to reduce damage and risks to human health. Over the same interval WS killed 27-

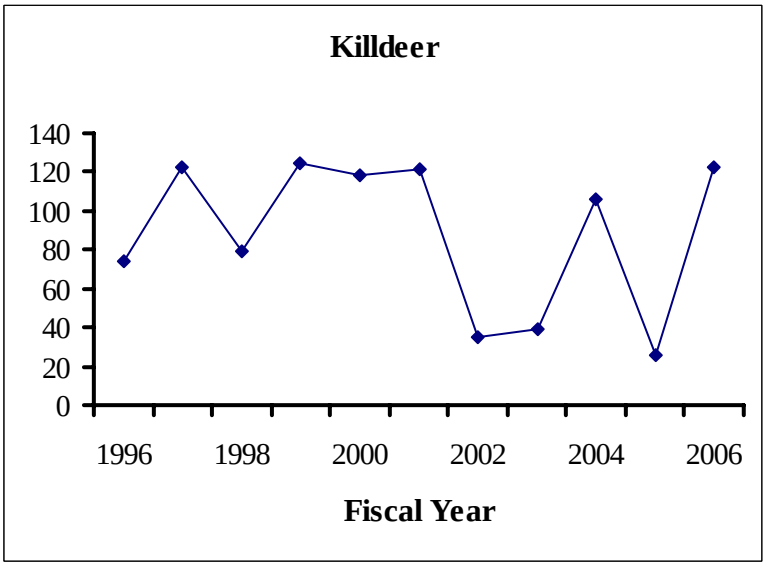

Figure 9. Standardized indices of Killdeer activity in the vicinity of the primary MO airport where WS takes Killdeer to reduce bird strike hazards to aircraft.

131 Killdeer per year during damage management activities. Non-WS entities killed an additional 0, 215, and 171 Killdeer per year during, 1994-1996, respectively, under permits issued by the USFWS. According to BBS data provided by Sauer et al. (2006) Killdeer populations appear to be stable to decreasing in Missouri (-1.4, P=0.07), the Central BBS Region (-1.3, P<0.00), and nationwide (-0.5, P = 0.02). There is some indication that Killdeer activity might also be declining at the primary airport where WS addresses issues with Killdeer. However, there is a considerable amount of annual variability (Fig. 9). In the 2001 United States Shorebird Conservation Plan (Brown et al. 2001), the USFWS estimated the national Killdeer population at approximately 2 million birds. Based on current and anticipated future requests for assistance with problems caused by Killdeer, WS anticipates maximum annual take of Killdeer will not exceed 265 birds. Because WS' take of Killdeer only occurs at a limited number of sites in Missouri, Killdeer are widespread in North American, and WS proposed maximum take is very low relative to the estimated national population (0.01%), we concluded that this alternative would have a low level of impact on state, regional and national Killdeer populations and will not contribute substantially to current population trends.

American Kestrel

American Kestrels are the smallest and most common North American falcon. Their range includes most of North America except the far northern portions of Alaska and Canada. All WS kestrel damage management activities have been conducted for the protection of human safety and property at airports. During the period of FY 2003-2006, WS dispersed/relocated 96-173 kestrels per year to reduce bird strike hazards at airports. Over the same interval WS killed 11-19 kestrels per year during bird strike prevention activities. Non-WS entities killed an additional 89, 99 and 91 American Kestrels per year during, 1994-1996, respectively, under permits issued by the USFWS. During the period of 1994-1996, the USFWS authorized the relocation of 105-145 American Kestrels per year, 12-24 of which were relocated by WS. Based on increases in requests for assistance with kestrel damage management WS anticipates the maximum annual take of kestrels permitted under this alternative needs to increase from 20 to 80 birds per year.

BBS data for the period of 1980-2006 indicate the American Kestrel population has been stable in Missouri (4.2% per year, P = 0.23) and decreasing nationwide (-0.6% per year, P = 0.07), and in the Central BBS Region (-1.7% per year, P = 0.01; Sauer et al. 2006). Using PIF model described above with a detectability factor of 9.6 yields a state American Kestrel population estimate of 56,300 breeding birds. The maximum proposed level of WS take combined with annual take by non-WS entities of 100 birds per year would be 0.32% of the breeding birds and within levels that could be sustained by the population. Given that WS' take of American Kestrels only occurs in a limited number of locations in Missouri and the low number of birds to be taken relative to the estimated state population, we conclude that the proposed action would not adversely impact the state, regional or national Kestrel population.

American Robins

All WS American Robin damage management activities have been conducted for the protection of human safety and property at airports. During the period of FY 2003-2006, WS dispersed/relocated 175-11,287 robins per year to reduce damage and risks to human health. Over the same interval WS killed 1-35 robins per year during damage management activities. Non-WS entities killed an additional 69, 108 and 35 American Robins per year during, 1994-1996, respectively, under permits issued by the USFWS. Based on current and anticipated future requests for assistance with robin damage management, WS anticipates that annual take of robins will not exceed 210 birds per year. American Robins were one of the species identified by LaDeau et al. (2007) as being adversely impacted by West Nile Virus. BBS data for the period of 1980-2006 indicate the American Robin population has been decreasing in Missouri (-1.2% per year, P = 0.01), relatively stable in the Central BBS Region (0.4% per year, P = 0.12), and slightly increasing nationwide (0.5% per year, P < 0.01). Despite a declining population trend in

Missouri, BBS relative abundance estimates indicate that American Robins are one of the 10 most common birds species observed in the state during the BBS survey (Sauer et al. 2005; Table 3). Given that WS' robin damage management activities will be confined to a limited number of airports in the state, and that American Robins are relatively abundant and widespread in the U.S., the proposed level of take is not anticipated to have an adverse impact on the American Robin population.

9.3 Effects on Nontarget Species Populations Including Threatened or Endangered Species

This EA concluded that WS bird damage managed activities would not adversely affect any non-target wildlife species. Since the completion of the EA, WS nontarget take for bird damage management activities has included one Mourning Dove and one Cooper's Hawk, both of which were live-captured and released[1]. This level of nontarget species take is consistent with that predicted in the EA and would not adversely impact nontarget species populations.

Actions proposed in this supplement which might change the risks to nontarget species include the addition of noose mats, Bal-chatri traps, and pole traps to the methods available for use by WS. Noose Mats, Bal-chatri traps and pole traps are live-capture devices which have the potential to capture nontarget birds. However, these devices would only be used when WS staff is present on-site and regularly monitoring the devices to ensure that captured animals are promptly removed from the devices. Pan tension devices can be used to prevent smaller bird from being capture in pole traps. Members of the public have been concerned that the foot-hold traps used in pole traps would cause extensive injury or death of captured birds. However, a study by Stucker et al. (2007) assessed trap-induced injury to 109 raptors captured with the device. None of the birds captured sustained more than minor injuries that would not prohibit the bird's chance of survival once released. The regular monitoring and prompt removal of captured birds helps to ensure that target and nontarget birds can be released in good condition. Therefore, while it is remotely possible that a nontarget bird could be killed or seriously injured in these devices, these instances are expected to be rare and will not adversely impact population of any nontarget species.

<u>Threatened and Endangered Species</u>

In the EA, WS determined that the proposed bird damage management activities would have no effect on state or federally listed plants, reptiles, amphibians, insects, fish, or other aquatic organisms. WS concluded that the proposed activities may affect but would not adversely affect state and/or federally-listed birds and mammals. WS has not taken, captured or hazed any species listed by the USFWS during bird damage management activities. However, with permits and approval from the USFWS and MDC, WS has hazed several state endangered species at airports and relocated three state-listed birds away from airfields. Hazing and relocating birds at airports protects the birds and human safety by reducing the risks of bird-aircraft collisions. Therefore, the conclusions in the EA regarding impacts of the BDM program on T&E species are accurate.

A review of the USFWS T&E species, and candidate species lists and MDC T&E species lists (Appendix B) showed no new additions to the state or federal lists of T&E mammals and birds. While there have been some changes in the lists of other T&E species, WS' BDM activities are not conducted in locations or in manners (e.g., WS does not do habitat management[2]) that would

[1] Table 2 also includes data on nontarget bird take from other WS projects in order to facilitate analysis of cumulative impacts of WS' proposed action on bird populations. Impacts of nontarget take of birds during aquatic rodent damage management activities are addressed in the EA, "*Management of Aquatic Rodent Damage in Missouri*" (USDA 2005).

[2] WS does not conduct habitat management, but may recommend habitat management to a landowner/manager as a means of reducing bird damage problems. When WS recommends habitat management, WS will advise the

have any effect on state or federally-listed plants, reptiles, amphibians, insects, fish, or other aquatic organisms. Actions proposed in this supplement which might change the risks to state and federally-listed T&E species include the addition of noose mats, Bal-chatri traps, and pole traps to the methods available for use by WS.

The only potential T&E species risks from pole traps, Bal-chatri traps, and noose mats would be to state and federally-listed birds, particularly raptors and shorebirds. In general, WS will avoid using these devices in areas where state or federally listed species are known to occur. Additionally, these devices are only used when WS personnel are in attendance at the site and closely monitoring the capture devices. WS personnel are trained in the identification of state and federally-listed birds that could be caught in these devices, and they will remove/deactivate the devices if state or federally-listed birds are observed in the area where the device is in use. WS may subsequently switch to a capture device that does not pose a risk to the state or federally-listed bird and/or switch time or location of activities to avoid capturing a T&E species. Therefore, we conclude that the inclusion of these methods in WS' BDM program will not adversely affect state or federally-listed species.

Given the information above on risks to nontarget species, WS history of extremely low impacts of BDM on nontarget species, and the protective measures proposed above, the proposed changes to the WS BDM program will not adversely affect nontarget species.

9.4 Economic Losses to Property as a Result of Bird Damage

Many property owners and managers are concerned with the economic cost associated with damage caused by birds to property. Birds can cause severe damage or total loss to property, structural damage to buildings, damage to equipment, manufactured products and food, and obstruction or damage to water control structures. The Integrated Bird Damage Management Alternative selected in the EA's Decision/FONSI (Alternative 1) allows for the use of the full range of lethal and non-lethal BDM methods and has the greatest potential of successfully reducing the risk of bird damage. Increasing the range of alternatives available for resolving a damage problem improves WS ability to develop site-specific damage management strategies which can effectively resolve bird damage problems and addresses sociological, humaneness and other stakeholder concerns.

The proposed increase in the maximum number of birds taken of some species would enable WS to continue to provide effective BDM assistance. If the current limits are maintained, WS may have to use methods that are less than optimal to resolve damage management situations that may occur after the yearly limit on take has been reached.

9.5 Impacts on Human Health and Safety

Even though the number of birds to be taken could increase, the proposed increase in take of some bird species would allow WS to continue to provide effective assistance in reducing risks to human health and safety from birds. If the current limits are maintained, WS may have to use methods that are less than optimal to reduce risks to human health and safety from birds. This may be particularly undesirable at airports where Missouri WS currently does much of its BDM . There are no risks to human health and safety from the use of the proposed live-capture devises. The addition of the live-capture devices will improve WS' ability to assist with surveillance for diseases communicable to humans and would be beneficial to human health and safety. Based on the analysis in the EA and the above information, the proposed action, including the use of the new live-capture devices, will not adversely impact human health and safety and will better

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landowner/manger that there may be state and federal regulations (e.g., permits for wetland alteration, T&E species considerations, etc.) pertaining to the proposed project and that the landowner/manager is responsible for compliance with these regulations.

enable WS to respond to the need to protect human health and safety from risks associated with birds.

9.6 Effects Human Affectionate-Bonds with Individual Birds and on Aesthetic Values of Bird Species

Some people who routinely view or feed individual birds such as geese and feral pigeons are disturbed by removal of such animals under the current program and would also be disturbed by the proposed increases in the lethal take of birds. However, lethal control actions would still generally be restricted to local sites and to small, insubstantial percentages of overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would therefore continue to remain available for viewing by persons with that interest.

9.7 Effects on Aesthetic Values of Property Damaged by Birds

The fecal contamination associated with high numbers of birds at parks and other public and private property is considered by some to be an adverse impact on their aesthetic enjoyment of these sites. The proposed increases in the maximum number of birds that could be taken would enable WS to continue to provide effective BDM assistance. If the current limits are maintained, WS may have to use methods that are less than optimal to resolve damage management situations that may occur after the yearly limit on take has been reached.

9.8 Humaneness and Animal Welfare Concerns of Lethal Methods Used by WS

As discussed in the EA, some individuals believe that the use of lethal BDM methods is inhumane and inappropriate. These individuals will also object to the proposed increases in lethal take for the same reasons discussed in the EA.

Some members of the public may be concerned that the foot-hold traps used in pole traps would be inhumane and cause extensive injury or death of captured birds. However, a study by Stucker et al. (2007) assessed trap-induced injury to 109 raptors captured with the device. None of the birds captured sustained more than minor injuries that would not prohibit the bird's chance of survival once released. Others may be concerned that the use of Bal-chatri traps causes unacceptable stress to the bait animal because of proximity to the captured raptor, even though the devices are designed so that the raptor cannot injure the bait animal. Others may consider these two methods acceptable because they do not cause long-term stress or permanent or substantial injury to the animals involved.

9.9 Cumulative Impacts

No significant cumulative environmental impacts are expected from the proposed increases in the number of birds that could be taken or the inclusion of new damage management technique. No risk to public safety is expected when WS' services are provided in Alternatives 1, 2, and 3, because trained and experienced wildlife biologists/specialists would conduct and recommend BDM activities. Although some persons will likely be opposed to the proposed increased in take of birds, and/or additional damage management methods that could be used to protect property and human health and safety at municipalities, industrial sites, agricultural sites, and private land within Indiana, the analysis in this EA indicates that WS Integrated BDM program will not result in significant cumulative adverse impacts on the quality of the human environment.

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XI. ACRONYMS

AC	Alpha-Chloralose
ADC	Animal Damage Control
AI	Avian Influenza
APHIS	Animal Plant Health Inspection Service
BDM	Bird Damage Management
BBS	Breeding Bird Survey
CBC	Christmas Bird Counts
CFR	Code of Federal Regulations
DCCO	Double-Crested Cormorant
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FEIS	Final EIS
FY	Fiscal Year
HP	Highly Pathogenic
INAD	Investigational New Animal Drug
IWDM	Integrated Wildlife Damage Management
MBTA	Migratory Bird Treaty Act
MDA	Missouri Depart of Agriculture
MDC	Missouri Department of Conservation
MDH	Missouri Department of Health
MIS	Management Information System
MOU	Memorandum of Understanding
NAS	National Audubon Society
NEPA	National Environmental Policy Act
NWRC	National Wildlife Research Center
PDEA	Pre-decisional EA
PIF	Partners in Flight
ROD	Record of Decision
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
USDA	United States Department of Agriculture
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Services
WS	Wildlife Services

APPENDIX A

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APPENDIX B

THREATENED AND ENDANGERED SPECIES OCCURRING IN MISSOURI

(USFWS 2007, MDC 2007)

SCIENTIFIC NAME	COMMON NAME	STATE[1] STATUS	FEDERAL[2] STATUS
PLANTS			
Asclepias meadii	Mead's Milkweed	Endangered	Threatened
Boltonia decurrens	Decurrent False Aster	Endangered	Threatened
Geocarpon minimum	Geocarpon	Endangered	Threatened
Helenium virginicum	Virginia Sneezeweed	Endangered	Threatened
Lindera melissifolium	Pondberry	Endangered	Endangered
Physaria filiformis	Missouri Bladder-pod	Endangered	Threatened
Platanthera praeclara	W. Prairie Fringed Orchid	Endangered	Threatened
Trifolium stoloniferum	Running Buffalo Clover	Endangered	Endangered
MOLLUSKS			
Antrobia culveri	Tumbling Creek Cavesnail	Endangered	Endangered
Cumberlandia monodonta	Spectaclecase		Candidate
Elliptio crassidens	Elephantear	Endangered	
Epioblasma florentina curtisii	Curtis Pearlymussel	Endangered	Endangered
Epioblasma triquetra	Snuffbox	Endangered	
Fusconaia ebena	Ebonyshell	Endangered	
Lampsilis abrupta	Pink Mucket	Endangered	Endangered
Lampsilis higginsii	Higgins Eye	Endangered	Endangered
Lampsilis rafinesqueana	Neosho Mucket		Candidate
Leptodea leptodon	Scaleshell	Endangered	Endangered
Plethobasus cyphyus	Sheepnose	Endangered	Candidate
Potamilus capax	Fat Pocketbook	Endangered	Endangered
Quadrula fragosa	Winged Mapleleaf	Endangered	Endangered
CRUSTACEANS			
Cambarus aculabrum	Cave crayfish, no common name		Endangered
INSECTS			
Somatochlora hineana	Hine's Emerald Dragonfly	Endangered	Endangered
FISH			
Acipenser fulvescens	Lake Sturgeon	Endangered	
Amblyopsis rosae	Ozark Cavefish	Endangered	Threatened
Cottus sp.	Grotto Sculpin		Candidate
Crystallaria asprella	Crystal Darter	Endangered	
Etheostoma cragini	Arkansas Darter		Candidate
Etheostoma fusiforme	Swamp Darter	Endangered	
Etheostoma histrio	Harlequin Darter	Endangered	
Etheostoma nianguae	Niangua Darter	Endangered	Threatened
Etheostoma parvipinne	Goldstripe Darter	Endangered	
Etheostoma whipplei	Redfin Darter	Endangered	
Forbesichthys agassizi	Spring Cavefish	Endangered	
Hybognathus hayi	Cypress Minnow	Endangered	
Notropis maculatus	Taillight Shiner	Endangered	

SCIENTIFIC NAME	COMMON NAME	STATE[1] STATUS	FEDERAL[2] STATUS
Notropis sabinae	Sabine Shiner	Endangered	
Notropis topeka	Topeka Shiner	Endangered	
	Endangered		
Noturus eleutherus	Mountain Madtom	Endangered	
Noturus placidus	Neosho Madtom	Endangered	
	Threatened		
FISH (cont.)			
Percina nasuta	Longnose Darter	Endangered	
Platygobio gracilis	Flathead Chub	Endangered	
Scaphirhynchus albus	Pallid Sturgeon	Endangered	
	Endangered		
Umbra limi	Central Mudminnow	Endangered	
AMPHIBIANS			
Cryptobranchus a. alleganiensis	Eastern Hellbender	Endangered	
Cryptobranchus a. bishopi	Ozark Hellbender	Endangered	Candidate
REPTILES			
Deirochelys reticularia miaria	Western Chicken Turtle	Endangered	
Elaphe vulpina vulpina	Western Fox Snake	Endangered	
Emydoidea blandingii	Blanding's Turtle	Endangered	
Kinosternon f. flavescens	Yellow Mud Turtle	Endangered	
Kinosternon f. spooneri	Illinois Mud Turtle	Endangered	
Sistrurus c. catenatus	Eastern Massasauga	Endangered	Candidate
BIRDS			
Aimophila aestivalis	Bachman's Sparrow	Endangered	
Botaurus lentiginosus	American Bittern	Endangered	
Charadrius melodus	Piping Plover (Great Plains		Threatened
	Population)		
Circus cyaneus	Northern Harrier	Endangered	
Egretta thula	Snowy Egret	Endangered	
Falco peregrinus	Peregrine Falcon	Endangered	
Haliaeetus leucocephalus	Bald Eagle	Endangered	Threatened
Limnothlypis swainsonii	Swainson's Warbler	Endangered	
Rallus elegans	King Rail	Endangered	
Sterna antillarum athalassos	Interior Least Tern	Endangered	Endangered
Tympanuchus cupido	Greater Prairie-chicken	Endangered	
Tyto alba	Barn Owl	Endangered	
MAMMALS			
Corynorhinus townsendii ingens	Ozark Big-eared Bat[3]	Endangered	Endangered
Lepus californicus	Black-tailed Jackrabbit	Endangered	
Myotis grisescens	Gray Bat	Endangered	Endangered
Myotis sodalis	Indiana Bat	Endangered	Endangered
Spilogale putorius	Spotted Skunk	Endangered	

1 Listed in the Wildlife Code of Missouri, Rule 3 CSR10-4, 111 Endangered Species.

2 Federally Listed Species under the Endangered Species Act (ESA) of 1973 as Amended:

Endangered = Any species that is in danger of extinction throughout all or a significant portion of its range.

Threatened = Any species that is likely to become endangered within the foreseeable future.

Candidate = Species that the USFWS is reviewing for possible addition to the list of Endangered and Threatened species.

3Considered extirpated by the MDC, historical or accidental occurrence in Missouri.

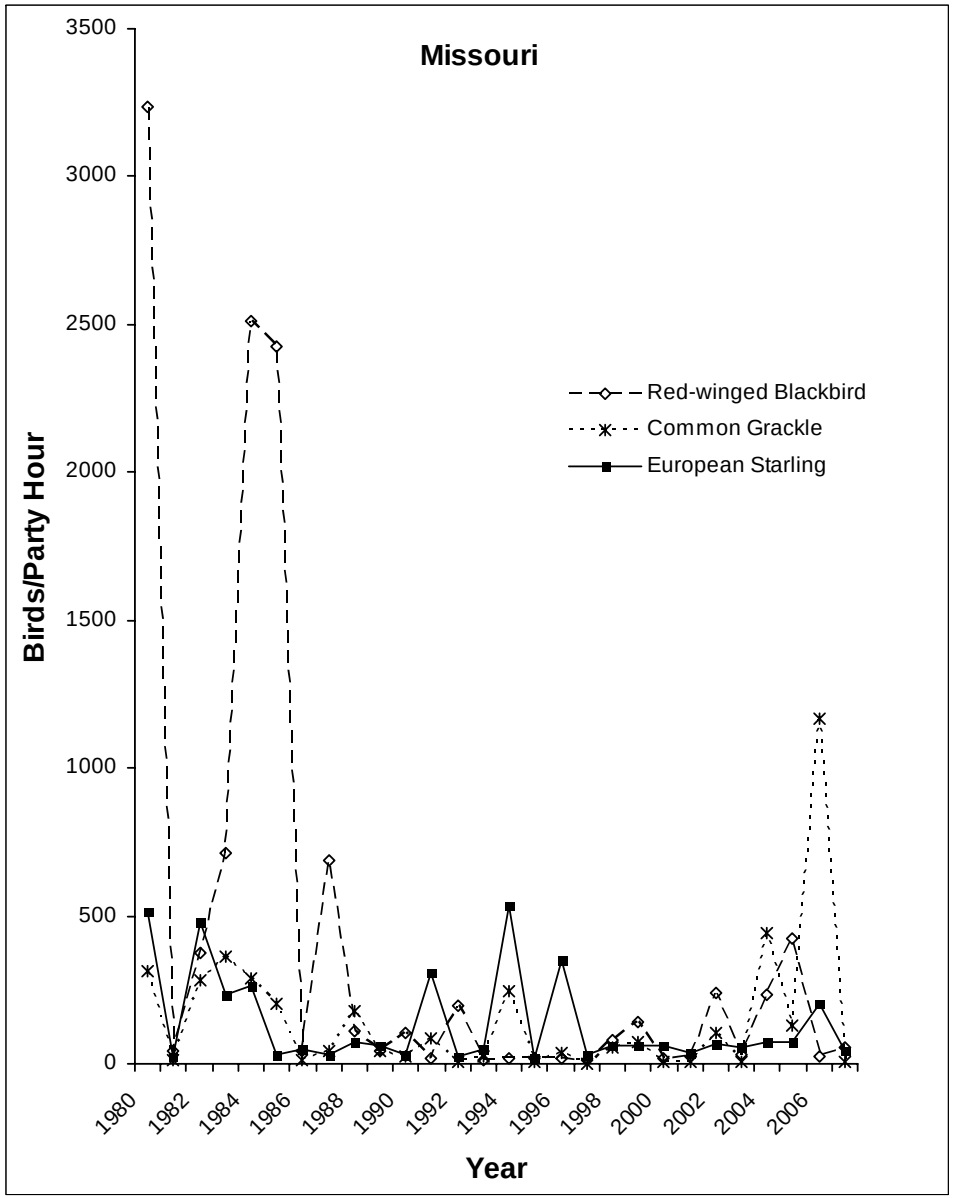
APPENDIX C

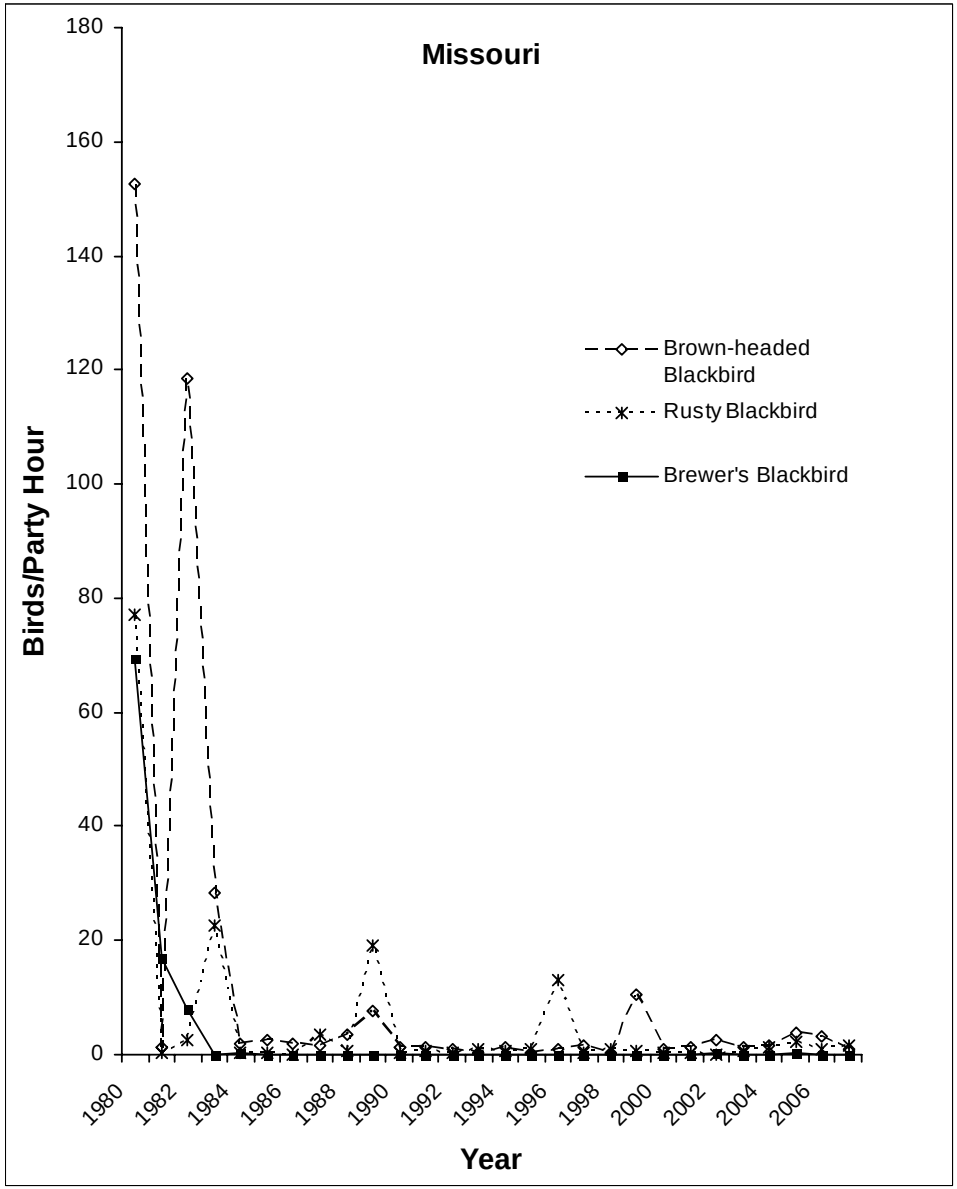
LATIN NAMES OF SPECIES MENTIONED IN THE TEXT[1]

American Bittern (*Botaurus lentiginosus*)
American Crows (*Corvus brachyrhynchos*)
American Kestrel *(Falco sparverius)*
American Robin *Turdus migratorius)*
Bald Eagle (*Haliaeetus leucocephalus*)
Bank Swallows (*Riparia riparia*)
Barn Owl (*Tyto alba*)
Barn Swallows (*Hirundo rustica*)
Boat-tailed Grackles (*Quiscalus major*),
Brewer's Blackbirds (*Euphagus cyanocephalus*),
Brown-headed Cowbirds (*Molothrus ater*),
Cliff Swallows (*Petrochelidon pyrrhonota*),
Common Grackles (*Quiscalus quiscula*
Eastern Meadowlark *Sturnella magna*
European Starlings (*Sturnus vulgaris*)
Great-tailed Grackles (*Quiscalus mexicanus*),
Great Blue Herons (*Ardea herodias*)
Horned Larks *(Eremophila alpestris)*
Killdeer *(Charadrius vociferous)*
Mallard (*Anas platyrhynchos)*
Mourning Dove *(Zenaida macroura)*
Northern Harrier (*Circus cyaneus*)
Northern Rough-winged Swallows (*Stelgidopteryx serripennis*)
Peregrine Falcon (*Falco peregrinus*)
Ring Billed Gull (*Larus delawarensis)*
Rusty Blackbirds (*Euphagus carolinus*)
Red-tailed Hawk *(Bureo jamaicensis)*
Red-winged Blackbirds (*Agelaius phoeniceus*),
Tree Swallows (*Tachycineta bicolor*)
Turkey Vulture *(Cathartes aura)*

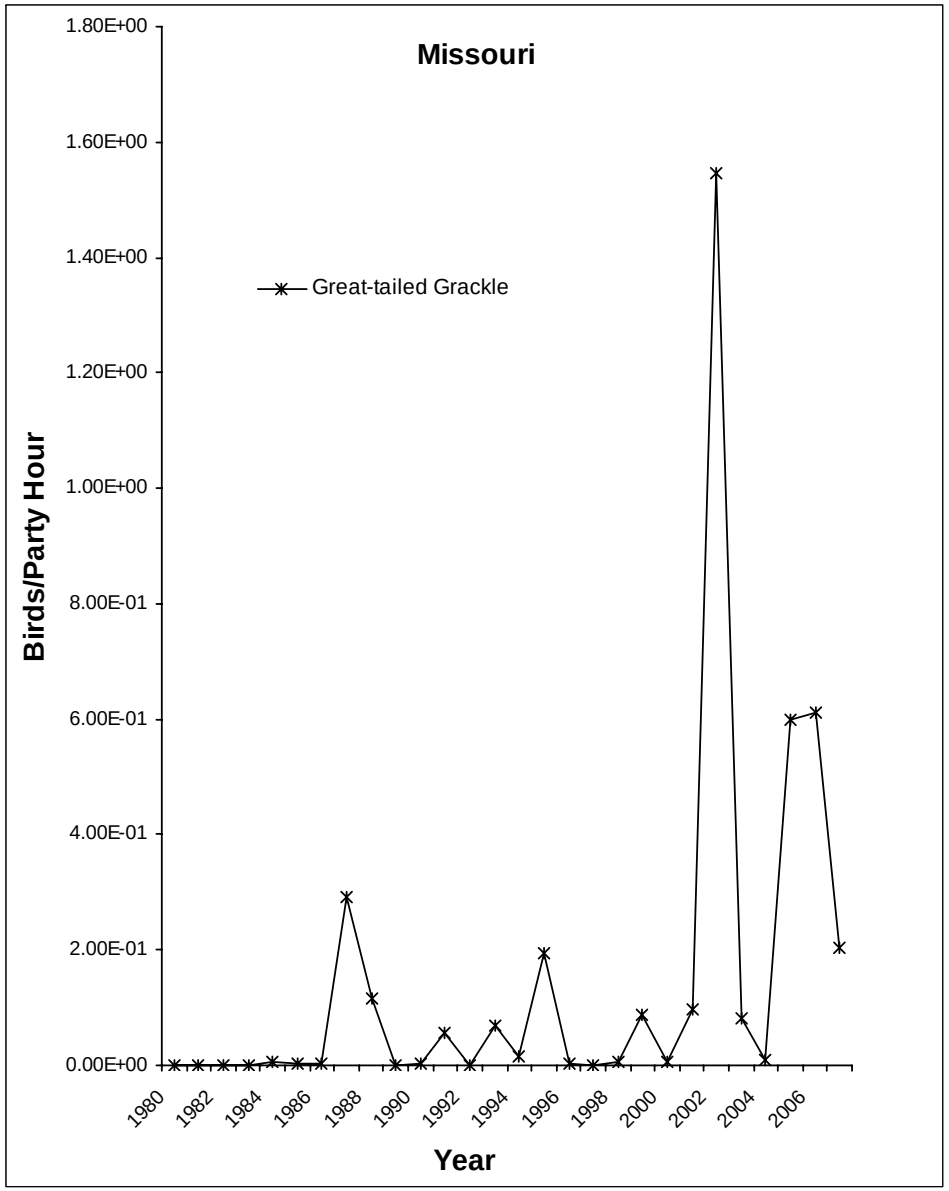
[1] Latin names of State and Federally-listed Threatened and Endangered Species are provided in Appendix B.

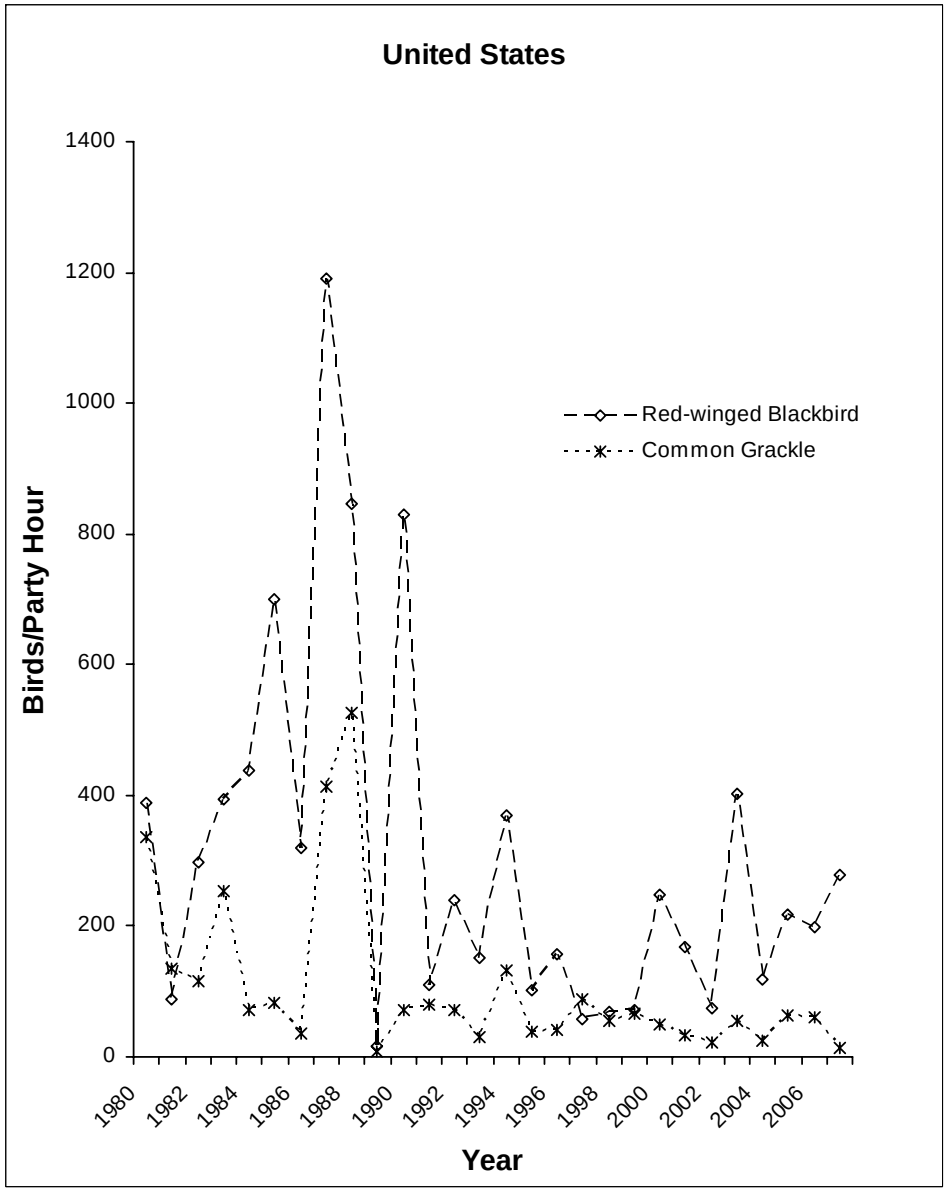
APPENDIX D – AUDUBON CHRISTMAS BIRD COUNT DATA FOR BLACKBIRD POPULATIONS[3]

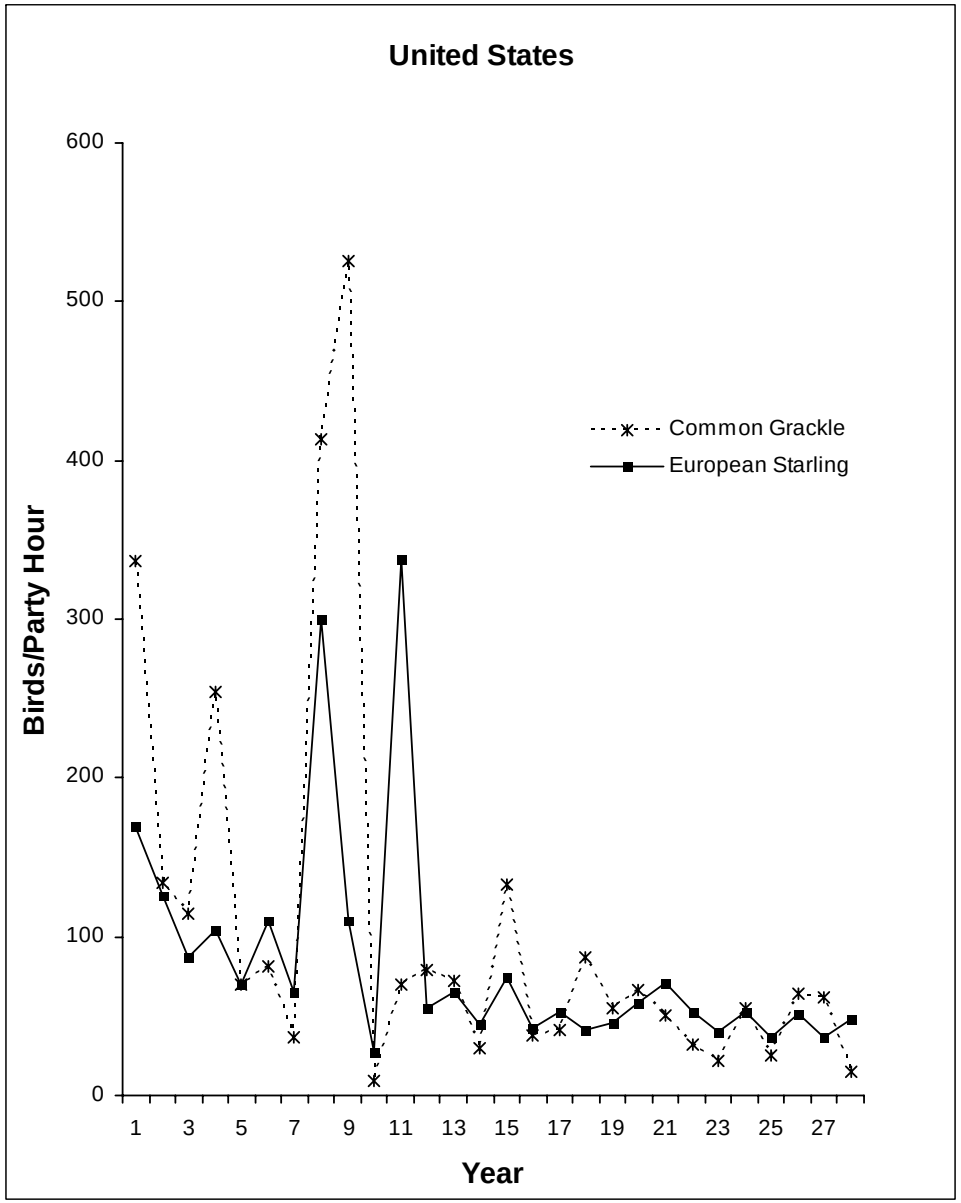


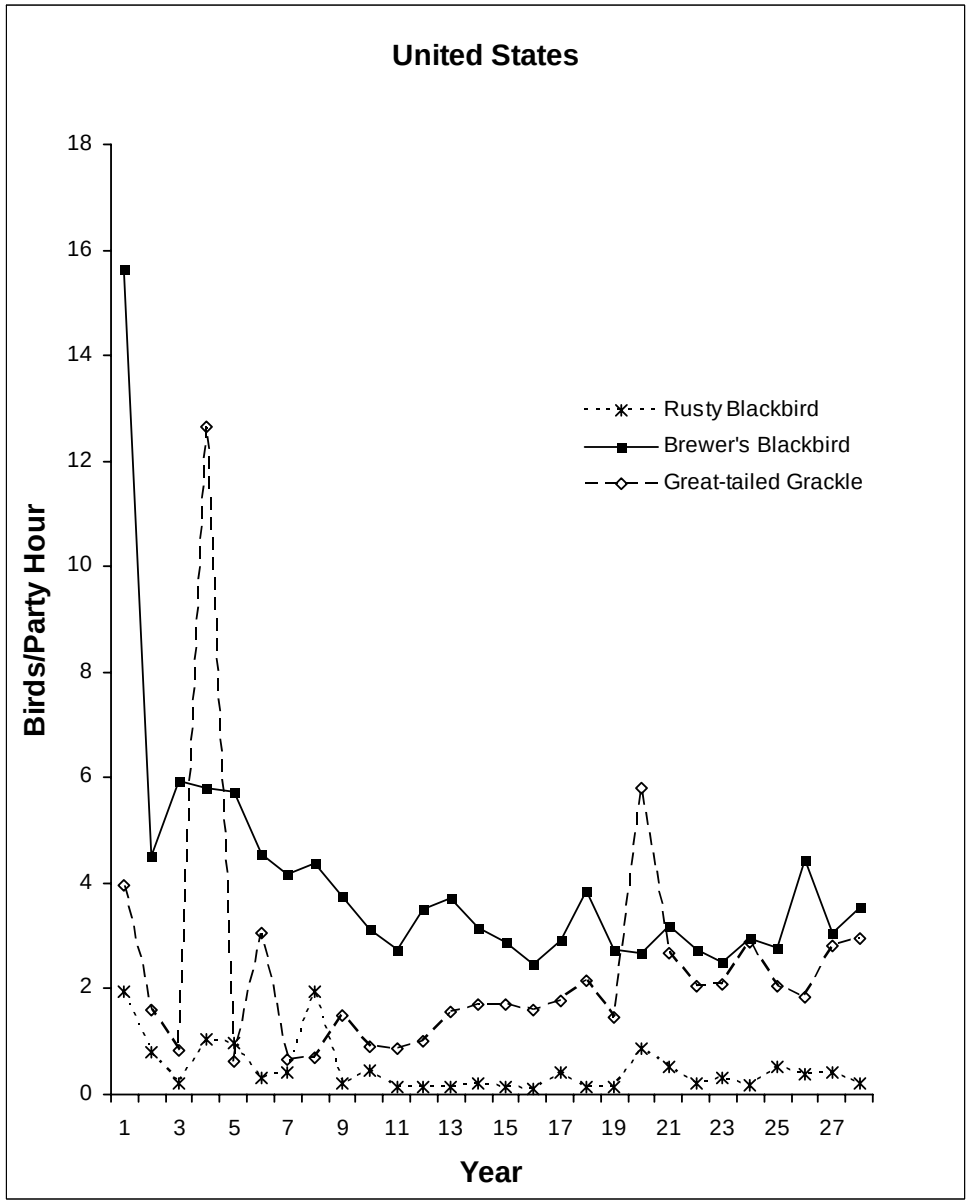


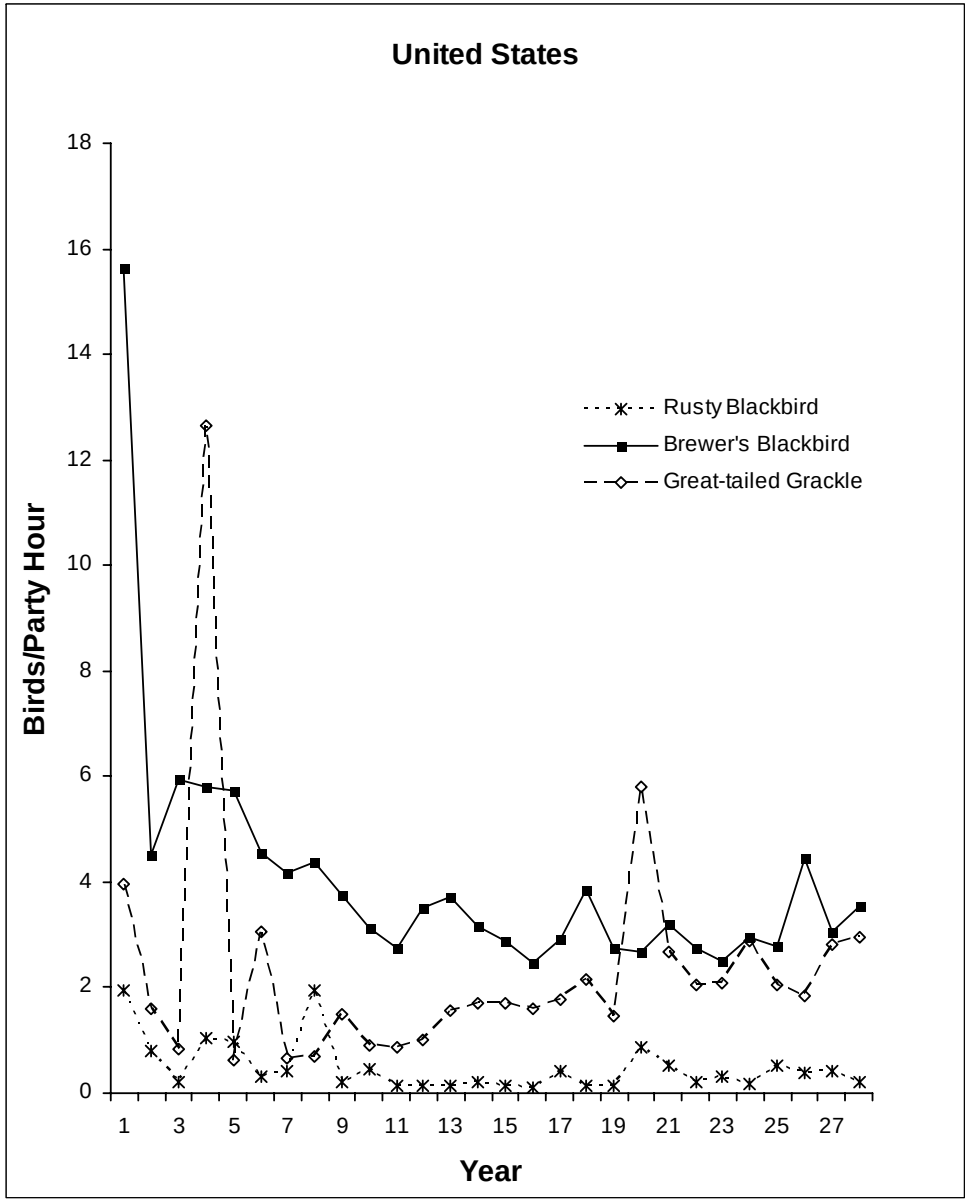
3 Data from Audubon 2002.

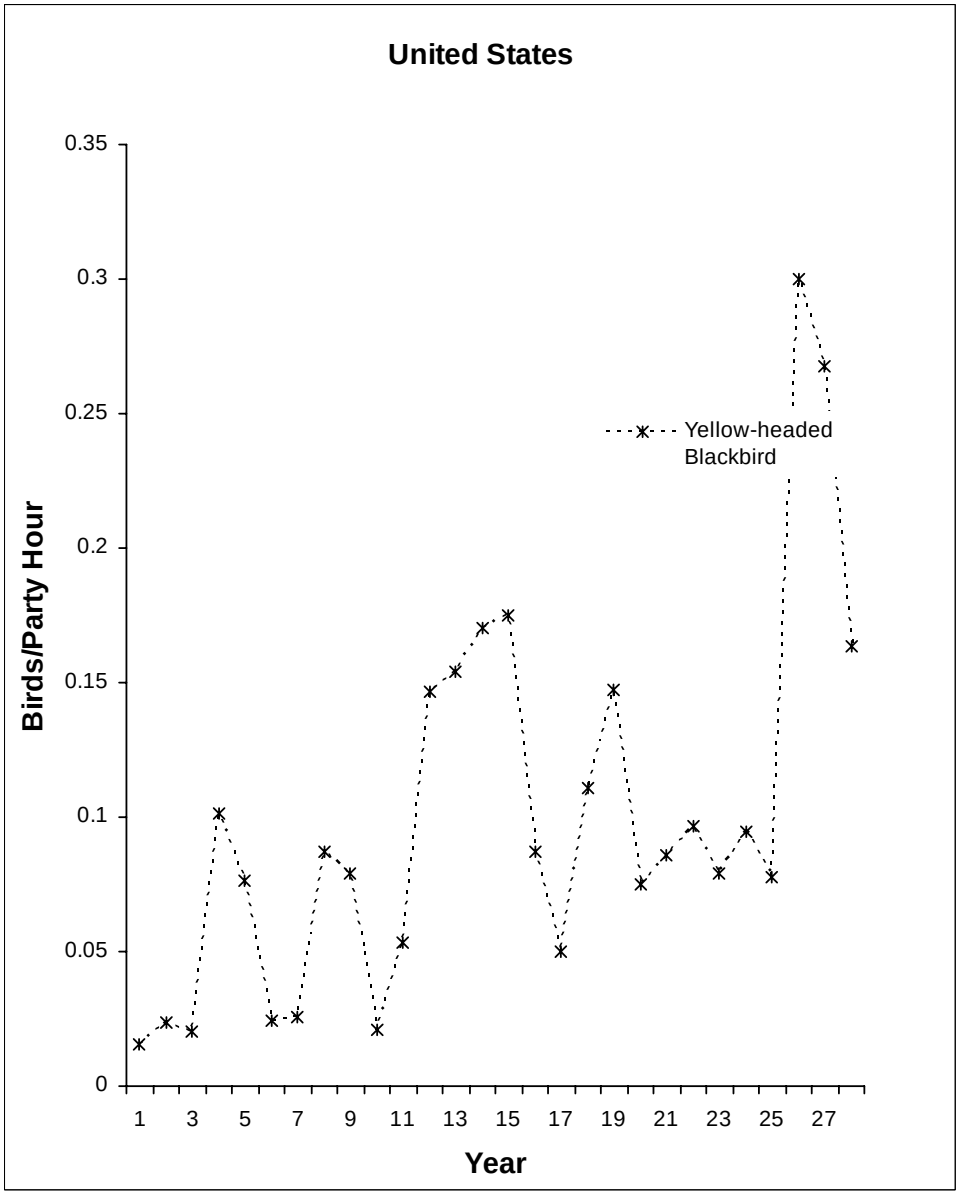

Missouri
Great-tailed Grackle
Birds/Party Hour
Year
1.80E+00
1.60E+00
1.40E+00
1.20E+00
1.00E+00
8.00E-01
6.00E-01
4.00E-01
2.00E-01
0.00E+00
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006


United States
Red-winged Blackbird
Common Grackle
Birds/Party Hour
Year
1400
1200
1000
800
600
400
200
0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006


United States
Birds/Party Hour
Year
Common Grackle
European Starling
0
100
200
300
400
500
600
1
3
5
7
9
11
13
15
17
19
21
23
25
27


United States
Birds/Party Hour
Year
Rusty Blackbird
Brewer's Blackbird
Great-tailed Grackle
0
2
4
6
8
10
12
14
16
18
1
3
5
7
9
11
13
15
17
19
21
23
25
27


United States
Birds/Party Hour
Year
Rusty Blackbird
Brewer's Blackbird
Great-tailed Grackle
0
2
4
6
8
10
12
14
16
18
1
3
5
7
9
11
13
15
17
19
21
23
25
27


United States
Birds/Party Hour
Year
Yellow-headed Blackbird
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
1
3
5
7
9
11
13
15
17
19
21
23
25
27